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**Hilarius Haarlem Holland BV**, the Netherlands, offers you a complete range of consumables for welding and soldering. Our greatest strength consists in the diversity of our product range. A spectrum from unalloyed to high-alloyed materials: stainless steels, high strength alloys, non-ferrous, aluminium and their respective alloy grades. All chemically right consumables, tested and considered as reliable by both our customers and internationally renowned classification institutes like: Lloyds Register of Shipping, ABS, DNV, TÜV and others. Since 1987 Lloyds accredits Hilarius under ISO 9002.

We are in all aspects your ideal partner for new construction and manufacturing projects as well as for repair & maintenance. The highly specialised nature of these tasks requires distinctive approaches, which we cover with our extensive know-how, experience and complete range of products.

Our awareness of the specific demands of your operation will result in the optimum solution for any application. Hence we will never leave you to your own devices. Our experienced, highly motivated and service minded team will therefore gladly answer all your technical questions and propose economical solutions. In other words we will offer you a tailor-made solution - anywhere in the world.

Founded in 1915, Hilarius has a tradition in servicing customers in over 100 countries in the world. This has resulted in strong partnerships with welders, welding engineers, purchasing managers, field technicians, and construction & production managers. This is done either directly or through our well-established network of distributors. You can find us anywhere, even where you do not expect it - typical Dutch isn't it?

The registered brand name HILCO, in combination with the powerful green colour, is the keystone of our success. The famous five letters and their typical type casting is the icon for recognizing our quality products and unparalleled service.

Hilarius is a part of the Böhler Thyssen Welding organisation, one of the very best in the arc welding industry throughout the world. This gives you an additional guarantee that we are the solid partner for you, now and in the future.

At Hilarius we consider welding to be people's business. We are committed to enhance relationships with our partners in business while continuously seeking ways that lead to a positive contribution to your success.

**If you are satisfied, we are satisfied - that is our mission,  
We are the smile behind the welder!**

Our products	Applications for our products
Coated electrodes	Shipyards/offshore
Solid MIG/MAG wires	Pressure vessel & boiler industry
Welding rods for TIG and gas welding	Construction works
Wires and fluxes for sub arc welding	Chemical & petrochemical industry
Rutile, basic and metal cored wires	Heat exchanger industry
Cored wires for hardfacing, overlaying	Transport & lifting industry
High strength and creep resistant alloys	Gas & pipeline industry
High temperature alloys	Road & bridge construction industry
Nickel-, copper, cobalt-, aluminium alloys	Paper, cane sugar & steel mills
Hardfacing alloys	Mine & cement industry
Consumables for repair & maintenance	Repair shops
Brazing filler metals	Marine equipment

The product data-sheets of the individual HILCO Welding Consumables contain a detailed description of each respective product. The data-sheets are subdivided as follows:

## Product identification

Brandname: mentioning the typical name of the respective product

Product ID: in sequence process - steel grade - typical application (optional)

Standard designation: classification according to AWS/ASME (Section II part C), EN and DIN-EN Werkstoffnr. In case an EN standard does not exist the DIN standard is mentioned.

## Typical characteristics of the product

Gives information about the specific product, the product properties and our recommendations for welding current, polarity, welding positions, approvals and arc voltage which is the voltage at which you can strike the arc of the stick electrodes. The different welding positions which according to AWS and EN are indicated by code digits are symbolized in the product data-sheet as follows:



**AWS:** 1G, 2G, 3G, 4G, 5G, 6G

**EN:** PA, PB, PC, PD, PE, PF, PG

"All positions"



**AWS:** 1G, 2G, 3G, 4G, 5Gu

**EN:** PA, PB, PC, PD, PE, PF

"All positions, except vertical down"



**AWS:** 1G, 1F, 2G, 2F

**EN:** PA, PB, PC

"Flatt butt and fillet welds only"

## Application / properties

A written description of the typical characteristics of the specific product, base materials to be welded mentioning the most important base metals for which the consumable is intended and its typical applications. In case the base metal or application is not included in the product data-sheet, or if you have any questions on the subject, your local HILCO Distributor or HILCO's customer service desk and our Technical Service Department will be pleased to help you. Call HILCO at +31-(0)23-531 91 00, Fax +31-(0)23-532 59 06, email: hilco@wxs.nl

## Equivalent product in alternative welding process

HILCO offers you package solutions for the entire range of welding techniques for a large number of our products. These package solutions comprise HILCO Stick electrodes for SMAW, MIG/MAG Solid wires for GMAW, Cored wires for FCAW, TIG Solid wires for GTAW, Fluxes and wires for SAW, OAW Solid wires for Oxy-acetylene gas welding and brazing rods. The mentioned product indicates the first choice in an alternative welding process.

## Chemical composition

The weld metal analysis (with the exception of SAW Solid wires) indicates the chemical composition of the deposit weld metal in weight % per element. The values indicated in the product data-sheets were determined by routine testing by our quality assurance department.

## Mechanical properties

The specified mechanical properties are typical values and refer to all-weld metal. It must be taken into account that the mechanical properties of welded joints, depending on the base materials, dimensions of the component, welding position, welding parameters, preheating, interpass temperatures, post-weld-heat-treatment (PWHT), may deviate from those of the all-weld metal. The mechanical properties indicated in the product data-sheets are to be considered as general guidelines and they may vary according to the variations of product batches.

## Disclaimer

The products and information in this handbook is based on today's knowledge about welding, welding techniques and product development. All technical data mentioned is not binding, alterations are possible at any time. If required please contact us for the latest developments.

**Standard designation as per:** AWS  
EN  
DIN  
Werkstoffnr.

American Welding Society  
European standard (issued by CEN)  
German standard for industries  
DIN-EN identification for materials

### Coating type, wire type or flux type (depending on the process):

Identifies the characteristics of the product concerned by means of either the chemical composition of the covering or core. In case of wire type the specific welding process concerned.

### Arc voltage:

Typical starting voltage for stick electrodes. 42V means electrode is suitable for lighting current transformers (in Europe 220V) and transformers with 42V or S marking.

### Current:

Identifies the current and polarity recommended. For DC current the sequence identifies our recommendations



AC current  
= AC



DC current /  
electrode connected  
to positive pole  
= DCEP



DC current /  
electrode connected  
to negative pole  
= DCEN



DC current /  
negative pole with a  
remark  
= DCEN

### Welding positions:

Identifies the welding position we recommend the consumable to be used in



All positions



All positions,  
except vertical  
downwards



All positions,  
specifically in  
vertical down  
position



Flat butt and  
fillet welds only



Flat butt and  
fillet welds,  
limited vertical  
upwards

**Approvals:** consumable is yearly tested and approved by international institutes

ABS	American Bureau of Shipping
BV	Bureau Veritas
CL	Controlas - Netherlands standard
DB+Ü	Deutsche Bundesbahn (German Railways) + Überwachungsvertrag (U-sign)
DNV	Det Norske Veritas
GL	Germanischer Lloyds
LR	Lloyds Register of Shipping
TüV	Technische Überwachungs Verein
Force	Force Institute - Danish standard

**Tip colour:** (if applicable) colour code for identification of stick electrodes, to be found on grip end of the electrode

**Printing:** Brandname / EN classification / AWS specification (or parts of this sequence) printed on the electrodes' coating for example: HILCO Red Extra / E42 0 RC / E 6013

### Equivalent product in alternative welding process:

Indicates the first choice for a consumable in another welding process, process identification acc. to ASME:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Shielded metal arc welding - stick electrodes - Manual metal arc welding - 111	Gas metal arc welding - MIG/MAG - 131/135	Flux cored arc welding - MAG welding - 136	Gas tungsten arc welding - TIG welding - 141	Submerged arc welding with wire electrode - 121	OAW - Oxy-acetylene welding - 311 / Brazing, soldering and braze welding - 9XX



## Stick electrodes

Rutile and low-hydrogen electrodes are packed in cardboard packs with polyethylene shrink wrapping which are then packed in outer boxes made of corrugated board in units of 3 or 4.

Pipeweld electrodes for welding cross-country pipelines are packed in steel metal cans to ensure moisture levels necessary for proper operation.

HILCHROME stainless steel electrodes are packed in hermetically sealed metal cans, which are then packed in outer boxes of corrugated board in units of 3. The metal HILcan offers the following advantages:

- Guaranteed completely dry electrodes, maintained in exactly the same quality controlled condition as immediately after production;
- Problem-free storage for an unlimited time in the originally sealed packaging;
- Protection from damage, climate changes and moisture pick-up;
- A weld metal deposit without any porosity when the electrodes are used within one single shift (8 hrs.) in any climate condition.



Hardmelt stick electrodes for depositing wear resistant layers are packed in the same way as rutile and low-hydrogen electrodes.

HILCO electrodes for welding Ni-base alloys, non ferrous alloys, cast iron grades and stellite are packed in small handy packages of max. 2 kilo with polyethylene shrink-wrapping which are then packed in outer boxes of corrugated board in units of 7.

HILCO stick electrodes for welding Aluminium are packed in hermetically sealed aluminium cans, which are then packed in outer boxes made of corrugated board in units of 6.

## TIG rods, gas welding rods

TIG rods and gas welding rods are available in 5 kilo packs made of corrugated board or 5 kilo cardboard tubes.

## Flux for submerged arc welding

HILCOWELD fluxes are normally supplied in polyethylene bags of 25 kilo. Other types of packaging are available upon request.

## MIG/MAG wires, Cored wires and wires for submerged arc welding

Are spooled on various spool type, each spool is packed in a polyethylene bag and individually or combined (S100 spools, some S200 spools) packed in corrugated boxes. With the introduction of the EN standard for technical delivery conditions (EN 759) the name of the spool types have been amended as follows:

DIN 8559 "old name"	EN 759 "new name" (datasheets)	Type	Typical weight * (kgs.)	Outer diameter (mm.)	Inner diameter (mm.)	Outer width (mm.)	Bore diameter (mm.)
D 100	S 100	Spool	1,0	100 +/- 2	-	45 +0/-2	16,5 +1/-0
D 200	S 200	Spool	5,0	200 +/- 3	-	55 +0/-3	50,5 +2,5/-0
D 300	S 300	Spool	15,0	300 +/- 5	-	103 +0/-3	50,5 +2,5/-0
K 300	B 300	Basket rim	15,0	300 +0/-5	180 +/- 2	100 +/- 3	-
- "Sandvik"	BS 300	Basket spool	15,0	300 +/- 5	-	103 +0/-3	50,5 +2,5/-0
K 415	B 415	Basket rim	25,0	415 +/- 5	300 +15/-0	70 +0/-15	-
-	MP	Drums	250,0	-	-	-	-
Note: typical weight indicates the typical content of a spool. Please consult the product data-sheets of the specific product for accurate information.							
EN 759		Typical application					
S 100		Plastic spools for <b>orbital welding</b>					
S 200		Plastic spools for usage in <b>confined areas</b>					
S 300		Plastic spools for universal usage					
B 300		<b>Steel basket rings for universal usage</b> - to be used with an adaptor					
BS 300		<b>Steel basket rings with characteristics of D 300 spools - environment friendly</b>					
B 415		Steel basket rings for Submerged arc welding wires					
MP		<b>Drums to improve your productivity.</b> Each MP contains more than thirteen 15 kilo spools, reducing stop-and-go sequences to an absolute minimum. Ideal for automatic welding processes requiring high productivity.					

Group	Designation		Constituents in percent volume						Procedure	Remarks
	Code	Mixture (data-sheet)	Oxidising		Inert		Reducing	Un-reactive		
			CO <sub>2</sub>	O <sub>2</sub>	Ar	He	H <sub>2</sub>	N <sub>2</sub>		
R	1	-			Bal.		>0-15		TIG, root shielding, plasma cutting	reducing
	2	-			Bal.		>15-35			
I	1	Pure Ar			100				MIG, TIG, root shielding	inert
	2	-				100				
	3	ArHe			Bal.	>0-95				
M1	1	ArCO <sub>2</sub>	>0-5		Bal.		>0-5		MAG	Slightly oxidizing
	2	ArCO <sub>2</sub>	>0-5		Bal.					
	3	ArCO <sub>2</sub> O <sub>2</sub>		>0-3	Bal.					
	4	ArCO <sub>2</sub> O <sub>2</sub>	>0-5	>0-3	Bal.					
M2	1	ArCO <sub>2</sub>	>5-25		Bal.					Strongly oxidizing
	2	ArO <sub>2</sub>		>3-10	Bal.					
	3	ArCO <sub>2</sub> O <sub>2</sub>	>0-5	>3-10	Bal.					
	4	ArCO <sub>2</sub> O <sub>2</sub>	>5-25	>0-8	Bal.					
M3	1	ArCO <sub>2</sub> O <sub>2</sub>	>25-50	>10-15	Bal.					
	2	Pure Ar			Bal.					
	3	ArCO <sub>2</sub> O <sub>2</sub>	>5-50	>8-15	Bal.					
C	1	CO <sub>2</sub>	100							
	2	CO <sub>2</sub> O <sub>2</sub>	Bal.	>0-30						
F	1							100	Plasma cutting, root shielding	Unreactive reducing
	2						>0-50	Bal.		

Note: Argon (Ar) may be substituted by Helium (He) up to 95% - the He percentage is indicated by an extra digit.

## Handling, storage, drying stick electrodes

To ensure satisfactory weld quality, stick must be handled and stored properly before use. Electrode coatings are carefully designed to provide the necessary operating characteristics and weld properties required for each electrode type. Generally stick electrodes should be stored in their original packing. The storage facilities should have an infrastructure which makes the "first in - first out" principle possible. Electrodes are manufactured to be within acceptable moisture limits, consistent with the type of covering and strength of the weld metal. It is recommended to facilitate the storage room in such way that the electrodes are stored dry and safe. Moisturizing units should not be stored in the same area. Open packaging should be stored in special conditioned areas.

### TYPICAL STORAGE CONDITIONS FOR STICK ELECTRODES

Storage of covered electrodes in cardboard boxes requires in general humidity and temperature controlled storage areas. Recommended storage conditions include:

- Temperature 18-25°C, relative humidity max. 60%
- Temperature 25-35°C, relative humidity max. 50%

Redrying of stick electrodes is recommended if the electrodes have picked up moisture or is imperiously required for low-hydrogen basic coated electrodes. We advise you to use the electrodes from a quiver after redrying.

### TYPICAL REDRYING GUIDELINES FOR STICK ELECTRODES

Electrodes for	Coating type	Redrying recommended	Redry temperature °C	Redrying time / h.
Unalloyed and low alloy structural steel	A, AR, RC, R, RR	No	--	--
	RB, B	Yes	300-350	2 - 10
Pipelines	C	Not allowed!	--	--
Fine grain steel	B	Yes	300-350	2 - 10
High temperature steel	R	No	--	--
	B	Yes	300-350	2 - 10
Stainless and heat resisting steel	R	Yes	120-200	2 - 10
	RB, B	No	--	--
Soft-martensitic steel	B	Yes	300-350	2 - 10
Duplex steel	R, RB	Yes	250-300	2 - 10
Hardfacing	R	No	--	--
	RB, B	Yes	300-350	2 - 10
Ni-base alloys	All types	If necessary	120-300	2 - 10

In certain cases it may be reasonable to redry electrodes even when they are not mentioned in the table above. Should the coating exhibit and excessively high water content as a result of e.g. improper storage or other adverse influences, which is reflected by the welding behaviour and by increased spattering or formation of pores, the electrodes may be redried at 100-120°C for one hour. Electrodes in special packaging (f.i. HILcans) can be used without redrying and holding in a drying oven within a period of 8 hours after opening. After that the electrodes can be redried in accordance with the table above.

## Handling, storage, drying cored wires

Unalloyed and low-alloyed cored wires are less sensitive to moisture pick-up since a metal sheath mainly covers the internal core. Nevertheless it is possible that the working environment affects the low hydrogen characteristics. For storage we recommend the same conditions as mentioned for stick electrodes (typical storage conditions for stick electrodes). For redrying we suggest to redry the wires at 150°C / max. 24 h.

Stainless steel cored wires are more sensitive to moisture pick up. Therefore the spools are vacuum packed. Storage facilities and redry procedures are the same as for unalloyed and low-alloyed cored wires. For stainless steel cored wires we kindly ask you to pay extra attention to removing the spools at the end of the working period and store them in a conditioned area. In case of need you can redry the wires at 150°C / max. 24 h.

## Handling, storage, drying fluxes for submerged arc welding

We recommend to store welding fluxes at a constant temperature in a conditioned area, this to avoid moisture pick-up. The shelf life of welding fluxes can be max. three years if stored properly. Flux in damaged packaging should be used or repacked immediately. To ensure a crack-free usage fluoride-basic fluxes should be dried before usage. Redrying can be avoided in case of usage directly from undamaged, airtight packaging.

TYPICAL REDRYING GUIDELINES SUB-ARC WELDING FLUXES				
Production method	Type	Redrying recommended	Redry temperature °C	Redrying time / h.
Agglomerated flux	FB	Yes	350	2 - 10
	AR	Yes	300	2 - 10
Fused	MS	Yes	150	2 - 500

Redry temperatures as mentioned in the table above are considered to be guidelines only. Redrying in multiple sequences is possible within the mentioned redrying time. Fluxes that are not used immediately after redrying should be stored in a heated area or in an airtight packaging such as a hermetically sealable drums. Storage temperature of the heated area should be around 150°C, max. storage period is 30 days. We recommend using a redrying oven where special care should be taken to overheating the flux.

## SI Units for use in the welding industry

To convert to metric, *multiply* by the factor in remarks;

To convert from metric, *divide* by the factor

Quantity	Unit	Symbol	Other units/symbol	Remarks / factor
Length	Meter	m	Inch (in)	0.0254
			Foot (ft)	0.3048
			Yard (yd)	0.9144
Area	Square meter	m <sup>2</sup>	Inch <sup>2</sup> (in <sup>2</sup> )	0.0064516
			Foot <sup>2</sup> (ft <sup>2</sup> )	0.09290304
			Yard <sup>2</sup> (yd <sup>2</sup> )	0.8361274
Volume	Cubic meter	m <sup>3</sup>	Inch <sup>3</sup> (in <sup>3</sup> )	0.001638706
			Foot <sup>3</sup> (ft <sup>3</sup> )	0.02831685
Frequency	Hertz	Hz	-	-
Mass	Kilogram	kg	Pounds (lbs)	0.4535924
Density	Kilogram per cubic meter	Kg/m <sup>3</sup>	-	-
Force	Newton	N	kgf	0.980665
			lbf	0.4448222
Mechanical load	Pascal,	Pa	Newton per square meter	1
	Mega Pascal	MPa	Newton per square millimetre (N/mm <sup>2</sup> )	1
		MPa	Ton f/in <sup>2</sup>	0,064749
Impact strength	Joule	J	1 ksi = 1.000 psi	6,89476
				1J = 1NM
				1J = 0,7377562 fl lbf
Temperature	Kelvin	K	Degree Celsius (°C)	tK=tC + 273.15
			Degree Fahrenheit (F)	tK=(tF+ 459.67)/1.8
	Celsius	C	Degree Fahrenheit (F)	tF=(tCx1.8)+32
	Fahrenheit	F	Degree Celcius (°C)	tC=(tF-32)x1.8
Electric current	Ampere	A	-	-
Electric potential	Voltage	V	-	-
Current density	Ampere per meter	A/m <sup>2</sup>	-	-

## Conversion international sizes

mm.	SWG	inch	mm.	SWG	inch.	mm.	SWG	inch.
1,2	-	3/64	3,0	10	1/8	8,0	-	5/16
1,5	16	1/16	4,0	8	5/32	10,0	-	3/8
2,0	14	5/64	5,0	6	3/16	13,0	-	1/2
2,5	12	3/32	6,0	4	1/4	25,4	-	1/1

## EURO Conversion rates EU countries

Country	1 EUR =	Country	1 EUR =
Austria	ATS	France	FRF
Belgium	BEF	Ireland	IEP
Germany	DEM	Italy	ITL
Spain	ESP	Netherlands	NLG
Finland	FIM	Portugal	PTE

## Material test certificates according to EN 10204

Increasingly, certificates attesting the characteristics and property values of welding filler metals are required by customers or inspection authorities within the framework of the acceptance testing of welded structures.

A few explanatory notes are included in this handbook with the request that they should be kept in mind when making enquiries or placing orders.

The EN standard 10204 is taken as a basis to determine the schedule of such certificates. The standard defines who is responsible for testing and authorized to sign, and whether the certificates must contain details concerning general typical values or specific test results relating to the particular delivery.

We would like to emphasize that EN 10204 does not contain the following details so that these must be specified by the customer upon ordering:

Scope of testing: e.g. type and number of tests, individual elements in case of chemical analysis tests

Consumables: e.g. type of shielding gas etc.

Test parameters: e.g. post weld heat treatment of the test piece, test temperatures

Requirements: e.g. minimum values for yield strength, tensile strength, elongation, impact values, chemical composition tolerances

Inspection society: if required.

All certificates issued in conformity with EN 10204 must be paid for and are charged separately.

## HILCO Test Reports

Typical test reports issued by Hilarius Haarlem Holland BV

HTR	Acc. to EN 10204	Issued by	Contents
1	2.2	HILCO Administration dept.	Typical chemical analysis Typical mechanical properties Non specific information
2	2.2	HILCO QA dept.	Typical chemical analysis Typical mechanical properties Specific information about shipment
3	2.3	HILCO QA dept.	Actual chemical analysis Typical mechanical properties Specific information about shipment
4	3.1.B	HILCO QA dept.	Actual chemical analysis Actual mechanical properties Specific information about shipment

## Ships plate

All grades of shipbuilding steels are suitable for welding. Normal shipbuilding steels have a tensile strength of 400-480 Mpa. These steel can be divided into 5 categories according to their quality:

Category	A	killed to semi-killed
	B	killed to semi-killed
	C	Al-killed, fine grained
	D	all deoxidising techniques, not killed
	E	Al-killed, fine grained

The required minimum impact strength values for the materials of categories C, D and E also apply for the filler metals. The values for ISO-V notch specimens are as follows:

Category	1	47 Joule minimum at +20°C
	2	47 Joule minimum at 0°C
	3	47 Joule minimum at -20°C
		61 Joule minimum at -10°C

Those welding consumables classified as per categories 2 and 3 having a low hydrogen content are additionally marked with:

Category	H15	max. H <sub>2</sub> O 0,5 g/100 g samples = (H <sub>DM</sub> < 15 ml / 100 gr deposit weld metal)
	H10	max. H <sub>2</sub> O 0,3 g/100 g samples = (H <sub>DM</sub> < 10 ml / 100 gr deposit weld metal)
	H5	max. H <sub>2</sub> O 0,2 g/100 g samples = (H <sub>DM</sub> < 5 ml / 100 gr deposit weld metal)

## Structural steel

In general the weldability of unalloyed structural steel is easy.

As in all are welding processes the weld metal needs mechanical properties to match the base materials to be welded. The welder must avoid forming defects in the weld.

Unlimited weldability for the different welding processes cannot be guaranteed for structural steels. The behaviour of a steel plate during and after welding has a close relationship to the chemical structure of the material itself as well as its dimensions and shape. Furthermore the fabrication and service conditions of the component are important.

## Boiler steel

There are no restrictions to the weldability of boiler steels. Please follow the recommendations mentioned in this handbook or mentioned in the classifications of the base materials to be welded.

## Fine grain steel

All fine-grained steels can be welded, restrictions only exist for welding processes involving considerably heat accumulation. Please follow the recommendations mentioned in this handbook or mentioned in the classifications of the base materials to be welded.

## Pipe steel

The weldability of pipe steels is not subject to any restrictions. Please follow the recommendations mentioned in this handbook or mentioned in the classifications of the base materials to be welded.

## Cast steel

The weldability of cast steels is only subject to restrictions as per EN 10213. Please follow the recommendations mentioned in this handbook or mentioned in the classifications of the base materials to be welded.



The known DIN designations 1629, 1681, 17100, 17102, 17155 and 17172 have been replaced by EN standards. A summary of both old designations and their replacements is as follows:

OLD DESIGNATION (DIN)		EN STANDARD (NEW)	
Base materials	DIN	EN	designation
Pipe steel	DIN 1629 / 1630	EN 10216-1	P235T1
			P235T2
			P275T1
			P275T2
			P355N

Cast steel	DIN 1681	GS-45	EN 10213-2	GP240R
		GS-52		GP240H T1/T2

Structural steel	DIN 17100	St. 33	EN 10025	S185
		St. 37-2		S235JR
		USt. 37-2		S235JRG1
		RSt. 37-2		S235JRG2
		St. 37-3U		S235J0
		St. 37-3N		S235J2G3
		St. 44-2		S275JR
		St. 44-3U		S275J0
		St. 44-3N		S275J2G3
		St. 52-3U		S355J0
		St. 52-3N		S355J2G3
		St. 60-2		E295
		St. 70-2		E335
				E360

Fine grain steel	DIN 17 102	StE 285	EN 10028-3	P275N
		WStE 285		P275NH
		TStE 285		P275NL1
		ESiE 285		P275NL2
		StE 355		P355N
		WStE 355		P355NH
		TStE 355		P355NL1
		ESiE 355		P355NL2
		StE 460		P460N
		WStE 460		P460NH
		TStE 460		P460NL1
		ESiE 460		P460NL2
		StE 285 / -	EN 10113-2/3	S275N / S275M
		TStE 285 / -		S275NL / S275ML
		StE 355 / BStE 355 TM		S355N / S355M
		TStE 355 / BTStE355 TM		S355NL / S355ML
		StE 420 / BStE 420 TM		S420N / S420M
		TStE 420 / BTStE420 TM		S420NL / S420ML
		StE 460 / BStE 460 TM		S460N / S460M
		TStE 460 / BTStE460 TM		S460 NL / S460 ML

Base materials	OLD DESIGNATION (DIN)		EN STANDARD (NEW)	
	DIN	designation	EN	designation
Boiler steel	DIN 17 155	H I	EN 10028-2	P235GH
		H II		P265GH
		17 Mn 4		P295GH
		19 Mn 6		P355GH
		15 Mo 3		16 Mo 3
		13 CrMo 4 4		13 CrMo 4-5
		10 CrMo 9 10		10 CrMo 9-10

Fine grain steel (high strength steel)	-	TSiE 460 V	EN 10137-2	S460QL
		SiE 500 V / TSiE 500 V		S500Q / S500QL
		SiE 550 V / TSiE 550 V		S550Q / S550QL
		SiE 620 V / TSiE 620 V		S620Q / S620QL
		SiE 690 V / TSiE 690 V		S690Q / S690QL
		TSiE 890 V / TSiE 960 V		S890QL / S960QL

Fine grain steel (weather resistant)		S235JRW-S355JRW	S235J2G3Cu-S355J2G3Cu
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Base materials	OLD DESIGNATION (DIN)		EN STANDARD (NEW)		API 5L
	DIN	designation	EN	designation	design.
Pipe steel	DIN 17 172	SiE290.7	EN 10208-2	L240MB	X42
		SiE290.7TM		L290MB	
		SiE240.7		L240NB	
		SiE290.7		L290NB	
		SiE320.7		L320NB	X46
		SiE360.7TM		L360MB	X52
		SiE360.7		L360NB	
		SiE385.7		L385NB	X56
		SiE415.7		L415NB	
		SiE415.7TM		L415MB	X60
		SiE445.7TM		L445MB	X65
		SiE480.7TM		L480MB	X70
		SiE550.7TM		L550MB	X80

	DESIGNATION	EN STANDARD (NEW)
Ships plate	Grade A	S235JRS2
	Grade AH32	S315G1S
	Grade AH36	S355G1S
	Grade AH40	-
	Grade B	-
	Grade D	S235J2S1.0
	Grade DH32	S315G2S
	Grade DH36	S355G2S
	Grade DH40	-
	Grade E	S235J4S
	Grade EH32	EN 17102: P315N
	Grade EH36	S355G3S
	Grade EH40	-

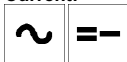
## Coating type:

Rutile

Arc voltage: 42V

Approvals: ABS, BV, DB+Ü, DNV, GL, LR, TÜV

## Current:



Tip colour:  
Red

## Welding positions:



## Printing:

HILCO Red Extra / E42 0 RC / E 6013

Red Extra is our universal electrode for all welding positions, including vertical-down position. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Red Extra is the ideal choice for construction work where the use of one type of electrodes is permissible. Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Red Extra is an all-current type (AC/DC), which also operates on transformers with low OCV, min. 42V.

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 2	H60 / HW430	Fer G 1

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	0,60	0,40	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	0°C ≥ 50

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	10,5	40-60
2,5	350	18,2	60-100
3,2	350	28,9	90-140
4,0	350	44,6	150-190
5,0	350	70,4	180-240

## Coating type:

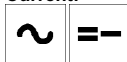
Rutile

Arc voltage: 42V

## Approvals:

-

## Current:



## Tip colour:

Red

## Welding positions:



## Printing:

HILCO Red / E 6013

Red is our rutile coated electrode for all welding positions, including vertical-down position. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Red is selected in a wide range of sheet metal applications. Typical applications include tack welding and welding on galvanised, primer painted and slightly rusted plates. Red is an all-current type (AC/DC) and is suitable for welding on transformers with low OCV, min. 42V.

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 2	H60 / HW430	Fer G 1

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,09	0,50	0,35	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	0°C ≥ 47

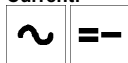
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	18,2	60-90
3,2	350	28,9	90-140
4,0	350	44,6	150-190

### Coating type:

Rutile

### Current:



### Welding positions:



**Arc voltage:** 50V

### Approvals:

ABS, BV, DB+Ü, LR

### Tip colour:

Brown

### Printing:

Brown / E42 0 RC / E 6013

Brown is our "fast freezing" rutile coated electrode for all welding positions, especially vertical-down position. The electrode is characterised by easy handling, a good penetrating arc and the ability to bridge wide root openings under conditions of poor fit: on rusty, scaled, primer painted and/or contaminated plate material. Brown is selected for bridging gaps, assembly, repair and workshop welding. Typical applications include repair welding in shipbuilding. Brown is an all-current type (AC/DC).

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 2	H60 / HW430	Fer G 1

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,55	0,35	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	0°C ≥ 47

### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	18,8	60-100
3,2	350	31,3	90-140
4,0	350	47,0	150-190

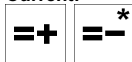
## Coating type:

Cellulose

Arc voltage: 70V

Approvals:

## Current:



\* Root pass!

Tip colour:

## Welding positions:



## Printing:

E 6010 / Pipeweld 6010

Pipeweld 6010 is our cellulose coated electrode recommended for all welding positions, particularly in vertical down and overhead position. The electrode is characterised by a deeply penetrating, forceful, spray type arc and readily removable slag. The majority of applications are in joining carbon steel, but performance on galvanised and some low-alloy steels is proven to be excellent. Typical applications include shipbuilding, general constructions, bridges, storage tanks, piping and pressure vessel fittings.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Pipelines

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 52	-	H100 / HW430	Fer G 2

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,14	0,55	0,18	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-20°C ≥ 70

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	17,7	50-80
3,2	350	25,5	80-130
4,0	350	39,5	120-180
5,0	350	61,4	160-220

### Coating type:

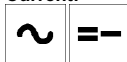
Rutile

Arc voltage: 42V

### Approvals:

GL, LR

### Current:



### Tip colour:

yellow

### Welding positions:



### Printing:

Performa / E42 0 RC / E 6013

Performa is our all-round all-current (AC/DC) electrode for all welding positions. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Performa is the logic first choice for shipbuilding. Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Performa also operates on transformers with low OCV, min. 42V.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry
- Do-it-yourself

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 1	H60 / HW430	Fer G 1

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,50	0,40	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	+20°C ≥ 55

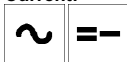
### Packaging and welding data:

Dia. mm.	Length Mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	16,5	80-110
3,2	350	27,9	110-130
4,0	350	42,5	140-160

### Coating type:

Rutile

### Current:



### Welding positions:



Arc voltage: 42V

### Approvals:

DB+Ü, TÜV

### Tip colour:

Yellow

### Printing:

Velora / E42 0 RR / E 6013

Velora is our "slow freezing" rutile coated electrode for all welding positions, except vertical down position. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Velora is selected for fast downhand welding of thin sheet metals ( $\geq 5,0$  mm. wall-thickness). Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Velora is an all-current type (AC/DC), which also operates on transformers with low OCV, min. 42V.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 1	H60 / HW155	Fer G 1

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	0,60	0,40	$\leq 0,030$	$\leq 0,030$							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 420$	$\geq 500$	$\geq 22$	0°C $\geq 47$

### Packaging and welding data:

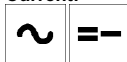
Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	10,9	50-70
2,5	350	20,5	60-100
3,2	350	34,4	100-140
4,0	450	70,0	150-190
5,0	450	112,0	190-270



### Coating type:

Rutile

### Current:



### Welding positions:



Arc voltage: 42V

### Approvals:

CL, LR

### Tip colour:

Blue

### Printing:

Velveta / E42 0 RR / E 6013

Velveta is our rutile coated electrode for all welding positions, especially for vertical up position. The electrode is characterised by an extremely easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Velveta is the logic first choice for thin-walled pipe welding. Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Velveta is an all-current type (AC/DC), which also operates on transformers with low OCV, min. 42V.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry
- Pipelines
- Gas industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 2	H60 / HW430	Fer G 1

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,60	0,40	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	0°C ≥ 47

### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	10,0	50-70
2,5	350	19,2	60-100
3,2	350	31,3	80-140
4,0	350	46,0	130-180
4,0	450	59,0	130-180
5,0	450	90,0	180-240

## Coating type:

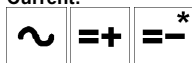
Basic-rutile

Arc voltage: 55V

## Approvals:

DB+Ü, DNV, LR, TÜV, Force

## Current:



\*root pass

## Welding positions:



## Printing:

Basic 55 / E 7016

Basic 55 is our double coated electrode for all welding positions, except vertical down position. The electrode is characterised by easy handling, a well controllable arc, excellent root penetration, easy slag removal and excellent metallurgical properties up to -30°C. Typical applications include shipbuilding, general constructions, bridges, storage tanks as well as root pass and positional welding. Basic Special is an all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESIE355, StE285TM-ESIE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 51	Fer SG 2	H100 / HW530	Fer G 2

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	0,90	0,70	≤ 0,025	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-20°C ≥ 90

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	19,5	60-90
3,2	350	32,8	95-150
3,2	450	43,2	95-150
4,0	450	65,0	140-190

### Coating type:

Basic

### Current:



### Welding positions:



**Arc voltage:** 65V

### Approvals:

ABS, GL, LR

### Tip colour:

-

### Printing:

BASIC / E 7018

Basic is our basic coated low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) electrode for all welding positions, except vertical down position. The electrode is characterised by a smooth, quiet arc, very low spatter and good arc penetration. Basic can be used at high travel speeds due to its elevated recovery (120%). Typical applications include shipbuilding, general constructions, bridges, storage tanks as well as producing crack-resistant and tough welded joints on mild and low-alloy steels. Basic is welded on AC current.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 51	Fer SG 2	H100 / HW530	Fer G 2

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,00	0,50	≤ 0,025	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-40°C ≥ 47

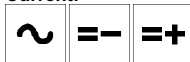
### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	20,5	65-90
3,2	350	37,3	100-140
4,0	450	64,4	140-190
5,0	450	98,3	180-250

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

DB+Ü, DNV, LR, TÜV, Force

## Tip colour:

-

## Printing:

BASIC SUPER / E7018-1

Basic Super is our universal low hydrogen ( $H_{DM} < 5$  ml. / 100 gr. deposit weld metal) electrode for all welding positions, except vertical down position. The electrode is characterised by a smooth, quiet arc, very low spatter, easy slag removal and excellent mechanical properties even at low temperatures (down to  $-40^{\circ}\text{C}$ ). Typical applications include shipbuilding, general constructions and offshore constructions. Basic Super is the ideal choice for out-of-position welding. Basic Super is preferably welded on AC current.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / Brazing
-	K 60	Hilco 51	Fer SG 2	H100 / HW530	Fer G 2

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	1,00	0,50	$\leq 0,020$	$\leq 0,020$							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 460$	$\geq 550$	$\geq 25$	$-40^{\circ}\text{C} \geq 60$

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	24,6	70-110
3,2	350	38,2	110-150
3,2	450	49,5	110-150
4,0	450	71,4	140-200
5,0	450	105,8	200-270

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

DNV, LR, TÜV, GL

## Tip colour:

-

## Printing:

Basic Directa / E 42 5 B / E 7018-1

Basic Directa is our high quality low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) electrode for all welding positions, except vertical down position. The electrode is characterised by a smooth, quiet arc, very low spatter, an easy slag removal and good mechanical properties up to  $-50^{\circ}\text{C}$ . Typical applications include shipbuilding, general constructions and offshore constructions. Basic Directa is welded on DC (+) current, has 120% recovery and is suitable to weld fine-grain steel grades.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG 3	Hilcord 51	Fer SG 3	H100 / HW530	Fer G 2

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,20	0,35	$\leq 0,020$	$\leq 0,020$							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation $L_0=5d$ - %	Impact Values ISO-V J
As welded	$\geq 420$	$\geq 500$	$\geq 20$	$-50^{\circ}\text{C} \geq 47$
Stress relieved	$\geq 400$	$\geq 500$	$\geq 22$	$-50^{\circ}\text{C} \geq 47$

Note: stress relieved condition  $620^{\circ}\text{C} / 1 \text{ h}$ .

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	21,0	65-110
3,2	350	39,1	100-145
3,2	450	50,0	100-145
4,0	450	72,5	135-200
5,0	450	103,6	180-280

## Coating type:

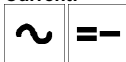
Rutile

Arc voltage: 65V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

Regina 140 / E42 0 R / E 7024

Regina 140 is our rutile coated high efficiency (recovery 140%) electrode for making fillet welds in the flat and horizontal position. The electrode is characterised by a smooth, quiet arc, very low spatter, and easily removable slag. Regina 140 can be used with high travel speeds, resulting in high deposition rates (> 3,2 kgs./hour). Typical applications include shipbuilding, general constructions, bridges and welding primer painted or contaminated plates. Regina 140 is all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	-	H60 / HW430	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,80	0,25	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 20	0°C ≥ 47

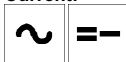
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
4,0	450	93,8	180-220
5,0	450	145,0	240-320

## Coating type:

Rutile-acid

## Current:



## Welding positions:



Arc voltage: 65V

Approvals: ABS, BV, CL, DB+Ü,  
DNV, GL, LR, TÜV

## Tip colour:

-

## Printing:

Regina 150 / E42 2 RA / E 7024-1

Regina 150 is our rutile-acid coated high efficiency (recovery 160%) electrode for making x-ray quality fillet welds in the flat and horizontal position. The electrode has a smooth quiet arc, very low spatter and easily removable slag (self-releasing even in narrow angles). Regina 150 can be used with high travel speeds, resulting in high deposition rates (> 3,6 kgs./hour). Typical applications include joining heavier sections of mild and low-alloyed structural steels found in shipbuilding and general constructions as well as usage on primer painted or contaminated plates.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESStE355, StE285TM-ESStE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 52	-	H100 / HW530	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,90	0,40	≤ 0,025	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 440	≥ 510	≥ 25	-20°C ≥ 50
Stress relieved	≥ 420	≥ 500	≥ 27	+20°C ≥ 75

Note: stress relieved condition 620°C / 1 h.

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	450	62,5	120-180
4,0	450	96,7	170-240
5,0	450	147,5	230-340
6,0	450	212,0	290-400

## Coating type:

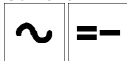
Rutile

Arc voltage: 65V

## Approvals:

BV, LR, Force

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

Regina 160 / E42 0 RR / E 7024

Regina 160 is our easy-to-handle high efficiency (recovery 160%) electrode for making fillet welds in the flat and horizontal position. The electrode has a smooth quiet arc, very low spatter and easily removable slag. Regina 160 can be used with high travel speeds, resulting in high deposition rates (> 3,5 kgs./hour). Typical applications include joining mild and low-alloyed structural steels as well as usage on primer painted or contaminated plates. Regina 160 is an all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 52	-	H60 / HW430	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,60	0,40	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 430	≥ 510	≥ 24	0°C ≥ 47
Stress relieved	≥ 410	≥ 470	≥ 26	+20°C ≥ 70

Note: stress relieved condition 620°C / 1 h.

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	450	65,6	120-160
4,0	450	103,6	160-230
5,0	450	154,3	250-340
6,0	450	220,0	300-400



## Coating type:

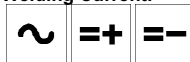
Zircon-Basic

**Arc Voltage:** 65V

## Approvals:

DNV, LR, TÜV

## Welding Current:



## Tip colour:

None

## Welding positions:



## Printing:

Basic 160 / 42 2 B / E7028

Basic 160 is our zircon-basic high efficiency (recovery  $\geq 160\%$ ) electrode for fast fillet welding, especially to be used for joining heavier sections of mild and low-alloyed structural steels found in construction and shipbuilding applications i.e. demanding applications. The non-basic elements in the electrode coating ensure excellent weldability, smooth bead appearance and an easy slag release. Basic 160 is an all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESStE355, StE285TM-ESStE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 51	-	H100 / HW530	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,85	0,30	$\leq 0,030$	$\leq 0,030$							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 430$	$\geq 510$	$\geq 25$	$-20^{\circ}\text{C} \geq 47$
Stress relieved	$\geq 400$	$\geq 470$	$\geq 27$	$-20^{\circ}\text{C} \geq 47$

Note: stress relieved condition  $620^{\circ}\text{C} / 1 \text{ h}$ .

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
4,0	450	98,2	180-230

### Coating type:

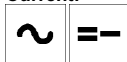
Rutile

Arc voltage: 65V

### Approvals:

BV, LR

### Current:



### Tip colour:

-

### Welding positions:



### Printing:

Regina 180 / E 42 0 RR / E 7024

Regina 180 is our high speed, high productivity (recovery 180%) electrode for making fillet welds in the flat and horizontal position. The electrode has a smooth quiet arc, very low spatter and easily removable slag. Regina 180 can be used with high travel speeds, resulting in high deposition rates (> 3,8 kgs./hour). Typical applications include joining mild and low-alloyed structural steels as well as usage on primed or contaminated plates. Regina 180 is an all-current type (AC/DC), size 5,0x600 mm. can be used for gravity welding.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 52	-	H100 / HW530	-

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,65	0,50	≤ 0,030	≤ 0,030							

### Mechanical Properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 440	≥ 510	≥ 24	0°C ≥ 47

### Packaging and welding data:

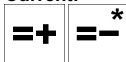
Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
4,0	450	105,5	180-220

**Coating type:**  
Cellulose

**Arc voltage:** 70V

**Approvals:**

**Current:**



\*root pass

**Welding positions:**



**Printing:**

E 6010 / Pipeweld 6010

Pipeweld 6010 is our cellulose coated electrode for cross-country welding API 5L pipe steels in vertical down position. Specially recommended for welding root passes. The electrodes are packed in metal cans to ensure moisture levels for proper operation.

**Base materials to be welded:**

- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Root passes in pipe steel up to L485MB, X70, StE480.7TM

**Applications:**

- Pipelines

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K60	Hilcord 52	-	H100 / HW430	Fer G 2

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,14	0,55	0,18	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-20°C ≥ 70

**Packaging and welding data:**

Dia. Mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	17,7	50-80
3,2	350	25,5	80-130
4,0	350	39,5	120-180
5,0	350	61,4	160-220

## Coating type:

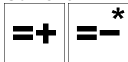
Cellulose

Arc voltage: 70V

## Approvals:

-

## Current:



\*root pass

## Welding positions:



## Printing:

E 8010-P1 / Pipeweld 8010

Pipeweld 8010 is our cellulose coated electrode for cross-country welding high-strength butt joints in API 5L pipe steels. The electrode is characterised by a deeply penetrating, forceful, spray type arc and readily removable slag. Typical application for Pipeweld 8010 is the welding of API 5L: X65 pipe steel. For root pass welding we recommend to use Pipeweld 6010. Electrodes are packed in metal cans to ensure moisture levels for proper operation.

## Base materials to be welded:

- Pipe steel P235T1-P355N, L210-L485MB, S275ML-S460ML, X42-X70, TStE290-TStE445.7TM
- Root passes in pipe steel up to L550MB(NB), X80, StE550.7TM

## Applications:

- Pipelines

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K60	Hilcord 52	-	H100 / HW430	Fer G-2

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,16	0,85	0,20	≤ 0,030	≤ 0,030		0,20					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 550	≥ 20	-30°C ≥ 47

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	26,8	80-130
4,0	350	40,5	120-180
5,0	350	62,0	160-220

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG 1 is our copper coated solid wire for MAG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks etc.

**Base materials to be welded:**

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	-	Hilcord 40	Fer SG1	H100 / HW430	Fer G-1

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,09	1,20	0,60	≤ 0,030	≤ 0,025							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 26	-20°C ≥ 80

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	S300	15	80-180	17-20
1,0	S300	15	120-240	17-22
1,2	S300	15	160-260	18-26

**Wire type:**  
MAG solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG 1 A Superflow is our bronze coated solid wire for MAG welding unalloyed and low alloyed galvanized structural steels. We have added Ti, Zr and Al to the wire which makes SG 1 A Superflow ideal for welding oxidised (rusted) material and also coated plate (primed or painted).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	-	Hilcord 40	Fer SG 1A	H100 / HW530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Ti	Zr	Al
0,06	1,10	0,50	≤ 0,030	≤ 0,025					0,15	0,12	0,15

Note: single values for Ti, Zr, Al are maximum values

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 27	-20°C ≥ 80

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	15	80-180	17-20
1,0	BS300	15	120-240	17-22
1,2	BS300	15	160-260	18-26

**Wire type:**  
MAG Solid wire

**Welding Current:**



**Welding positions:**



**Approvals:**  
LR

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

SG 2 is our copper coated solid wire for MAG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks etc.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-EStE355, StE285TM-EStE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	-	Hilcord 40	Fer SG 2	H100 / HW530	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,50	0,85	≤ 0,030	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 430	≥ 510	≥ 22	-20°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,6	S200	5	60-140	16-20
0,8	S200	5	80-180	17-20
0,6	S300	15	60-140	16-20
0,8	S300	15	80-180	17-20
0,9	S300	15	100-200	17-22
1,0	S300	15	120-240	17-22
1,2	S300	15	160-260	18-26

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
ABS, CL, DB+Ü, GL, LR, TÜV

**Shielding gas:**  
C1 = CO<sub>2</sub>, M11-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

K60 is our solid wire for MAG welding unalloyed and low alloyed, incl. fine grain types, structural steels. The wire is used in a wide range of applications: general constructions, shipbuilding, bridges, tanks etc. The stability of the wire makes K60 suitable for controlled automatic and robotic welding processes including T.I.M.E., high efficiency MAG welding etc.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	-	Hilcord 40	Fer SG 2	H100 / HW530	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,40	0,85	≤ 0,030	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 430	≥ 510	≥ 22	-20°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	B300	16	80-180	17-20
1,0	B300	16	120-240	17-22
1,2	B300	16	160-260	18-26
0,8	MP	250	80-180	17-20
1,0	MP	250	120-240	17-22
1,2	MP	250	160-260	18-26

Note: high efficiency MAG welding data on request



**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

SG 3 is our copper coated solid wire for MAG welding structural steels with a maximum tensile strength of 620 Mpa. Typical applications include: general constructions, shipbuilding, bridges, tanks etc.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	-	Hilcord 51	Fer SG 3	H100 / HW 530	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,75	1,00	≤ 0,030	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 600	≥ 24	-40°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	B300	16	80-180	17-20
1,0	B300	16	120-240	17-22
1,2	B300	16	160-260	18-26

**Wire type:**

Rutile cored wire

**Current:**

**Welding positions:**

**Approvals:**

GL, LR

**Shielding gas:**

M21 = ArCO<sub>2</sub> / C = CO<sub>2</sub>

Hilcord 40 is our rutile flux cored wire for MAG welding unalloyed and low alloyed structural steels in all positions. Wire offers excellent weldability, good mechanical properties, practically no spatter and allows you to weld in spray arc mode. Hilcord 40 can be used in single and multipass applications, typical are: shipbuilding, machinery, bridge construction, rolling stock, structural fabrication, size 1,0 mm. is specifically suitable to weld thin sheet metals.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Velora	K 60	-	Fer SG 1	H100 / HW 430	Fer G 1

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	1,30	0,60	≤ 0,030	≤ 0,025							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 530	≥ 24	-30°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,0	BS200	4,5	130-250	22-30
1,2	BS200	4,5	150-300	22-32
1,0	BS300	16	130-250	22-30
1,2	BS300	16	150-300	22-32
1,6	BS300	16	160-375	32-33

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

GL

## Shielding gas:

C1 = CO<sub>2</sub>

Hilcord 40C is our rutile flux cored wire for MAG welding unalloyed and low alloyed structural steels under CO<sub>2</sub> gas shielding. Wire offers excellent weldability, good mechanical properties, practically no spatter and allows you to weld in spray arc mode. Hilcord 40C can be used in single and multipass applications, typical are: shipbuilding, machinery, bridge construction, rolling stock, structural fabrication.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Velora	K 60	-	Fer SG 1	H100 / HW 430	Fer G 1

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,40	0,50	≤ 0,030	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 22	-20°C ≥ 47

Note: properties under C1 = CO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
1,2	S200	5	160-260	18-26
1,2	B300	16	160-260	18-26
1,6	B300	16	180-300	20-30

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

ABS, DNV, LR, TÜV

## Shielding gas:

M21 = ArCO<sub>2</sub> / C1 = CO<sub>2</sub>

Hilcord 41 is our seamless copper coated rutile flux cored wire for MAG welding unalloyed and low alloyed structural steels in all positions. Wire can be used in a wide range of applications and offers excellent weldability, good mechanical properties, practically no spatter and allows you to weld in spray arc mode. Hilcord 41 is a guaranteed low hydrogen content wire ( $H_{DM} < 5 \text{ ml/100 gr. deposit weld metal}$ ). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	-	Fer SG 1	H 60 / HW 430	Fer G 1

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,40	0,50	≤ 0,030	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 530	≥ 23	-20°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B200	5	150-300	22-32
1,0	B300	16	130-270	21-30
1,2	B300	16	150-300	22-32
1,6	B300	16	180-375	24-33

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

C1 = CO<sub>2</sub>

Hilcord 41C is our seamless copper coated rutile flux cored wire for MAG welding unalloyed and low alloyed structural steels under CO<sub>2</sub> gas shielding. Wire can be used in a wide range of applications and offers excellent weldability, good mechanical properties, practically no spatter and allows you to weld in spray arc mode. Hilcord 41C is a guaranteed low hydrogen content wire (H<sub>DM</sub> < 5 ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	-	Fer SG 1	H 60 / HW 430	Fer G 1

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,30	0,45	≤ 0,030	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	Yield strength Rp 0,2 Mpa	Tensile strength RM Mpa	Elongation A5 - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 22	-20°C ≥ 70

Note: properties under C1 = CO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	S200	5	150-350	23-33
1,2	B300	16	150-350	23-33
1,6	B300	16	180-400	24-33

## Wire type:

Open arc

## Current:



## Welding positions:



## Approvals:

-

Hilcord 2040 is our cored wire for self shielded single pass arc welding of unalloyed and low alloyed structural steels. The wire is excellent for joining thin sheet metals, size 0,8 mm. allows you to weld sheets as thin as 1,2 mm. Hilcord 2040 in size 0,8 and 0,9 mm. is ideal for usage on light industrial MAG welding machines with a max. output range up to 160-170A.

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry
- Do-it-yourself

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Velveta	K 60	-	Fer SG 1	-	Fer G 1

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,25	0,70	0,40	≤ 0,030	≤ 0,025							2,00

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 480	≥ 22	+20°C ≥ 25

## Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
0,8	S200	4,5	40-160	14-22
0,9	S200	4,5	80-200	14-22
1,2	S200	4,5	95-250	15-26
0,9	BS300	15	80-200	14-24
1,2	BS300	15	95-250	15-26

## Wire type:

Open arc

## Current:



## Welding positions:



## Approvals:

-

Hilcord 2048 is our cored wire for self shielded single pass arc welding unalloyed and low alloyed structural steels in all welding positions. Hilcord 2048 has a fast-freezing slag permitting high deposition rates and excellent welding characteristics. Typical applications include: joining sheet-pile walls, plate and tubular welding, bridge and building fabrication including seismic applications, hull and stiffener welding for ship constructions.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Brown	K 60	-	Fer SG 1	H 100 / HW 430	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,20	0,50	0,40	≤ 0,030	≤ 0,025							0,50

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 530	≥ 20	-20°C ≥ 70

## Packaging and welding data:

Dia. mm.	Length mm.	Weight / spool kg.	Current A	Voltage V
1,6	S200	4,5	140-240	18-25
1,6	BS300	15	140-240	18-25

**Wire type:**

Basic cored wire

**Current:**

**Welding positions:**

**Approvals:**

ABS, DNV, LR, TÜV

**Shielding gas:**

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>, M33 = ArCO<sub>2</sub>O<sub>2</sub>

Hilcord 51 is our seamless copper coated basic flux cored wire for MAG welding unalloyed and low alloyed structural steels. Wire has characteristics typical for basic type consumables: weld deposits have superior impact toughness and crack resistance comparable to stick electrodes type E7018. Hilcord 51 is a guaranteed low hydrogen content wire ( $H_{DM} < 5 \text{ ml/100 gr. deposit weld metal}$ ). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	-	Fer SG 2	H 100 / HW 530	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,50	0,45	≤ 0,030	≤ 0,025							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 24	-40°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

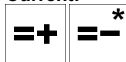
Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-350	18-32
1,6	B300	16	200-450	20-34



## Wire type:

Basic cored wire

## Current:



\*all positions

## Welding positions:



## Approvals:

-

## Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 51.71 is our basic flux cored wire for MAG welding unalloyed and low alloyed structural steels. Wire has characteristics typical for basic type consumables: weld deposits have superior impact toughness and crack resistance comparable to stick electrodes type E7018-1. Under mixed gas shielding (M21 = ArCO<sub>2</sub>) the wire can be welded in all-positions. Hilcord 51.71 can be use in single and multipass applications and is recommended for medium to heavy constructions.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	-	Fer SG 2	H 100 / HW 530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,40	0,50	< 0,030	< 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 24	-50°C ≥ 50
Stress relieved	≥ 400	≥ 500	≥ 26	-50°C ≥ 60

Note: properties under M21 = ArCO<sub>2</sub> gas shielding  
SR 580°C 15h

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	15	100-350	18-32
1,6	BS300	15	160-450	20-34

**Wire type:**

Metal cored wire

**Current:**

**Welding positions:**

**Approvals:**

LR, GL, DNV, CL, TüV, DB+Ü

**Shielding gas:**

M21 = ArCO<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

Hilcord 50 is our metal cored wire for MAG welding of unalloyed and low alloyed structural steels. Wire offers excellent weldability and deposition rates of > 6,0 kilo per hour can be reached (dia 1,2 mm.). Hilcord 50 is used in a wide range of applications: shipbuilding, machinery, general constructions, bridge constructions etc.

**Base materials to be welded:**

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Regina 150	K 60	-	-	H60 / HW430	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,35	0,60	≤ 0,030	≤ 0,020							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 24	-30°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	S200	4,5	90-340	15-34
1,2	B300	15	90-340	15-34
1,6	B300	15	145-400	15-36
1,2	Drums	200	90-340	15-34

## Wire type:

Metal cored wire

## Current:



## Welding positions:



**Approvals:** BV, CL, DB+Ü, DNV, LR, TÜV, GL

## Shielding gas:

M21 = ArCO<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

Hilcord 52 is our seamless copper coated metal cored wire for MAG welding unalloyed and low alloyed structural steels in all welding positions. Wire is spatter free, offers good side wall wetting, concave weld shape, radiographical soundness and porosity free weld metal. Hilcord 52 is a guaranteed low hydrogen content wire (H<sub>DM</sub> < 5 ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Regina 150	K 60	-	-	H60 / HW 430	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,40	0,65	≤ 0,030	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 530	≥ 24	-20°C ≥ 50
Stress relieved	≥ 420	≥ 510	≥ 26	-20°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

SR 620°C 1h

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	S200	5	120-350	17-32
1,0	B300	16	90-280	16-30
1,2	B300	16	120-350	17-32
1,6	B300	16	200-450	20-34

**Wire type:**

Metal cored wire

**Current:**

**Welding positions:**

**Approvals:**

LR, TÜV, DNV

**Shielding gas:**

M21 = ArCO<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

Hilcord 54 is our metal cored wire for all-position welding of unalloyed and low alloyed structural steels under mixed gas shielding. The wire has outstanding welding properties in short-arc and spray-arc range. Excellent mechanical properties in both as welded and PWHT condition. Hilcord 54 is slagless, offers a high efficiency, is almost spatter-free. Wire offers excellent mechanical properties (CNV 1 60J at -40°C). Typical applications include semi-automatic and mechanised welding of thin sheet metals (> 3 mm.).

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	OAW
Regina 150	SG 3	-	Fer SG 2	H 100 / HW 530	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,40	0,60	≤ 0,020	≤ 0,020							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 560	≥ 22	+20°C ≥ 130 -40°C ≥ 70
PWHT 580°C/2h.	≥ 420	≥ 520	≥ 22	+20°C ≥ 130 -40°C ≥ 70

Notes: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B200	5	90-330	16-33
1,2	B300	16	90-330	16-33
1,2	Drums	200	90-340	16-36
1,6	B300	16	170-450	20-34

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG1 is our copper coated wire for TIG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks and is extremely suited for joining thin sheet metals. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Velveta	SG 1	Hilcord 40	-	-	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,09	1,20	0,60	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 26	-20°C ≥ 80

Notes: properties under pure Argon gas shielding

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Fer SG 1A is our copper coated wire for TIG welding unalloyed and low alloyed galvanized structural steels. We have added Ti, Zr and Al to the wire, this makes Fer SG 1A ideal for welding oxydized (rusted) material and also coated plate (primed or painted). To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	SG 1A Superflow	Hilcord 40	-	H100 / HW530	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Ti	Zr	Al
0,06	1,10	0,50	≤ 0,030	≤ 0,025					0,15	0,12	0,15

Note: single values for Ti, Zr, Al are maximum values

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 27	-20°C ≥ 80

Note: properties under pure Argon gas shielding

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Fer SG 2 is our copper coated wire for TIG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks etc. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	Hilcord 40	-	H100 / HW530	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,40	0,85	≤ 0,030	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 560	≥ 22	-20°C ≥ 70

Notes: properties under pure Argon gas shielding

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG 3 is our copper coated wire for TIG welding structural steels with a maximum tensile strength of 620 MPa. Typical applications include: general constructions, shipbuilding, bridges, tanks etc. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	SG 3	Hilcord 51	-	H100 / HW 530	Fer G 2

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,75	0,90	≤ 0,030	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 600	≥ 24	-40°C ≥ 50

Notes: properties under pure Argon gas shielding

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5



### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

TüV

### Shielding gas:

Oxy-acetylene

Fer G 1 is our copper coated rod for oxy-acetylene gas welding of unalloyed structural steels. Fer G 1 is easy flowing and gives a very clean smooth weld. Operating temperature of the workpiece is maximum 350°C.

### Base materials to be welded:

- Structural steel S185-255, St.33-St37.3
- Boiler steel P235GH-P265GH, HI, HII
- Pipe steel P235T1-L210, St.37.0-St.44.0

### Applications:

- Construction works
- Repair shops
- Office furniture industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	SG 1	Hilcord 40	Fer SG 1	H60 / HW 430	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,50	0,15	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 280	≥ 360	≥ 20	+20°C ≥ 30

Note: properties under oxy-acetylene gas

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5 / 25
2,0	1000	5 / 25
2,4	1000	5 / 25
3,0	1000	5 / 25
4,0	1000	5 / 25

### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

TÜV

### Shielding gas:

Oxy-acetylene

Fer G 2 is our copper coated rod for oxy-acetylene gas welding of unalloyed structural steels. Fer G 2 offers better mechanical properties than Fer G 1. The viscosity of the weld metal makes out-of-position welding very simple. Operating temperature of the workpiece is maximum 350°C.

### Base materials to be welded:

- Structural steel S185-S275, St.33-St44.2
- Boiler steel P235GH-P265GH, HI, HII
- Pipe steel P235T1, L210, St.37.0-St.44.0

### Applications:

- Construction works
- Pressure vessel & boiler industry
- Repair shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	SG 2	Hilcord 40	Fer SG 2	H60 / HW 430	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,15	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 300	≥ 390	≥ 20	+20°C ≥ 50

Note: properties under oxy-acetylene gas

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

TÜV

### Shielding gas:

Oxy-acetylene

Fer G 3 is our copper coated rod with 0,5% Ni for oxy-acetylene gas welding unalloyed and low alloyed structural steels. Recommended for welding circumferential joints in pipes, where good penetration and good X-ray values is required. Fer G 3 does not spatter and it has an easy controllable molten pool. Operating temperature of the workpiece is maximum 350°C.

### Base materials to be welded:

- Structural steel S185-S275, St.33-St50.2
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Pipe steel P235T1, L210, St.37.0-St.52.0, St45.8 X42, StE210.7

### Applications:

- Construction works
- Pressure vessel & boiler industry
- Repair shops
- Gas industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	SG 3	Hilcord 40	Fer SG 3	H100 / HW 430	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,20	≤ 0,030	≤ 0,030		0,50					

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 310	≥ 410	≥ 22	+20°C ≥ 60

Notes: properties under oxy-acetylene gas

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	1000	5
2,4	1000	5
3,0	1000	5

### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

TÜV

### Shielding gas:

Oxy-acetylene

Fer G 4 is our copper coated rod with 0,5% Mo content for oxy-acetylene gas welding fine grain and creep resistant Mo steels like 16Mo3. Very smoothly flowing wire with no loss due to spatter. Approved for working temperatures up to 500°C. Also available as non copper coated rod.

### Base materials to be welded:

- Structural steel S185-S355J2, St.33-St52.3, St50.2
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4 16Mo3, 15Mo3
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel P235T1-P355N, L210-L360MB, St.37.0-St.52.4, St 45.8, X42-X52, StE210.7-StE360.7TM

### Applications:

- Construction works
- Pressure vessel & boiler industry
- Repair shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	SG Mo	Hilcord 60M	Fer SG Mo	H100Mo / HW530	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,11	1,10	0,20	≤ 0,030	≤ 0,030			0,50				

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 350	≥ 450	≥ 22	+20°C ≥ 60

Note: properties under oxy-acetylene gas

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

HW 430: BV, CL, DNV, LR

H 60 is our solid wire for submerged arc welding of unalloyed and low alloyed structural steels in combination with Hilcoweld fluxes HW 430, HW 450. Also suitable for hardfacing bulldozer tracks in combination with Hilcoweld flux HW 400.

**Base materials to be welded:**

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	Hilcord 40	Fer SG 2	-	Fer G 1

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,50	0,10	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
	HW 430	HW 450	HW 430	HW 450	HW 430	HW 450	HW 430	HW 450
In combination with flux								
As welded	≥ 400	≥ 380	≥ 500	≥ 500	≥ 25	≥ 26	0°C ≥ 50	+20°C ≥ 40

Note: Combination with flux HW 400 gives a hardness of max. 400 HB.

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25
3,2	B415	25
4,0	B415	25
4,8	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

HW 530: ABS, BV, CL, DNV, GL, LR, TÜV

HW 580: BV, CL, DNV, LR

H 100 is our solid wire for submerged arc welding of unalloyed and low alloyed structural steels in combination with Hilcoweld fluxes HW 430, HW 530, HW 580. H 100 is the ideal choice for shipbuilding, general constructions and pressure vessel industries.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESStE355, StE285TM-ESStE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	Hilcord 51	Fer SG 2	-	Fer G 2

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,10	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

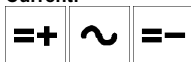
Condition	0,2% Yield strength			Tensile strength			Elongation			Impact Values		
	MPa			MPa			Lo=5d - %			ISO-V J		
In combination with flux	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580
As welded	≥ 400	≥ 400	≥ 510	≥ 520	≥ 520	≥ 600	≥ 25	≥ 26	≥ 26	-20°C 27	-40°C 50	-40°C 70

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,0	B415	25
2,5	B415	25
3,2	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 100 Si is our silicon alloyed wire for submerged arc welding of unalloyed and low alloyed structural steels in combination with Hilcoweld fluxes HW 430, HW 530, HW 580. Applications include shipbuilding, general construction and pressure vessel industries.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	Hilcord 40	Fer SG 2	-	Fer G 2

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,30	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa			Tensile strength MPa			Elongation Lo=5d - %			Impact Values ISO-V J		
	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580
In combination with flux												
As welded	≥ 400	≥ 430	≥ 480	≥ 520	≥ 530	≥ 550	≥ 25	≥ 28	≥ 27	-20°C 27J	-20°C 80J	-20°C 80J

**Packaging data:**

Packaging:		
Dia. mm.	Spooltype	Weight / spool kg.
2,0	B415	25
2,5	B415	25
3,2	B415	25
4,0	B415	25

**Wire type:**  
SAW Cored wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

Hilcord 100 is our metal cored wire for submerged arc welding of unalloyed and low alloyed structural steels in combination with Hilcoweld fluxes HW 430, HW 530. Hilcord 100 offers exceptional productivity as deposition rates achieved can be up to +20% higher than with the same size of solid wire at the same welding parameters.

**Base materials to be welded:**

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	OAW
Red Extra	K 60	Hilcord 52	Fer SG 2	-	Fer G 2

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,50	0,60									

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
In combination with flux	HW430	HW530	HW430	HW530	HW430	HW530	HW430	HW530
As welded	≥ 440	≥ 490	≥ 560	≥ 540	≥ 28	≥ 28	-20°C ≥ 27	-20°C ≥ 40

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,0	B415	25
2,4	B415	25
3,2	B415	25



## Flux type:

Fused, Mn/Si alloying

Grain size: 12x150

## Current:



## Welding positions:



## Approvals in combination with wire:

-

HW 150 is our fused flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid wires H60, H100. HW 150 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. The basicity index is 0,8 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Repair Shops

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60	0,05	0,40	1,00					
H 100	0,05	0,40	1,40					

## Mechanical properties, weld metal – typical:

Condition		0,2% Yield strength	Tensile strength	Elongation	Impact Values ISO-V J			
A = as welded		MPa	MPa	Lo=5d - %	+20°C	0°C	-20°C	-40°C
H 60	A	≥ 360	≥ 470	≥ 27		≥ 60		
H 100	A	≥ 440	≥ 560	≥ 22		≥ 50		

## Packaging data:

type	Weight / kg.
bag	25 kilo

## Flux type:

Fused, Mn/Si alloying

Grain size: 40x150

## Current:



## Welding positions:



## Approvals in combination with wire:

-

HW 155 is our fused flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid wires H60, H100. HW 155 is specifically developed for high speed welding on thin sheet metals (3 to 5 mm. thickness). Typical applications include the manufacturing of lamp and telephone poles. Flux is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. The basicity index is 0,9 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60	0,04	0,20	1,20					
H 100	0,04	0,30	1,30					

## Mechanical properties, weld metal – typical:

Condition A = as welded	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J			
				+20°C	0°C	-20°C	-40°C
H 60	A	≥ 420	≥ 520	≥ 22	≥ 45		
H 100	A	≥ 440	≥ 560	≥ 22	≥ 45	≥ 30	

## Packaging data:

type	Weight / kg.
bag	25 kilo

## Flux type:

Agglomerated rutile, Mn/Si alloying

## Current:



## Welding positions:



## Approvals in combination with wire:

H 60: BV, CL, DNV, LR

HW 430 is our agglomerated rutile flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid wires H60, H100, H100Si and metalcored wire Hilcord 100. HW 430 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. Flux/wire usage ratio 1:1, the basicity index is 0,4 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60	0,04	0,80	1,20					
H 100	0,04	0,80	1,40					
H 100 Si	0,04	1,10	1,50					
Hilcord 100	0,08	1,40	1,70					

## Mechanical properties, weld metal – typical:

Condition A = as welded		0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J			
					+20°C	0°C	-20°C	-40°C
H 60	A	≥ 400	≥ 500	≥ 25		≥ 50		
H 100	A	≥ 400	≥ 520	≥ 25		≥ 40	≥ 27	
H 100 Si	A	≥ 400	≥ 520	≥ 25		≥ 40	≥ 27	
Hilcord 100	A	≥ 440	≥ 560	≥ 28		≥ 40	≥ 27	

## Packaging data:

type	Weight / kg.
bag	25 kilo

### Flux type:

Agglomerated rutile, Mn/Si alloying

### Current:



### Welding positions:



### Approvals in combination with wire:

-

HW 450 is our agglomerated rutile flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid wire H60. HW 450 is specifically developed for applications where a "breathing" flux is required f.i. working temperatures up to 500°C. Typical applications include reconditioning pistons. HW 450 is suitable for single pass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. Flux/wire ratio is very economical < 0,7:1.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

### Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60	0,05	1,10	1,10					

### Mechanical properties, weld metal – typical:

Condition A = as welded	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J			
				+20°C	0°C	-20°C	-40°C
H 60 A	≥ 400	≥ 500	≥ 26		≥ 40		

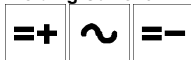
### Packaging data:

type	Weight / kg.
bag	25 kilo

## Flux type:

Agglomerated (semi) basic

## Welding Current:



## Welding positions:



## Approvals in combination with wire:

H100: ABS, BV, CL, DNV, GL, LR, TÜV

HW 530 is our agglomerated semi-basic flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid mild steel wires H100, H100Si and metalcored wire Hilcord 100. HW 530 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. The weld metal, produced in combination with corresponding wires, offers good mechanical properties also at low temperatures. The basicity index is 1,3 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cu	P	S
H 100	0,04	0,40	1,30					
H 100 Si	0,04	0,60	1,30					
Hilcord 100	0,08	1,00	1,50					

## Mechanical properties, weld metal – typical:

Condition A = as welded S = stress relieved 620°C 1 hr.		0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J		
					0°C	-20°C	-40°C
H 100	A	≥ 400	≥ 520	≥ 26	-	100	50
H 100	S	≥ 400	≥ 500	≥ 25	-	110	50
H 100 Si	A	≥ 400	≥ 530	≥ 28	100	80	-
H 100 Si	S	≥ 400	≥ 500	≥ 25	100	80	-
Hilcord 100	A	≥ 490	≥ 540	≥ 28	-	40	-

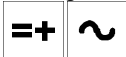
## Packaging and welding data:

type	Weight / kg.
bag	25 kilo

## Flux type:

Agglomerated rutile, Cr/Mo alloying

## Welding Current:



## Welding positions:



## Approvals in combination with wire:

-

HW 400 is our agglomerated rutile flux for surfacing parts subject to wear using the submerged arc welding process. HW 400 is specifically developed for reconditioning bulldozer tracks and similar applications.

## Base materials to be welded:

## Applications:

- Repair shops

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60 (3 <sup>rd</sup> layer)	0,25	0,70	2,00		0,5	3,0		

## Mechanical properties, weld metal – typical:

Condition A= as welded	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
H 60 A	> 360	> 450	> 22	400 HB

## Packaging and welding data:

type	Weight / kg.
bag	25 kilo

**Coating type:**

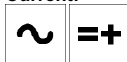
Special

**Arc voltage:** 70V

**Approvals:**

-

**Current:**



**Tip colour:**

Violet

**Welding positions:**



**Printing:**

CUTIL

Cutil is our electrode for cutting, gouging, chamfering and piercing of all metals, including stainless, aluminium, cast iron and non ferrous alloys. Cutil guarantees welders easy performance, high cutting and gouging rates and easy handling. Take precautions when using: when grooving it is advised to lift the work so that the molten parent metal can run off better. The electrode should be set as horizontal as possible to the workpiece and kept in contact constantly. Push the electrode slightly to increase the working speed.

**Base materials to be welded:**

- Structural steels
- Stainless steels
- Aluminium
- Nickel alloys
- Cast iron

**Applications:**

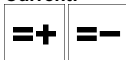
- All industries related to welding

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	37,9	130-180
4,0	450	72,9	170-230
5,0	450	107,1	210-390

**Coating type:**  
Copper coated

**Current:**



**Arc voltage:** 35-55V - power source needs OCV  $\geq$  60V

Carbon gouging rods are copper-coated air carbon arc cutting rods made from a mixture of graphite and pure carbon. Typical applications can be found in every field of metalworking, in foundries, steel constructions, shipbuilding, repair & maintenance. Carbon gouging rods are used for weld edge preparations, back-gouging in multipass welding, removing unsatisfactory welds, bolt and wire ends, spatter removal, all kinds of cutting.

## Base materials to be welded:

- Carbon, low-alloyed steels
- Stainless steels
- Aluminium
- Nickel alloys
- Cast iron
- Copper alloys
- Magnesium

## Applications:

- All industries related to welding

## Process description, recommendations for usage

Carbon gouging rods remove molten metal with a jet of air. The intense heat of an arc between the carbon-graphite electrode and a workpiece melts a portion of the metal, while simultaneously a jet of air is passed through the arc to blow away the molten metal. The process (Air carbon arc cutting - CAC-A) is used for cutting and gouging, and it can be done manually or mechanized. Carbon steel, stainless steel, copper alloys, cast irons, aluminium, magnesium and nickel alloys can all be cut with Carbon gouging rods. The process requires an electrode holder, cutting electrodes, a power source and an air supply. Manual electrode holders are similar to shielded metal arc electrode holders (stick electrode holders). The electrode is held in a rotatable head containing air orifices. A valve is provided to turn the air on and off. Carbon gouging rods are round, pointed and copper coated. They are intended to use at DC current.

Base material	Electrode	Current	Remarks
Carbon, low-alloyed steels	DC	= +	-
Stainless steels	DC	= +	-
Aluminium	DC	= +	Extend electrode no more than 10 cm.
Nickel alloys	DC	= -	-
Cast iron	DC	= -	At middle of electrode current range
	DC	= +	At maximum current only
Copper alloys	DC	= +	At maximum current only
Magnesium	DC	= +	Clean surface before welding

## Packaging and welding data:

Dia. mm.	Length mm.	Current A
4,0	305	90-150
5,0	305	150-200
6,3	305	200-400
8,0	305	250-450
10,0	305	350-600



## Weather resistant steel

Weather resistant steels of Cor-Ten type have excellent weldability. All welding methods can be used when proper precautions are taken. In general matching filler metals should be used. For dissimilar joining i.e. weather resistant steel grades of different strength undermatching filler metals can be used, in such cases we recommend you to contact us for information.

When welding weather resistant steels it is important to minimize the risk of cold cracking (also known as hydrogen cracking or delayed cracking). Hydrogen in weld metal combined to stresses in the welded structure is the main reason for such cracking. The risk of cracking can be minimized by:

- preheating the base materials before welding
- ensuring that the joint surfaces are perfectly clean and dry
- minimizing the shrinkage stresses
- use a low hydrogen filler metal ( $H_{DM} < 5 \text{ ml} / 100 \text{ gr. deposit weld metal}$ )

## Creep resisting steel

Such steels are used for the creep resistance in medium-high to high temperature applications. Depending on the temperature for which they are intended, both base material and filler metals should guarantee strength properties at their respective working temperature. For exact welding recommendations we advise you to contact us.

In general are low alloyed creep resisting steels excellent weldable. Before, during and after welding special precautions should be taken on heat-treatment (preheating), interpass temperatures and post-weld heat-treatment (PWHT).

For more information we recommend you to contact us for information about the exact treatment for your application. In such case please specify the base materials used and provide us with as much specific information as possible.

## High strength steel

Low alloyed high strength steels offer users the possibility of reducing the dead weight of a construction and so increasing the possibilities of the same. Steels of this kind are widely used for pressure vessels, mobile cranes, lifting equipment, vehicle frames etc.

Low alloyed high strength steels owe their strength to their lowest as possible alloying content and their specific production process. As a result they can be welded easily when special precautions are taken. After welding it is important that the steel structure has maintained its specific microstructure giving the steel its high strength and toughness. It is therefore of utmost importance to give special attention to shear cutting, machining, forming, cold bending, folding as well as thermal cutting and welding. The welding process may bring a change in the steel's microstructure. If not done properly the base materials will lose its strength.

Take special and extra precautions when welding low alloyed high strength steels:

- ensure that the joint surfaces are perfectly clean and dry
- minimize the shrinkage stresses
- use the lowest heat input possible
- use a low hydrogen filler metal ( $H_{DM} < 5 \text{ ml} / 100 \text{ gr. deposit weld metal}$ )
- follow the PWHT recommendations of your filler metal supplier, post-heat the welded joint immediately after welding, the PWHT temperature should be the same as the preheat temperature.

When welding low alloyed high strength steels it is important to minimize the risk of cold cracking (also known as hydrogen cracking or delayed cracking). Hydrogen in weld metal combined to stresses in the welded structure is the main reason for such cracking.

The known DIN designations 1629, 1681, 17100, 17102, 17155 and 17172 have been replaced by EN standards. A summary of both old designations and their replacements is as follows:

OLD DESIGNATION (DIN)		EN STANDARD (NEW)	
Base materials	DIN	EN	designation
Pipe steel	DIN 1629 / 1630	EN 10216-1	P235T1
			P235T2
			P275T1
			P275T2
			P355N

Cast steel	DIN 1681	GS-45 GS-52	EN 10213-2	GP240R GP240H T1/T2
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Structural steel	DIN 17100	St. 33	EN 10025	S185
		St. 37-2		S235JR
		USt. 37-2		S235JRG1
		RSt. 37-2		S235JRG2
		St. 37-3U		S235J0
		St. 37-3N		S235J2G3
		St. 44-2		S275JR
		St. 44-3U		S275J0
		St. 44-3N		S275J2G3
		St. 52-3U		S355J0
		St. 52-3N		S355J2G3
		St. 50-2		E295
		St. 60-2		E335
		St. 70-2		E360

Fine grain steel	DIN 17 102	StE 285	EN 10028-3	P275N
		WStE 285		P275NH
		TStE 285		P275NL1
		ESiE 285		P275NL2
		StE 355		P355N
		WStE 355		P355NH
		TStE 355		P355NL1
		ESiE 355		P355NL2
		StE 460		P460N
		WStE 460		P460NH
		TStE 460		P460NL1
		ESiE 460		P460NL2
		StE 285 / -	EN 10113-2/3	S275N / S275M
		TStE 285 / -		S275NL / S275ML
		StE 355 / BStE 355 TM		S355N / S355M
		TStE 355 / BTStE355 TM		S355NL / S355ML
		StE 420 / BStE 420 TM		S420N / S420M
		TStE 420 / BTStE420 TM		S420NL / S420ML
		StE 460 / BStE 460 TM		S460N / S460M
		TStE 460 / BTStE460 TM		S460 NL / S460 ML

Base materials	OLD DESIGNATION (DIN)		EN STANDARD (NEW)	
	DIN	designation	EN	designation
Boiler steel	DIN 17 155	H I	EN 10028-2	P235GH
		H II		P265GH
		17 Mn 4		P295GH
		19 Mn 6		P355GH
		15 Mo 3		16 Mo 3
		13 CrMo 4 4		13 CrMo 4-5
		10 CrMo 9 10		10 CrMo 9-10

Fine grain steel (high strength steel)	-	TSiE 460 V	EN 10137-2	S460QL
		SiE 500 V / TSiE 500 V		S500Q / S500QL
		SiE 550 V / TSiE 550 V		S550Q / S550QL
		SiE 620 V / TSiE 620 V		S620Q / S620QL
		SiE 690 V / TSiE 690 V		S690Q / S690QL
		TSiE 890 V / TSiE 960 V		S890QL / S960QL

Fine grain steel (weather resistant)		S235JRW-S355JRW	S235J2G3Cu-S355J2G3Cu
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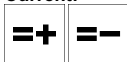
Base materials	OLD DESIGNATION (DIN)		EN STANDARD (NEW)		API 5L
	DIN	designation	EN	designation	design.
Pipe steel	DIN 17 172	SiE290.7	EN 10208-2	L240MB	X42
		SiE290.7TM		L290MB	
		SiE240.7		L240NB	
		SiE290.7		L290NB	
		SiE320.7		L320NB	X46
		SiE360.7TM		L360MB	X52
		SiE360.7		L360NB	
		SiE385.7		L385NB	X56
		SiE415.7		L415NB	
		SiE415.7TM		L415MB	X60
		SiE445.7TM		L445MB	X65
		SiE480.7TM		L480MB	X70
		SiE550.7TM		L550MB	X80

	DESIGNATION		EN STANDARD (NEW)	
Ships plate	Grade A		S235JRS2	
	Grade AH32		S315G1S	
	Grade AH36		S355G1S	
	Grade AH40		-	
	Grade B		-	
	Grade D		S235J2S1.0	
	Grade DH32		S315G2S	
	Grade DH36		S355G2S	
	Grade DH40		-	
	Grade E		S235J4S	
	Grade EH32		EN 17102: P315N	
	Grade EH36		S355G3S	
	Grade EH40		-	

## Coating type:

Basic

## Current:



## Welding positions:



Arc Voltage: 70V

## Approvals:

TÜV

## Tip colour:

-

## Printing:

Hilco B 12 Mo

B 12Mo is our basic-coated low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) electrode for welding low alloyed fine grain and creep resisting steels like 16Mo3 up to a maximum operating temperature of 500°C. Typical applications include the construction of pressure vessels, boilers and pipes. B 12Mo is preferably welded on DC current, root pass and narrow gap welding on DC- polarity.

## Base materials to be welded:

- Boiler steel P235GH-P310GH, 16Mo3, 17Mo3, 16Mo5, 14Mo6, 15NiCuMoNb5, 17MnMoV64, A355 Grade P1
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel L320NB-L415NB, L360MB-L415MB  
API 5L X52-X70

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Mo	Hilcord 60M	Fer SG Mo	H100Mo / HW530	Fer G 4

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	0,80	0,40	≤ 0,010	≤ 0,020			0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 560	≥ 22	-40°C ≥ 40
Stress relieved	≥ 460	≥ 560	≥ 22	-40°C ≥ 60

Note: stress relieved condition 620°C / 2 h.

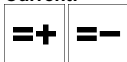
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	22,7	80-110
3,2	350	37,5	100-140
4,0	350	55,3	130-180
5,0	450	109,1	190-230

## Coating type:

Basic

## Current:



## Welding positions:



**Arc Voltage:** 70V

## Approvals:

TÜV

## Tip colour:

-

## Printing:

Hilco B 19 CrMo

B 19 CrMo is our basic-coated low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) for welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. B 19CrMo is preferably welded on DC current, root pass and narrow gap welding on DC- polarity.

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG CrMo 1	Hilcord 61M	Fer SG CrMo 1	H100CrMo1/HW 580	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,07	0,80	0,40	$\leq 0,020$	$\leq 0,020$	1,10		0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	$\geq 490$	$\geq 590$	$\geq 22$	+20°C $\geq 100$

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

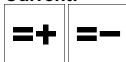
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	23,6	80-110
3,2	350	38,3	100-140
4,0	350	55,3	130-180

## Coating type:

Basic

## Current:



## Welding positions:



**Arc Voltage:** 70V

## Approvals:

-

## Tip colour:

-

## Printing:

Hilco B 20 CrMo

B 20 CrMo is our basic-coated low hydrogen ( $H_{DM} < 5 \text{ ml. / 100 gr. deposit weld metal}$ ) electrode for welding low alloyed fine grain and creep resisting steels like 10CrMo9.10 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. B 20CrMo is preferably welded on DC current, root pass and narrow gap welding on DC- polarity.

## Base materials to be welded:

- Boiler steel 10CrMo9.10, A335 Grade P22, 10CrSiMoV7 (1.8075), G17CrMo9.10 (1.7379)
- Heat treatable steels up to 980 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG CrMo 2	Hilcord 62M	Fer SG CrMo 2	H60CrMo2/HW580	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,07	0,80	0,40	≤ 0,020	≤ 0,025	2,20		1,00				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 530	≥ 620	≥ 20	+20°C ≥ 100

Notes: stress relieved condition 730°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 10CrMo9.10 preheat 200-300°C, PWHT 660-730°C min. 1/2 h., cool down slowly

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	39,2	90-145
4,0	350	56,5	120-185

## Coating type:

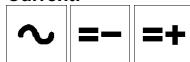
Basic

Arc voltage: 70V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

BASIC 70 / E8018-C3

Basic 70 is our basic-coated low hydrogen ( $H_{DM} < 5$  ml. / 100 gr. deposit weld metal) electrode for welding low alloyed structural steels having a nominal yield strength up to 550 MPa used in applications where good sub-zero toughness is required down to  $-60^{\circ}\text{C}$ . Typical applications include heavy machinery, petrochemical equipment and offshore constructions. Basic 70 is an all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SGNi 1	Hilcord 43	Fer SG Ni1	H100 Ni1/HW530	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	1,00	0,45	$\leq 0,005$	$\leq 0,010$		0,90					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation $L_0=5d$ - %	Impact Values ISO-V J
As welded	$\geq 480$	$\geq 580$	$\geq 23$	$-60^{\circ}\text{C} \geq 70$
Stress relieved	$\geq 470$	$\geq 560$	$\geq 25$	$-60^{\circ}\text{C} \geq 50$

Notes: stress relieved condition  $620^{\circ}\text{C} / 1$  h. - preheat and PWHT should match with the requirements of the base metal.

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	19,5	60-110
3,2	350	38,2	80-155
4,0	450	75,0	140-210
5,0	450	107,1	200-270

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M33 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG Cor-Ten is our solid wire for MAG welding low alloyed weather resistant steels like Cor-Ten A, B, Patinax and similar CuNi-alloyed steels. Typical applications include steel structures, bridge constructions, railwaycars.

## Base materials to be welded:

- Weather resistant steel S235J2G3Cu-S355J2G3Cu  
S235JRW-S355JRW, S235J2W-S355J2W  
Corten, Patinax, Alcodur 50, Koralpin 52, Domex

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Rail wagons
- Container frames

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	Hilcord Cor-Ten	Fer Cor-Ten	Cor-Ten / HW530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,40	0,80	≤ 0,025	≤ 0,025	0,40	0,40		0,40			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 550	≥ 24	-20°C ≥ 80

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	B300	16	80-180	17-20
1,0	B300	16	160-260	18-26
1,2	B300	16	180-300	20-29



**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M21 = ArCO<sub>2</sub>

K 80 is our solid wire for MAG welding low alloyed high strength steels having a nominal yield strength of 690 MPa such as: HY 80, N-A-XTRA 63, N-A-XTRA 70, Weldox 700, Grade 100, USS T-1 and similar HSLA steel grades. Typical applications include crane fabrication, automotive and transport industries. A low heat input is recommended to obtain the mechanical properties desired. .

**Base materials to be welded:**

- Fine grain steel S620QL1, S690QL1, S700MC  
N-A-XTRA 63-70, TStE620-TStE690, T1, Weldox 700
- Pipe steel L480-L550, API 5L X65-X80

**Applications:**

- Construction works
- Pipelines
- Transport & lifting industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	Hilcord 59M	K80 (TIG)	H150NiCrMo1 / HW 580	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,50	0,60	≤ 0,025	≤ 0,025	0,35	1,50	0,25	< 0,25		0,09	

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 690	≥ 750	≥ 17	-40°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,0	B300	16	120-240	17-22
1,2	B300	16	160-260	18-26

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M11-M33 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG Mo is our solid wire for MAG welding of low alloyed fine grain and creep resisting steels like 16Mo3 up to a maximum operating temperature of 500°C. Typical applications include the construction of pressure vessels, boilers and pipes.

**Base materials to be welded:**

- Boiler steel P235GH-P310GH, 16Mo3, 17Mo3, 16Mo5, 14Mo6, 15NiCuMoNb5, 17MnMoV64, A355 Grade P1
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel L320NB-L415NB, L360MB-L415MB  
API 5L X52-X70

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	-	Hilcord 60M	Fer SG Mo	H100Mo / HW530	Fer G 4

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,60	≤ 0,025	≤ 0,025			0,50				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 560	≥ 22	-20°C ≥ 60

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	15	80-180	17-20
1,0	BS300	15	120-240	18-26
1,2	BS300	15	160-260	20-29

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
M11-M33 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG CrMo1 is our solid wire for MAG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes.

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	-	Hilcord 61M	SG CrMo1	H100CrMo1/HW530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025	1,20		0,50				

Note: AWS spec. ER80S-B2 Mn 0,40-0,70%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 460	≥ 560	≥ 26	+20°C ≥ 47

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	15	80-180	17-20
1,0	BS300	15	120-240	18-26
1,2	BS300	15	160-260	20-29

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M21-M33 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG CrMo2 is our solid wire for MAG welding low alloyed fine grain and creep resisting steels like 10CrMo9.10 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes.

## Base materials to be welded:

- Boiler steel 10CrMo9.10, A335 Grade P22, 10CrSiMoV7 (1.8075), G17CrMo9.10 (1.7379)
- Heat treatable steels up to 980 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 20 CrMo	-	Hilcord 62M	SG CrMo2	H60CrMo2/HW530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,00	0,60	≤ 0,025	≤ 0,025	2,50		1,00				

Note: AWS spec. ER90S-B3 Mn 0,40-0,70%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 400	≥ 500	≥ 22	+20°C ≥ 47

Notes: stress relieved condition 730°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 10CrMo9.10 preheat 200-300°C, PWHT 660-730°C min. 1/2 h., cool down slowly

## Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
0,8	BS300	15	80-180	17-20
1,0	BS300	15	120-240	18-26
1,2	BS300	15	160-260	20-29

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M21 = ArCO<sub>2</sub>

SG Ni 1 is our solid wire for MAG welding low alloyed structural steels having a nominal yield strength up to 550 MPa used in applications where good sub-zero toughness is required down to -60°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic 70	-	Hilcord 43	Fer SG Ni1	H100Ni1/HW530	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025		0,90					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 580	≥ 24	-60°C ≥ 60

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	15	160-260	20-29

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions**



**Approvals:**

-

**Shielding gas:**

M21 = ArCO<sub>2</sub>

SG Ni2,5 is our Ni-alloyed solid wire for MAG welding low alloyed cryogenic steels used in applications where excellent sub-zero toughness is required down to -80°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions.

## Base materials to be welded:

- Fine grain steels S275NL2-S500QL1, StE315-StE500  
12Ni14 G1/G2, X 12 Ni 5, 13MnNi 6-3

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road construction
- Pressure vessel & boiler industry
- Pipelines

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	Fer SG Ni 2,5	H100Ni2/HW580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,50	≤ 0,025	≤ 0,025		2,50					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 510	≥ 620	≥ 22	-70°C ≥ 60
Stress relieved	≥ 480	≥ 560	≥ 24	-80°C ≥ 55

Note: stress relieved condition 680°C / 2 h.

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	15	160-260	20-29

## Wire type:

Basic cored wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord Cor-Ten is our seamless copper coated basic flux cored wire for MAG welding low alloyed weather resistant steels like Cor-Ten A, B, Patinax and similar CuNi-alloyed steels. Typical applications include steel structures, bridge constructions, railwaycars. Hilcord Cor-Ten is a guaranteed low hydrogen content wire ( $H_{DM} < 5$  ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Weather resistant steel S235J2G3Cu-S355J2G3Cu  
S235JRW-S355JRW, S235J2W-S355J2W  
Corten, Patinax, Alcodur 50, Koralpin 52, Domex

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Railway wagons
- Container frames

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Cor-Ten	-	Fer Cor-Ten	Cor-Ten / HW530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	1,20	0,35	≤ 0,025	≤ 0,025		1,20		0,50			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 470	≥ 540	≥ 24	-40°C ≥ 60

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	16	160-260	18-26

## Wire type:

Metal cored wire

## Current:



## Welding positions:



## Approvals:

LR

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 59M is our seamless copper coated metal cored wire for MAG welding low alloyed high strength steels having a nominal yield strength of 690 MPa such as: HY 80, N-A-XTRA 63, N-A-XTRA 70, Weldom 700, Grade 100, USS T-1 and similar HSLA steel grades. Typical applications include crane fabrication, automotive and transport industries. A low heat input is recommended to obtain the mechanical properties desired. Hilcord 59M is a guaranteed low hydrogen content wire ( $H_{DM} < 5 \text{ ml/100 g deposit weld metal}$ ).

## Base materials to be welded:

- Fine grain steel S620QL1, S690QL1, S700MC  
N-A-XTRA 63-70, TStE620-TStE690, T1, Weldom 700
- Pipe steel L480-L550, API 5L X65-X80

## Applications:

- Construction works
- Pipelines
- Transport & lifting industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 80	-	K 80 (TIG)	H150NiCrMo1 / HW580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,50	0,65	≤ 0,020	≤ 0,020	0,40	2,20	0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 690	≥ 760	≥ 17	-51°C ≥ 40

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-350	17-32



## Wire type:

Metal cored wire

## Current:



## Welding positions:



## Approvals:

TüV

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 60M is our seamless copper coated metal cored wire for welding low alloyed fine grain and creep resisting steels like 16Mo3 up to a maximum operating temperature of 500°C. Typical applications include the construction of pressure vessels, boilers and pipes. Hilcord 60M is a guaranteed low hydrogen content wire ( $H_{BM} < 5$  ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Boiler steel P235GH-P310GH, 16Mo3, 17Mo3, 16Mo5, 14Mo6, 15NiCuMoNb5, 17MnMoV64, A355 Grade P1
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel L320NB-L415NB, L360MB-L415MB  
API 5L X52-X70

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	SG Mo	-	Fer SG Mo	H100Mo / HW 530	Fer G 4

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,00	0,35	≤ 0,015	≤ 0,015			0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 490	≥ 560	≥ 22	-20°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-300	17-32

## Wire type:

Metal cored wire

## Current:



## Welding positions:



## Approvals:

TüV

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 61M is our seamless copper coated metal cored wire for MAG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. Hilcord 61M is a guaranteed low hydrogen content wire ( $H_{BM} < 5 \text{ ml/100 gr. deposit weld metal}$ ). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	SG CrMo1	-	Fer SG CrMo1	H 100CrMo1/HW 580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,00	0,35	≤ 0,015	≤ 0,015	1,00		0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 470	≥ 560	≥ 22	-20°C ≥ 50

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-300	17-32

**Wire type:**  
Metal cored wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
M21 = ArCO<sub>2</sub>

Hilcord 62M is our seamless copper coated metal cored wire for MAG welding low alloyed fine grain and creep resisting steels like 10CrMo9.10 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. Hilcord 62M is a guaranteed low hydrogen content wire (H<sub>DM</sub> < 5 ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

**Base materials to be welded:**

- Boiler steel 10CrMo9.10, A335 Grade P22, 10CrSiMoV7 (1.8075), G17CrMo9.10 (1.7379)
- Heat treatable steels up to 980 MPa tensile strength
- Case hardening and nitriding steels

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 20 CrMo	SG CrMo2	-	Fer SG CrMo2	H 60CrMo2/HW 580	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,07	0,90	0,35	≤ 0,015	≤ 0,015	2,20		1,00				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 540	≥ 620	≥ 18	+20°C ≥ 80

Notes: Stress relieved condition 710°C / 1 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 10CrMo9.10 preheat 200-300°C, PWHT 660-730°C min. 1/2 h., cool down slowly

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-350	17-32
1,4	B300	16	170-380	20-32

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

LR, TÜV

## Shielding gas:

M21 = ArCO<sub>2</sub>

-

Hilcord 43 is our seamless copper coated rutile flux cored wire for all position MAG welding of low alloyed structural steels having a nominal yield strength up to 550 MPa used in applications where good sub-zero toughness is required down to -50°C. Typical applications include open butt-joints using non-fusible backing materials. Hilcord 43 is a guaranteed low hydrogen content wire ( $H_{DM} < 5$  ml/100 g deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic 70	SG Ni 1	-	-	H100 Ni 1 / HW 530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,40	0,40	≤ 0,015	≤ 0,012		0,95					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 550	≥ 620	≥ 22	-50°C ≥ 50

Notes: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	16	120-300	20-32

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

LR

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 44 is our rutile flux cored wire for all position MAG welding of low alloyed structural steels having a nominal yield strength up to 550 MPa used in applications where good sub-zero toughness is required down to -60°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions.

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic 70	SG Ni 1	-	-	H100 Ni 1 / HW 530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,20	0,40	≤ 0,025	≤ 0,025		1,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 560	≥ 22	-40°C ≥ 70 J (-90J) -60°C ≥ 47 J (-60J)

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B200	5	160-300	20-32
1,2	B300	16	160-300	20-32

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding:**

I1 = Pure Ar

Fer Cor-Ten is our solid wire for TIG welding low alloyed weather resistant steels like Cor-Ten A, B, Patinax and similar CuNi-alloyed steels. Typical applications include steel structures, bridge constructions, railwaycars. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Weather resistant steel S235J2G3Cu-S355J2G3Cu  
S235JRW-S355JRW, S235J2W-S355J2W  
Corten, Patinax, Alcodur 50, Koralpin 52, Domex

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Rail wagons
- Container frames

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Cor-Ten	Hilcord Cor-Ten	-	Cor-Ten / HW530	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,50	0,80	≤ 0,025	≤ 0,025		0,90		0,40			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 550	≥ 24	-20°C ≥ 80

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

K 80 is our solid wire for TIG welding low alloyed high strength steels having a nominal yield strength of 690 MPa such as: HY 80, N-A-XTRA 63, N-A-XTRA 70, Weldox 700, Grade 100, USS T-1 and similar HSLA steel grades. Typical applications include crane fabrication, automotive and transport industries. A low heat input is recommended to obtain the mechanical properties desired. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Fine grain steel S620QL1, S690QL1, S700MC  
N-A-XTRA 63-70, TStE620-TStE690, T1, Weldox 700
- Pipe steel L480-L550, API 5L X65-X80

**Applications:**

- Construction works
- Pipelines
- Transport & lifting industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K80	Hilcord 59M	-	H150NiCrMo1/HW580	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,60	0,50	≤ 0,025	≤ 0,025	0,30	1,40	0,30	< 0,25		0,10	

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 690	≥ 750	≥ 17	-40°C ≥ 50

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
2,5	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Fer SG Mo is solid wire for TIG welding low alloyed fine grain and creep resisting steels like 16Mo3 up to a maximum operating temperature of 500°C. Typical applications include the construction of pressure vessels, boilers and pipes. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Boiler steel P235GH-P310GH, 16Mo3, 17Mo3, 16Mo5, 14Mo6, 15NiCuMoNb5, 17MnMoV64, A355 Grade P1
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel L320NB-L415NB, L360MB-L415MB  
API 5L X52-X70

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	SG Mo	Hilcrod 60M	-	H100Mo / HW530	Fer G-4

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,60	≤ 0,025	≤ 0,025			0,5				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	570	≥ 22	-20°C ≥ 60

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5



**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Fer SG CrMo1 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. To be used in combination with tungsten electrodes type Wolfram WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	SG CrMo1	Hilcrod 61M	-	H100CrMo1/HW580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025	1,20		0,50				

Note: AWS spec. ER 80S-B2 Mn 0,40-0,70%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 560	≥ 22	+20°C ≥ 100

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1, Pure Ar

Fer SG CrMo2 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like 10CrMo9.10 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Boiler steel 10CrMo9.10, A335 Grade P22, 10CrSiMoV7 (1.8075), G17CrMo9.10 (1.7379)
- Heat treatable steels up to 980 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 20 CrMo	SG CrMo2	Hilcord 62M	-	H60CrMo2/HW580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,00	0,60	≤ 0,025	≤ 0,025	2,50		1,00				

Note: AWS spec. ER 90S-B3 Mn 0,40-0,70%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 570	≥ 20	+20°C ≥ 80

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG CrMo5 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like 12CrMo19-5 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. Fer SG CrMo5 is also used for repair welding forging dies. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Boiler steel 12CrMo19.5, A335 Grade P5, C5 X12CrMo5 (1.7362), G-X12CrMo5 (1.7363)
- Heat treatable steels up to 1180 MPa tensile strength
- Case hardening and nitriding steels

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW wire	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	0,50	0,40	≤ 0,025	≤ 0,025	5,70		0,60				

Note:

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 630	≥ 20	+20°C ≥ 60

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	914 / 1000	5
2,0	914 / 1000	5
2,4	914 / 1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG CrMo9 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like A335 Gr. P9 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Boiler steel X-12CrMo9 1, A335 Grade P9  
G-X12CrMo101 (1.7389)

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW wire	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	0,55	0,45	≤ 0,025	≤ 0,025	9,00		1,00				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 650	≥ 18	+20°C ≥ 60

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	914 / 1000	5
2,0	914 / 1000	5
2,4	914 / 1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Fer SG Ni1 is our solid wire for TIG welding low alloyed structural steel having a nominal yield strength up to 550 MPa used in applications where good sub-zero toughness is required down to -60°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic 70	SG Ni1	Hilco 43	-	H100Ni1/HW530	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025		0,90					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 580	≥ 24	-60°C ≥ 60

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Welding Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG Ni2,5 is our Ni-alloyed solid wire for TIG welding low alloyed cryogenic steels under mixed gas shielding used in applications where excellent sub-zero toughness is required down to -80°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Fine grain steels S275NL2-S500QL1, StE315-StE500  
12Ni14 G1/G2, X 12 Ni 5, 13MnNi 6-3

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road construction
- Pressure vessel & boiler industry
- Pipelines

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Ni2,5	-	-	H100Ni2/HW580	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,50	≤ 0,025	≤ 0,025		2,50					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 510	≥ 620	≥ 22	-80°C ≥ 50

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5

### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

TÜV

### Shielding gas:

Oxy-acetylene

Fer G 4 is our copper coated rod with 0,5 Mo content for oxy-acetylene gas welding fine grain and creep resistant Mo steels like 16Mo3. Very smoothly flowing wire with no loss due to spatter. Approved for working temperatures up to 500°C. Also available as non copper coated rod.

### Base materials to be welded:

- Structural steel S185-S355J2, St.33-St52.3, St50.2
- Boiler steel P235GH-P295GH, H1, H11, 17Mn4 16Mo3, 15Mo3
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel P235T1-P355N, L210-L360MB, St.37.0-St.52.4, St 45.8, X42-X52, StE210.7-StE360.7TM

### Applications:

- Construction works
- Pressure vessel & boiler industry
- Repair shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	SG Mo	Hilcord 60M	Fer SG Mo	H100Mo / HW530	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,11	1,10	0,20	≤ 0,030	≤ 0,030			0,50				

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 350	≥ 450	≥ 22	+20°C ≥ 60

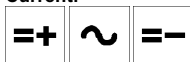
Note: properties under oxy-acetylene gas

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

HW 530: ABS, BV, CL, DNV, GL, LR, TÜV

HW 580: BV, CL, DNV, LR

H 100 is our solid wire for submerged arc welding of unalloyed and low alloyed structural steels in combination with Hilcowed fluxes HW 430, HW 530, HW 580. H 100 is the ideal choice for shipbuilding, general constructions and pressure vessel industries.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESStE355, StE285TM-ESStE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	Hilcord 51	Fer SG 2	-	Fer G 2

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,10	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa			Tensile strength MPa			Elongation Lo=5d - %			Impact Values ISO-V J		
	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580	HW430	HW530	HW580
In combination with flux	≥ 400	≥ 400	≥ 510	≥ 520	≥ 520	≥ 600	≥ 25	≥ 26	≥ 26	-20°C 27	-40°C 50	-40°C 70
As welded	≥ 400	≥ 400	≥ 510	≥ 520	≥ 520	≥ 600	≥ 25	≥ 26	≥ 26	-20°C 27	-40°C 50	-40°C 70

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,0	B415	25
2,5	B415	25
3,0	B415	25
4,0	B415	25



**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 150 is our manganese-alloyed wire for submerged arc welding of low alloyed structural and high tensile steels in combination with Hilcoweld fluxes HW 530, HW 580. Applications include general constructions, pressure vessel industries, boiler works and offshore constructions.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	Hilcord 51	Fer SG 3	-	Fer G 2

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	1,50	0,10	≤ 0,030	≤ 0,030							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580
In combination with flux								
As welded	≥ 460	≥ 480	≥ 530	≥ 550	≥ 28	≥ 26	-20°C ≥ 80	-20°C ≥ 150

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25
3,2	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 150 Si is our silicon-manganese alloyed wire for submerged arc welding of low alloyed and high tensile steels in combination with Hilcoweld flux HW 580. Applications include general constructions, pressure vessel industries, boiler works and offshore constructions.

#### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

#### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

#### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	OAW
Basic Directa	K 60	Hilcord 51	Fer SG 3	-	Fer G 2

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,70	0,30	< 0,015	< 0,015							

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 460	≥ 550	≥ 28	-60° ≥ 95

Notes:

#### Packaging data:

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25
3,2	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 200 is our manganese alloyed wire for submerged arc welding of low alloyed structural steels used in applications demanding good impact values even at low temperatures. Wire is used in combination with Hilcowed flux HW 580. Applications include general constructions, pressure vessel industries, boiler works.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	Hilcord 51	Fer SG 3	-	Fer G 2

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	2,00	0,10	≤ 0,025	≤ 0,025							

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 510	≥ 600	≥ 26	-60° ≥ 50

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25
3,2	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**  
HW 530: TÜV

Cor-Ten is our solid wire for submerged arc welding low alloyed weather resistant steels like Cor-Ten A, B, Patinax and similar CuNi-alloyed steels in combination with Hilcoweld flux HW 530. Typical applications include steel structures, bridge constructions, railwaycars.

**Base materials to be welded:**

- Weather resistant steel S235J2G3Cu-S355J2G3Cu  
S235JRW-S355JRW, S235J2W-S355J2W  
Corten, Patinax, Alcodur 50, Korlpin 52, Domex

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Rail wagons
- Container frames

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Cor-Ten	Hilcord Cor-Ten	Fer Cor-Ten	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,30				0,90	0,15	0,50			

**Mechanical properties, weld metal – typical:**

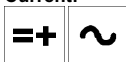
Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 530	HW 530	HW 530	HW 530
As welded	≥ 460	≥ 540	≥ 24	-20°C ≥ 50

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 150 NiCrMo1 is our solid wire for submerged arc welding low alloyed high strength steels having a nominal yield strength of 690 MPa such as: HY 80, N-A-XTRA 63, N-A-XTRA 70, Weldom 700, Grade 100, USS T-1 and similar HSLA steel grades. To be used in combination with Hilcoweld flux HW 580. Typical applications include crane fabrication, automotive and transport industries. A low heat input is recommended to obtain the mechanical properties desired.

**Base materials to be welded:**

- Fine grain steel S620QL1, S690QL1, S700MC
- N-A-XTRA 63-70, TStE620-TStE690, T1, Weldom 700
- Pipe steel L480-L550, API 5L X65-X80

**Applications:**

- Construction works
- Pipelines
- Transport & lifting industry

**Equivalent product in alternative welding process:**

SAW	GMAW	FCAW	GTAW	SAW	OAW
-	K 80	Hilcord 59M	K 80 (TIG)	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,14	1,70	0,10	≤ 0,020	≤ 0,020	0,35	2,10	0,60				

**Mechanical properties, weld metal – typical:**

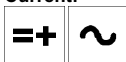
Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 690	≥ 760	≥ 18	-40°C ≥ 47

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**  
HW 580: CL, LR

H 100 Mo is solid wire for submerged arc welding of low alloyed fine grain and creep resistant steels like 16Mo3 up to a maximum operating temperature of 500°C. To be used in combination with Hilcoweld fluxes HW530, HW 580. Typical applications include the construction of pressure vessels, boilers and pipes.

**Base materials to be welded:**

- Boiler steel P235GH-P310GH, 16Mo3, 17Mo3, 16Mo5, 14Mo6, 15NiCuMoNb5, 17MnMoV64, A355 Grade P1
- Fine grain steel S275N-S500N, P355NH-P460NH, S355NL-S500NL
- Pipe steel L320NB-L415NB, L360MB-L415MB  
API 5L X52-X70

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 12 Mo	SG Mo	Hilcord 60M	Fer SG Mo	-	Fer G 4

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,20	≤ 0,020	≤ 0,020			0,50				

**Mechanical properties, weld metal – typical:**

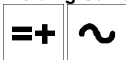
Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
In combination with flux	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580
As welded	≥ 490	≥ 560	≥ 590	≥ 640	≥ 24	≥ 24	-20°C 65	-40°C 50

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

**Wire type:**  
SAW Solid wire

**Welding Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 100CrMo1 is our solid wire for submerged arc welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. To be used in combination with flux HW 580. Typical applications include the construction of pressure vessels, boilers and pipes.

**Base materials to be welded:**

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

**Applications:**

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	SG CrMo1	Hilcord 61M	Fer SG CrMo1	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	0,90	0,20	≤ 0,020	≤ 0,020	1,10		0,50				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 500	≥ 600	≥ 23	+20°C ≥ 120

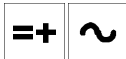
**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

## Wire type:

SAW Solid wire

## Current:



## Welding positions:



## Approvals in combination with flux:

-

H 60 CrMo2 is our solid wire for submerged arc welding low alloyed fine grain and creep resisting steels like 10CrMo9.10 up to a maximum operating temperature of 600°C. To be used in combination with Hilcoweld flux HW 580. Typical applications include the construction of pressure vessels, boilers and pipes.

## Base materials to be welded:

- Boiler steel 10CrMo9.10, A335 Grade P22, 10CrSiMoV7 (1.8075), G17CrMo9.10 (1.7379)
- Heat treatable steels up to 980 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 20 CrMo	SG CrMo2	Hilcord 62M	Fer SG CrMo2	-	-

## Chemical composition wire, wt. %:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	0,60	0,20	≤ 0,020	≤ 0,020	2,50		1,00				

## Mechanical properties, weld metal – typical:

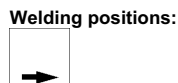
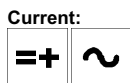
Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 500	≥ 600	≥ 23	+20°C ≥ 120

## Packaging data:

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo



**Wire type:**  
SAW Solid wire



**Approvals in combination with flux:**  
HW 530: TÜV

H 100 Ni 1 is our solid wire for submerged arc welding low alloyed structural steels having a nominal yield strength up to 550 Mpa. To be used in combination with Hilcoweld flux HW 530, HW 580. The wire is particularly used in applications where good sub-zero toughness is required down to -60°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions.

**Base materials to be welded:**

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355K2G4, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH
- Fine grain steel SP355NL2-S500QL1, S275N-S420ML
- Pipe steel P235T1-P355N, L360-L485MB/NB, St37.0-St52.4, St45.8, X52-X70
- Cast steel GP240R, GS45

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic 70	SG Ni1	Hilcord 43	Fer SG Ni1	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	1,10	0,20	≤ 0,025	≤ 0,025		0,95					

**Mechanical properties, weld metal – typical:**

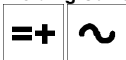
Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
In combination with flux	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580	HW 530	HW 580
As welded	≥ 460	≥ 510	≥ 550	≥ 590	≥ 27	≥ 26	-60°C ≥ 40	-60°C ≥ 50

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

**Wire type:**  
SAW Solid wire

**Welding Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

H 100 Ni2 is our Ni-alloyed solid wire for submerged arc welding low alloyed cryogenic steels under mixed gas shielding. To be used in combination with Hilcoweld flux HW 580. The wire is particularly used in applications where excellent sub-zero toughness is required down to -80°C. Typical applications include heavy machinery, petrochemical equipment and offshore constructions.

**Base materials to be welded:**

- Fine grain steels S275NL2-S500QL1, StE315-StE500  
12Ni14 G1/G2, X 12 Ni 5, 13MnNi 6-3

**Applications:**

- Shipyards/offshore
- Construction works
- Bridge & road construction
- Pressure vessel & boiler industry
- Pipelines

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG Ni2,5	-	Fer SG Ni2,5	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,10	0,15				2,50					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 580	HW 580	HW 580	HW 580
As welded	≥ 480	≥ 580	≥ 26	-80°C ≥ 45

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,5	B415	25 kilo
3,0	B415	25 kilo
4,0	B415	25 kilo

EN 760: S A AB 1 67 AC H5

AWS A5.17: F7A4-EM12 / F7A2--EM12K

AWS A5.23: F7A2-EG / F7A2-EA2 / F7AP6-ENi1

EN 756: S 42 3 AB S2 / S 46 2 AB S3 / S 46 2 AB S0 / S 46 2 AB S2Mo / S 46 6 AB S2Ni1

## Flux type:

Agglomerated (semi) basic

## Current:



## Welding positions:



## Approvals in combination with wire:

H 100: ABS, BV, CL, DNV, GL, LR, TÜV

Cor-Ten: TÜV

H 100 Ni1: TÜV

HW 530 is our agglomerated semi-basic flux for submerged arc welding low alloyed fine grain steels. HW 530 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. The weld metal, produced in combination with corresponding wires, offers good mechanical properties also at low temperatures. The basicity index is 1,3 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P460NH, S275N-S500N, StE285-EstE460, StE285TM-EstE460TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X70, StE210.7-StE360.7TM
- Cast steel GP240R, GS45, Weather resistant steel

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Container frames

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cu	P	S
H 100	0,04	0,40	1,30					
H 150	0,10	0,15	1,70					
Cor-Ten	0,10	0,25	1,00	0,90	0,15	0,50		
H 100 Mo	0,10	0,15	1,00		0,50			
H 100 Ni1	0,08	0,15	1,10	0,95				

## Mechanical Properties, weld metal – typical:

Condition A = as welded S = stress relieved 620°C 1 hr.		0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J			
					0°C	-20°C	-40°C	-60°C
H 100	A	≥ 400	≥ 520	≥ 26	-	-	50	-
H 150	A	≥ 460	≥ 530	≥ 28	-	80	-	-
Cor-Ten	A	≥ 460	≥ 540	≥ 24	70	50	-	-
H 100 Mo	A	≥ 490	≥ 590	≥ 24	-	65	35	-
H 100 Ni1	A	≥ 460	≥ 550	≥ 27	-	-	-	40
H 100 Ni1	S	≥ 430	≥ 520	≥ 27	-	-	-	70

## Packaging data:

type	Weight / kg.
bag	25 kilo

EN 760: S A FB 1 55 AC H5

AWS A5.17: F8A4-EM12 / F7A4-~EM12K / F7A6-EH12K / F8A6-EH14

AWS A5.23: F9A4-EA2-A2 / F8A0-EB2-B2 / F8A0-EB3-B3 / F11A8-EG-F6

F8A6-ENi1-Ni1 / F8A7-ENi2-Ni2

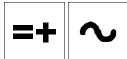
EN 756: S 50 4 FB S2 / S 46 2 FB S3 / S 46 6 FB S3Si / S 50 6 FB S4

S 50 2 FB S2Mo / - / S 46 6 FB S2Ni1 / S 46 6 FB S2Ni2

## Flux type:

Agglomerated high basic

## Current:



## Welding positions:



## Approvals in combination with wire:

H 100 Mo: CL, LR

HW 580 is our agglomerated high-basic flux for submerged arc welding low alloyed fine grain steels. HW 580 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. The weld metal, produced in combination with corresponding wires, offers good mechanical properties also at low temperatures. The basicity index is 2,1 ca. (Boniszewski).

## Base materials to be welded:

- Ship plates A - E(H)36, S235J - S355G3S
- Structural steels S185 - S355J2, St.33 - St. 52-3U
- Boiler steels P235GH-P355GH, H1, H11, 17Mn4, 19Mn6 16Mo3, A 355 Gr. P1, 13CrMo44, A 333 Gr. P12, 10CrMo9.10, A 335 Gr. P22
- Fine grain steels S275N-S500NL, StE 285-StE 355
- Pipe steels L210MB-L415MB, API 5L X52-X70
- Cast steels up to GS-18CrMo9.10
- Heat treatable, case hardening and nitriding steels

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessels & boiler industry
- Pipelines
- Transport & lifting industry

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 100	0,05	0,40	1,30					
H 150	0,10	0,15	1,60					
H 150 Si	0,10	0,40	1,70					
H 200	0,10	0,15	2,00					
H 100 Mo	0,10	0,15	1,00		0,50			
H 100 CrMo1	0,10	0,15	1,00		0,50	1,20		
H 60 CrMo2	0,10	0,15	0,60		1,00	2,50		
H 150 NiCrMo1	0,08	0,20	1,45	2,00	0,60	0,30		
H 100 Ni1	0,12	0,15	1,10	1,00				
H 100 Ni2	0,10	0,15	1,10	2,40				

EN 760: S A FB 1 55 AC H5

AWS A5.17: F8A4-EM12 / F7A4-~EM12K / F7A6-EH12K / F8A6-EH14

AWS A5.23: F9A4-EA2-A2 / F8A0-EB2-B2 / F8A0-EB3-B3 / F11A8-EG-F6

F8A6-ENi1-Ni1 / F8A7-ENi2-Ni2

EN 756: S 50 4 FB S2 / S 46 2 FB S3 / S 46 6 FB S3Si / S 50 6 FB S4

S 50 2 FB S2Mo / - / S 46 6 FB S2Ni1 / S 46 6 FB S2Ni2

## Mechanical properties, weld metal – typical:

Condition A = as welded		0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J				
					0°C	-20°C	-40°C	-60°C	-80°C
H 100	A	≥ 510	≥ 600	≥ 26	-	-	70	-	-
H 150	A	≥ 480	≥ 550	≥ 26	-	150	-	-	-
H 150 Si	A	≥ 460	≥ 550	≥ 28	-	-	-	95	-
H 200	A	≥ 510	≥ 600	≥ 26	-	-	-	50	-
H 100 Mo	A	≥ 560	≥ 640	≥ 24	-	80	50	-	-
H 100 CrMo1	A	≥ 500	≥ 600	≥ 23	80	-	-	-	-
H 60 CrMo2	A	≥ 500	≥ 600	≥ 23	80	-	-	-	-
H 150 NiCrMo1	A	≥ 690	≥ 760	≥ 18	-	80	47	-	-
H 100 Ni1	A	≥ 510	≥ 590	≥ 26	-	-	-	60	-
H 100 Ni2	A	≥ 480	≥ 580	≥ 26	-	145	-	-	45

## Packaging data:

type	Weight / kg.
bag	25 kilo

## What is Stainless Steel?

Stainless steel is the generic name for a number of different steels used primarily for their resistance to corrosion. The key element they all share is a certain minimum percentage (by mass) of chromium: 12%. Although other elements, particularly nickel and molybdenum, are added to improve corrosion resistance, chromium is always the deciding factor.

## What causes corrosion?

Corrosion is a natural phenomenon as nature seeks to combine other elements which man has produced in a pure form for his own use. Iron occurs naturally as iron ore. Pure iron is therefore unstable and wants to "rust"; that is to combine with oxygen in the presence of water. For most of the Iron Age, which began about 1000 BC, cast and wrought iron was used; iron with a high carbon content and various unrefined impurities. The production of steel did not begin until the 19th century. At present the majority of steel produced in the world is carbon steel, which can be defined as an alloy of a small content of carbon combined with well-refined iron. Despite its various additions stainless steel still behaves as steel, it is not like the nickel alloys that are really alloys of a number of different metals, iron ore only being one. Even highly alloyed stainless steel grades, such as 316, have a minimum of 62% iron.

Carbon steels without any protection will form a coating of rust that will in a sense protect the rest of the steel. So constantly removing the rust exposes a new fresh layer of steel to be attacked. This is called general corrosion. Various coatings will impede the rusting process, in particular painting, coating with zinc (galvanised steel), and epoxy resins. Another lateral way of reducing corrosion is to put corrosion inhibitors into the solutions that would otherwise cause iron to corrode.

## The unique advantage of stainless steel.

For a wide range of applications, stainless steel competes with carbon steels supplied with protective coatings, as well as other metals such as aluminium, brass and bronze. The success of stainless steel is based on the fact that it has one big advantage. The chromium in the stainless steel has a great affinity for oxygen, and will form on the surface of the steel at a molecular level a film of chromium oxide. This thin layer is described as passive, tenacious and self-renewing. Passive means that it does not react or influence other materials; tenacious means that it clings to the layer of steel and is not transferred elsewhere; self-renewing means that if damaged or forcibly removed more chromium from the steel will be exposed to the air and form more chromium oxide. This means that over a period of years a stainless steel knife can literally be worn away by daily use and by being re-sharpened on a sharpening stone and will still remain stainless. Manhole and access covers in the water treatment and chemical industry are widely made out of both galvanised steel and stainless steel. In normal use galvanised steel can last many years without corrosion occurring and in these cases there would be little advantage apart from aesthetic reasons to switch to stainless steel. Where stainless comes into its own is where the galvanised coating is constantly being worn away, for example by chains being dragged over it, or constantly being walked over, or where very corrosive chemicals are being randomly splashed onto it.

This leads to the fact that fabrication in stainless steel will always be more expensive than using ordinary steel, not just because of the higher cost of stainless steel, but also because it is more difficult to machine. However it is the better life cycle costs of stainless steel that makes it attractive, both in terms of much longer service life, less maintenance costs, and high scrap value on decommissioning.

## Product characteristics.

Stainless steel can be selected for use compared to other materials for a number of reasons, not just its corrosion resistance. These include:

- Aesthetic qualities: it can be polished to a satin or mirror finish;
- "Dry corrosion" occurs to steel at higher temperatures where it oxidises or scales up. Stainless steel is far more resistant to this than ordinary carbon steel and grades such as 310 (25% chromium 20% nickel) were specifically developed for use at high temperatures;
- Non-contamination of the liquids stainless comes into contact with, because there is no coating to break down and dissolve;
- Weight savings: as thinner sections and more innovative design structures can be used, with cost savings on foundations and platform weights;
- Many anti-corrosion coatings are fire hazards or the materials themselves have a low melting point.

## Applications.

The most everyday use of stainless steel is obviously in cutlery. Very cheap cutlery is made out of grades 409 and 430, with the finest quality cutlery using specially produced 410 and 420 for the knives and grade 304 (18/8 stainless, 18% chromium 8% nickel) for the spoons and forks. The different grades are used as 410/420 can be hardened and tempered so that the knife blades will take a sharp edge, whereas the more ductile 18/8 stainless is easier to work and therefore more suitable for objects that have to undergo numerous shaping, buffing and grinding processes.

Very large amounts of stainless steel are used in food production and storage. The most commonly used grades are 304 and 316. Typical uses would be dairy, milk storage and ham curing, frozen and salted fish storage. Whereas 304 is used for normal temperatures and acid concentrations, 316 is used for harsher environments. For example 304 is used in cheese production, but where salted ham is being prepared 316 is used. For low concentrations of phosphoric acid (one of the constituents of cola) 304 is used, but at higher temperatures and concentrations 316 is used. Food slicers are made out of 420 and 440. Very often in food production stainless is used not because the food itself is corrosive but the use of stainless allows for faster and more efficient cleaning. For example in ice cream production 316 is specified so that strong anti-bacteriological cleaning and rinsing systems can be used. One of the great advantage of stainless steel is that imparts no taste to the food that it comes into contact with.

The pumping and containment of oils, gases and acids has created a large market for stainless tanks, pipes, pumps and valves. The storage of dilute nitric acid was one of the first major success stories for 18/8 stainless steel as it could be used for thinner sections and was more robust than other materials. Special grades of stainless have been developed to have greater corrosion resistance. These are used in desalination plants, sewage plants, offshore oil rigs, harbour support and ships propellers.

Architecture is a growing market. Many modern building uses stainless for cladding. When reinforced concrete first started to be used it was considered that the carbon steel used would not rust, as cement, obviously derived from limestone, is alkaline. However, constantly using grit salt on bridges can change the pH to acidic thereby rusting the steel, which expands and cracks the concrete. Stainless steel reinforcing bar, although initially expensive, is proving to have good life cycle costing. The low maintenance cost and anti-vandal characteristics of stainless provides a growing market in public transport, ticket machines and street furniture.

The nuclear power industry uses large quantities of stainless, often specified with a low cobalt content, for both power and radiation containment. Special louvered ventilation shafts are made, which are used in case of emergencies to seal off plants for years if necessary. Steam and gas turbines use stainless because of its corrosion resisting and heat resisting qualities.

Especially clean melted stainless is used for medical implants and artificial hips. A great deal of medical equipment – such as orthopaedic beds, cabinets and examination machines – is made as standard from stainless because of its hygienic and easy-clean qualities. Pharmaceutical companies use stainless for pill funnels and hoppers and for piping creams and solutions.

Automobile industries are making increasing use of stainless steel, primarily for exhaust systems (grade 409) and catalytic converters, but also for structural purposes.

## Classification of Stainless Steel.

Stainless steel is commonly divided into five groups, depending on the specific amounts of alloying elements, which control the microstructure of the alloy.

### Austenitic Stainless Steel.

Austenitic Stainless Steel is the most weldable of the stainless steel grades and can be divided rather loosely into three groups: common chrome-nickel (300 series), manganese-chromium-nickel-nitrogen (200 series) and special alloys. Austenitic is the most popular stainless steel group and is used for numerous industrial and consumer applications, such as in chemical plants, power plants, food processing and dairy equipment.

### Ferritic Stainless Steel.

Ferritic Stainless Steel consists of iron-chromium alloys with body-centred cubic crystal structures. They can have good ductility and formability, but high-temperature strengths are relatively poor when compared to austenitic grades. Some ferritic grades (such as type 409 and 405) used, for example, in mufflers, exhaust systems, kitchen counters and sinks, cost less than other stainless steel grades. Other more highly alloyed steels low in C and N (such as types 444 and 261) are more costly but are highly resistant to chlorides.

### Martensitic Stainless Steel.

Martensitic Stainless Steel, such as type 403, 410, 410NiMo and 420, are similar in composition to the ferrite group, but contain a balance of C and Ni vs. Cr and Mo; hence austenite at high temperatures transforms to martensite at low temperatures. Like ferrite, they also have a body-centred cubic crystal structure in the hardened condition. The carbon content of these hardenable steels affects forming and welding. To obtain useful properties and prevent cracking, the weldable martensitics usually require preheating and post-weld heat treatment.

### Duplex

Primarily used in chemical plants and piping applications, the duplex stainless steels are developing rapidly today and have a microstructure of approximately equal amounts of ferrite and austenite. Duplex stainless steels typically contain about 22-25% Chromium and 5% Nickel with Molybdenum and Nitrogen. Although duplex and some austenitics have similar alloying elements, duplex has higher yield strength and greater stress corrosion cracking resistance to chloride than austenitic stainless steels.

### Precipitation Hardening

Precipitation-hardening Stainless Steel is chromium-nickel stainless, that contains alloying additions such as aluminium, copper or titanium which allow them to be hardened by a solution and aging heat treatment. They can be either austenitic or martensitic in the aged condition. Precipitation-hardening stainless steels are grouped into three types: martensitic, semiaustenitic and austenitic. The martensitic (such as type 630) and semiaustenitic (such as type 631) can provide higher strength than the austenitic (such as type 660, also known as A286) types.



## Selecting the welding process.

Since stainless steel is more expensive than regular steel, it is important to choose a process that provides the best results, avoiding such common problems as melt-through (especially when welding thin sections). Following are different processes recommended for welding stainless steel. Process selection is to be made on a case-by-case basis depending on the particular application and availability of equipment.

### MMA Manual metal arc welding (ASME: SMAW)

MMA, using covered electrodes, is still the most widely used welding process when it comes to welding stainless steel. The process is suited to all weldable grades, in thickness of 1 mm. and upward. In principle there is no upper limit of thickness. However, for heavier material, the automatic welding processes are often more economical. Although there is a trend towards these wire-processes, manual welding still represents the major proportion of total welding operations.

### Factors to consider when choosing an electrode.

The electrode should be of the same basic analysis as the parent metal. This gives the weld its optimum corrosion resistance. However, certain exceptions are permissible. For example a high-alloy electrode may sometime be used for welding a low alloy parent metal. The reason for doing so is weldability and mechanical strength. In all cases the corrosion conditions must be considered. In citric acid, grade 18-10L is more resistant than 17-12-2.5L. In such applications, grade 18-10L should be welded with HILCHROME 308R electrodes and not with a higher alloyed type.

There are basically four different types of covered electrodes for stainless applications: lime or basic (-15), titania or rutile-basic (-16), silica-titania or rutile (-17) and heavy coated for flat and horizontal welding (-26). Electrode selection will be based mainly on the welding position.

<b>Basic coated (-15)</b>	DC only	<ol style="list-style-type: none"> <li>1. Vertical and overhead welding and all-positions applications such as pipe-welding</li> <li>2. Root passes on heavy plate</li> <li>3. Fully austenitic high alloyed stainless steels subject to weld-centerline cracking</li> </ol>
<b>Rutile-basic coated (-16)</b>	AC / DC, DC preferred	<ol style="list-style-type: none"> <li>1. Applications in the flat position</li> <li>2. Uphill and overhead welding when lime covered electrodes are not available</li> </ol>
<b>Rutile coated (-17)</b>	AC / DC, DC preferred	<ol style="list-style-type: none"> <li>1. Flat- and horizontal position welding when minimum cleanup is desired</li> <li>2. When a concave bead appearance is desired</li> </ol>
<b>Heavy coated (-26)</b>	AC / DC, DC preferred	<ol style="list-style-type: none"> <li>1. Recommended for flat position, horizontal fillet is possible</li> <li>2. High-current, high-deposition rate welding</li> </ol>

### Gas Metal Arc Welding (MAG Welding)

The main advantage of MIG welding is its speed. Using a spool of solid wire, an operator can produce high deposition rates. Solid wire can be used in short-circuiting, globular and spray modes of arc transfer, giving GMAW a wide range of deposition rates and heat inputs. While pulsed GMAW can be used on thinner sections or for out-of-position welding, conventional spray transfer is used to join thicker sections because of its high deposition rates. Short-circuiting transfer is extensively used for stainless steel sheet and thin tubing.

MIG welding requires a shielding gas to prevent oxidation of the stainless steel alloys in the welding arc. Depending on the location and regional tendencies, mixtures of argon, helium and CO<sub>2</sub> are used.

The MIG process is either semi-automatic or fully automatic. It is a more economical process than welding with covered electrodes. However, all gas-shielded processes are sensitive to draughts meaning they are not suitable for outdoor work or for welding in open vessels in which a chimney effect may easily occur.

## Flux Cored Arc Welding (ASME: FCAW)

Traditionally, the most frequently used processes for welding stainless steels were MMA followed by MIG, TIG and SAW. The fifth process FCAW is developed more recently and offers fabricators a genuine opportunity to increase productivity. Nowadays FCAW is the most used process for welding stainless steels.

FCAW is commonly used for welding stainless steel in the flat position as well as out of position. Cored Wires uses basically the same wire feed equipment and power supply as the MIG process. Unlike MIG wires, however, some Cored Wires contain a very fast freezing flux to form a slag shelf, which allows out of position welding without a special power supply.

Like MIG welding FCAW requires a shielding gas. We recommend either a mixed gas 75%Ar-25%CO<sub>2</sub> or pure CO<sub>2</sub>. The difference between these concerns mainly the weldability and possibility to weld vertical upwards.

## Gas Tungsten Arc Welding (TIG Welding)

Although slower than MIG and FCAW, TIG Welding can produce high quality, clean welds with minimal defects. Able to weld thin sheets without melt-through, manual and automatic TIG Welding are used for joining conventional and PH stainless steel – particularly in thicknesses up to 5 mm. To avoid contaminating the stainless steel with tungsten, the tungsten electrode should never touch the workpiece.

TIG Welding is typically used for critical welds where strict conformance to code is mandatory, such as in the food service and nuclear industries. In pipe and pressure-vessel welding, TIG is often used for root passes before switching to other processes for the fill passes.

Normally, DC electrode negative (DCEN) is used with a power supply having a constant current output. Alternating Current (AC) is sometimes used for more cleaning action while welding stainless steels containing aluminium. Shielding gas is normally argon, though helium or an argon-helium mixture might be used for greater penetration. The tungsten electrode should be alloyed with thorium when welding stainless steel.

## Submerged Arc Welding (ASME: SAW)

Submerged Arc Welding is used for heavy workpieces. Usually, one or two bottom weld beads are deposited first by some other welding process. The joint is then filled by SAW. In certain cases, the bottom bead may also be submerged-arc welded. In such case we use root-backing tapes.

The flux is supplied through a funnel located ahead of the filler wire, which is fed continuously. The flux exercises a shielding function. During welding, part of it is converted into a readily removable slag. Welding is generally performed using DC electrode positive (DCEP). During SAW, extensive interaction occurs between the welding wire and the flux. Chemical elements can be exchanged.

## POINTS TO REMEMBER WHEN WELDING STAINLESS STEEL

### **Before welding**

Adjust the root gap and joint angle in a way securing good penetration, for duplex types a wider root gap is recommended

1. Clean the joint and base metal thoroughly
2. Use only stainless brushes for cleaning
3. Preheating is normally not recommended
4. Always use dry electrodes, if necessary redry covered electrodes at 250-350°C for 2 hours

### **During welding**

1. The heat input should be related to the plate thickness and welding method
2. Avoid striking the arc outside the joint. Arc strikes can act a initiation points for pitting corrosion and cracks
3. A correct root gas shielding is important. Suitable backing gas are high purity Ar or mixtures containing N<sub>2</sub> and H<sub>2</sub>
4. Excessive weaving should be avoided. This can result in an overly high heat input

### **After welding**

1. Thorough cleaning after welding is essential to obtain good corrosion resistance. All slag and oxide on and around the weld must be removed
2. Brushing should be done manually and only with stainless brushes
3. Rotating brushes can result in micro-crevices in the weld metal
4. Subsequent heat treatment is normally not necessary
5. Stress relieving should be avoided since this can cause embrittlement of the steel and weld metal
6. When polishing, use a new grinding stone. Small iron particles in a grinding stone might get pushed into the steel, in this way initiating corrosion.

Base materials		Service condition	HILCO WELDING CONSUMABLES FOR WELDING STAINLESS STEEL	
Wrought	Cast		Stick electrodes	Other filler metals
201 202 301 302 304 305 308	CF-8 CF-20	As welded or annealed	Hilchrome 308R	Hilchrome G308L Si Hilcord 81 Hilchrome W308L Si Hilchrome S308L + flux
302B	-	As welded	Hilchrome 309R Hilchrome 310R	Hilchrome G309L Si Hilcord 85 Hilchrome W309L Si Hilchrome S309L / HW 120
303 303Se	-	As welded or annealed	Hilchrome 312R Hilchrome 309R	Hilchrome G309L Si Hilcord 85 Hilchrome W309L Si Hilchrome S309L / HW 120
304L	CF-3	As welded	Hilchrome 308R Hilchrome 347R	Hilchrome G308L Si Hilcord 81 Hilchrome W308L Si Hilchrome S308L + flux
308L	-	As welded	Hilchrome 308R	Hilchrome G308L Si Hilcord 81 Hilchrome W308L Si Hilchrome S308L + flux
309	CH-20	As welded	Hilchrome 309R	Hilchrome G309L Si Hilcord 85 Hilchrome W309L Si Hilchrome S309L / HW 120
310	CK-20	As welded	Hilchrome 310R	-
310S	-	As welded	Hilchrome 310R	-
316 316L	CF-8M CF-12M	As welded or annealed	Hilchrome 316R Hilchrome 316R-V	Hilchrome G316L Si Hilcord 83, Hilcord 83LT-1 Hilchrome W316L Si Hilchrome S316L + flux
316L	CF-3M	As welded or stress relieved	Hilchrome 316R Hilchrome 316R-V	Hilchrome G316L Si Hilcord 83, Hilcord 83LT-1 Hilchrome W316L Si Hilchrome S316L + flux
317	CG-8M	As welded or annealed	317 Grade (on request)	
321 321H	-	As welded	Hilchrome 347R	Hilchrome W347Si
347 347H 348 348H	-	As welded	Hilchrome 347R	Hilchrome W347Si
410	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
405	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
420	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
430	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
430Ti	-	As welded	430 Grade (on request)	
431	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades

Base materials		Service condition	HILCO WELDING CONSUMABLES FOR WELDING STAINLESS STEEL	
Wrought	Cast		Stick electrodes	Other filler metals
442	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
446	-	As welded	Hilchrome 308R, 309R, 310R	308, 309 Grades
16-8-2	-	As welded	-	-
A584 type 630	-	As welded Heat treated	-	-
2205	-	As welded	Hilchrome 2209	Hilchrome G2209 Hilchrome W2209 Hilchrome S2209 / HW 120
2553	-	As welded	Hilchrome 2553 (on request)	Hilchrome W2553 (on request)

For other base materials we recommend you to contact us for more detailed information.

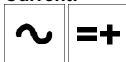
	347, 347H	321, 321H	317	316L	316, 316H	310S	310	309S	309	308	304
304H, 305, 304	308R	308R	308R 316R (317)	308R 316R	308R 316R	308R 309R 310R	308R 309R 310R	308R 309R	308R 309R	308R	308R
304L	308R 347R	308R 347R	308R 316R (317)	308R 316R	308R 316R	308R 309R 310R	308R 309R 310R	308R 309R	308R 309R	308R	
308	308R 347R	308R	308R 316R (317)	308R 316R	308R 316R	308R 309R 310R	308R 309R 310R	308R 309R	308R 309R		
309	309R 347R	309R 347R	309R 316R	309R 316R	309R 316R	309R 310R	309R 310R	309R			
309S	309R 347R	309R 347R	309R 316R	309R 316R	309R 316R	309R 310R	309R 310R				
310	308R 310R	308R 310R	(317) 309Mo 310R	316R 309Mo 310R	316R 309Mo 310R	310R					
310S	308R 310R	308R 310R	(317) 309Mo	316R 309Mo	316R 309Mo						
316H, 316	308R 316R 347R	308R 316R	(317) 316R	316R							
316L	316R 347R	316R	(317)								
317	308R (317) 347R	308R (317)									
321H, 321	308R 347R										

For other base materials we recommend you to contact us for more detailed information.

**Coating type:**

Rutile-basic

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 307R / E307-16

Hilchrome 307R is our rutile basic coated electrode for joining dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. The electrode is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance, crack resistance and scaling resistance up to 850°C. Hilchrome 307R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome W307	Hilcord 82	Hilchrome G307	S307 / HW 100	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	6,50	0,70	≤ 0,030	≤ 0,030	18,8	8,80					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 650	≥ 30	+20°C ≥ 80

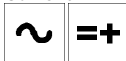
**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,9	60-80
3,2	350	34,6	80-120
4,0	350	51,1	100-160

## Coating type:

Rutile

## Current:



## Welding positions:



Arc voltage: 50V

## Approvals:

-

## Tip colour:

-

## Printing:

Hilchrome 309R / E309L-17

Hilchrome 309R is our rutile coated electrode for welding corrosion resistant and heat resistant CrNi steels, joining dissimilar metals and buffering. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels. The electrode suitable for joining clad steels. The FN content (FN ~16) ensures good cracking resistance. Hilchrome 309R is a core wire alloyed all-current type (AC/DC).

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G309LSi	Hilcorder 85	Hilchrome W309LSi	S309L / HW120	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	0,70	0,70	≤ 0,030	≤ 0,030	22,7	12,5					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 440	≥ 550	≥ 30	+20°C ≥ 47

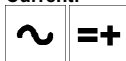
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,0	60-90
3,2	350	33,8	80-120
4,0	350	51,1	100-160

## Coating type:

Rutile

## Current:



## Welding positions:



Arc voltage: 50V

## Approvals:

TÜV

## Tip colour:

-

## Printing:

Hilchrome 309MoR / E309MoL-17

Hilchrome 309MoR is our rutile coated electrode for joining similar and dissimilar steels, buffering, joining hardenable and difficult-to-weld steels. Typical applications include joining high strength steels, un- and low alloyed structural steels and heat treatable steels. The electrode is suitable for joining clad steels. The Mo-alloyed electrode has an increased FN content (FN ~20) ensuring maximum cracking resistance. Hilchrome 309MoR is a core wire alloyed all-current type (AC/DC).

## Base materials to be welded:

- Similar and dissimilar joining high strength, unalloyed and alloyed structural steels and heat treatable steels
- Un- and low alloyed boiler steels, CrNi(Mo) steels
- Combinations between ferritic and austenitic steels
- First layer in CrNiMo claddings AISI 316L and similar austenitic stainless steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	Hilcord 85Mo	Hilchrome W309LMo	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	0,80	0,70	≤ 0,030	≤ 0,030	23,0	12,5	2,70				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 650	≥ 750	≥ 25	+20°C ≥ 47 -10°C ≥ 32

## Packaging and welding data:

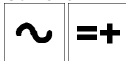
Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,5	60-80
3,2	350	36,8	80-120
4,0	350	53,2	100-160



**Coating type:**

Rutile

**Current:**



**Welding positions:**



**Arc Voltage:** 65V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 312R / E312-17

Hilchrome 312R is our rutile coated electrode which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. The electrode deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50. Hilchrome 312R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Tool, die and spring steels
- Austenitic manganese steels
- Hardfacing clutches, gear wheels, shafts
- Buffer layers prior to hardfacing
- Dissimilar joining

**Applications:**

- Repair shops
- Cement industry
- Steel mills
- Mine industry
- Railways
- Cane sugar mills

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G312	-	Hilchrome W312	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,70	1,20	≤ 0,020	≤ 0,025	28,5	9,5					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 650	≥ 800	≥ 22	+20°C ≥ 30

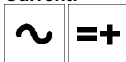
**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	17,5	60-80
3,2	350	32,3	80-120
4,0	350	47,8	110-145

## Coating type:

Rutile

## Current:



## Welding positions:



## Approvals:

TÜV

## Tip colour:

-

## Printing:

Hilchrome 308R / E308L-17

Hilchrome 308R is our rutile coated electrode for welding low carbon 18Cr10Ni austenitic stainless steel grades like AISI 304, 304L. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome 308R is also suitable for Nb (Cb) or Ti stabilised grades 347 and 321. Weld metal has an excellent resistance to general and intergranular corrosion (up to 350°C), good resistance to oxidising acids and cold reducing acids. Hilchrome 308R is a core wire alloyed all-current type (AC/DC).

## Base materials to be welded:

- ASTM/AISI Grade 302, 304, 304L, 304LN, 321, 347
- WNr 1.4306, 1.4301, 1.4541, 1.4550, 1.4311, 1.4300
- CrNi 18 10 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry
- Dairy and cold storage industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G308LSi	Hilcord 81	Hilchrome W308LSi	S308L/HW100	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	0,80	0,80	≤ 0,025	≤ 0,030	19,8	10,2					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 550	≥ 35	+20°C ≥ 70 -196°C ≥ 32

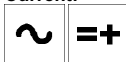
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	11,3	40-60
2,5	300	17,5	50-90
3,2	350	33,3	80-120
4,0	350	50,6	110-160

**Coating type:**

Rutile

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

TÜV

**Tip colour:**

-

**Printing:**

Hilchrome 347R / E347-17

Hilchrome 347R is our stabilised electrode for welding low carbon 18Cr10NiNb (Cb) austenitic stainless steel grades like AISI 347, 321. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome 347R is also suitable for unstabilised grades 304 and 304L. Weld metal has an excellent resistance to general and intergranular corrosion (up to 400°C). Hilchrome 347R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- ASTM/AISI Grade 347, 321, A 296 CF8C, 304, A157 C9, A320 B 8 C and D, 304LN, 302
- WNr. 1.4550, 1.4541, 1.4552, 1.4301, 1.4312, 1.4878, 1.6905, 1.4311, 1.4306, 1.4300
- Stabilised CrNiNb 18 10 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	Hilchrome W347Si	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	0,80	0,80	≤ 0,030	≤ 0,030	19,5	10,0			10xC		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 580	≥ 35	+20°C ≥ 50

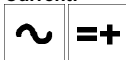
**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	17,5	50-90
3,2	350	34,2	80-120
4,0	350	50,6	110-160

**Coating type:**

Rutile

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

LR, TÜV

**Tip colour:**

-

**Printing:**

Hilchrome 316R / E316L-17

Hilchrome 316R is our multi-purpose electrode for welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L. Universal in applications but typical for all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking. Hilchrome 316R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*
- \* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G316LSi	Hilcord 83	Hilchrome W316LSi	S316L/HW100	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	0,80	0,80	≤ 0,025	≤ 0,030	18,8	11,7	2,7				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 450	≥ 580	≥ 35	+20°C ≥ 50 -120°C ≥ 32

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	11,3	40-60
2,5	300	17,5	50-90
3,2	350	34,2	80-120
4,0	350	50,6	110-160

**Coating type:**

Rutile

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 316R-V / E316L-17

Hilchrome 316R is our rutile coated grade 316L electrode for DC welding austenitic acid resistant stainless steels in vertical down position. Highly economical in usage as the electrode offers approx. 50% time savings over vertical upwards position using the same type of electrodes. Hilchrome 316R-V performs best welding thin sheet metals, root and cover passes in V-butt joints. Hilchrome 316R-V is core wire alloyed.

**Base materials to be welded:**

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*
- \* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	OAW
-	Hilchrome G316LSi	Hilcord 83	Hilchrome W316LSi	S316L/HW100	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	0,70	0,70	≤ 0,025	≤ 0,030	19,0	12,0	2,7				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 450	≥ 580	≥ 35	+20°C ≥ 50

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	14,9	75-85
3,2	300	24,2	105-115

## Coating type:

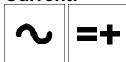
Rutile

Arc voltage: 50V

## Approvals:

TÜV,

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

Hilchrome 318R / E318 -17

Hilchrome 318R is our stabilised electrode for welding low carbon 17Cr12Ni3MoNb austenitic acid resistant stainless steel grades like AISI 318. Typical applications include all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking. Hilchrome 318R is a core wire alloyed all-current type (AC/DC).

## Base materials to be welded:

- ASTM/AISI Gr. 316, 316L, 316Cb, 316Ti
- WNr 1.4571, 1.4580, 1.4401, 1.4581, 1.4410, 1.6905, 1.4583, 1.4436
- Stabilised CrNiMoNb 17 12 3 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	Hilchrome W318 Si	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	0,80	0,80	≤ 0,025	≤ 0,030	19,0	11,5	2,7		10xC		

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 650	≥ 30	+20°C ≥ 50

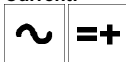
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,0	50-90
3,2	350	35,0	80-120
4,0	350	52,9	110-160

**Coating type:**

Rutile-basic

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 310R / E310 -16

Hilchrome 310R is our rutile-basic coated electrode for joining and surfacing 25Cr20Ni austenitic heat resistant Cr-, CrSi, CrNi and CrNiSi as well as ferritic-pearlitic CrAl steel grades. Maximum operating temperature in a non-sulphurous environment is 1150°C. When exposed to sulphurous gases (max. 2 g S/Nm<sup>3</sup>) we recommend a maximum working temperature up to 1040°C. Typical applications include annealing plants, hardening plants, steam boiler construction, crude oil industry and ceramic industry. Hilchrome 310R is core wire alloyed, AC/DC.

**Base materials to be welded:**

- ASTM/AISI Gr. 310 and similar heat resistant steels
- WNr. 1.4841, 1.4828, 1.4845, 1.4713, 1.4724, 1.4742
- Heat resisting rolled, forged and cast steels

**Applications:**

- Pressure vessel & boiler industry
- Heat exchanger industry
- Paper mills
- Steel mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	2,00	0,50	≤ 0,025	≤ 0,025	26,0	21,0					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 560	≥ 30	+20°C ≥ 80

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,5	55-70
3,2	350	35,4	65-105
4,0	350	48,0	100-140

**Coating type:**

Rutile

**Current:**



\*root pass

**Welding positions:**



**Arc voltage:** 55V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 2209 / E 2209-17

Hilchrome 2209 is our rutile coated electrode for welding ferritic-austenitic duplex steel grades like WNr. 1.4462, UNS 31803. The deposit weld metal offers elevated mechanical strength and toughness, excellent resistance to stress corrosion cracking. Typical applications are found in offshore engineering and chemical, petrochemical, pulp and paper industry where the electrode is used for root and filler passes of tubes and pipes (vertical up position, use DCEN). Hilchrome 2209 is a core wire alloyed all-current (AC/DC) type.

**Base materials to be welded:**

- UNS Gr. S31803, S31200
- WNr. 1.4462, 1.4463, 1.4460
- Duplex steel grades of similar composition
- Dissimilar joining UNS/WNr. Materials to 1.4583, P235GH, 16Mo3 and similar materials

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G2209	-	Hilchrome W2209	S2209/HW120	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	N	Al
0,03	0,80	0,90	≤ 0,030	≤ 0,030	22,5	9,0	3,0			0,12	

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 600	≥ 800	≥ 22	+20°C ≥ 47

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	16,8	40-75
3,2	350	32,9	70-110
4,0	350	47,8	110-140



## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

Hilchrome 600/E NiCrFe3

Hilchrome 600 is our basic coated DC electrode for welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Electrode is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking. Hilchrome 600 is core wire alloyed.

## Base materials to be welded:

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G600	-	Hilchrome W600	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,04	6,0	0,40	≤ 0,030	≤ 0,030	16,0	Bal.			2,0	6,0	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 620	≥ 35	+20°C ≥ 80 -196°C ≥ 65

Notes:

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	15,3	50- 70
3,2	300	27,4	70-95
4,0	350	42,6	90-120

**Coating type:**

Basic

**Current:**



**Welding positions:**



**Arc voltage:** 60V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 625 / ENiCrMo-3

Hilchrome 625 is our basic-coated DC electrode for welding corrosion resistant nickel-base alloys like Inconel® 625. Typical applications include joining and surfacing high strength-high corrosion resistant Ni-base alloys, 6Mo steels, high-temperature and creep resisting steels, heat resisting and cryogenic materials, joining ferritic to austenitic steels, surfacing unalloyed and low alloyed steels. Electrode is suitable for usage between -196°C up to +1100°C (in a S-free environment), highly resistant to hot cracking. Hilchrome 625 is core wire alloyed.

**Base materials to be welded:**

- ASTM/AISI Grade Alloy 625, Alloy 825, Alloy 800H
- Inconel® 625, 825, 800H, Alloy G-3, Alloy 20, Alloy 59
- WNr. 1.4876, 1.4529, 1.4539, 2.4858, 2.4856
- NiCr 22 Mo 9 Nb and nickel alloys of similar composition
- 6 Mo steels
- Dissimilar joining

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G625	-	Hilchrome W625	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,03	0,60	0,40	≤ 0,030	≤ 0,030	22,0	Bal.	9,0		3,3	0,6	

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 450	≥ 760	≥ 30	+20°C ≥ 75 -196°C ≥ 45

Notes:

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	250	14,3	50-70
3,2	300	28,6	70-95
4,0	350	51,3	90-120

### Coating type:

Basic

### Current:



### Welding positions:



Arc voltage: 60V

### Approvals:

-

### Tip colour:

-

### Printing:

HILCO E NiCu 7

NiCu 7 is our basic coated DC electrode for joining and surfacing nickel-copper alloys like Monel® 400 and nickel-copper clad steels. Typical applications include welding NiCu30Fe (WNR 2.4630) and NiCu30Al (WNR 2.4375) as well as dissimilar joining of steel to copper and steel to copper-nickel alloys. These materials are found in apparatus constructions designed for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment. NiCu 7 is core wire alloyed.

### Base materials to be welded:

- ASTM/AISI Grade Alloy 400, Alloy K500
- Monel® 400, 405
- WNR. 2.4360, 2.4375, 2.4361, 2.4365
- Dissimilar joining Monel® 400 to Nickel 200 and to CuNi alloys 70/30 and 90/10

### Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Heat exchanger industry
- Petrochemical industry
- Marine equipment

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	G NiCu 7	-	W NiCu 7	-	-

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,05	3,00	0,70				Bal.		29,0		1,0	0,7

Note: Al 0,3%

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 300	≥ 450	≥ 30	+20°C ≥ 80

### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	16,6	55-70
3,2	350	31,3	75-110
4,0	350	47,0	90-130

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>

Hilchrome G307 is our solid wire for MAG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilchrome G307 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C.

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	-	Hilcord 82	Hilchrome W307	S307 / HW 100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	7,00	0,80			19,00	9,00					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 600	≥ 35	+20°C ≥ 80

Note: properties under M13 = ArO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	12,5	60-90	18-24
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26
1,6	BS300	15	180-300	20-30

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M13, ArCO<sub>2</sub>

Hilchrome G309L Si is our solid wire for MAG welding corrosion resistant and heat resistant CrNi steels, dissimilar metals and buffering. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels. Hilchrome G309L Si is suitable for joining clad steels. The FN content (FN ~16) ensures good cracking resistance.

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309R	-	Hilcord 85	Hilchrome W309L Si	S309L / HW 120	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	2,00	0,90			24,0	13,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 550	≥ 30	+20°C ≥ 55

Note: properties under M13 = ArO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	12,5	60-90	18-24
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26
1,6	BS300	15	180-300	20-30

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>

Hilchrome G312 is our solid wire for MAG welding which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. Hilchrome G312 deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50.

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 312R	-	-	Hilchrome W312	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,15	1,60	0,50			30,0	9,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 750	≥ 20	+20°C ≥ 30

Note: properties under M13 = ArO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
CL, TÜV

**Shielding gas:**  
M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>

Hilchrome G308L Si is our solid wire for MAG welding low carbon 18Cr10Ni austenitic stainless steel grades like AISI 304, 304L. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome G308L Si is also suitable for Nb (Cb) or Ti stabilised grades 347 and 321. Weld metal has an excellent resistance to general and intergranular corrosion (up to 350°C), good resistance to oxidising acids and cold reducing acids.

**Base materials to be welded:**

- ASTM/AISI Grade 302, 304, 304L, 304LN, 321, 347
- WNr 1.4306, 1.4301, 1.4541, 1.4550, 1.4311, 1.4300
- CrNi 18 10 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry
- Dairy & cold storage industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 308R	-	Hilcord 81	Hilchrome W308L Si	S308L/HW100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,70	0,90			20,0	10,0					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 550	≥ 30	+20°C ≥ 80 -196°C ≥ 35

Note: properties under M13 = ArO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	12,5	60-90	18-24
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26
1,6	BS300	15	180-300	20-30

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
CL, LR, TÜV

**Shielding gas:**  
M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>

Hilchrome G316L Si is our solid wire for MAG welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L. Universal in applications but typical for all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking.

## Base materials to be welded:

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*  
\* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 316R	-	Hilcord 83	Hilchrome W316L Si	S316L/HW100	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,70	0,80			18,8	12,5	2,8				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 550	≥ 35	+20°C ≥ 80 -120°C ≥ 35

Note: properties under M13 =ArO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	12,5	60-90	18-24
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26
1,6	BS300	15	180-300	20-30



**Wire type:**  
MAG Solid wire

**Welding Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>,

Hilchrome G2209 is our solid wire for MAG welding ferritic-austenitic duplex steel grades like WNr. 1.4462, UNS 31803. The deposit weld metal offers elevated mechanical strength and toughness, excellent resistance to stress corrosion cracking. Typical applications are found in offshore engineering and chemical, petrochemical, pulp and paper industry.

**Base materials to be welded:**

- UNS Gr. S31803, S31200
- WNr. 1.4462, 1.4463, 1.4460
- Duplex steel grades of similar composition
- Dissimilar joining UNS/WNr. Materials to 1.4583, P235GH, 16Mo3 and similar materials

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 2209	-	-	Hilchrome W2209	S2209/HW120	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	V	Al
0,025	1,60	0,50			23,0	9,0	3,00		0,14		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 680	≥ 22	+20°C ≥ 50

Note: properties under M13 =ArO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar, ArHeCO<sub>2</sub> (special mixed gas)

Hilchrome G600 is our solid wire for MIG welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Hilchrome G600 is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking.

#### Base materials to be welded:

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

#### Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

#### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 600	-	-	Hilchrome W600	-	-

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	2,80	0,50	≤ 0,015	≤ 0,030	20,0	Bal.			2,50	3,00	0,80

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 640	≥ 35	+20°C ≥ 150 -196°C > 40

Note: properties under pure Argon gas shielding

#### Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
1,2	BS300	15	100-250	18-26

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar, ArHeCO<sub>2</sub> (special mixed gas)

Hilchrome G625 is our solid wire for MIG welding corrosion resistant nickel-base alloys like Inconel® 625. Typical applications include joining and surfacing high strength-high corrosion resistant Ni-base alloys, 6Mo steels, high-temperature and creep resisting steels, heat resisting and cryogenic materials, joining ferritic to austenitic steels, surfacing unalloyed and low alloyed steels. Hilchrome G625 is suitable for usage between -196°C up to +1100°C (in a S-free environment), highly resistant to hot cracking.

**Base materials to be welded:**

- ASTM/AISI Grade Alloy 625, Alloy 825, Alloy 800H
- Inconel® 625, 825, 800H, Alloy G-3, Alloy 20, Alloy 59
- WNr. 1.4876, 1.4529, 1.4539, 2.4858, 2.4856
- NiCr 22 Mo 9 Nb and nickel alloys of similar composition
- 6 Mo steels
- Dissimilar joining

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 625	-	-	Hilchrome W625	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	0,50	0,50	≤ 0,015	≤ 0,015	22,00	bal.	9,00		3,50	5,0	0,30

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 720	≥ 27	+20°C ≥ 100 -196°C ≥ 80

Note: properties under pure Argon gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	BS300	15	100-250	18-26

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar, ArHeCO<sub>2</sub> (special mixed gas)

G NiCu7 is our solid wire for MIG welding nickel-copper alloys like Monel® 400 and nickel-copper clad steels. Typical applications include welding NiCu30Fe (WNR 2.4630) and NiCu30Al (WNR 2.4375) as well as dissimilar joining of steel to copper and steel to copper-nickel alloys. These materials are found in apparatus constructions designed for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

#### Base materials to be welded:

- ASTM/AISI Grade Alloy 400, Alloy K500
- Monel® 400, 405
- WNR. 2.4360, 2.4375, 2.4361, 2.4365
- Dissimilar joining Monel® 400 to Nickel 200 and to CuNi alloys 70/30 and 90/10

#### Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Heat exchanger industry
- Petrochemical industry
- Marine equipment

#### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
NiCu7	-	-	W NiCu7	-	-

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,15	3,50	1,20	≤ 0,015	≤ 0,020		65,0		Bal.		2,50	2,20

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 300	≥ 500	≥ 35	+20°C ≥ 150

Note: properties under pure Argon gas shielding

#### Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
1,2	BS300	15	100-250	18-26

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 82 is our rutile flux cored wire for MAG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilcord 82 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C.

## Base materials to be welded:

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

## Applications:

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	Hilchrome G307	-	Hilchrome W307	S307 / HW 100	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	7,0	0,70			17,5	8,5					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 450	≥ 630	≥ 35	+20°C ≥ 60
				Hardness 160 HB, 450HB after deformation

Note: properties under M21= ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	15	160-200	25-29

AWS A5.22: E 309LT1-4 (0,9 mm) / E 309L T 0-4 (1,2 mm)

AWS A5.22: E 309LT1-1 (0,9 mm) / E 309LT0-1 (1,2 mm)

EN 12073: T 23 12 LPM1 (0,9 mm) / T 23 12 LRM3 (1,2 mm)

EN 12073: T 23 12 LPC1 (0,9 mm) / T 23 12 LRC3 (1,2 mm)

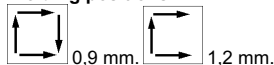
### Wire type:

Rutile cored wire

### Current:



### Welding positions:



### Approvals:

TÜV

### Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 85 is our rutile flux cored wire for MAG welding corrosion resistant and heat resistant CrNi steels, dissimilar metals and buffering. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels. Hilcord 85 is suitable for joining clad steels. The FN content (FN ~16) ensures good cracking resistance. Size 0,9 mm is suited for welding thin metal sheets ( $\geq 1,5$  mm) in all positions ( $\geq 5$  mm plate thickness).

### Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

### Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309R	Hilchrome G309L Si	-	Hilchrome W309L Si	S309L / HW 120	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
$\leq 0,03$	1,60	0,60			22,8	12,5					

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 350$	$\geq 520$	$\geq 30$	+20°C $\geq 47$

Notes: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,9	BS300	12,5	100-160	22-32
1,2	BS300	15	120-280	22-32

AWS A5.22: E 309MoLT1-4 (0,9 mm) / E 309MoL T 0-4 (1,2 mm)

AWS A5.22: E 309MoLT1-1 (0,9 mm) / E 309MoL T 0-1 (1,2 mm)

EN 12073: T 23 12 2 LPM1 (0,9 mm) / T 23 12 2 LRM3 (1,2 mm)

EN 12073: T 23 12 2 LPC1 (0,9 mm) / T 23 12 2 LRC3 (1,2 mm)

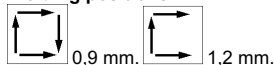
## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

TÜV

## Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 85 is our rutile flux cored wire for MAG welding similar and dissimilar steels, buffering, joining hardenable and difficult-to-weld steels. Typical applications include joining high strength steels, un- and low alloyed structural steels and heat treatable steels. Hilcord 85 is suitable for joining clad steels. The Mo-alloyed electrode has an increased FN content (FN ~20) which ensures maximum cracking resistance. Size 0,9 mm is suited for welding thin metal sheets ( $\geq 1,5$  mm) in all positions ( $\geq 5$  mm plate thickness).

## Base materials to be welded:

- Similar and dissimilar joining high strength, unalloyed and alloyed structural steels and heat treatable steels
- Un- and low alloyed boiler steels, CrNi(Mo) steels
- Combinations between ferritic and austenitic steels
- First layer in CrNiMo claddings AISI 316L and similar austenitic stainless steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309MoR	-		Hilchrome W309LMO	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
$\leq 0,03$	1,40	0,70			22,7	12,5	2,8				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 450$	$\geq 550$	$\geq 25$	+20°C $\geq 47$

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,9	BS300	12,5	100-160	22-32
1,2	BS300	15	120-280	22-32

AWS A5.22: E 308L T 1-4 (0,9 mm) / E 308 LT 0-4 (1,2 mm)

AWS A5.22: E 308L T 1-1 (0,9 mm) / E 308L T 0-1 (1,2 mm)

EN 12073: T 19 9 LPM1 (0,9 mm) / T 19 9 LRM3 (1,2 mm)

EN 12073: T 19 9 LPC1 (0,9 mm) / T 19 9 LRC3 (1,2 mm)

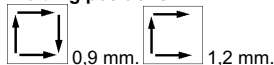
### Wire type:

Rutile cored wire

### Current:



### Welding positions:



### Approvals:

TÜV

### Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 81 is our rutile flux cored wire for MAG welding low carbon 18Cr10Ni austenitic stainless steel grades like AISI 304, 304L. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilcord 81 is also suitable for Nb (Cb) or Ti stabilised grades 347 and 321. Weld metal has an excellent resistance to general and intergranular corrosion (up to 350°C), good resistance to oxidising acids and cold reducing acids. Size 0,9 mm is suited for welding thin metal sheets ( $\geq 1,5$  mm) in all positions.

### Base materials to be welded:

- ASTM/AISI Grade 302, 304, 304L, 304LN, 321, 347
- WNr 1.4306, 1.4301, 1.4541, 1.4550, 1.4311, 1.4300
- CrNi 18 10 and similar stainless steel grades

### Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry
- Dairy and cold storage industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 308R	Hilchrome W308L Si	-	Hilchrome W308L Si	S308L/HW100	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
< 0,03	1,50	0,60			20,0	10,5					

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	$\geq 350$	$\geq 520$	$\geq 35$	+20°C $\geq 47$ -196°C $\geq 32$

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,9	BS300	12,5	100-160	22-32
1,2	BS300	15	120-280	22-32



AWS A5.22: E 316L T 1-4 (0,9 mm) / E 316L T 0-4 (1,2 mm)

AWS A5.22: E 316L T 1-1 (0,9 mm) / E 316L T 0-1 (1,2 mm)

EN 12073: T 19 12 3 LPM1 (0,9 mm) / T 19 12 3 LRM3 (1,2 mm)

EN 12073: T 19 12 3 LPC1 (0,9 mm) / T 19 12 3 LRC3 (1,2 mm)

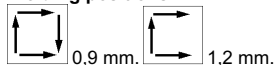
### Wire type:

Rutile cored wire

### Current:



### Welding positions:



### Approvals:

TÜV

### Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 83 is our rutile flux cored wire for MAG welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L. Universal in applications but typical for all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking. Size 0,9 mm is suited for welding thin metal sheets (≥ 1,5 mm) in all positions (≥ 5 mm plate thickness).

### Base materials to be welded:

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*
- \* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

### Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

### Equivalent product in alternative welding process:

SAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 316R	Hilchrome W316L Si	-	Hilchrome W316L Si	S316L/HW100	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
≤ 0,03	1,50	0,60			19,0	12,0	2,8				

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 350	≥ 510	≥ 30	+20°C ≥ 47 -120°C ≥ 32

Notes: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
0,9	BS300	12,5	100-160	22-32
1,2	BS300	15	120-280	22-32

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

TÜV

## Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>

Hilcord 83LT-1 is our rutile flux cored wire for all position MAG welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L. Typical applications include all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking.

## Base materials to be welded:

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*
- \* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 316R	Hilchrome W316L Si	-	Hilchrome W316L Si	S316L/HW100	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
≤ 0,03	1,40	0,70			18,8	12,0	2,7				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 350	≥ 510	≥ 30	+20°C ≥ 47 -120°C ≥ 32

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
1,2	BS300	15	120-280	22-32

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Hilchrome W307 is our solid wire for TIG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilchrome W307 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	Hilchrome G307	Hilcord 82	-	S 307 / HW 100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	7,00	0,80			19,00	9,00					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 600	≥ 35	+20°C ≥ 80

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W309L is our solid wire for TIG welding corrosion resistant and heat resistant CrNi steels, joining dissimilar metals and buffering. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels. Hilchrome W309L is suitable for joining clad steels. The FN content (FN ~16) ensures good cracking resistance. To be used in combination with tungsten electrodes type WT20.

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309R	Hilchrome W309L	Hilcord 85	-	S309L / HW 120	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	2,00	0,40			24,0	13,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 550	≥ 30	+20°C ≥ 55

Notes: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W309L Si is our solid wire for TIG welding corrosion resistant and heat resistant CrNi steels, joining dissimilar metals and buffering. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels. Hilchrome W309L Si is suitable for joining clad steels. The FN content (FN ~16) ensures good cracking resistance. To be used in combination with tungsten electrodes type WT20.

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309R	Hilchrome W309L Si	Hilcord 85	-	S309L / HW 120	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	2,00	0,90			24,0	13,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 550	≥ 30	+20°C ≥ 55

Notes: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W309LMo is our solid wire for TIG welding hardenable and difficult-to-weld steels, dissimilar joining and buffering. Typical applications include joining high strength steels, un- and low alloyed structural steels and heat treatable steels. Hilchrome W309LMo is suitable for joining clad steels. The Mo-alloyed TIG rod has an increased FN content (FN ~20) ensuring maximum cracking resistance. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Similar and dissimilar joining high strength, unalloyed and alloyed structural steels and heat treatable steels
- Un- and low alloyed boiler steels, CrNi(Mo) steels
- Combinations between ferritic and austenitic steels
- First layer in CrNiMo claddings AISI 316L and similar austenitic stainless steels
- Dissimilar joining

**Applications:**

- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309MoR	-	Hilcord 85Mo	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,03	1,80	0,80			23,50	13,50	2,80				

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 550	≥ 30	+20°C ≥ 100

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Hilchrome W312 is our solid wire for TIG welding which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. Hilchrome W312 deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Armour plate
- Hardenable steels incl. DFTW-steels
- Tool, die and spring steels
- Austenitic manganese steels
- Hardfacing clutches, gear wheels, shafts
- Buffer layers prior to hardfacing
- Dissimilar joining

## Applications:

- Repair shops
- Cement industry
- Steel mills
- Mine industry
- Railways
- Cane sugar mills

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 312R	Hilchrome G312	-		-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,15	1,60	0,50			30,0	9,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 750	≥ 20	+20°C ≥ 30

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
CL, TÜV

**Shielding gas:**  
I1 = Pure Ar

Hilchrome W308L Si is our solid wire for TIG welding low carbon 18Cr10Ni austenitic stainless steel grades like AISI 304, 304L. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome W308L Si is also suitable for Nb (Cb) or Ti stabilised grades 347 and 321. Weld metal has an excellent resistance to general and intergranular corrosion (up to 350°C), good resistance to oxidising acids and cold reducing acids. To be used in combination with tungsten electrodes type WT20, WC20.

**Base materials to be welded:**

- ASTM/AISI Grade 302, 304, 304L, 304LN, 321, 347
- WNr 1.4306, 1.4301, 1.4541, 1.4550, 1.4311, 1.4300
- CrNi 18 10 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry
- Dairy and cold storage industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 308R	Hilchrome G308L Si	Hilcord 81		S308L/HW100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,70	0,90			20,0	10,0					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 550	≥ 30	+20°C ≥ 80 -196°C ≥ 35

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,0	1000	5
1,2	1000	5
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5



**Wire type:**  
TIG solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Hilchrome W347 Si is our stabilised wire for TIG welding low carbon 18Cr10NiNb (Cb) austenitic stainless steel grades like AISI 347, 321. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome W347Si is also suitable for unstabilised grades 304 and 304L. Weld metal has an excellent resistance to general and intergranular corrosion (up to 400°C). To be used in combination with tungsten electrodes WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- ASTM/AISI Grade 347, 321, A 296 CF8C, 304, A157 C9, A320 B 8 C and D, 304LN, 302
- WNr. 1.4550, 1.4541, 1.4552, 1.4301, 1.4312, 1.4878, 1.6905, 1.4311, 1.4306, 1.4300
- Stabilised CrNiNb 18 10 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Office furniture industry
- Food processing industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 347R	-	-	Hilchrome G347 Si	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,50	0,80			19,5	9,50			12xC		

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 550	≥ 30	+ 20°C ≥ 100

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
CL, TÜV

**Shielding gas:**  
I1 = Pure Ar

Hilchrome W316L Si is our solid wire for TIG welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L. Universal in applications but typical for all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*
- \* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 316R	Hilchrome G316L Si	Hilcord 83		S316L/HW100	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,70	0,80			18,8	12,5	2,8				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 550	≥ 35	+20°C ≥ 80 -120°C ≥ 35

Notes: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,0	1000	5
1,2	1000	5
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W318 Si is our stabilised wire for TIG welding low carbon 17Cr12Ni3MoNb austenitic acid resistant stainless steel grades like AISI 318. Typical applications include all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking. To be used in combination with tungsten electrodes WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- ASTM/AISI Gr. 316, 316L, 316Cb, 316Ti
- WNr 1.4571, 1.4580, 1.4401, 1.4581, 1.4410, 1.6905, 1.4583, 1.4436
- Stabilised CrNiMoNb 17 12 3 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Cellulose & textile industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 318R		-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	1,50	0,80			19,0	12,0	2,80		12xC		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 550	≥ 30	+20°C ≥ 70

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W2209 is our solid wire for TIG welding ferritic-austenitic duplex steel grades like WNr. 1.4462, UNS 31803. The deposit offers elevated mechanical strength and toughness, excellent resistance to stress corrosion cracking. Typical applications are found in offshore engineering and chemical industry. To be used in combination with tungsten electrodes type WT 20, thorium WC 20 or WL 20.

**Base materials to be welded:**

- UNS Gr. S31803, S31200
- WNr. 1.4462, 1.4463, 1.4460
- Duplex steel grades of similar composition
- Dissimilar joining UNS/WNr. Materials to 1.4583, P235GH, 16Mo3 and similar materials

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 2209	Hilchrome G2209	-	-	S2209/HW120	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	V	Al
0,025	1,60	0,50			23,0	9,0	3,00		0,14		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 480	≥ 680	≥ 22	+20°C ≥ 50

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W600 is our solid wire for TIG welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Hilchrome W600 is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking. To be used in combination with tungsten electrodes type WT20.

**Base materials to be welded:**

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

**Applications:**

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 600	Hilchrome G600	-		-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	2,80	0,50	≤ 0,015	≤ 0,030	20,0	Bal.			2,50	3,00	0,80

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 640	≥ 35	+20°C ≥ 150 -196°C ≥ 40

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W625 is our solid wire for TIG welding corrosion resistant nickel-base alloys like Inconel® 625. Typical applications include joining and surfacing high strength-high corrosion resistant Ni-base alloys, 6Mo steels, high-temperature and creep resisting steels, heat resisting and cryogenic materials, joining ferritic to austenitic steels, surfacing unalloyed and low alloyed steels. Hilchrome W625 is suitable for usage between -196°C up to +1100°C (in a S-free environment), highly resistant to hot cracking. To be used in combination with tungsten electr. WT 20.

**Base materials to be welded:**

- ASTM/AISI Grade Alloy 625, Alloy 825, Alloy 800H
- Inconel® 625, 825, 800H, Alloy G-3, Alloy 20, Alloy 59
- WNr. 1.4876, 1.4529, 1.4539, 2.4858, 2.4856
- NiCr 22 Mo 9 Nb and nickel alloys of similar composition
- 6 Mo steels
- Dissimilar joining

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Gas industry
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 625	Hilchrome G625	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	0,50	0,50	≤ 0,015	≤ 0,015	22,00	bal.	9,00		3,50	5,0	0,30

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 720	≥ 27	+20°C ≥ 100 -196°C > 80

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,4	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

W NiCu7 is our solid wire for TIG welding nickel-copper alloys like Monel® 400 and nickel-copper clad steels. Typical applications include welding NiCu30Fe (WNr 2.4630) and NiCu30Al (WNr 2.4375) as well as dissimilar joining of steel to copper and steel to copper-nickel alloys. These materials are found in apparatus constructions designed for the chemical and petrochemical industries. A special application field is the fabrication of seawater evaporation plants and marine equipment.

## Base materials to be welded:

- ASTM/AISI Grade Alloy 400, Alloy K500
- Monel® 400, 405
- WNr. 2.4360, 2.4375, 2.4361, 2.4365
- Dissimilar joining Monel® 400 to Nickel 200 and to CuNi alloys 70/30 and 90/10

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Heat exchanger industry
- Petrochemical industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
NiCu7	G NiCu7	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,15	3,50	1,20	≤ 0,015	≤ 0,020		65,0		Bal.		2,50	2,20

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 300	≥ 500	≥ 35	+20°C ≥ 150

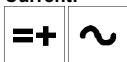
Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,4	1000	5

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**

-

Hilchrome S307 is our solid wire for submerged arc welding difficult-to-weld steels in combination with Hilcowed flux HW100. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C.

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels

**Applications:**

- Repair shops
- Heat exchanger industry
- Cement industry
- Railways

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	Hilchrome G307	Hilcord 82	Hilchrome W307	-	-

**Chemical composition wire, wt%:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	7,00	1,00			19,0	9,0					

**Mechanical properties, weld metal – typical:**

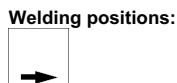
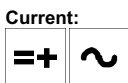
Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 100	HW 100	HW 100	HW 100
As welded	≥ 320	≥ 570	≥ 36	+20°C ≥ 80

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,4	B415	25
3,0	B415	25
4,0	B415	25



**Wire type:**  
SAW Solid wire



**Approvals in combination with flux:**

-

Hilchrome S309L is our solid wire for submerged arc welding and cladding corrosion resistant and heat resistant CrNi steels in combination with Hilcoweld flux HW100. Typical applications include joining high-strength steels, un- and low alloyed heat treatable steels, stainless, ferritic chromium and austenitic chrome-nickel steels, austenitic manganese steels.

**Base materials to be welded:**

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels

**Applications:**

- Pressure vessel & boiler industry
- Cement industry
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 309R	Hilchrome G309L Si	Hilcord 85	Hilchrome W309L Si	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,50	0,50			24,0	13,0					

**Mechanical properties, weld metal – typical:**

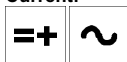
Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 120	HW 120	HW 120	HW 120
As welded	≥ 400	≥ 520	≥ 30	+20°C ≥ 100

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,4	B415	25
3,0	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**  
HW 120: TÜV

Hilchrome S308L is our solid wire for submerged arc welding low carbon 18Cr10Ni austenitic stainless steel grades like AISI 304, 304L in combination with Hilcoweld fluxes HW100, HW120. Typical applications include all industries where similar materials (incl. higher carbon types) as well as ferritic 13% Cr steels are used. Hilchrome S308L is also suitable for Nb (Cb) or Ti stabilised grades 347 and 321. Weld metal has an excellent resistance to general and intergranular corrosion (up to 350°C), good resistance to oxidising acids and cold reducing acids.

**Base materials to be welded:**

- ASTM/AISI Grade 302, 304, 304L, 304LN, 321, 347
- WNr 1.4306, 1.4301, 1.4541, 1.4550, 1.4311, 1.4300
- CrNi 18 10 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Food processing industry
- Petrochemical industry
- Dairy and cold storage industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 308R	Hilchrome G308LSi	Hilcord 81	Hilchrome W308LSi	-	-

**Chemical composition wire, wt%:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,025	1,80	0,60			20,0	9,8					

**Mechanical properties, weld metal – typical:**

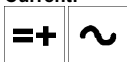
Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
	HW 100	HW 120	HW 100	HW 120	HW 100	HW 120	HW 100	HW 120
In combination with flux								
As welded	≥ 380	≥ 380	≥ 570	≥ 540	≥ 36	≥ 36	+20°C ≥ 80 -196°C > 40	+20°C ≥ 80 -196°C > 40

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,4	B415	25
3,0	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**  
HW 120: TÜV

Hilchrome S316L is our solid wire for submerged arc welding low carbon 17Cr12Ni3Mo austenitic acid resistant stainless steel grades like AISI 316, 316L in combination with Hilcoweld fluxes HW100, HW120. Typical applications include all industries where superior corrosion resistance is required: textile industry, paper mills, chemical industry, cellulose industry etc., resistance to general and intergranular corrosion (up to 400°C), good resistance to hot cracking.

**Base materials to be welded:**

- ASTM/AISI Gr. 316, 316L, 316LN, 316Cb, 316Ti
- WNr 1.4583, 1.4435, 1.4436, 1.4404, 1.4401, 1.4571, 1.4580, 1.4406\*, 1.4429\*  
\* without postweld quenching
- CrNiMo 17 12 3 and similar stainless steel grades

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 316R	Hilchrome G316L Si	Hilcord 83	Hilchrome W316L Si	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,02	1,80	0,50			19,0	12,0	2,80				

**Mechanical properties, weld metal – typical:**

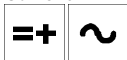
Condition	0,2% Yield strength MPa		Tensile strength MPa		Elongation Lo=5d - %		Impact Values ISO-V J	
	HW 100	HW 120	HW 100	HW 120	HW 100	HW 120	HW 100	HW 120
In combination with flux								
As welded	≥ 390	≥ 400	≥ 600	≥ 580	≥ 35	≥ 35	+20°C ≥ 75 -196°C ≥ 40	+20°C ≥ 80 -196°C ≥ 40

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,4	B415	25
3,0	B415	25
4,0	B415	25

**Wire type:**  
SAW Solid wire

**Current:**



**Welding positions:**



**Approvals in combination with flux:**  
HW 120: TÜV

Hilchrome S2209 is our solid wire for submerged arc welding ferritic-austenitic duplex steel grades like WNr. 1.4462, UNS 31803 in combination with Hilcoweld flux HW120. The deposit weld metal offers elevated mechanical strength and toughness, excellent resistance to stress corrosion cracking. Typical applications are found in offshore engineering and chemical industry.

**Base materials to be welded:**

- UNS Gr. S31803, S31200
- WNr. 1.4462, 1.4463, 1.4460
- Duplex steel grades of similar composition

**Applications:**

- Shipyards/offshore
- Construction works
- Boiler & pressure vessel industry
- Repair shops
- Heat exchanger industry
- Paper mills
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 2209	Hilchrome G2209	-	Hilchrome W2209	-	-

**Chemical composition wire, wt. %:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	V	Al
0,02	1,60	0,50			23,0	8,80	3,20		0,15		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
In combination with flux	HW 120	HW 120	HW 120	HW 120
As welded	≥ 570	≥ 780	≥ 32	+20°C ≥ 100

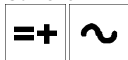
**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
2,4	B415	25
3,0	B415	25

### Flux type:

Agglomerated (semi) basic

### Current:



### Welding positions:



### Approvals in combination with wire:

-

HW 100 is our agglomerated semi-basic flux for submerged arc welding stainless steel grades. HW 100 is suitable for single and multipass welding, for fillet welds and multiwire applications. The weld has an excellent appearance and the slag is self-releasing, even when hot. The weld metal, produced in combination with corresponding wires, offers good corrosion resistance in its typical applications. The basicity index is 1,2 ca. (Boniszewski).

### Base materials to be welded:

- CrNi 18 10 (AISI 304) and similar stainless steel grades
- CrNiMo 17 12 3 (AISI 316) and similar stainless steels
- Armour plate, hardenable steels, non-magnetic austenitic steels, heat resisting ferritic chromium steels

### Applications:

- Shipyards/offshore
- Boiler & pressure vessel industry
- Construction works
- Repair shops
- Heat exchanger industry
- Cement industry
- Railways
- Petrochemical industry
- Dairy and cold storage industry

### Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	Nb
Hilchrome S307	0,10	1,00	7,00	9,0		19,0	
Hilchrome S308L	0,04	0,80	1,80	9,8		20,0	
Hilchrome S316L	0,04	0,80	1,80	12,0	2,80	19,0	

### Mechanical properties, weld metal – typical:

Condition		0,2% Yield strength MPa	Tensile strength MPa	Elongation A5 - %	Impact Values ISO-V J	
A = as welded					+20°C	-196°C
Hilchrome S307	A	≥ 320	≥ 570	≥ 36	≥ 80	-
Hilchrome S308L	A	≥ 380	≥ 570	≥ 36	≥ 80	≥ 40
Hilchrome S316L	A	≥ 390	≥ 600	≥ 35	≥ 75	≥ 40

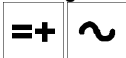
### Packaging data:

Spooltype	Weight / kg.
bag	25

### Flux type:

Agglomerated high basic

### Welding Current:



### Welding positions:



### Approvals in combination with wire:

Hilchrome S308L: TÜV

Hilchrome S316L: TÜV

Hilchrome S2209: TÜV

HW 120 is our agglomerated high-basic flux for submerged arc welding stainless steel grades incl. duplex. HW 120 is suitable for single and multipass welding, for fillet welds and multiwire applications. The weld has an excellent appearance and the slag is self-releasing, even when hot. HW 120 is suitable for high speed welding on thin sheet metals. The basicity index is 2,2 ca. (Boniszewski).

### Base materials to be welded:

- CrNi 18 10 (AISI 304) and similar stainless steel grades
- CrNiMo 17 12 3 (AISI 316) and similar stainless steels
- Duplex steel grades UNS S31803, 1.4462 and similar materials
- Chemically resistant claddings

### Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Heat exchanger industry
- Cement industry
- Paper mills
- Food processing industry
- Petrochemical industry

### Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	N
Hilchrome S309L	0,04	0,60	1,6	13,5		23,5	
Hilchrome S308L	0,04	0,60	1,6	10,0		19,0	
Hilchrome S316L	0,04	0,60	1,6	12,0	2,8	18,7	
Hilchrome S2209	0,03	0,60	1,6	9,0	3,2	22,5	0,15

### Mechanical Properties, weld metal – typical:

Condition A = as welded	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J		
				+20°C	-40°C	-196°C
Hilchrome S309L A	≥ 400	≥ 520	≥ 30	≥ 100	≥ 80	≥ 60
Hilchrome S308L A	≥ 380	≥ 540	≥ 36	≥ 80	-	≥ 40
Hilchrome S316L A	≥ 400	≥ 580	≥ 35	≥ 80	-	≥ 40
Hilchrome S2209 A	≥ 570	≥ 780	≥ 32	≥ 80	≥ 80	-

### Packaging data:

Spooltype	Weight / kg.
bag	25

Repair & Maintenance is one of the widest application fields in welding. In principle all activities not being involved in joining new structures are to be considered as repair & maintenance. Generally speaking repair & maintenance is a every day routine in all aspects of the welding industry.

## Hardfacing

A particular area of the repair & maintenance field is hardfacing or surfacing parts subject to wear. Hardfacing is a low cost method of depositing wear resistant surfaces on metal components to extend their service life. Although used primarily to restore worn parts to usable condition, hardfacing is also applied to new components before being placed into service. Hardfacing provides the following benefits:

- Extension of the life cycle of workpieces
- Fewer replacement parts needed
- Increased operating efficiency by reducing downtime
- Less expensive base materials can be used
- Reduction of overall costs

Restoring worn parts normally involves the following steps:

1. Buttering = a deposit will dilute the C and alloy content of base materials
2. Build-up = seriously worn areas are rebuilt close to their working size using crack resistant welding materials
3. Hardfacing = wear resistant surfaces are deposited on the base materials or on build-up deposits

Welding material selection depends on three major factors:

1. Base metal - primarily affects the choice of build-up materials
2. Type of wear -
  - a. metal-to-metal friction - wear from steel parts rolling or sliding against each other with little or no lubrication
  - b. severe impact - wear from severe pounding tends to squash, gouge and crack the surface
  - c. abrasion + impact - wear from gritty material accompanied by heavy pounding which tends to chip or crack, grind away the surface
  - d. severe abrasion - wear from gritty materials which grind or erode the surface. Severe abrasion is often accompanied by heavy compression or moderate impact
  - e. metal-to-earth abrasion - wear from earth like materials accompanied by moderate impact
  - f. corrosion - chemical attack.
3. Arc welding method - depends primarily upon the size and number of components, available equipment and frequency of hardfacing. All general welding techniques can be applied.

## Fighting wear

In order to combat against wear it is important to determine the types of wear as well as the situation of the workpiece in practice i.e. its function. For each type of wear guidelines can be given to which a hardfacing alloy should comply. Some of these guidelines are to be found on the following pages. For general information about hardfacing and specific information how to combat wear in your typical application we recommend you to contact us.

Base material	Description	Welding process / filler metals					
		Stick electrodes (1 <sup>st</sup> choice)	Stick electrodes (2 <sup>nd</sup> choice)	GMAW/ GTAW	FCAW	SAW	
Cast Iron	Grey CI	Pure Nickel	Nickel Iron	On request	On request	-	A,B
	Nodular CI	Nickel Iron	Pure Nickel	On request	On request	-	B
	Malleable CI	Nickel Iron	-	On request	On request	-	A,B
	CI to steel	Nickel Iron	Pure Nickel	On request	On request	-	A,B
Difficult-to-weld steel (DFTW)	C45	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
	42CrMo4	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
	42MnV7	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
	Tool steel	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
	Cast steel	307R	312R	G/W307	Hilcord 82	S307/HW100	C
	Mn-steel	307R	312R	G/W307	Hilcord 82	S307/HW100	D
	Armour plate	307R	312R	G/W307	Hilcord 82	S307/HW100	C
	Spring steel	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
	Unknown materials	312R	307R	G/W312, 307	Hilcord 82	S307/HW100	C
Wear resistant surfacing	Medium abrasion, high impact	Hardmelt 600	-	H-600	Hilcord 600	-	E
	Heavy abrasion, medium impact	Hardmelt 638	Hardmelt 643	-	On request	-	E
	Extreme abrasion, low impact	Hardmelt 643	Hardmelt 645	-	On request	-	E
	Extreme impact, low abrasion	Manganil	Hardmelt 350	H-350	On request	S307/HW100	-
	Sliding wear, heavy impact	Hardmelt 620	Hardmelt 600	H-600	On request	-	E
	Sliding wear, impact, corrosion	Hilchrome 312R	Hilchrome 307R	G/W312	Hilcord 82	S307/HW100	-
	Extreme sliding, abrasion, heat and corrosion	Hilcostel 6E	Hilcostel 12E	Hilcostel 6T	On request	-	F
	Buffer layers prior to surfacing	Hilchrome 312R	Hardmelt 350	G/W312 H-350	Hilcord 82	-	G
Remarks	A	Peening, hammering of the weld deposit is helping to reduce welding stress					
	B	A temperature (interpass) of 60°C should be maintained to avoid heat stress					
	C	Preheat thick workpieces up to 150-200°C					
	D	Do not preheat, keep interpass temperature at max. 150°C					
	E	Preheat crack sensitive base materials, apply a buffer layer prior to surfacing					
	F	Preheat base materials: • Small workpieces: 200-300°C • Large workpieces: 300-400°C					
	G	First choice for crack sensitive base materials and filler metals					



## Scope:

The DIN standard 8555 applies to filler metals made of unalloyed and alloyed steel as well as grey iron (cast iron); it also covers filler metals made of hard alloys, hard metals and copper alloys used in surfacing primarily in connection with ferrous metals.

The DIN standard 8555 is intended to make the selection and application of filler metals easier for the user and to define the properties and security limits of the surfacing welding applied. The standard designation contains a description of alloy groups.

Alloy group	Description	Examples for application	Filler metals
1	Unalloyed filler metals $\leq 0,4\%C$ or low alloy type $\leq 0,4\%C$ and $\leq 5\%$ maximum total alloying constituents Cr, Mn, Mo, Ni - used wherever straight-forward surfacing on unalloyed steel is concerned and where no special demands are made in respect to the hardness of the weld deposit	Rails, parts for agricultural machines, tractor tracks	Hardmelt 350 H 60 / HW 400
2	Unalloyed filler metals $> 0,4\%C$ or low alloy type $> 0,4\%C$ and $\leq 5\%$ maximum total alloying constituents Cr, Mn, Mo, Ni - offers higher resistance to wear than group 1.	Screw conveyors, fan impellers, mixers	H-350
3	Alloyed filler metals having the properties of hot working tools - used in cases where the weld metal is required to have a greater hardness at elevated temperatures	Hot working tools, forging dies, shears, tips for ingots tongs when exposed to high temperatures	On request
4	Alloyed filler metals having the properties of high speed steels	Cutting tools, mandrels, shear blades, cutting dies, tips of boring tools	Hardmelt 620
5	Alloyed filler metals $> 5\%Cr$ and low C content ( $\leq 0,2\%C$ ) - filler metals of Cr-steel character and low C. The hardness of weld metal increases acc. to the proportion of martensite	Surfacing welds which are scale resistant and from 12%Cr upwards rust resistant, valve parts, pump plungers, furnace parts	Stainless steel grades
6	Alloyed filler metals $> 5\%Cr$ and higher C content ( $> 0,2\% - \leq 2,0\%C$ ) - owing to the high C content the hardness is $> 500HB$ and rust resistance is reduced.	Cutting tools, shear blades, rolls for cold rolling mills	Hardmelt 600 H-600 Hilcord 600
7	Mn austenites with 11-18%Mn, $> 0,5\%C$ and $\leq 3\%Ni$ - materials giving a weld metal corresponding to austenitic manganese steel, weld metal is work-hardenable when strained and is suitable for parts in which work-hardening is obtained through pressure	Surfacing of large areas, wearing plates, crusher plates, excavator teeth, bolts	Manganil
8	Cr-Ni-Mn austenites - filler metals give a tougher weld metal than alloys of group 7	Crusher components not subjected to severe duty, switch blades, crossings, rails, water turbine parts	Hilchrome 307R Hilchrome S307 / HW 100
9	Cr-Ni steels (resistant to rust acid and heat) - used where it is important for the weld metal to have adequate resistance to corrosion	Deposition welding resistant to corrosion and heat	Stainless steel grades
10	High C ( $\geq 2,0\% - \leq 5,0\%$ ) content and / or high Cr ( $\leq 35\%$ ) alloying constituent with or without Co, Mo and W - used in a wide range of industrial applications, weld metal contains complex carbides on a Cr basis in an austenitic matrix	Repairs to mining and steel works equipment, surfacing on machine components used in the construction industry and agriculture	Hardmelt 638 Sugarhard Hardmelt 643 Hardmelt 645

Alloy group	Description	Examples for application	Filler metals
20	Low iron filler metals on Co basis, alloyed with Cr-W with or without Ni and Mo.	Fittings of all kinds, valves seatings of exhaust valves, valves seatings in steam engines, pumps shafts and similar components exposed to severe corrosion and erosion	Hilcostel 6E Hilcostel 6T Hilcostel 12E Hilcostel 12T
21	Low iron alloys on a carbide basis	Tools and machine components for working in rocky soil, drills etc. extruder worms for the ceramic industry	On request
22	Low iron alloys on Ni basis, alloyed with Cr and Cr-B	Valves, worms, shafts as used, cement pumps and other pump types	Hilchrome 600S
23	Alloys on Ni basis, alloyed with Mo with or without Cr	Contact surfaces of valves in chemical equipment, cladding on the working edges of Ni-Cr-Mo alloy cutting dies at high temp.	Hilchrome 625
30	Non ferrous alloys on a Cu basis, alloyed with Sn - outstanding for resistance to sliding wear and resistant to salt solutions and acids	Bearing shells, shafts, slides, valves, housing, worm wheels, and helical gears, guide wheels and track wheels, fittings	Bronsil Tinbronze 94-6 Brazing rods
31	Non ferrous alloys on a Cu basis, alloyed with Al ( $\geq 5,0 - \leq 15\%$ ): CuAl filler metals alloying element Fe - containing up to 6%Fe  CuAl filler metals alloying element Ni - containing up to 5% Ni  CuAl filler metals alloying element Mn - containing up to 15% Mn  CuAl filler metals alloying element Si containing up to 2,5% Si	Pump components, valve parts, agitators, propellers, pickling hooks Ships propellers, turbine rotors, pump components, valve parts Turbine and pump components, ships propellers, flanges, valves, shafts, cylinder heads, safety tools Pumps components, valves, gearing components	Albronze 8, ALBz9Fe (on request) ALBz 35 (on request)  Albronze 300  -
32	Non ferrous alloys on a Cu basis, alloyed with Ni - CuNiAl alloys	Distilling apparatus, sea water pipelines, capacitors, coolers, chemical equipment, heat exchangers	Cuni Cunifer 70-30 Cunifer 90-10

With this conversion table you can determine the approximate hardness of deposit weld metal. Please note that conversion tables must be regarded only as an estimate of comparative values.

Rm = tensile strength (MPa)

HV = Vickers hardness

HB = Brinell hardness

HRc = Rockwell hardness

Rm	HV	HB	HRc	Rm	HV	HB	HRc	Rm	HV	HB	HRc
200	63	60	-	1000	311	296	~31	1800	547	-	~52
220	69	66	-	1020	317	301	32	1820	553	-	-
240	75	71	-	1040	323	307	-	1840	559	-	-
260	82	78	-	1060	330	314	~33	1860	564	-	~53
280	88	84	-	1080	367	349	34	1880	570	-	-
300	94	89	-	1100	342	325	-	1900	575	-	-
320	100	95	-	1120	349	332	~35	1920	580	-	~54
340	107	102	-	1140	355	337	36	1940	586	-	-
360	113	107	-	1160	361	343	-	1960	591	-	-
380	119	113	-	1180	367	349	~37	1980	596	-	55
400	125	119	-	1200	373	354	38	2000	602	-	-
420	132	125	-	1220	380	361	-	2020	607	-	-
440	138	131	-	1240	385	366	~39	2040	613	-	-
460	143	136	-	1260	392	371	40	2060	618	-	~56
480	150	143	-	1280	397	377	-	2080	623	-	-
500	157	149	-	1300	403	383	41	2100	629	-	-
520	163	155	-	1320	410	390	-	2120	634	-	-
540	168	160	-	1340	417	396	~42	2140	639	-	57
560	175	166	-	1360	423	402	43	2160	644	-	-
580	181	172	-	1380	430	409	-	2180	650	-	-
600	187	178	-	1400	434	413	44	2200	655	-	58
620	193	184	-	1420	440	418	-	-	675	-	59
640	200	190	-	1440	446	424	~45	-	698	-	60
660	205	195	-	1460	452	429	-	-	720	-	61
680	212	201	-	1480	458	435	46	-	745	-	62
700	219	208	-	1500	464	441	-	-	773	-	63
720	225	214	-	1520	470	447	-	-	800	-	64
740	230	219	-	1540	473	449	~47	-	829	-	65
760	237	225	-	1560	481	-	-	-	864	-	66
780	243	231	21	1580	486	-	~48	-	900	-	67
800	250	238	22	1600	491	-	-	-	940	-	68
820	255	242	23	1620	497	-	49				
840	262	249	~24	1640	503	-	-				
860	268	255	25	1660	509	-	-				
880	275	261	~26	1680	514	-	50				
900	280	266	27	1700	520	-	-				
920	287	273	28	1720	525	-	-				
940	293	278	29	1740	527	-	~51				
960	299	284	-	1760	536	-	-				
980	305	290	~30	1780	541	-	-				

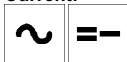
## Coating type:

Rutile

Arc voltage: 42V

Approvals: ABS, BV, DB+Ü, DNV, GL, LR, TÜV

## Current:



Tip colour:  
Red

## Welding positions:



## Printing:

HILCO Red Extra / E42 0 RC / E 6013

Red Extra is our universal electrode for all welding positions, including vertical-down position. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Red Extra is the ideal choice for construction work where the use of one type of electrodes is permissible. Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Red Extra is an all-current type (AC/DC), which also operates on transformers with low OCV, min. 42V.

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 2	H60 / HW430	Fer G 1

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,12	0,60	0,40	≤ 0,030	≤ 0,030							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	0°C ≥ 50

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,0	300	10,5	40-60
2,5	350	18,2	60-100
3,2	350	28,9	90-140
4,0	350	44,6	150-190
5,0	350	70,4	180-240

### Coating type:

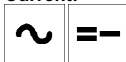
Rutile

Arc voltage: 42V

### Approvals:

GL, LR

### Current:



### Tip colour:

yellow

### Welding positions:



### Printing:

Performa / E42 0 RC / E 6013

Performa is our all-round (AC/DC) electrode for all welding positions. The electrode is characterised by easy handling, smooth arc transfer, easy slag removal and a finely rippled bead surface. Performa is the logic first choice for shipbuilding. Typical applications include assembly, workshop and repair welding of mild and low-alloyed structural steels. Performa also operates on transformers with low OCV, min. 42V.

### Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Office furniture industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 40	Fer SG 1	H60 / HW430	Fer G 1

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,50	0,40	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 500	≥ 22	+20°C ≥ 55

### Packaging and welding data:

Dia. mm.	Length Mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	16,5	80-110
3,2	350	27,9	110-130
4,0	350	42,5	140-160

## Coating type:

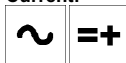
Basic-rutile

Arc voltage: 55V

## Approvals:

DB+Ü, DNV, LR, TÜV, Force

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

Basic 55 / E 7016

Basic 55 is our double coated electrode for all welding positions, except vertical down position. The electrode is characterised by easy handling, a well controllable arc, excellent root penetration, easy slag removal and excellent metallurgical properties up to -30°C. Typical applications include shipbuilding, general constructions, bridges, storage tanks as well as root pass and positional welding. Basic Special is an all-current type (AC/DC).

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcord 51	Fer SG 2	H100 / HW530	Fer G 2

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	0,90	0,70	≤ 0,025	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-20°C ≥ 90

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	19,5	60-90
3,2	350	32,8	95-150
3,2	450	43,2	95-150
4,0	450	65,0	140-190

### Coating type:

Basic

### Current:



### Welding positions:



Arc voltage: 65V

### Approvals:

ABS, GL, LR

### Tip colour:

-

### Printing:

BASIC / E 7018

Basic is our basic coated low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) electrode for all welding positions, except vertical down position. The electrode is characterised by a smooth, quiet arc, very low spatter, and good arc penetration. Basic can be used at high travel speeds due to its elevated recovery (120%). Typical applications include shipbuilding, general constructions, bridges, storage tanks as well as producing crack-resistant and tough welded joints on mild and low-alloy steels. Basic is welded on AC current.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESiE355, StE285TM-ESiE355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	K 60	Hilcor 51	Fer SG 2	H100 / HW530	Fer G 2

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,00	0,50	≤ 0,025	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 510	≥ 22	-40°C ≥ 47

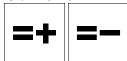
### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	20,5	65-90
3,2	350	37,3	100-140
4,0	450	64,4	140-190
5,0	450	98,3	180-250

## Coating type:

Basic

## Current:



## Welding positions:



**Arc Voltage:** 70V

## Approvals:

TÜV

## Tip colour:

-

## Printing:

Hilco B 19 CrMo

B 19 CrMo is our basic-coated low hydrogen ( $H_{DM} < 5 \text{ ml.} / 100 \text{ gr.}$  deposit weld metal) for welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. B 19CrMo is preferably welded on DC current, root pass and narrow gap welding on DC- polarity.

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	SG CrMo 1	Hilcord 61M	Fer SG CrMo 1	H100CrMo1/HW 580	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,07	0,80	0,40	≤ 0,020	≤ 0,020	1,10		0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 490	≥ 590	≥ 22	+20°C ≥ 100

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

## Packaging and welding data:

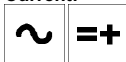
Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	23,6	80-110
3,2	350	38,3	100-140
4,0	350	55,3	130-180



**Coating type:**

Rutile-basic

**Current:**



**Welding positions:**



**Arc voltage:** 50V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 307R / E307-16

Hilchrome 307R is our rutile-basic coated electrode for joining dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. The electrode is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C. Hilchrome 307R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome W307	Hilcord 82	Hilchrome G307	S307/HW100	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	6,50	0,70	≤ 0,030	≤ 0,030	18,8	8,80					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 650	≥ 30	+20°C ≥ 80

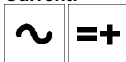
**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	18,9	60-80
3,2	350	34,6	80-120
4,0	350	51,1	100-160

**Coating type:**

Rutile

**Current:**



**Welding positions:**



**Arc Voltage:** 65V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 312R / E312-17

Hilchrome 312R is our rutile coated electrode which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. The electrode deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50. Hilchrome 312R is a core wire alloyed all-current type (AC/DC).

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Tool, die and spring steels
- Austenitic manganese steels
- Hardfacing clutches, gear wheels, shafts
- Buffer layers prior to hardfacing
- Dissimilar joining

**Applications:**

- Repair shops
- Cement industry
- Steel mills
- Mine industry
- Railways
- Cane sugar mills

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G312	-	Hilchrome W312	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	0,70	1,20	≤ 0,020	≤ 0,025	28,5	9,5					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 650	≥ 800	≥ 22	+20°C ≥ 30

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	17,5	60-80
3,2	350	32,3	80-120
4,0	350	47,8	110-145

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

Hilchrome 600/E NiCrFe3

Hilchrome 600 is our basic coated DC electrode for welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Electrode is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking. Hilchrome 600 is core wire alloyed.

## Base materials to be welded:

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

## Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G600	-	Hilchrome W600	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,04	6,0	0,40	≤ 0,030	≤ 0,030	16,0	Bal.			2,0	6,0	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 620	≥ 35	+20°C ≥ 80 -196°C ≥ 65

Notes:

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	300	15,3	50-70
3,2	300	27,4	70-95
4,0	350	42,6	90-120

**Coating type:**

Basic

**Current:**



**Welding positions:**



**Arc voltage:** 60V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

Hilchrome 600S/E NiCrFe3

Hilchrome 600 is our basic coated high efficiency (140%) electrode for welding high-grade nickel-base alloys like Inconel® 600. Typical applications include surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels.

**Base materials to be welded:**

- NiCr15Fe and nickel alloys of similar composition
- Dissimilar joining

**Applications:**

- Repair shops
- Paper mills
- Cement industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Hilchrome G600	-	Hilchrome W600	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,04	4,5	0,30			16,0	Bal.			3,0	< 7,0	

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 380	≥ 620	≥ 35	+20°C ≥ 80 -196°C ≥ 65

Notes:

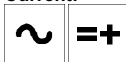
**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	28,1	60-90
3,2	350	47,5	90-120
4,0	350	71,9	110-150

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 70V

## Approvals:

-

## Tip colour:

-

## Printing:

E1-UM-350 HARDMELT 350

Hardmelt 350 is our basic coated electrode for wear resistant surfacing on low alloyed steel subject to metal-to-metal wear, but also impact and mild abrasion. Deposit weld metal has a martensitic structure, hardness of pure weld deposit approximately 370HB.

After welding the deposit can easily be machined using carbide tipped tools.

## Applications:

Hardmelt 350 is particularly suitable under conditions of moderate abrasion and friction, combined with impact. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear. Hardmelt 350 may also be used as a final overlay on parts that need to be machined or as a build-up layer for hardfacing materials providing higher wear resistance.

Applications are universal but typical for building up parts e.g. tractor and shovel parts, dragline chains, cable sheaves, shovel and bucket lips, dredge pump parts, cutter teeth, repair of worn switches and rails, pump impellers and housings, dredge and shovel bucket teeth, mill and crushing hammers. Hardfacing crane and mine car wheels, tractor rolls, idlers, links and sprockets, cable drums, roller guides, transmission parts, drilling equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	H 350	On request	-	H60/HW400	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,20	1,40	1,20			1,80						

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer on unalloyed steel
	2 layers on unalloyed steel
	1 layer on 0,5%C steel
	370 HB
	420 HB
	420 HB

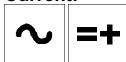
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	450	46,0	100-140
4,0	450	69,7	140-180
5,0	450	109,5	180-230

**Coating type:**

Basic

**Current:**



**Welding positions:**



**Arc voltage:** 65V

**Approvals:**

-

**Tip colour:**

Red

**Printing:**

HARDMELT 600

Hardmelt 600 is our basic coated electrode for wear resistant surfacing parts of steel, cast steel and high Mn-steel, subject to abrasion, metal-to-metal wear, impact and/or compression stresses. Deposit weld metal has a martensitic structure, hardness of pure weld deposit approx. 600HB. After welding the deposit can be machined by grinding only.

**Applications:**

Hardmelt 600 is particularly suitable under conditions of heavy abrasion and friction, combined with impact. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear.

Applications are universal but typical for hardfacing parts e.g. agricultural, earth moving and stone crushing industry, hardfacing crane and mine car wheels, sprockets and gear teeth, skip guides, dredger buckets, scraper blades, transferables, cable sheaves, tractor and shovel parts, dragline buckets, conveyor chains, hammer heads, clutch jaws

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	H600	Hilcord 600	-	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,50	0,40	2,30			9,0						

**Mechanical properties, weld metal – typical:**

Condition	Hardness
As welded	1 layer After soft annealing 780-820°C / oven After hardening 1000-1050°C / oil 1 layer on high Mn-steel 2 layer on high Mn-steel
	56-58 HRc approx. 25 HRc approx. 60 HRc approx. 22 HRc approx. 40 HRc

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	34,1	100-140
4,0	450	68,3	140-180
5,0	450	105,7	180-210

## Coating type:

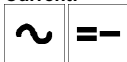
Rutile

Arc voltage: 60V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

HARDMELT 620

Hardmelt 620 is our rutile coated electrode for wear resistant surfacing tool steels subject to metal-to-metal wear at elevated temperatures up to 550°C. Deposit weld metal is a high speed steel (HSS) similar to M-1 tool steel, structure is fine precipitated carbides in a martensitic matrix, hardness of pure weld metal is 62 HRc. This hardness can be increased after tempering. After welding the deposit can be machined by grinding only.

## Applications:

Hardmelt 620 produces a crack-free wear resistant tool steel deposit and is particularly suitable for applications involving severe metal-to-metal wear coupled with elevated temperatures (up to 550°C).

Typical applications include building up worn steel dies, high speed cutting tools, wire guides, punch and forging dies, cold and hot shear blades, trimmers or the application of wear resistant surfaces to unalloyed and low alloy steel

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
1,10	0,10	1,10			4,70		9,80			2,20	2,10

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 61 HRc After soft annealing 840°C / oven approx. 25 HRc After hardening 1180-1240°C and annealed 530°C 2 h 63 HRc

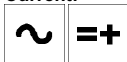
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	27,1	60- 90
3,2	350	46,7	80-120
4,0	450	93,3	120-160

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

HARDMELT 638

Hardmelt 638 is our basic coated high efficiency (205%) electrode for wear resistant surfacing parts subject to grinding abrasion and moderate impact. Deposit weld metal is a near eutectic mix of chromium carbides and austenite, hardness of pure weld metal is 60 HRc. After welding the deposit can be machined by grinding, due to the homogeneous and finely rippled seam this is, for most applications, not necessary.

## Applications:

Hardmelt 638 produces an abrasion resistant deposit and is particularly suitable for applications involving grinding abrasion with moderate impact at service temperatures up to 600°C. The weld deposit is extreme resistant to mineral wear. Hardmelt 638 is also suited as a final layer on tough-hard deposits (Hardmelt 600) or high Mn-steel (Manganil).

Typical applications are found in heavy constructions, mining, stone crushing and dredging industries e.g. shovel and dragline buckets, bucket teeth, scraper cutters, scoop lift buckets, crusher hammers, cement mixers, dredge pump parts, rubber industry mixing machines, shaker pans, excavator buckets, gyratory and impact crusher parts, conveyor screws

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
5,20	0,50	1,60			31,8						

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 1 layer on steel with C = 0,15% 1 layer on high Mn-steel
	60 HRc approx. 55 HRc approx. 52 HRc

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	53,5	110-140
4,0	350	81,5	160-190
5,0	450	174,2	220-260



## Coating type:

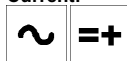
Basic

Arc voltage: 50V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

SUGARHARD E10-UM-60-GR

Sugarhard is our basic coated high efficiency (205%) electrode for roughening the wet mill rollers used in the sugar cane crushing process. Striking the arc with Sugarhard is very easy and the welding characteristics are superb in the environment to which the electrodes are exposed. The welding is done with a striking arc roughening the roller surface during processing with wear resistant chromium carbide globules; hardness of pure deposit weld metal is 63 HRC.

## Applications:

Enormous rollers are used in the sugar cane crushing process and are subject to excessive wear during the season. These rollers have to be continuously welded, even when the process is in full swing. The roller, which is located near the end of the crushing process, is smothered in crushed, sludgy cane and its surface is wet. Sugarhard accommodates these conditions and deposits a dispersion of small, hard and very wear-resistant globules that fastens to the side walls of the ridges of the roller.

## Roller arcing (welding method)

For arcing of sugar mill rollers you have to hold the Sugarhard electrode at right angles to the flans of the profile. Maintain contact with the electrode coating and the base material. Use "cold welding" technique, avoid excessive heat in the weld area.

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
3,5	1,0	4,5			20,0						

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	Deposit weld metal 63 HRC

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	450	72,5	110-130
4,0	450	104,0	160-210

## Coating type:

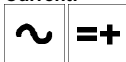
Basic

Arc voltage: 45V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

HARDMELT 643

Hardmelt 643 is our basic coated high efficiency (190%) electrode for wear resistant surfacing parts subject to severe abrasion and moderate impact. Deposit weld metal has an austenite structure with Nb and Cr carbides, hardness of pure weld metal is 62 HRc. After welding the deposit can be machined by grinding, due to the homogeneous and finely rippled seam this is, for most applications, not necessary.

## Applications:

Hardmelt 643 produces an abrasion resistant deposit and is particularly suitable for applications involving heavy grinding abrasion with moderate impact at service temperatures up to 500°C. The weld deposit is extreme resistant to mineral wear.

Typical applications are found in cement industries e.g. hardfacing cement presses, brick presses, refractory press-screws, conveyor screws, mixer blades, spreader cones, feeder blades, kiln trunnions

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
6,50	1,50	1,50			24,5				7,0		

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 1 layer on steel with C = 0,15% 1 layer on high Mn-steel 62 HRc approx. 55 HRc approx. 52 HRc

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	53,5	110-140
4,0	350	81,5	140-190

## Coating type:

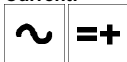
Basic

Arc voltage: 45V

## Approvals:

-

## Current:



## Tip colour:

-

## Welding positions:



## Printing:

HARDMELT 645

Hardmelt 645 is our basic coated high efficiency (250%) electrode for wear resistant surfacing parts subject to severe abrasion and moderate impact. Deposit weld metal has a premium carbide structure with Nb, Cr, Mo, W and V carbides; hardness of pure weld metal is 63 HRc. After welding the deposit can be machined by grinding, due to the homogeneous and finely rippled seam this is, for most applications, not necessary.

## Applications:

Hardmelt 645 produces an abrasion resistant deposit and is particularly suitable for applications involving severe sliding mineral abrasion with moderate impact at service temperatures up to 600°C.

Typical applications are found in cement and steel industries e.g. hardfacing excavator teeth, bag packer screws, pulverizer mill components, spreader cones, conveyor and mixer screws, fan blades, shredder knives, dredge pumps parts, sintering plant parts, wear bars and plates, scraper bars, blast furnace, cement furnaces, bucket teeth and lips

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
5,80	1,50	1,90			21,0		6,0		6,0	1,2	2,5

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 1 layer on steel with C = 0,15% 1 layer on high Mn-steel 63 HRc approx. 58 HRc approx. 55 HRc

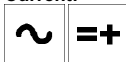
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
4,0	450	129,4	140-190
5,0	450	209,0	210-290

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

HILCO MANGANIL

Manganil is our basic coated electrode for joining and wear resistant surfacing manganese steels (Hadfield 14Mn steels). Deposit weld metal is austenitic 14% Mn steel that rapidly work hardens under heavy impact and battering. Hardness of pure weld metal is 200 HB, after work hardening this hardness increases to 52 HRC. After welding the deposit can be machined using carbide tipped tools.

## Applications:

Manganil is ideally suitable under conditions of heavy impact and gouging with moderate abrasion and friction. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear. Manganil may be used for joining 14Mn steels in low stress conditions.

Applications are universal but typical for building up manganese steel parts e.g. rail equipment, heavy crushing equipment, crusher mantles and liners, swing and crusher hammers, toothed crusher rolls, ore crusher crown wheels, shovel and dredging buckets, dredge pumps parts, frogs, switches, rail ends, cross-overs

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
0,95	13,7	0,10			3,8	3,6	0,7				

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	200 HB
work hardened	approx. 52 HRC

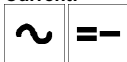
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	450	50,4	110-140
4,0	450	76,9	140-180
5,0	450	125,0	180-230

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

HILCO PURE NICKEL / E Ni CI

Pure Nickel is our basic coated electrode for cold welding grey and malleable cast iron grades and for joining these base metals to steel, copper and copper alloys. The electrode deposits a high-grade pure nickel weld metal: ideal for repair welding cracked and worn castings including highly contaminated cast materials. Both weld metal and HAZ are soft and easily machinable using files. Pure Nickel is ideally suited for the combined welding with Nickel Iron (E NiFe CI), buttering with Pure Nickel and filling with Nickel Iron.

## Base materials to be welded:

- Lammellar grey cast irons GG10 to GG40
- Malleable cast irons GTS35-GTS 60, GTW35-GTW60
- Joining and repairing
- Dissimilar joining cast iron to steel, copper, copper alloys

## Applications:

- Repair shops
- Casings of machines, pumps, gear boxes, piston grooves

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,50	0,20	0,10				Bal.				2,3	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 220	-	-	175 HB

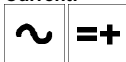
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	20,4	55- 90
3,2	350	33,5	80-120
4,0	350	49,0	100-145

### Coating type:

Basic

### Current:



### Welding positions:



Arc voltage: 60V

### Approvals:

-

### Tip colour:

Orange

### Printing:

HILCO E NiFe CI / NICKEL IRON

Nickel Iron is our basic coated electrode for repair, construction and production welding all cast commercial iron grades including grey, malleable, nodular and phosphorous (P > 0,02%) cast iron.

The electrode deposits a high-grade nickel-iron weld metal: ideal for highly restrained or thick walled workpieces including applications where toughness and crack resistance is important. Both weld metal and transition zone are easily machinable using cutting tools.

### Base materials to be welded:

- Lammelar grey cast irons GG10 to GG40
- Malleable cast irons GTS35-GTS 65, GTW35-GTW65
- Nodular cast irons GGG40-GGG70
- Joining and repairing
- Dissimilar joining cast iron to steel

### Applications:

- Repair shops
- Casings, machine frames, engine blocks, cylinders, valves

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	On request	On request	-	-	-

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Al
0,90	0,80	0,70				53,0				Bal.	

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 340	≥ 500	≥ 18	190 HB

### Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	18,5	55-75
3,2	350	31,3	80-100
4,0	350	45,5	100-125
5,0	350	72,5	125-160

## Coating type:

Basic

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

HILCOSTEL 6E

Hilcostel 6E is our basic coated electrode for high-grade surfacing parts subject to a combination of metal-to-metal wear, impact, pressure, abrasion, erosion, corrosion, cavitation and high temperatures up to 900°C. Deposit weld metal is Co-Cr-W alloyed, hardness is 40-42 HRC, has excellent gliding characteristics, good polish ability, good toughness, is non-magnetic. After welding the deposit can be machined by grinding or with tungsten carbide cutting tools.

## Applications:

Hilcostel 6E produces a cobalt base weld metal, resistant to metal-to-metal wear or erosion at service temperatures up to 900°C. Weld metal is highly resistant to the most aggressive chemicals.

Applications are universal but typical for hardfacing parts e.g. running and sealing faces on gas, water, steam and acid fittings, valve seats and cones for combustion engines, gliding surfaces metal-to-metal, highly stressed hot working tools without thermal shock, milling mixers, drilling tools.

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	Hilcostel 6T	-	Hilcostel 6T

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
1,10	-	-			27,5						4,5

Note: Co = balance

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer Hardness at 600°C 40-42 HRC approx. 33 HRC

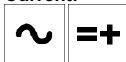
## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	300	24,0	70-110
4,0	350	35,1	90-130

## Coating type:

Rutile

## Current:



## Welding positions:



Arc voltage: 60V

## Approvals:

-

## Tip colour:

-

## Printing:

HILCOSTEL 12E

Hilcostel 12E is our rutile coated electrode for highly wear resistant surfacing parts subject to a combination of metal-to-metal wear, abrasion, erosion, corrosion, pressure and high temperatures up to 900°C. Deposit weld metal is Co-Cr-W alloyed, hardness is 48-50 HRC. After welding the deposit can be machined by grinding or with tungsten carbide cutting tools.

## Applications:

Hilcostel 12E produces a cobalt base weld metal, resistant to metal-to-metal wear or erosion at service temperatures up to 900°C. Weld metal is highly resistant to the most aggressive chemicals.

Applications are universal but typical for hardfacing parts e.g. running, sealing and gliding faces on fittings and pumps, tools for wood, paper, plastic, shredding tools, highly stressed hot working tools without thermal shock

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	On request	Hilcostel 12T	-	Hilcostel 12T

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
1,60	-	-			29,0						8,5

Note: Co = balance

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer Hardness at 600°C 48-50 HRC approx. 40 HRC

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	300	37,8	70-110
4,0	350	59,5	90-130



## Coating type:

Special

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

-

## Tip colour:

-

## Printing:

-

Aluminil Si 5 is our special coated aluminium electrode for welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The easy flowing characteristics make the electrode suitable for welding all aluminium castings (except AlMg castings). The electrode has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

## Base materials to be welded:

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL Si 5	-	AL Si 5	-	Fluxcored AL Si5

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
	0,05	5,0						0,05			Bal.

Note: Zn 0,10 - Fe 0,20

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 90$	$\geq 160$	$\geq 15$	40-55 HB

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	9,0	60-90
3,2	350	13,2	80-110
4,0	350	20,4	110-150

## Coating type:

Special

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

-

## Tip colour:

-

## Printing:

-

Aluminil Si 12 is our special coated electrode developed for welding all types of aluminium castings and applications where good colour matching with base materials is important. Typical applications include repair welding, surfacing and construction welding: window frames, aluminium tubes, furniture, aluminium castings, engine blocks, automotive parts. The electrode has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

## Base materials to be welded:

- Aluminium-Si cast alloys up to 12% Si content:  
G-AISI 12 (Cu), G-AISI 10 Mg (Cu), G-AISI 6 Cu 4

## Applications:

- Construction works (aluminium base metals)
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL Si 12	-	AL Si 12	-	AL Si 12

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
	0,10	12,0						0,05			Bal.

Note: Zn 0,10 - Fe 0,40

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 80$	$\geq 180$	$\geq 5$	50 HB

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	8,8	60-90
3,2	350	13,2	80-110
4,0	350	19,6	110-150

**Coating type:**

Basic

**Current:**

**Welding positions:**

**Approvals:**

-

**Tip colour:**

Gold

**Printing:**

E CuSn / C Bronsil

Bronsil is our basic coated tin-bronze electrode for joining and surfacing copper and copper alloys, phosphor- and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and shipbuilding. The electrode is also suitable for cladding steel and minor repair jobs in cast iron and C/Mn steel. Typical applications include repairing rotors and ship screws.

**Base materials to be welded:**

- Tin-bronze alloys CuSn 2, CuSn 6, CuSn 8, CuSn 6 Zn
- WNr. 2.1010, 2.1020, 2.1030, 2.1080

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Tinbronze 94-6	-	Tinbronze 94-6	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Sn	Fe	Mo	Cu	Nb	V	Al
	1,50	0,50	0,010	0,15	7,50	0,20		Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 200	≥ 280	≥ 25	≥ 100 HB

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	21,7	60-80
3,2	350	34,5	80-100
4,0	350	68,2	100-120

**Coating type:**

Basic

**Current:**

**Welding positions:**

**Approvals:**

-

**Tip colour:**

-

**Printing:**

HILCO E Cu Ni

Cuni is our basic coated copper-nickel electrode for joining and surfacing alloys of similar composition with up to 30% nickel as well as non-ferrous alloys and dissimilar steel grades. The deposit weld metal is highly resistant to seawater, typical applications include usage in shipbuilding, oil refineries, food processing industry, the engineering of general corrosion proof vessels and equipment.

**Base materials to be welded:**

- Copper-nickel alloys up to 30% Ni content
- CuNi30Mn, CuNi30Mn1Fe, CuNi10Fe1Mn, CuNi20Fe, CuNi25, CuNi44Mn
- WNr. 2.0890, 2.0882, 2.0872, 2.0878, 2.0830, 2.0842
- Dissimilar joining nickel to copper-nickel alloys

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry
- Food processing industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	Cunifer 70/30	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Sn	Fe	Mo	Cu	Ni	V	Al
0,015	1,80	0,40	0,010	0,15		0,60		Bal.	30,0		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 240	≥ 390	≥ 25	105 HB

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	34,5	80-105
4,0	350	68,2	110-130

**Coating type:**

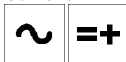
Special

**Arc voltage:** 70V

**Approvals:**

-

**Current:**



**Tip colour:**

Violet

**Welding positions:**



**Printing:**

CUTIL

Cutil is our electrode for cutting, gouging, chamfering and piercing of all metals, including stainless, aluminium, cast iron and non ferrous alloys. Cutil guarantees welders easy performance, high cutting and gouging rates and easy handling. Take precautions when using: when grooving it is advised to lift the work so that the molten parent metal can run off better. The electrode should be set as horizontal as possible to the workpiece and kept in contact constantly. Push the electrode slightly to increase the working speed.

**Base materials to be welded:**

- Structural steels
- Stainless steels
- Aluminium
- Nickel alloys
- Cast iron

**Applications:**

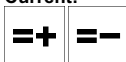
- All industries related to welding

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	37,9	130-180
4,0	450	72,9	170-230
5,0	450	107,1	210-390

**Coating type:**  
Copper coated

**Current:**



**Arc voltage:** 35-55V - power source needs OCV  $\geq$  60V

Carbon gouging rods are copper-coated air carbon arc cutting rods made from a mixture of graphite and pure carbon. Typical applications can be found in every field of metalworking, in foundries, steel constructions, shipbuilding, repair & maintenance. Carbon gouging rods are used for weld edge preparations, back-gouging in multipass welding, removing unsatisfactory welds, bolt and wire ends, spatter removal, all kinds of cutting.

## Base materials to be welded:

- Carbon, low-alloyed steels
- Stainless steels
- Aluminium
- Nickel alloys
- Cast iron
- Copper alloys
- Magnesium

## Applications:

- All industries related to welding

## Process description, recommendations for usage

Carbon gouging rods remove molten metal with a jet of air. The intense heat of an arc between the carbon-graphite electrode and a workpiece melts a portion of the metal, while simultaneously a jet of air is passed through the arc to blow away the molten metal. The process (Air carbon arc cutting - CAC-A) is used for cutting and gouging, and it can be done manually or mechanized. Carbon steel, stainless steel, copper alloys, cast irons, aluminium, magnesium and nickel alloys can all be cut with Carbon gouging rods. The process requires an electrode holder, cutting electrodes, a power source and an air supply. Manual electrode holders are similar to shielded metal arc electrode holders (stick electrode holders). The electrode is held in a rotatable head containing air orifices. A valve is provided to turn the air on and off. Carbon gouging rods are round, pointed and copper coated. They are intended to use at DC current.

Base material	Electrode	Current	Remarks
Carbon, low-alloyed steels	DC	= +	-
Stainless steels	DC	= +	-
Aluminium	DC	= +	Extend electrode no more than 10 cm.
Nickel alloys	DC	= -	-
Cast iron	DC	= -	At middle of electrode current range
	DC	= +	At maximum current only
Copper alloys	DC	= +	At maximum current only
Magnesium	DC	= +	Clean surface before welding

## Packaging and welding data:

Dia. mm.	Length mm.	Current A
4,0	305	90-150
5,0	305	150-200
6,3	305	200-400
8,0	305	250-450
10,0	305	350-600

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M32 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub> including M21 (1) = ArHeCO<sub>2</sub>

SG 2 is our copper coated solid wire for MAG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks etc.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	-	Hilcord 40	Fer SG 2	H100 / HW530	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,50	0,85	≤ 0,025	≤ 0,025							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 430	≥ 510	≥ 22	-20°C ≥ 70

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,6	S200	5	60-140	16-20
0,8	S200	5	80-180	17-20
0,6	S300	15	60-140	16-20
0,8	S300	15	80-180	17-20
0,9	S300	15	100-200	17-22
1,0	S300	15	120-240	17-22
1,2	S300	15	160-260	18-26

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
M11-M33 = ArCO<sub>2</sub>-ArCO<sub>2</sub>O<sub>2</sub>

SG CrMo1 is our solid wire for MAG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes.

#### Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

#### Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

#### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	-	Hilcord 61M	SG CrMo1	H100CrMo1/HW530	-

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025	1,20		0,50				

Note: AWS spec. ER80S-B2 Mn 0,40-0,70%

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 460	≥ 560	≥ 26	+20°C ≥ 47

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

#### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	15	80-180	17-20
1,0	BS300	15	120-240	18-26
1,2	BS300	15	160-260	20-29



**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>,

Hilchrome G307 is our solid wire for MAG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilchrome G307 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C.

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	-	Hilcord 82	Hilchrome W307	S307 / HW100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	7,00	0,80			19,00	9,00					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 600	≥ 35	+20°C ≥ 80

Note: properties under M13 = ArO<sub>2</sub> gas shielding

**Packaging and welding data:**

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
0,8	BS300	12,5	60-90	18-24
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26
1,6	BS300	15	180-300	20-30

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

M12-M13 = ArCO<sub>2</sub>-ArO<sub>2</sub>

Hilchrome G312 is our solid wire for MAG welding which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. Hilchrome G312 deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50.

## Base materials to be welded:

- High strength, unalloyed and alloyed heat treatable steels; stainless, ferritic chromium and austenitic CrNi steels; austenitic manganese steels
- Chemically resistant weld claddings ranging from ferritic-pearlitic steels to fine grain steels, incl. high temperature fine grain steels
- Dissimilar joining

## Applications:

- Boiler & pressure vessel industry
- Repair shops
- Gas industry
- Cane sugar mills
- Cement industry
- Petrochemical industry
- Mine industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 312R	-	-	Hilchrome W312	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,15	1,60	0,50			30,0	9,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 750	≥ 20	+20°C ≥ 30

Note: properties under M13 =ArO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,0	BS300	15	80-140	18-25
1,2	BS300	15	100-250	18-26

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome G600 is our solid wire for MIG welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Hilchrome G600 is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking.

#### Base materials to be welded:

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

#### Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

#### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 600	-	-	Hilchrome W600	-	-

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	2,80	0,50	≤ 0,015	≤ 0,030	20,0	Bal.			2,50	3,00	0,80

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 640	≥ 35	+20°C ≥ 150 -196°C > 40

Note: properties under pure Argon gas shielding

#### Packaging and welding data:

Dia. mm.	Length mm.	Weight / package kg.	Current A	Voltage V
1,2	BS300	15	100-250	18-26

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M32 = ArO<sub>2</sub>-ArCO<sub>2</sub>

H-350 is our solid wire for wear resistant surfacing on low-alloy steel subject to metal-to-metal wear, but also impact and mild abrasion. Deposit weld metal has a martensitic structure, hardness of pure weld deposit approx. 350HB. After welding the deposit can easily be machined by grinding.

### Applications:

H-350 is particularly suitable under conditions of moderate abrasion and friction, combined with impact. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear. H-350 may also be used as a final overlay on parts that need to be machined or as a build-up layer for hardfacing materials providing higher wear resistance.

Applications are universal but typical for building up parts e.g. repair of worn switches and rails, tractor and shovel parts, dragline chains, cable sheaves, shovel and bucket lips, dredge pump parts, cutter teeth, pump impellers and housings, dredge and shovel bucket teeth, mill and crushing hammers. Hardfacing crane and mine car wheels, tractor rolls, idlers, links and sprockets, cable drums, roller guides, transmission parts

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hardmelt 350	-	On request	-	H60/HW400	-

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,70	1,90	0,45			1,00						

### Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer hardened 820-850°C / oil soft annealed 720-740°C 1 layer on unalloyed steel
	450 HB approx. 62 HRc approx. 200 HB approx. 350 HB

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kgs.	Current A	Voltage V
1,2	B300	15	130-260	26-31

**Wire type:**  
MAG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

C1 = CO<sub>2</sub>, M11-M32 =ArO<sub>2</sub>-ArCO<sub>2</sub>

H-600 is our solid wire for wear resistant surfacing parts of steel, cast steel and high Mn-steel, subject to abrasion, metal-to-metal wear, impact and/or compression stresses. Deposit weld metal has a martensitic structure, hardness of pure weld deposit approximately 600HB.

After welding the deposit can be machined by grinding only.

### Applications:

H-600 is particularly suitable under conditions of heavy abrasion and friction, combined with impact. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear.

Applications are universal but typical for hardfacing parts e.g. agricultural, earth moving and stone crushing industry, hardfacing crane and mine car wheels, sprockets and gear teeth, skip guides, dredger buckets, scraper blades, transferables, cable sheaves, tractor and shovel parts, dragline buckets, conveyor chains, hammer heads, clutch jaws

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hardmelt 600	-	Hilcord 600	-	-	-

### Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,45	0,40	3,00			9,20						

### Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer hardened 1000°C / oil soft annealed 800°C 1 layer on unalloyed steel
	54-60 HRc approx. 62 HRc approx. 250 HB approx. 53 HRc

### Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kgs.	Current A	Voltage V
1,2	S300	15	135-260	26-31

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Tinbronze 94-6 is our tin-bronze alloyed solid wire for MIG welding and surfacing copper and copper alloys, phosphor- and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and shipbuilding. Tinbronze 94-6 is also suitable for cladding steel and minor repair jobs in cast iron and C/Mn steel. Typical applications include repairing rotors and ship screws.

**Base materials to be welded:**

- Tin-bronze alloys CuSn 2, CuSn 6, CuSn 8, CuSn 6 Zn
- WNr. 2.1010, 2.1020, 2.1030, 2.1080

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Bronsil	-	-	Tinbronze 94-6	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				0,25			6,5	Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 150	≥ 300	20	80 HB

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,2	S300	~12

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1 = Pure Ar

Albronze 8 is our Cu-Al alloyed solid wire for MIG welding and surfacing aluminium bronzes like CuAl5, CuAl8. Typical applications include surfacing of copper, brass, special brass (CuZn20Al), unalloyed and low alloyed steels, joining seawater conducting corrosion resistant aluminium bronze or special brass pipelines. For multi-layer surfacing we recommend puls-arc welding.

## Base materials to be welded:

- Aluminium bronze alloys: CuAl8Fe3, CuAl10Fe3Mn2, CuAl9Mn2, CuAl10Ni5Fe4
- Cast Aluminium bronzes: G-CuAl8Mn, G-CuAl10Ni,
- Surfacing copper, brass, special brass, steel
- Joining brass (CuZn20Al) pipelines

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Petrochemical industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
								Bal.			8,0

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 180	≥ 430	≥ 40	120 HB

## Packaging data:

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12

## Wire type:

Basic cored wire

## Current:



## Welding positions:



## Approvals:

ABS, DNV, LR, TÜV

## Shielding gas:

C1 = CO<sub>2</sub>, M21 = ArCO<sub>2</sub>, M33 = ArCO<sub>2</sub>O<sub>2</sub>

Hilcord 51 is our seamless copper coated basic flux cored wire for MAG welding unalloyed and low alloyed structural steels. Wire has characteristics typical for basic type consumables: weld deposits have superior impact toughness and crack resistance comparable to stick electrodes type E7018. Hilcord 51 is a guaranteed low hydrogen content wire ( $H_{DM} < 5$  ml/100 gr. deposit weld metal). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, H1, H11, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Basic Directa	K 60	-	Fer SG 2	H 100 / HW 530	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,50	0,45	≤ 0,025	≤ 0,025							

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 420	≥ 520	≥ 24	-40°C ≥ 50

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-350	18-32
1,6	B300	16	200-450	20-34



## Wire type:

Metal cored wire

## Current:



## Welding positions:



## Approvals:

TüV

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 61M is our seamless copper coated metal cored wire for MAG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. Hilcord 61M is a guaranteed low hydrogen content wire ( $H_{DM} < 5 \text{ ml/100 gr. deposit weld metal}$ ). The specific properties of seamless cored wires offer you a guaranteed problem-free usage at all times!

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GAUW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	SG CrMo1	-	Fer SG CrMo1	H 100CrMo1/HW 580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,06	1,00	0,35	≤ 0,015	≤ 0,015	1,00		0,50				

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
Stress relieved	≥ 460	≥ 540	≥ 22	-20°C ≥ 50

Notes: stress relieved condition 680°C / 2 h. - preheat, interpass and PWHT are essential for obtaining properties as indicated. For welding 13CrMo4-5 preheat 200-250°C, PWHT 660-700°C min. 1/2 h., cool down slowly

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	16	120-300	17-32

## Wire type:

Rutile cored wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 82 is our rutile flux cored wire for MAG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilcord 82 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C.

## Base materials to be welded:

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

## Applications:

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	Hilchrome G307	-	Hilchrome W307	S307 / HW100	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	7,0	0,70			17,5	8,5					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 450	≥ 630	≥ 35	+20°C ≥ 60
				Hardness 160 HB, 450HB after deformation

Note: properties under M21 = ArCO<sub>2</sub> gas shielding

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kg.	Current A	Voltage V
1,2	B300	15	160-200	25-29

## Wire type:

Basic cored wire  
1,2 mm. metal cored wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

M21 = ArCO<sub>2</sub>

Hilcord 600 is our cored wire for wear resistant surfacing parts of steel, cast steel and high Mn-steel, subject to abrasion, metal-to-metal wear, impact and/or compression stresses. Deposit weld metal has a martensitic structure, hardness of pure weld deposit approximately 600HB.

After welding the deposit can be machined by grinding only.

## Applications:

Hilcord 600 is particularly suitable under conditions of heavy abrasion and friction, combined with impact. Ideally suitable for applications involving rolling, sliding and metal-to-metal wear.

Applications are universal but typical for hardfacing parts e.g. agricultural, earth moving and stone crushing industry, hardfacing crane and mine car wheels, sprockets and gear teeth, skip guides, dredger buckets, scrapper blades, transfertables, cable sheaves, tractor and shovel parts, dragline buckets, conveyor chains, hammer heads, clutch jaws

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hardmelt 600	H600	-	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,50	1,50	0,60	≤ 0,025	≤ 0,025	5,50		0,60				

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 54-60 HRC

## Packaging and welding data:

Dia. mm.	Spooltype	Weight / spool kgs.	Current A	Voltage V
1,2	B300	16	160-260	18-26
1,6	B300	16	180-300	20-27

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Fer SG 2 is our copper coated wire for TIG welding unalloyed and low alloyed, incl. fine grain types, structural steels. Typical applications include: general constructions, shipbuilding, bridges, tanks etc. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

### Base materials to be welded:

- Ships plate A-E, A(H)32-E(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2G3, St.33-St.52.3, C(K)10-C(K)35
- Boiler steel P235GH-P355GH, HI, HII, 17Mn4, 19Mn6
- Fine grain steel P275N-P355NL2, S275N-S420N, StE285-ESTe355, StE285TM-ESTe355TM
- Pipe steel P235T1-P355N, L210-L415MB, St37.0-St52.4, St45.8, X42-X60, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

### Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry
- Repair Shops
- Car industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Red Extra	K 60	Hilcord 40	-	H100 / HW530	Fer G 1

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	1,40	0,85	≤ 0,030	≤ 0,030							

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 560	≥ 22	-20°C ≥ 70

Notes: properties under pure Argon gas shielding

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
TüV

**Shielding gas:**  
I1 = Pure Ar

Fer SG CrMo1 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like 13CrMo4 5 up to a maximum operating temperature of 550°C. Typical applications include the construction of pressure vessels, boilers and pipes. To be used in combination with tungsten electrodes type Wolfram WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Boiler steel 13CrMo4-5, 15CrMo5, 16CrMoV4, A 333 Grade P 11, P 12, G-17CrMo5-5, 22Mo4, G-22CrMo 5-4, 42CrMo4,
- Heat treatable steels up to 780 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry
- Steel mills
- Petrochemical industry
- Cement industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
B 19 CrMo	SG CrMo1	Hilcrod 61M	-	H100CrMo1/HW580	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,10	1,00	0,60	≤ 0,025	≤ 0,025	1,20		0,50				

Note: AWS spec. ER80S-B2 Mn 0,40-0,70%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 460	≥ 560	≥ 22	+20°C ≥ 100

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Fer SG CrMo5 is our solid wire for TIG welding low alloyed fine grain and creep resisting steels like 12CrMo19-5 up to a maximum operating temperature of 600°C. Typical applications include the construction of pressure vessels, boilers and pipes. Fer SG CrMo5 is also used for repair welding forging dies. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Boiler steel 12CrMo19.5, A335 Grade P5, C5 X12CrMo5 (1.7362), G-X12CrMo5 (1.7363)
- Heat treatable steels up to 1180 MPa tensile strength
- Case hardening and nitriding steels

## Applications:

- Pressure vessel & boiler industry
- Pipelines
- Repair shops
- Heat exchanger industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW wire	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	0,50	0,40	≤ 0,025	≤ 0,025	5,70		0,60				

Note:

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 630	≥ 20	+20°C ≥ 60

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	914/1000	5
2,0	914/1000	5
2,4	914/1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W307 is our solid wire for TIG welding dissimilar steels and difficult-to-weld steels. Typical applications include joining 14Mn steels, spring steels, tool steels, high carbon steels. Hilchrome W307 is recommended for buffer layers prior to surfacing. The deposit weld metal features strain hardenability, excellent cavitation resistance, thermal shock resistance and scaling resistance up to 850°C. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Armour plate
- Hardenable steels incl. DFTW-steels
- Non-magnetic austenitic steels
- Work hardening austenitic manganese steels
- Heat resisting ferritic chromium steels
- Dissimilar joining

**Applications:**

- Repair shops
- Car industry
- Heat exchanger industry
- Cement industry
- Railways
- Cane sugar industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 307R	Hilchrome G307	Hilcord 82	-	S307 / HW100	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,08	7,00	0,80			19,00	9,00					

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 320	≥ 600	≥ 35	+20°C ≥ 80

Note: properties under pure Argon gas shielding

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W312 is our solid wire for TIG welding which is to be considered as a problem solver for all kinds of steel grades incl. stainless and difficult-to-weld steels. Typical applications for this WELD-ALL include joining hard manganese steels, tool steels, spring steels, buffering as well as joining dissimilar steel grades. Hilchrome W312 deposits a crack-resistant weld metal with an increased ferrite content of approx. FN50. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

## Base materials to be welded:

- Armour plate
- Hardenable steels incl. DFTW-steels
- Tool, die and spring steels
- Austenitic manganese steels
- Hardfacing clutches, gear wheels, shafts
- Buffer layers prior to hardfacing
- Dissimilar joining

## Applications:

- Repair shops
- Cement industry
- Steel mills
- Mine industry
- Railways
- Cane sugar mills

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 312R	Hilchrome G312	-		-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,15	1,60	0,50			30,0	9,0					

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 500	≥ 750	≥ 20	+20°C ≥ 30

Note: properties under pure Argon gas shielding

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	1000	5
2,4	1000	5



**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Hilchrome W600 is our solid wire for TIG welding high-grade nickel-base alloys like Inconel® 600. Typical applications include joining and surfacing high-temperature and creep resisting steels, heat resisting and cryogenic materials i.e. cold-tough steels (9% Ni), dissimilar joining and low-alloyed problem steels. Hilchrome W600 is suitable for usage between -196°C up to +650°C, maximum operating temperature of 1200°C (in a S-free environment), highly resistant to hot cracking. To be used in combination with tungsten electrodes type WT20.

#### Base materials to be welded:

- ASTM/AISI Grade Alloy 600/B168, Alloy 75, Alloy 80A
- Inconel® 600, 601, 690 - Incoloy® 800
- WNr. 2.4816, 2.4951, 2.4952
- NiCr15Fe and nickel alloys of similar composition
- Ni-steel up to and including 9% Ni
- Dissimilar joining

#### Applications:

- Pressure vessel & boiler industry
- Repair shops
- Gas industry (incl. LNG applications)
- Heat exchanger industry
- Paper mills
- Cement industry
- Petrochemical industry

#### Equivalent product in alternative welding process:

SAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilchrome 600S	Hilchrome G600	-		-	-

#### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Ti
0,10	2,80	0,50	≤ 0,015	≤ 0,030	20,0	Bal.			2,50	3,00	0,80

#### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Impact Values ISO-V J
As welded	≥ 400	≥ 640	≥ 35	+20°C ≥ 150 -196°C ≥ 40

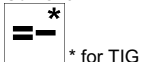
Note: properties under pure Argon gas shielding

#### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,4	1000	5

**Coating type:**

TIG Solid wire  
OAW Solid wire

**Current:**

**Welding positions:**

**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar, Oxy-acetylene

Hilcostel 6T is our solid wire for TIG welding or oxy-acetylene welding parts subject to a combination of metal-to-metal wear, impact, pressure, abrasion, erosion, corrosion, cavitation and high temperatures up to 900°C. Deposit weld metal is Co-Cr-W alloyed, hardness is 40-42 HRC, has excellent gliding characteristics, good polishability, good toughness, is non-magnetic. After welding the deposit can be machined by grinding or with tungsten carbide cutting tools.

**Applications:**

Hilcostel 6T produces a cobalt base weld metal, resistant to metal-to-metal wear or erosion at service temperatures up to 900°C. Weld metal is highly resistant to the most aggressive chemicals.

Applications are universal but typical for hardfacing parts e.g. running and sealing faces on gas, water, steam and acid fittings, valve seats and cones for combustion engines, gliding surfaces metal-to-metal, highly stressed hot working tools without thermal shock, milling mixers, drilling tools.

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilcostel 6E	-	On request	-	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
1,20	-	-			27,0						4,5

Notes: Co = balance

**Mechanical properties, weld metal – typical:**

Condition	Hardness
As welded	1 layer Hardness at 600°C 40-42 HRC approx. 33 HRC

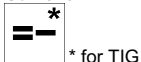
**Packaging data:**

Dia. mm.	Length mm.	Weight / package kgs.
3,0	1000	5
4,0	1000	5

## Coating type:

TIG Solid wire  
OAW Solid wire

## Current:



## Welding positions:



## Approvals:

-

## Shielding gas:

I1 = Pure Ar, Oxy-acetylene

Hilcostel 12T is solid wire for TIG welding or oxy-acetylene welding parts subject to a combination of metal-to-metal wear, abrasion, erosion, corrosion, pressure and high temperatures up to 900°C. Deposit weld metal is Co-Cr-W alloyed, hardness is 48-50 HRC. After welding the deposit can be machined by grinding or with tungsten carbide cutting tools.

## Applications:

Hilcostel 12T produces a cobalt base weld metal, resistant to metal-to-metal wear or erosion at service temperatures up to 900°C. Weld metal is highly resistant to the most aggressive chemicals.

Applications are universal but typical for hardfacing parts e.g. running, sealing and gliding faces on fittings and pumps, tools for wood, paper, plastic, shredding tools, highly stressed hot working tools without thermal shock

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Hilcostel 12E	-	On request	-	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	W
1,80	-	-			29,0						8,5

Notes: Co = balance

## Mechanical properties, weld metal – typical:

Condition	Hardness
As welded	1 layer 48-50 HRC Hardness at 600°C approx. 40 HRC

## Packaging data:

Dia. mm.	Length mm.	Weight / package kgs.
3,0	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Cunifer 70-30 is solid copper-nickel wire for TIG welding and surfacing alloys of similar composition with up to 30% nickel as well as non-ferrous alloys and dissimilar steel grades. The deposit weld metal is highly resistant to seawater, typical applications include usage in shipbuilding, oil refineries, food processing industry, the engineering of general corrosion proof vessels and equipment.

## Base materials to be welded:

- Copper-nickel alloys up to 30% Ni content
- CuNi30Mn, CuNi30Mn1Fe, CuNi10Fe1Mn, CuNi20Fe, CuNi25, CuNi44Mn
- WNr. 2.0890, 2.0882, 2.0872, 2.0878, 2.0830, 2.0842
- Dissimilar joining nickel to copper-nickel alloys

## Applications:

- Shipyards/offshore
- Repair shops
- Petrochemical industry
- Food processing industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Cuni	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	1,00				31,0		0,50	Bal.	0,40		

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 200	≥ 420	≥ 30	115 HB

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	1000	5
2,0	1000	5
2,5	500	5
2,5	1000	5

## Wire type:

OAW Cored wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Fluxcored AL 99,5 is our flux cored aluminium wire rod for oxy-acetylene gas welding, repairing and surfacing pure aluminium and wrought aluminium alloys. The internal flux core makes the need of additional fluxes unnecessary.

## Base materials to be welded:

- Pure aluminium acc. to DIN 1712 Al 99,8 and Al 99
- Pure aluminium Werkstoff nr. 3.0285 and 3.0205
- Similar aluminium and wrought aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil 99,8	AL 99,5	-	AL 99,5	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
											> 99,5

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 647-658°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
3,0	820	1

## Wire type:

OAW Cored wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Fluxcored Aluminium 5Si is our flux cored aluminium wire rod for oxy-acetylene gas welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The internal flux core makes the need of additional fluxes unnecessary.

## Base materials to be welded:

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 5	AL Si 5	-	AL Si 5	-	AL Si 5

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	5,0									Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 573-625°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
3,0	820	1

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze C is our low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Bronze C produces poreless joints, color matching with brass. Applications are universal but typical for joining galvanized steel (without destroying its zinc layer), joining non-ferrous metals, tube structures, sanitary installations, fitting and repair work, bicycles, motorcycles, automotive industries, furniture industry. The Mn content guarantees strong and high quality joints.

## Base materials to be welded:

- Similar and dissimilar joining
- To be used in combination with HILCO Bronze Flux.

## Applications:

- Shipyards/offshore
- Constructionworks
- Repair shops
- Car industry/assembling
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	Bronze F, Autobronze

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
	0,60	0,40			≤ 0,01	0,35	≤ 0,10	60,0		Bal.	≤ 0,005

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 490	≥ 35	870-900°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	1000	5
2,0	1000	5
2,5	1000	5
3,0	1000	5
4,0	1000	5
5,0	1000	5

AWS A5.8: RB CuZnA

EN 1044: CU 301

DIN 8513: L-CuZn40

Werkstoffnr. 2.0367

## Wire type:

OAW Solid wire (fluxcoated)

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze F is our flux coated low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Bronze F produces poreless joints, color matching with brass. The flux coating makes use of additional brazing fluxes unnecessary.

## Base materials to be welded:

- Similar and dissimilar joining

## Applications:

- Shipyards/offshore
- Constructionworks
- Repair shops
- Car industry/assembly
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	Bronze C, Autobronze

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
		0,30				0,20		60,0		Bal.	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 350	≥ 35	875-895°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	2,5
2,5	500	2,5
3,0	500	2,5



## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze N is our high strength Nickel-bronze brazing rod for joining and surfacing steel, malleable cast iron, nickel and nickel alloys. Typical applications include joints subject to severe mechanical loads, soldering butt joints on heavily stressed components, sleeveless pipe assemblies in the car industry.

## Base materials to be welded:

- Similar and dissimilar joining
- To be used in combination with HILCO Bronze Flux.

## Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Car industry/assembly
- Bicycle industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
	0,20	0,25			10,0	0,20		48,0		Bal.	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 690	≥ 18	890-920°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500 / 1000	5
2,5	500 / 1000	5
3,0	500 / 1000	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Phosphorbronze 93/7 is our thin flowing Copper-Phosphorous alloy used for brazing copper-to-copper. The alloy has good bridging capacities and requires a lesser good fit up than Phosphorbronze 92/8. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Refrigerator industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	L-Ag 2P

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				6,8				93,2			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	5	710-820°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	5
2,5	500	5

## Flux type:

Agglomerated rutile, Mn/Si alloying

## Current:



## Welding positions:



## Approvals in combination with wire:

H 60: BV, CL, DNV, LR

HW 430 is our agglomerated rutile flux for submerged arc welding unalloyed and low alloyed structural steels in combination with solid wires H60, H100, H100Si and metalcored wire Hilcord 100. HW 430 is suitable for single and multipass welding, for fillet welds and multi wire applications. The weld has an excellent appearance and the slag is self-releasing. Flux/wire usage ratio 1:1, the basicity index is 0,4 ca. (Boniszewski).

## Base materials to be welded:

- Ships plate A-D, A(H)32-D(H)36, S315G1S-S355G3S
- Structural steel S185-S355J2, St.33-St.52, C(K)10-C(K)35
- Boiler steel P235GH-P295GH, HI, HII, 17Mn4
- Fine grain steel P275N-P355N, S275N-S355M, StE285-StE 355, StE285-StE355TM
- Pipe steel P235T1-P355N, L210-L360NB, St37.0-St52, St45.8, X42-X52, StE210.7-StE360.7TM
- Cast steel GP240R, GS45

## Applications:

- Shipyards/offshore
- Construction works
- Bridge & road constructions
- Pressure vessel & boiler industry

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60	0,04	0,80	1,20					
H 100	0,04	0,80	1,40					
H 100 Si	0,04	1,10	1,50					
Hilcord 100	0,08	1,40	1,70					

## Mechanical properties, weld metal – typical:

Condition		0,2% Yield strength	Tensile strength	Elongation	Impact Values ISO-V J			
A = as welded		MPa	MPa	Lo=5d - %	+20°C	0°C	-20°C	-40°C
H 60	A	≥ 400	≥ 500	≥ 25		≥ 50		
H 100	A	≥ 400	≥ 520	≥ 25		≥ 40	≥ 27	
H 100 Si	A	≥ 400	≥ 520	≥ 25		≥ 40	≥ 27	
Hilcord 100	A	≥ 440	≥ 560	≥ 28		≥ 40	≥ 27	

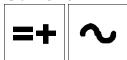
## Packaging data:

type	Weight / kg.
bag	25 kilo

### Flux type:

Agglomerated (semi) basic

### Current:



### Welding positions:



### Approvals in combination with wire:

-

HW 100 is our agglomerated semi-basic flux for submerged arc welding and surfacing stainless steel grades. HW 100 is suitable for single and multipass welding, for fillet welds and multiwire applications. The weld has an excellent appearance and the slag is self-releasing, even when hot. The weld metal, produced in combination with corresponding wires, offers good corrosion resistance in its typical applications. The basicity index is 1,2 ca. (Boniszewski).

### Base materials to be welded:

- Armour plate, hardenable steels, non-magnetic austenitic steels, heat resisting ferritic chromium steels

### Applications:

- Repair shops
- Railways

### Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	Nb
Hilchrome S307	0,10	1,00	7,00	9,0		19,0	

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness HB
A = as welded				
Hilchrome S307 A	≥ 320	≥ 570	≥ 36	150 after deformation 40-45HRc

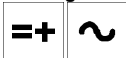
### Packaging data:

Spooltype	Weight / kg.
bag	25

## Flux type:

Agglomerated rutile, Cr/Mo alloying

## Welding Current:



## Welding positions:



## Approvals in combination with wire:

-

HW 400 is our agglomerated rutile flux for surfacing parts subject to wear using the submerged arc welding process. HW 450 is specifically developed for reconditioning bulldozer tracks and similar applications.

## Base materials to be welded:

## Applications:

- Repair shops

## Chemical composition, wt.% weld metal – typical:

Type of wire	C	Si	Mn	Ni	Mo	Cr	P	S
H 60 (3 <sup>rd</sup> layer)	0,25	0,70	2,00		0,5	3,0		

## Mechanical properties, weld metal – typical:

Condition A= as welded	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
H 60 A	≥ 360	≥ 450	≥ 22	400 HB

## Packaging and welding data:

type	Weight / kg.
bag	25 kilo

## **Welding of Aluminium**

Aluminium is successfully welded only after careful thought and preparation. Through correct preparation, it is easier to avoid the pitfalls that can trap the unwary. Therefore this introduction with facts on base metals, welding methods, types of joint and filler metals. This introduction is just a general guideline, please contact us for more information.

### **Base metals**

Aluminium and its alloys can be divided into three major groups:

- Aluminium
- Non hardenable / non heat treatable alloys
- Hardenable / heat treatable alloys

Aluminium is developed in various grades of purity. The most common commercial grades contain 99,7-99,5 or 99,0% aluminium. Non-hardenable alloys, i.e. not suitable for heat treatment, contain small amounts of Mn or Mg. AlMn alloys are often made up of between 1,0-1,2%Mn, while AlMg alloys with up to 5% are quite common. AlMgMn alloys are also used. The hardenable alloys contain copper (Cu), magnesium and silicon (Mg+Si), or zinc and magnesium (Zn+Mg).

Aluminium and most of the non-heat treatable and heat treatable alloys possess good weldability. In the case of hardenable alloys with copper and lead additives, there is a risk of hot cracking and therefore they are difficult-to-weld. Many casting alloys are also suitable for welding except in the case of those, which have high content of copper or magnesium which cannot be welded.

### **Welding methods**

Aluminium can be welded easily. Consideration must be given to both the welding method, the type of joint and the filler metal. The two dominating welding processes are GMAW (MIG) and GTAW (TIG) welding, but also gas, plasma an resistance welding are used as well as welding with stick electrodes (SMAW).

Determining the welding process depends on numerous factors. TIG welding is better for thin light-gauge materials, when there is a need for good surface finish and for single sided welding (such as when welding pipes) as well as repair welding. TIG welding is generally done on AC current.

MIG welding is used primarily in case of thicker or heavy-gauge materials and when high speed is a priority in combination with long continuous welds. Due to the lower heat input, MIG welding results in less distortion in the welding zone. Pulse-arc welding with MIG is an interesting technology.

Stick electrodes are used mainly for repair jobs. The advantage of this process is the simple controllability as well as the possibility to be flexible in any environment. Low investment costs can be a factor for choosing SMAW.

### **Types of joint**

The joint-type depends on the thickness of the base materials and the type and shape of the workpiece. As a rule no preparation is required for thinner materials. An ordinary I-joint is recommended for single sided TIG welding plates ≤ 4mm. plate thickness, a 50° V-joint with a 2 to 3 mm. bevelled edge is recommended for two sided welding plates > 4 mm. thickness. Alternatively a 90° double V-joint can be applied.

Good joint preparation makes welding easier, saves shielding gas and filler metals and contributes to the quality of the weld.

A special characteristic of aluminium is the higher melting point of oxide that forms on its surface. To avoid welding defects the joint surface must be scrapped or brushed using stainless steel wire brushes.

Bear in mind that welding causes greater deformation in aluminium than it does in steel. It is therefore essential to give good consideration to all aspects of the welding process.

### **Filler metals**

The choice which filler metal to use, is based on the composition of the base materials and the requirements of the finished product. Generally speaking, aluminium and non-heat treatable alloys should be welded with matching filler metals. Alloys, which are suitable for hardening, should be welded with a filler metal with a high content of Si or Mg in order to avoid the risk of hot cracking.

If there is a need of good match in colour between the welded joint and the base materials after anodic treatment, a suitable filler metal should be used.

As in the case of base materials, care must be taken to keep the filler metals clean, free from any contamination (especially oil, grease or dust). Keep your filler metals in warm and dry conditions. For storing stick electrodes take extra precautions and store the electrodes in their original hermetically sealed aluminium cans.

Welding application	Special considerations	Common base materials	Filler metal selection
<b>Shipbuilding and sub suppliers</b>			
<b>Requirements:</b> <b>Saltwater corrosion resistance, pressure vessel service, thick plate welding</b>			
Structural frames	Strength & fatigue, corrosion, extrusions & cut plate	6061 to 6061 6061 to 5086 5086 to 5086 5083 to 5083	AL Mg5 AL Mg5 AL Mg5 AL Mg4,5Mn
Skin	Strength & corrosion	5052 to 5052 5086 to 5086 6061 to 6061 5083 to 5083	AL Mg5, AL Si5 (2 <sup>nd</sup> choice) AL Mg5 AL Mg5 AL Mg4,5Mn
Desalination units	Corrosion & high temperatures	5454 to 5454 5052 to 5052	AL Mg3 AL Mg3
Tube railings	Strength & anodize	6061 to 6061 6063 to 6063	AL Mg5 AL Mg5
Structural plate & LNG tanks	Impact strength & cold temperature properties	5083 to 5083	AL Mg4,5Mn
Marine cast hardware	Strength & corrosion	5180 to 5180 5350 to 5350	AL Mg5 AL Mg5
<b>Cars, manufacturing and sub suppliers</b>			
<b>Requirements:</b> <b>Thin wall brazing for heat exchangers, corrosion resistant high strength wheels, high torque drive components, body and frame joining</b>			
Heat exchangers	Pressure seal, corrosion resistance & thin wall burst pressure	3003 to 3003 3003 to 6061 6061 to 6061	AL Si12, AL Si5 (2 <sup>nd</sup> choice) AL Si12, AL Si5 (2 <sup>nd</sup> choice) AL Si12, AL Si5 (2 <sup>nd</sup> choice)
Wheels	Shear strength, fatigue and high temperature	5454 to 5454 5454 to 6061 5356 to 5454	AL Mg3 AL Mg3 AL Mg3
Drive shafts	Torque / shear strength & fatigue	6061 to 6061	AL Mg5
Bumpers & supports	Impact strength, corrosion resistance & extrusions	7005 to 7005 7029 to 7029	AL Mg5
Body panels	Tensile strength, corrosion resistance & thin wall welding	6009 to 6009 6011 to 6011	AL Si5, AL Si 12 (2 <sup>nd</sup> choice) AL Si5, AL Si 12 (2 <sup>nd</sup> choice)
Frame sections	Strength & fatigue	6061 to 6061	AL Si5
<b>Trucks, buses and trailers</b>			
<b>Requirements:</b> <b>High quality production welding technology, product cost optimization, product reliability engineering</b>			
Formed truck panels	Formability & corrosion resistance	5052 to 5052 5052 to 5454 5454 to 5454	AL Mg5 AL Mg5 AL Mg5
Engine blocks cast housings	Weld cracking	356 to 356	AL Si12
Cylinder heads	Weld cracking	A201.0 to A201.0 240.0 to 240.0 242.0 to 242.0	AL Si12 AL Si12 AL Si12
Forged pistons	Weld cracking	2218 to 2218 2618 to 2618	AL Si5 AL Si5

Welding application	Special considerations	Common base materials	Filler metal selection
<b>Trucks, buses and trailers</b> <b>Requirements:</b> <b>High quality production welding technology, product cost optimisation, product reliability engineering</b>			
Truck panels	Strength, cost efficiency & fatigue	5454 to 5454 5086 to 5086 5083 to 5083	AL Mg5, AL Mg3 (2 <sup>nd</sup> choice) AL Mg5 AL Mg5, AL Mg4,5Mn (2 <sup>nd</sup> choice)
Chemical tankers	Strength & corrosion resistance	5254 to 5254	AL Mg4,5Mn
Line heaters & steam liners	Strength & high temperature	5454 to 5454	AL Mg3
Trim	Formability, anodise & polish	5050 to 5050 5005 to 5005	AL Mg5 AL Mg5
<b>Trains, railway cars</b> <b>Requirements:</b> <b>High quality production welding technology, product cost optimisation, product reliability engineering</b>			
Train panels	Strength & fatigue cost efficiency	5454 to 5454 5086 to 5086 5083 to 5083	AL Mg5, AL Mg3 (2 <sup>nd</sup> choice) AL Mg5 AL Mg4,5Mn
<b>Aerospace &amp; defence industry</b> <b>Requirements:</b> <b>Extreme temperature service, maximum strength-to-weld ratios, X-ray inspection standards, armour plate technology, complex joint designs</b>			
Aerospace hardware	Strength-to-weight ratio	6061 to 6061 6013 to 6013 If anodised PWHT	AL Si5 AL Si5 AL Mg5 AL Si5
Turbine blades and torque converters	Strength-to-weight ratio	711.0 to 711.0	AL Mg5
Armour plate	Impact strength & strength-to-weight ratio	5083 to 5083 7039 to 7039	AL Mg5 AL Mg5
Military bridges	Strength-to-weight ratio	7039 to 7039 PWHT	AL Mg5
<b>Other transport equipment</b> <b>Requirements:</b> <b>Alloys for maximum strength-to-weight ratios, high strength thin wall joining, complex heat treatment</b>			
Bicycle frames & sport wheels	Strength fatigue & anodise	6061 to 6061 6061 to 6061 PWHT 7005 to 7005  7046 to 7046  5086 to 5086	AL Mg5 AL Si5  AL Mg5, AL Mg4,5Mn (2 <sup>nd</sup> choice) AL Mg5, AL Mg4,5Mn (2 <sup>nd</sup> choice) AL Mg5
Tops & sleds	Deep drawing & forming	1100 to 1100 1100 to 1100	AL 99,5 AL Si5
Frame extrusions & body sheet	Strength-to-weight ratio & forming	6061 to 6061 5454 to 5454 5086 to 5086 5052 to 5052	AL Mg5 AL Mg5 AL Mg5 AL Mg5



Welding application	Special considerations	Common base materials	Filler metal selection
<b><u>Energy generation incl. boilers and pressure vessels. Turbines. power plants, windmills</u></b> <b>Requirements:</b> <b>Defect free production welding technology, special alloys for specific environments</b>			
Pressure vessel	Strength	5456 to 5456	AL Mg4,5Mn AL Mg4,5MnZr (on request) AL Mg5Mn (on request)
Marine & cryogenic tanks	Temperature & strength	5083 to 5083	AL Mg4,5Mn
Chemical tanks	Chemical (acids), processing (food), H <sub>2</sub> O <sub>2</sub> , corrosion & strength	1060 to 1060 1100 to 1100 3003 to 3003 5254 to 5254	AL Si5 AL Si5 AL Si5 AL Mg3
<b><u>General repair &amp; maintenance</u></b> <b>Requirements:</b> <b>In field repair of cast aluminium objects, in workshop repair of aluminium objects, anodised aluminium parts</b>			
General repairs of aluminium products e.g. cylinders heads, machine bases, small engine crank cases, marine etc.	Pure/cast Al anodised, Mn & Mg Al alloys, AlMgSi alloys, unalloyed aluminium cast silicon aluminium alloys general grades	N/A N/A 6060 / 6083 N/A N/A all	AL 99,5 Aluminil 99,5 AL Mg3 Aluminil Mn1 Aluminil Si12 Aluminil Si5

Aluminium base materials, the alloy designation, their application		
International registration	Alloy	Typical applications
1050A, 1200	Al99,5 Al99,0	Body panels for tanks used for chemical and food industry, dairy industry, breweries, packaging industry, household appliances, electronic industry
3103	AlMn1	Buildings, heat exchangers, roof coverings
5052, 5251	AlMg2,5 AlMg2Mn0,3	Tanks, body panels and construction in contact with seawater and -air
5083	AlMg4,5Mn	Shipbuilding, tanks and tubes for transportation liquid gases, armour plate
5086	AlMg4Mn	Shipbuilding and car bodies
5454	AlMg2,7Mn	Shipbuilding, car bodies, transportation industry
6005A	AlMgSi0,7	General construction grade, roof constructions, light poles, pipelines
6060, 6063	AlMgSi0,5	Building materials, windows, doors
6061	AlMg1SiCu	General construction grade for dynamic stressed constructions, bridges
6082	AlMgSi1	Car body industry
7020	AlZn4,5Mg1	Non-marine applications, cars, armour plate

Filler metals for welding Aluminium								
No.	HILCO	AWS Spec.	DIN	Werkstoffnr.	Available as			
					SMAW	GMAW	GTAW	OAW
1	AL 99,5	ER 1100	SG-Al 99,5	3.0259	•	•	•	•
2	AL Si5	ER 4043	SG-AlSi 5	3.2245	•	•	•	•
3	AL Si12	ER 4047	SG-AlSi 12	3.2585	•	•	•	•
4	AL Mg3	ER 5754	SG-AlMg 3	3.3536	(•)	•	•	
5	AL Mg4,5Mn	ER 5183	SG-AlMg 4,5 Mn	3.3548		•	•	
6	AL Mg5	ER 5356	SG-AlMg 5	3.3556		•	•	

Consumable selector							
Base materials	7020	6005A, 6060, 6061, 6063, 6082	5083	5086	5454	5052, 5251	1050, 1200, 3103
1050, 1200, 3103	2	6, 2	6	6	5, 2	5, 2	1
5052, 5251	5	5, 2	6	6	6	6	
5454	5	6	6	6	6		
5086	5	6	6	6			
5083	5	6	5				
6005A, 6060, 6061, 6063, 6082	5, 2	6					
7020	5						

**Notes:** for welding alloy 7020 it is possible to use filler metal no. 6 instead of no. 5.  
For workpieces subject to anodic treatment we recommend filler metal no. 6.

**Coating type:**

Special

**Current:**



**Welding positions:**



**Arc voltage:** 65V

**Approvals:**

-

**Tip colour:**

-

**Printing:**

-

Aluminil 99,8 is our special coated aluminium electrode for welding pure aluminium and wrought aluminium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair welding engine blocks, oil-castings, automotive parts and aluminium pump housings. Aluminil 99,8 has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

**Base materials to be welded:**

- Pure aluminium acc. to DIN 1712 Al 99,8 and Al 99
- Pure aluminium Werkstoff nr. 3.0285 and 3.0205
- Similar aluminium and wrought aluminium alloys

**Applications:**

- Construction works (aluminium base metals)
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL 99,5	-	AL 99,5	-	Fluxcored AL 99,5

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
	0,02	0,08						0,02			99,8

Note: Zn 0,03 - others 0,05 max.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 30$	$\geq 80$	$\geq 30$	-

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	9,2	60-90
3,2	350	14,0	80-110
4,0	350	20,4	110-150

## Coating type:

Special

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

-

## Tip colour:

-

## Printing:

-

Aluminil Si 5 is our special coated aluminium electrode for welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The easy flowing characteristics make the electrode suitable for welding all aluminium castings (except AlMg castings). The electrode has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

## Base materials to be welded:

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL Si 5	-	AL Si 5	-	Fluxcored AL Si5

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
0,05	5,0							0,05			Bal.

Note: Zn 0,10 - Fe 0,20

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 90$	$\geq 160$	$\geq 15$	40-55 HB

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	9,0	60-90
3,2	350	13,2	80-110
4,0	350	20,4	110-150

## Coating type:

Special

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

-

## Tip colour:

-

## Printing:

-

Aluminil Si 12 is our special coated electrode developed for welding all types of aluminium castings and applications where good colour matching with base materials is important. Typical applications include repair welding, surfacing and construction welding: window frames, aluminium tubes, furniture, aluminium castings, engine blocks, automotive parts. The electrode has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

## Base materials to be welded:

- Aluminium-Si cast alloys up to 12% Si content:  
G-AISI 12 (Cu), G-AISI 10 Mg (Cu), G-AISI 6 Cu 4

## Applications:

- Construction works (aluminium base metals)
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL Si 12	-	AL Si 12	-	AL Si 12

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
	0,10	12,0						0,05			Bal.

Note: Zn 0,10 - Fe 0,40

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 80$	$\geq 180$	$\geq 5$	50 HB

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	8,8	60-90
3,2	350	13,2	80-110
4,0	350	19,6	110-150

## Coating type:

Special

## Current:



## Welding positions:



Arc voltage: 65V

## Approvals:

-

## Tip colour:

-

## Printing:

-

Aluminil Mn is our special coated aluminium electrode for welding forged and cast aluminium-manganese and aluminium-magnesium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair and construction welding. Aluminil Mn has a pure white coating specifically designed to reduce moisture pick-up. For thicker plate materials ( $\geq 15$  mm.) it is recommended to preheat at 150°C to 250°C before welding.

## Base materials to be welded:

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-magnesium castings

## Applications:

- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	AL Mg 3	-	AL Mg 3	-	-

## Chemical composition, wt. % weld metal – typical:

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	V	Al
	1,20	0,30						0,02			Bal.

Note: Zn 0,09 - Fe 0,60

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	$\geq 40$	$\geq 110$	$\geq 20$	-

## Packaging and welding data:

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	9,0	60-90
3,2	350	13,7	80-110
4,0	350	20,4	110-150

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1-I3 = Ar-ArHe

AL 99,5 is our aluminium wire for MIG welding pure aluminium and wrought aluminium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair welding engine blocks, oil-castings, automotive parts and aluminium pump housings.

**Base materials to be welded:**

- Pure aluminium acc. to DIN 1712 Al 99,8 and Al 99
- Pure aluminium Werkstoffnr. 3.0285 and 3.0205
- Similar aluminium and wrought aluminium alloys

**Applications:**

- Construction works (aluminium base metals)
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil 99,8	-	-	AL 99,5	-	Fluxcored AL 99,5

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
		0,10						0,05	0,05	0,07	> 99,50

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 20	≥ 65	≥ 35	Melting range 647-658°C	Density ~2700 kg/m <sup>3</sup>

Note: electrical conductivity 33 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S300	5
1,0	S300	6
1,2	S300	6

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1-I3 = Ar-ArHe

AL Si 5 is our aluminium wire for MIG welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The easy flowing characteristics make the wire suitable for welding all aluminium castings (except AlMg castings).

**Base materials to be welded:**

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

**Applications:**

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 5	-	-	AL Si 5	-	Fluxcored AL Si5

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	5,0									Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 573-625°C	Density ~2680 kg/m <sup>3</sup>

Note: electrical conductivity 15-19 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S100 / S300	0,5 / 5
1,0	S100 / S300	0,5 / 6
1,2	S300	6
1,6	S300	6



**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1-I3 = Ar-ArHe

AL Si 12 is our aluminium wire for MIG welding all types of aluminium castings and applications where good colour matching with base materials is important. Typical applications include repair welding, surfacing and construction welding: window frames, aluminium tubes, furniture, aluminium castings, engine blocks, automotive parts.

**Base materials to be welded:**

- Aluminium-Si cast alloys up to 12% Si content:  
G-AlSi 12 (Cu), G-AlSi 10 Mg (Cu), G-AlSi 6 Cu 4

**Applications:**

- Construction works (aluminium base metals)
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 12	-	-	AL Si 12	-	AL Si 12

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	12,0									Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 80	≥ 170	≥ 5	Melting range 573-585°C	Density ~2650 kg/m <sup>3</sup>

Note: electrical conductivity 18-22 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S300	5
1,0	S300	6
1,2	S300	6

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1-I3, Ar-ArHe

AL Mg 3 is our aluminium wire for MIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair and construction welding.

## Base materials to be welded:

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-magnesium castings

## Applications:

- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Mn	-	-	AL Mg 3	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30				< 0,30	3,0			< 0,15		Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 80	≥ 180	≥ 18	Melting range 580-642°C	Density ~2660 kg/m <sup>3</sup>

Note: electrical conductivity 16-22 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S300	5
1,0	S300	6
1,2	S300	6

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
ABS, LR

**Shielding gas:**  
I1-I3 = Ar-ArHe

AL Mg 4,5 Mn is our aluminium wire for MIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys in applications where high tensile strengths and/or excellent resistance to sea water is required. Typical applications include shipbuilding, tankbuilding and general construction welding.

**Base materials to be welded:**

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-MgSi alloys
- Similar aluminium alloys

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
~Aluminil Mn	-	-	AL Mg 4,5 Mn	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,80				0,15	4,7			< 0,15		Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 125	≥ 275	≥ 17	Melting range 568-638°C	Density ~2400 kg/mm <sup>3</sup>

Note: electrical conductivity 15-19 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S300	5
1,0	S300	6
1,2	S300	6

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
ABS, DNV, LR

**Shielding gas:**  
I1-I3 = Ar-ArHe

AL Mg 5 is our aluminium wire for MIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys with a maximum of 5% Mg content. Typical applications include shipbuilding, tankbuilding railway and car industry.

## Base materials to be welded:

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-MgSi alloys
- Similar aluminium alloys

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Car industry/assembly
- Railways
- Bicycle industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
~Aluminil Mn	-	-	AL Mg 5	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,40				0,15	5,0			< 0,15		Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 110	≥ 240	≥ 17	Melting range 562-633°C	Density ~2640 kg/mm <sup>3</sup>

Note: electrical conductivity 14-19 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Spooltype	Weight / spool kg.
0,8	S100 / S300	0,5 / 5
1,0	S300	6
1,2	S100 / S300	0,5 / 6

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

AL 99,5 is our aluminium wire for TIG welding pure aluminium and wrought aluminium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair welding engine blocks, oil-castings, automotive parts and aluminium pump housings. To be used in combination with tungsten electrodes type W.

**Base materials to be welded:**

- Pure aluminium acc. to DIN 1712 Al 99,8 and Al 99
- Pure aluminium Werkstoff nr. 3.0285 and 3.0205
- Similar aluminium and wrought aluminium alloys

**Applications:**

- Construction works (aluminium base metals)
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil 99,8	AL 99,5	-	-	-	Fluxcored AL 99,5

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
		0,10						0,05	0,05	0,07	> 99,50

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 20	≥ 65	≥ 35	Melting range 647-658°C	Density ~2700 kg/m <sup>3</sup>

Note: electrical conductivity 33 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

AL Si 5 is our aluminium wire for TIG welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The easy flowing characteristics make the wire suitable for welding all aluminium castings (except AlMg castings). To be used in combination with tungsten electrodes type W.

**Base materials to be welded:**

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

**Applications:**

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 5	AL Si 5	-	-	-	Fluxcored AL Si5

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	5,0									Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 573-625°C	Density ~2680 kg/m <sup>3</sup>

Note: electrical conductivity 15-19 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5
5,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

AL Si 12 is our aluminium wire for TIG welding all types of aluminium castings and applications where good colour matching with base materials is important. Typical applications include repair welding, surfacing and construction welding: window frames, aluminium tubes, furniture, aluminium castings, engine blocks, automotive parts. To be used in combination with tungsten electrodes type W.

**Base materials to be welded:**

- Aluminium-Si cast alloys up to 12% Si content:  
G-AlSi 12 (Cu), G-AlSi 10 Mg (Cu), G-AlSi 6 Cu 4

**Applications:**

- Construction works (aluminium base metals)
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 12	AL Si 12	-	-	-	AL Si 12

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	12,0									Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 80	≥ 170	≥ 5	Melting range 573-585°C	Density ~2650 kg/m <sup>3</sup>

Note: electrical conductivity 18-22 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

AL Mg 3 is our aluminium wire for TIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys. Deposit weld metal has good mechanical properties and high corrosion resistance. Typical applications include repair and construction welding. To be used in combination with tungsten electrodes type W.

**Base materials to be welded:**

- Aluminium-manganese alloys: Al Mn 1
- Aluminium-magnesium alloys: Al Mg1, Al Mg3
- Aluminium-magnesium castings: G-Al Mg3

**Applications:**

- Shipyards/offshore
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Mn	AL Mg 3	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30				< 0,30	3,0			< 0,15		Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength Mpa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 80	≥ 180	≥ 18	Melting range 580-642°C	Density ~2660 kg/m <sup>3</sup>

Note: electrical conductivity 16-22 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5



**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
ABS, LR

**Shielding gas:**  
I1 = Pure Ar

AL Mg 4,5 Mn is our aluminium wire for TIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys in applications where high tensile strengths and/or excellent resistance to seawater is required. Typical applications include shipbuilding, tankbuilding and general construction welding. To be used in combination with tungsten electrodes type W.

## Base materials to be welded:

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-MgSi alloys
- Similar aluminium alloys

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops

## Equivalent product in alternative welding process:

SAW	GMAW	FCAW	GTAW	SAW	Gas welding / Brazing
~Aluminil Mn	-	-	AL Mg 4,5 Mn	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,80				0,15	4,7			< 0,15		Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 125	≥ 275	≥ 17	Melting range 568-638°C	Density ~2400 kg/mm <sup>3</sup>

Note: electrical conductivity 15-19 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
ABS, DNV, LR

**Shielding gas:**  
I1 = Pure Ar

AL Mg 5 is our aluminium wire for TIG welding forged and cast aluminium-manganese and aluminium-magnesium alloys with a maximum of 5% Mg content. Typical applications include shipbuilding, tankbuilding railway and car industry. To be used in combination with tungsten electrodes type W.

**Base materials to be welded:**

- Aluminium-manganese alloys
- Aluminium-magnesium alloys
- Aluminium-MgSi alloys
- Similar aluminium alloys

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Car industry/assembling
- Railways
- Bicycle industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
~Aluminil Mn	AL Mg 5	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,40				0,15	5,0			< 0,15		Bal.

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength Mpa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 110	≥ 240	≥ 17	Melting range 562-633°C	Density ~2640 kg/mm <sup>3</sup>

Note: electrical conductivity 14-19 Sm/mm<sup>2</sup>

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

AL Si 5 is aluminium wire for oxy-acetylene gas welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The easy flowing characteristics make the wire suitable for welding all aluminium castings (except AlMg castings).

## Base materials to be welded:

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 5	AL Si 5	-	AL Si 5	-	Fluxcored AL Si5

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	5,0									Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 573-625°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5
5,0	1000	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

AL Si 12 is our aluminium wire for oxy-acetylene gas welding all types of aluminium castings and applications where good colour matching with base materials is important. Typical applications include repair welding, surfacing and construction welding: window frames, aluminium tubes, furniture, aluminium castings, engine blocks, automotive parts.

## Base materials to be welded:

- Aluminium-Si cast alloys up to 12% Si content:  
G-AlSi 12 (Cu), G-AlSi 10 Mg (Cu), G-AlSi 6 Cu 4

## Applications:

- Construction works (aluminium base metals)
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 12	AL Si 12	-	AL Si 12	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	12,0									Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 80	≥ 170	≥ 5	Melting range 573-585°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,6	1000	5
2,0	1000	5
2,4	1000	5
3,2	1000	5
4,0	1000	5

## Wire type:

OAW Cored wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Fluxcored AL 99,5 is our flux cored aluminium wire rod for oxy-acetylene gas welding, repairing and surfacing pure aluminium and wrought aluminium alloys. The internal flux core makes the need of additional fluxes unnecessary.

## Base materials to be welded:

- Pure aluminium acc. to DIN 1712 Al 99,8 and Al 99
- Pure aluminium Werkstoff nr. 3.0285 and 3.0205
- Similar aluminium and wrought aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil 99,8	AL 99,5	-	AL 99,5	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
											> 99,5

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 647-658°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
3,0	820	1

## Wire type:

OAW Cored wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Fluxcored Aluminium 5Si is our flux cored aluminium wire rod for oxy-acetylene gas welding, repairing and surfacing forged and cast aluminium-silicon alloys and joining dissimilar aluminium alloys with max. 7%Si content. The internal flux core makes the need of additional fluxes unnecessary.

## Base materials to be welded:

- Aluminium-MgSi alloys
- Aluminium-Mg alloys up to 2,5% Mg
- Aluminium-MnCu alloys
- Aluminium-Si cast alloys
- Joining dissimilar aluminium alloys

## Applications:

- Construction works (aluminium base metals)
- Shipyards/offshore
- Repair shops

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Aluminil Si 5	AL Si 5	-	AL Si 5	-	AL Si 5

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Cr	Mg	Fe	Cu	Ti	Zn	Al
	0,30	5,0									Bal.

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Physical properties	
As welded	≥ 70	≥ 130	≥ 16	Melting range 573-625°C	Density -

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
3,0	820	1

## Copper and copper alloys and their weldability

Copper and copper alloys are often chosen because of their corrosion resistance and electrical and thermal conductivity. This introduction identifies the various types of copper alloys and gives information about the production process of these materials and their weldability.

### Material types

Copper and copper alloys are grouped to their principal alloying element:

- C** Pure copper
- CH** Copper with small alloy additions
- CZ** Copper-zinc / brass
- NS** Copper-zinc-nickel / nickel silver
- PB** Copper-tinbronze (phosphor bronze alloys also contain phosphorous in their alloy)
- G** Copper-tin-zinc, gun metal (some alloys contain lead)
- CA** Copper-aluminium, aluminium bronze (most alloys also contain iron and nickel)
- CN** Copper-nickel, cupronickel

### Pure Copper (C)

Is normally supplied in one of three forms i.e. oxygen bearing, phosphorous deoxidised copper, oxygen-free copper. For welding jobs, oxygen free and phosphorous deoxidised copper should be selected as they are more easily welded. TIG and MIG are the preferred welding processes; OAW and SMAW can be used for repair jobs on oxygen bearing tough pitch copper. In order to counteract the high thermal conductivity He and NO-based gases can be used as an alternative to argon.

### Copper with small alloy additions (CH)

Grades with additions of sulphur and tellurium are considered as not weldable. Copper with small additions of chromium, zirconium or beryllium can be welded but with care.

### Copper-zinc alloys / brass (CZ) - Copper-zinc-nickel / nickel silver (NS)

Brasses can be separated into two weldable groups, low zinc ( $\leq 20\%Zn$ ) and high zinc (30 - 40%Zn). Nickel silvers contain 20 to 45%Zn and nickel to improve strength. The main problem in fusion welding these alloys is the volatilisation of the zinc, which results in white fumes of zinc oxide and weld metal porosity. Only low zinc brasses are considered suitable for fusion welding using TIG and MIG.

### Bronzes - Tinbronze, Phosphor bronze (PB), Silicon bronze and gun metal (G)

Tinbronze contain between 1 and 10%Sn, phosphorbronze contains up to 10% phosphorous. Gunmetal is essentially a tinbronze with up to 5%Zn and may also have 5% lead. Silicon bronze contains typically 3% Si and 1% Mn and is the easiest to weld.

Bronzes are weldable using matching filler metals. Gas welding of phosphor bronzes is subject to porosity which can be avoided by using a higher level of deoxidants. Gun metal cannot be welded.

### Aluminium bronze (CA)

There are two types of aluminium bronzes: single phase alloys containing between 5 and 10% aluminium, with a small amount of iron or nickel, and, two phase alloys containing up to 12% aluminium and about 5% iron with specific alloys containing Ni, Mn, Si. Gas shielded welding processes are preferred, TIG welding requires AC under Argon gas shielding or DC with a Helium gas.

### Cupro-Nickels (CN)

Cupro-nickel alloys contain between 5 and 30% nickel with specific alloys having additions of iron and manganese; 90-10 and 70-30 (Cu-Ni) are commonly welded grades. These alloys are single phase and are weldable using inert gas processes and SMAW. A matching filler metal is normally used but 70-30 is often regarded as an universal filler metal for these alloys.

## Brazing with silver containing filler metals

Brazing with a silver-containing filler metal is one of the most versatile methods of metal joining used, for a number of reasons:

- It is cost-effective, there is very little braze alloy required to produce a brazed joint. With properly designed joints, brazing will compare favourably to any other metal joining method;
- The joints produced are strong. Strength data are typically close to and in occasions exceed the typical strength of the base materials brazed;
- Joints produced are ductile, able to withstand considerable shock and vibration;
- The joints are generally produced easily and quickly;
- Brazing is excellent for dissimilar joining, you can easily join metals with widely different melting points;
- It can join metals with different cross sections. For example, joining 0,1 mm. thick copper foil to a 2,5 mm. thick steel plate is relatively easy to braze, it is almost impossible to weld;
- Joints have excellent stress distribution and heat transfer. The braze fillet formed is ideally shaped to resist fatigue;
- The process is highly suitable for automation. Typical automation methods include torch, furnace, induction and resistance heating;
- After brazing there is seldom any need for grinding, filling or mechanical finishing after the joint is completed. This is cost-reducing and particularly beneficial for assemblies to be plated;
- The joints virtually make themselves by capillary action, complex geometries are as easy to join as simple ones;
- Brazing is done at relatively low temperature ranges, excellent for heat input sensitive materials and workpieces subject to hot cracking.

## The process

Silver brazing uses a silver-containing alloy with a melting temperature above 450°C but below the melting point of the metals to be joined. In brazing, the base metals are heated, usually to a point slightly above the liquidus (flow point) of the filler metal, causing it to melt. The filler metal then flows into the parallel joint clearance between the two base materials by capillary attraction and bonds to their surfaces through atomic attraction and diffusion. Unlike other methods of metal joining, in brazing we are interested in flowing the alloy between closely fitted members. For successful brazing you have to understand the fundamentals of brazing. When the following brazing fundamentals are understood, problem solving becomes a simple matter:

- **Good fit and proper clearance**
- **Clean base metals**
- **Proper fixturing**
- **Proper fluxing/atmosphere**
- **Heating the assembly**
- **Cleaning the brazed assembly**

## Good fit and proper clearance

Any braze alloy relies on capillary action to distribute the brazing filler metal throughout the joint interface. Capillary action is the force that pulls a liquid through two parallel surfaces. In brazing, the clearance at which capillary action is most effective is in the 0,03 to 0,10 mm. range. Joint clearance also has a profound impact on joint strength. Upon brazing stainless steel the strongest joint (930 Mpa) is achieved with a joint clearance of 0,038 mm. In every days practice any slip fit will give you a perfectly adequate brazed joint between two tubular parts. If you are joining two flat parts, you can simply rest one on top of the other. The clearance provided by the average "mill finish" is usually adequate enough to create capillary paths for the flow of molten filler metal.



### **Cleaning the metals**

Capillary action will work properly only when the surfaces of the metals are clean. Contaminants, such as oil, grease, rust, scale or dirt, must be removed. If they remain, they will form a barrier between the base metal surfaces and the brazing materials. Start by getting rid of oil and grease, usually done by dipping the part into a degreasing solvent, or by vapor degreasing, alkaline or aqueous cleaning. If the metal surfaces are coated with oxide or scale, remove those chemically or mechanically. For chemical removal, used an acid pickle treatment. Mechanical removal calls for abrasive cleaning. Particularly in repair brazing, where parts can be very dirty or rusted, you can speed the cleaning process by using emery cloth, a grinding wheel, file or metallic shot blast.

Once the parts are thoroughly clean, it is recommended to flux and braze as soon as possible. This way, there is the least chance for recontamination of surfaces.

### **Fluxing the parts**

Flux is chemical compound applied to the joint surfaces before brazing. Its use is essential for brazing as the coating of flux on the joint area will shield the surfaces from the air, preventing oxide formation. The flux will also dissolve and absorb any oxides that form during heating or those not completely removed during the cleaning process. HILCO brazing fluxes conventionally comes in a powder, which is formed in a paste by stirring in water. Flux the assembly just before brazing, if possible.

Fluxing is usually an essential step in the brazing operation. There are a couple of exceptions to this rule. You can join copper to copper without flux by using a brazing filler metal specially formulated for the job, such as silver-copper-phosphorus alloys (L-Ag2P, L-Ag5P, L-Ag15P). The P content in these alloys act as a fluxing agent on copper.

### **Proper fixturing**

If the shape and weight of the part permit, the simplest way to hold them together is by gravity. If you have a number of assemblies to braze it may be a good idea to use a brazing support fixture. If you need to fixture close to the joint use a non-wetting material for the fixture, such as titanium.

### **Heating the assembly**

This step brazes the joint. It involves heating the joint to brazing temperature and flowing the filler metal through the joint. Both metals in the assembly should be heated as uniformly as possible to reach brazing temperature at the same time. Therefore, when joining a thick section to a thin section, more heat should be applied to the thick section. Or, when joining a good conductor of heat to a poor conductor, such as copper to stainless steel, more heat will have to be applied to the good conductor (copper). The flux is used as an indicator for even heating.

In manual brazing, when the assembly reaches brazing temperature, hold the brazing rod carefully against the joint area. Do not heat the brazing rod directly. The heated assembly will melt off a portion of the brazing rod, which will instantly be drawn by capillary action throughout the entire joint area. We recommend you to heat the side of the assembly opposite the point where you are going to feed the filler metal.

If using performs (slugs, washers, shims or special shapes of filler metal) preplace them in the joint before applying heat to the assembly.

### **Cleaning the brazed assembly**

Postcleaning of brazed assemblies is done primarily to remove flux residue. Flux removal is a simple, but essential, operation to prevent flux residue to attack the base metal, possibly weakening the joint. Most fluxes are water soluble, the easiest way to remove them is to submerge the assembly in hot water.

Application	Metal to metal		Filler metal	Brazing flux	Working temperature °C
Water and gas installations	Copper	Copper	Phosphorbr. 93-7	-	720
	Copper	Copper	L-Ag 2P	Silver solder flux	710
	Copper	Copper	L-Ag 45 Sn	Silver solder flux	670
Galvanized pipe, shipbuilding, offshore and support pipes	Steel	Steel	L-Ag 30 Cd	Silver solder flux	680
	Cupro-nickel	Tinbronze	L-Ag 50 Cd	Silver solder flux	660
	Brass	Tinbronze	L-Ag 50 Cd	Silver solder flux	660
Refrigeration units without ammonia	Copper	Copper	L-Ag 5P	-	710
	Copper	Tinbronze	L-Ag 15P	Silver solder flux	710
	Copper	Steel	L-Ag 40 Cd	Silver solder flux	610
	Steel	Steel	L-Ag 30 Cd	Silver solder flux	680
	Stainless	Stainless	L-Ag 40 Cd	Silver solder flux	610
Heating installations	Copper	Copper	Phosphorbr. 93-7	-	720
	Copper	Tinbronze	L-Ag 2P	Silver solder flux	710
	Copper	Steel	L-Ag 30 Cd	Silver solder flux	680
	Steel	Steel	L-Ag 30 Cd	Silver solder flux	680
Heat exchangers, oil coolers, air conditioners, gas burners, boilers	Copper	Copper	L-Ag 2P	-	710
	Copper	Steel	L-Ag 30 Cd	Silver solder flux	680
	Steel	Steel	L-Ag 40 Cd	Silver solder flux	680
	Steel	Brass	L-Ag 30 Cd	Silver solder flux	610
Oil piping, fuel tanks and vehicle radiators	Steel	Steel	L-Ag 20 Cd	Silver solder flux	750
	Steel	Brass	L-Ag 30 Cd	Silver solder flux	680
	Steel	Copper	L-Ag 40 Cd	Silver solder flux	610
Instrument parts	Copper	Copper	L-Ag 2P	-	710
	Copper	Copper	L-Ag 5P	-	710
	Copper	Stainless	L-Ag 40 Cd	Silver solder flux	610
	Brass	Brass	L-Ag 40 Cd	Silver solder flux	610
	Brass	Copper	L-Ag 15P	-	650
	Brass	Stainless	L-Ag 40 Cd	Silver solder flux	610
Parts in contact with potable water	Stainless	Stainless	L-Ag 55 Sn	Silver solder flux	650
	Stainless	Copper	L-Ag 45 Sn	Silver solder flux	670
	Stainless	Brass	L-Ag 45 Sn	Silver solder flux	670
Heating, cooling and kitchen equipment for in house usage	Copper	Copper	L-Ag 2P	-	710
	Copper	Copper	L-Ag 5P	-	710
	Copper	Copper	L-Ag 15P	-	710
	Brass	Brass	L-Ag 34 Sn	Silver solder flux	710
	Brass	Copper	L-Ag 45 Sn	Silver solder flux	670
	Brass	Stainless	L-Ag 45 Sn	Silver solder flux	670
Tubular furniture and camping gas equipment	Steel	Steel	L-Ag 20 Cd	Silver solder flux	750
	Steel	Copper	L-Ag 30 Cd	Silver solder flux	680
	Steel	Brass	L-Ag 30 Cd	Silver solder flux	680
	Stainless	Stainless	L-Ag 55 Sn	Silver solder flux	650
	Stainless	Copper	L-Ag 55 Sn	Silver solder flux	650

**Coating type:**

Basic

**Current:**

**Welding positions:**

**Approvals:**

-

**Tip colour:**

Gold

**Printing:**

E CuSn / C Bronsil

Bronsil is our basic coated tin-bronze electrode for joining and surfacing copper and copper alloys, phosphor- and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and shipbuilding. The electrode is also suitable for cladding steel and minor repair jobs in cast iron and C/Mn steel. Typical applications include repairing rotors and ship screws.

**Base materials to be welded:**

- Tin-bronze alloys CuSn 2, CuSn 6, CuSn 8, CuSn 6 Zn
- WNr. 2.1010, 2.1020, 2.1030, 2.1080

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	Tinbronze 94-6	-	Tinbronze 94-6	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Sn	Fe	Mo	Cu	Nb	V	Al
	1,50	0,50	0,010	0,15	7,50	0,20		Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 200	≥ 280	≥ 25	≥ 100 HB

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
2,5	350	21,7	60-80
3,2	350	34,5	80-100
4,0	350	68,2	100-120

**Coating type:**  
Basic

**Current:**



**Welding positions:**



**Approvals:**

-

**Tip colour:**

-

**Printing:**

HILCO E Cu Ni

Cuni is our basic coated copper-nickel electrode for joining and surfacing alloys of similar composition with up to 30% nickel as well as non-ferrous alloys and dissimilar steel grades. The deposit weld metal is highly resistant to seawater, typical applications include usage in shipbuilding, oil refineries, food processing industry, the engineering of general corrosion proof vessels and equipment.

**Base materials to be welded:**

- Copper-nickel alloys up to 30% Ni content
- CuNi30Mn, CuNi30Mn1Fe, CuNi10Fe1Mn, CuNi20Fe, CuNi25, CuNi44Mn
- WNr. 2.0890, 2.0882, 2.0872, 2.0878, 2.0830, 2.0842
- Dissimilar joining nickel to copper-nickel alloys

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry
- Food processing industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	Cunifer 70-30	-	-

**Chemical composition, wt. % weld metal – typical:**

C	Mn	Si	S	P	Sn	Fe	Mo	Cu	Ni	V	Al
0,015	1,80	0,40	0,010	0,15		0,60		Bal.	30,0		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 240	≥ 390	≥ 25	105 HB

**Packaging and welding data:**

Dia. mm.	Length mm.	Weight (kgs) 1000 pcs.	Current A
3,2	350	34,5	80-105
4,0	350	68,2	110-130

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Tinbronze 94-6 is our tin-bronze alloyed solid wire for MIG welding and surfacing copper and copper alloys, phosphor- and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and shipbuilding. Tinbronze 94-6 is also suitable for cladding steel and minor repair jobs in cast iron and C/Mn steel. Typical applications include repairing rotors and ship screws.

**Base materials to be welded:**

- Tin-bronze alloys CuSn 2, CuSn 6, CuSn 8, CuSn 6 Zn
- WNr. 2.1010, 2.1020, 2.1030, 2.1080

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Bronsil	-	-	Tinbronze 94-6	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				0,25			6,5	Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 150	≥ 300	20	80 HB

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12
1,6	S300	~12
2,4	S300	~12

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Albronze 8 is our Cu-Al alloyed solid wire for MIG welding and surfacing aluminium bronzes like CuAl5, CuAl8. Typical applications include surfacing of copper, brass, special brass (CuZn20Al), unalloyed and low alloyed steels, joining seawater conducting corrosion resistant aluminium bronze or special brass pipelines. For multi-layer surfacing we recommend puls-arc welding.

**Base materials to be welded:**

- Aluminium bronze alloys: CuAl8Fe3, CuAl10Fe3Mn2, CuAl9Mn2, CuAl10Ni5Fe4
- Cast Aluminium bronzes: G-CuAl8Mn, G-CuAl10Ni,
- Surfacing copper, brass, special brass, steel
- Joining brass (CuZn20Al) pipelines

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
								Bal.			8,0

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 180	≥ 430	≥ 40	120 HB

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1, Pure Ar

Albronze 35 is our Cu-Ni-Al alloyed solid wire for MIG welding complex aluminium bronzes and surfacing unalloyed and low alloyed steels. Deposit weld metal has excellent resistance to seawater. Typical applications include shiprepair jobs (rotors and screws), machines, boilers and pumps. For multi-layer surfacing on steel we recommend puls-arc welding.

**Base materials to be welded:**

- Aluminium bronze alloys: CuAl10Ni, CuAl10Fe, CuAl8Fe
- Cast Aluminium bronzes: G-CuAl10Ni, G-CuAl9Ni, G-CuAl10
- Surfacing on unalloyed and low alloyed steels

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	1,50				4,50		3,50	> 77,00			9,00

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 400	≥ 530	≥ 30	150 HB

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12

**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Albronze 300 is our Cu-Mn-Ni-Al alloyed solid wire for MIG welding and surfacing complex aluminium bronzes with high Mn content and cast-aluminium bronzes. The high strength deposit weld metal is seawater resistant. Typical applications include surfacing of steel and cast iron, joining of GGG-steel, GGG-manganese steel, GGG-GGG, propellers, armatures, gliding surfacing, drawing tools.

**Base materials to be welded:**

- Aluminium bronze alloys: CuAl9Mn2, CuAl10Ni5Fe4, CuAl11Ni6Fe5, CuAl10Fe3Mn2
- Cast Aluminium bronzes: G-CuAl8Mn, G-CuAl10Fe,
- Surfacing steel and cast iron
- Joining cast-steel, cast-manganese steels, cast iron

**Applications:**

- Shipyards/offshore
- Pressure vessel & boiler industry
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	13,0				2,50		2,50	Bal.			8,0

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 600	≥ 900	≥ 10	> 200 HB

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12



**Wire type:**  
MIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**  
-

**Shielding gas:**  
I1, Pure Ar

Cusi3 is our Copper silicon alloyed solid wire for MIG welding copper alloys, brass and galvanised steel grades. Typical applications include joining CuSi2Mn and CuSi3Mn, surfacing unalloyed and low alloyed steels, joining zinc coated steels in automotive industries.

**Base materials to be welded:**

- Copper silicon alloys CuSi2Mn, CuSi3Mn
- Galvanised steels
- Surfacing on unalloyed and low alloyed steels

**Applications:**

- Shipyards/offshore
- Repair shops
- Car industry/assembling

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	1,20	3,0					< 0,30	Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 300	≥ 380	≥ 40	90 HB

**Packaging data:**

Dia. mm.	Spooltype	Weight / spool kg.
1,2	S300	~12

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Tinbronze 94-6 is our tin-bronze alloyed solid wire for TIG welding and surfacing copper and copper alloys, phosphor- and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and shipbuilding. Tinbronze 94-6 is also suitable for cladding steel and minor repair jobs in cast iron and C/Mn steel. Typical applications include repairing rotors and ship screws. To be used in combination with tungsten electrodes type WT 20, thorium free WC 20 or WL 20.

**Base materials to be welded:**

- Tin-bronze alloys CuSn 2, CuSn 6, CuSn 8, CuSn 6 Zn
- WNr. 2.1010, 2.1020, 2.1030, 2.1080

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Bronsil	Tinbronze 94-6	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				0,25			6,5	Bal.			

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation A5 - %	Hardness
As welded	≥ 150	≥ 300	20	80 HB

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,5	1000	5
2,0	1000	5
2,4	1000	5
3,0	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Cunifer 70-30 is solid copper-nickel wire for TIG welding and surfacing alloys of similar composition with up to 30% nickel as well as non-ferrous alloys and dissimilar steel grades. The deposit weld metal is highly resistant to seawater, typical applications include usage in shipbuilding, oil refineries, food processing industry, the engineering of general corrosion proof vessels and equipment.

**Base materials to be welded:**

- Copper-nickel alloys up to 30% Ni content
- CuNi30Mn, CuNi30Mn1Fe, CuNi10Fe1Mn, CuNi20Fe, CuNi25, CuNi44Mn
- WNr. 2.0890, 2.0882, 2.0872, 2.0878, 2.0830, 2.0842
- Dissimilar joining nickel to copper-nickel alloys

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry
- Food processing industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Cuni	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	1,00				31,0		0,50	Bal.	0,40		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 200	≥ 420	≥ 30	115 HB

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
2,0	1000	5
2,4	1000	5
3,2	1000	5

**Wire type:**  
TIG Solid wire

**Current:**



**Welding positions:**



**Approvals:**

-

**Shielding gas:**

I1 = Pure Ar

Cunifer 90-10 is solid copper-nickel wire for TIG welding and surfacing alloys of similar composition with up to 10% nickel as well as non-ferrous alloys and dissimilar steel grades. The deposit weld metal is highly resistant to seawater, typical applications include usage in shipbuilding, oil refineries, food processing industry, the engineering of general corrosion proof vessels and equipment.

**Base materials to be welded:**

- Copper-nickel alloys up to 10% Ni content
- CuNi5Fe, CuNi10Fe
- WNr. 2.0862, 2.0872
- Dissimilar joining nickel to copper-nickel alloys

**Applications:**

- Shipyards/offshore
- Repair shops
- Petrochemical industry
- Food processing industry

**Equivalent product in alternative welding process:**

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
Cuni	-	-	-	-	-

**Chemical composition, wt.% weld metal – typical:**

C	Mn	Si	S	P	Ni	Mg	Fe	Cu	Ti	Zn	Al
	1,00				10,5		1,50	Bal.	0,40		

**Mechanical properties, weld metal – typical:**

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Hardness
As welded	≥ 150	≥ 300	≥ 30	100 HB

Notes:

**Packaging data:**

Dia. mm.	Length mm.	Weight / package kg.
1,5	1000	5
2,0	1000	5
2,5	1000	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze C is our low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Bronze C produces poreless joints, color matching with brass. Applications are universal but typical for joining galvanized steel (without destroying its zinc layer), joining non-ferrous metals, tube structures, sanitary installations, fitting and repair work, bicycles, motorcycles, automotive industries, furniture industry. The Mn content guarantees strong and high quality joints.

## Base materials to be welded:

- Similar and dissimilar joining
- To be used in combination with HILCO Bronze Flux.

## Applications:

- Shipyards/offshore
- Constructionworks
- Repair shops
- Car industry/assembling
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	Bronze F, Autobronze

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
	0,60	0,40			≤ 0,01	0,35	≤ 0,10	60,0		Bal.	≤ 0,005

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 490	≥ 35	870-900°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	1000	5
2,0	1000	5
2,5	1000	5
3,0	1000	5
4,0	1000	5
5,0	1000	5

## Wire type:

OAW Solid wire (fluxcoated)

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze F is our flux coated low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Bronze F produces poreless joints, color matching with brass. The flux coating makes use of additional brazing fluxes unnecessary.

## Base materials to be welded:

- Similar and dissimilar joining

## Applications:

- Shipyards/offshore
- Constructionworks
- Repair shops
- Car industry/assembly
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	Bronze C, Autobronze

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
		0,30				0,20		60,0		Bal.	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 350	≥ 35	875-895°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	2,5
2,5	500	2,5
3,0	500	2,5

## Wire type:

OAW Cored wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Bronze P is our flux cored low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Autobronze produces poreless joints, color matching with brass. The internal flux core makes the need of additional fluxes unnecessary.

## Base materials to be welded:

- Similar and dissimilar joining

## Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Car industry/assembling
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
	0,60	1,00			0,85	0,30		59,0		Bal.	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 400	≥ 30	870-890°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,5	500	4

## Wire type:

OAW Solid wire (flux coated)

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Autobronze is our carved flux coated low fuming bronze (brass) brazing rod for joining and surfacing steel, copper and copper alloys, brass, grey and malleable cast iron, nickel and nickel alloys. Autobronze produces poreless joints, color matching with brass. The flux coating makes use of additional brazing fluxes unnecessary.

## Base materials to be welded:

- Similar and dissimilar joining

## Applications:

- Shipyards/offshore
- Constructionworks
- Repair shops
- Car industry/assembling
- Bicycle industry
- Office furniture industry
- Marine equipment

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
0,60	1,00				0,85	0,30		59,0		Bal.	

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 400	≥ 30	870-890°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	2,5
2,5	500	2,5



### Wire type:

OAW Solid wire

### Welding positions:



### Approvals:

-

### Shielding gas:

Oxy-acetylene

Bronze N is our high strength Nickel-bronze brazing rod for joining and surfacing steel, malleable cast iron, nickel and nickel alloys. Typical applications include joints subject to severe mechanical loads, soldering butt joints on heavily stressed components, sleeveless pipe assemblies in the car industry.

### Base materials to be welded:

- Similar and dissimilar joining
- To be used in combination with HILCO Bronze Flux.

### Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Car industry/assembly
- Bicycle industry

### Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

### Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Sn	Fe	Cu	Ti	Zn	Al
	0,20	0,25			10,0	0,20		48,0		Bal.	

### Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 690	≥ 18	890-920°C

### Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500 / 1000	5
2,5	500 / 1000	5
3,0	500 / 1000	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Phosphorbronze 92-8 is our thin flowing Copper-Phosphorous alloy used for brazing copper-to-copper and copper to brass. Phosphorbronze 92-8 requires good fit up. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Refrigerator industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	L-Ag 2P

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				7,1				92,9			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	5	710-820°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	5
2,5	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Phosphorbronze 93-7 is our thin flowing Copper-Phosphorous alloy used for brazing copper-to-copper. The alloy has good bridging capacities and requires a lesser good fit up than Phosphorbronze 92-8. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Refrigerator industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	L-Ag 2P

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				6,8				93,2			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	5	710-820°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	5
2,5	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

Phosphorbronze 94-6 is our easy flowing Copper-Phosphorous alloy used for brazing copper-to-copper and copper to brass. Phosphorbronze 94-6 requires good fit up and is suitable for capillary brazing. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Refrigerator industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				7,4				92,6			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	5	710-890°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	5
2,5	500	5

Silver-Copper-Phosphorus Brazing rods								
Type	Composition				Melting range	Classification		
	Ag	Cu	P	others		AWS A5.8	EN 1044	DIN 8513
<b>L-Ag 2 P *</b>	2,0	91,5	6,5	-	645-825°C	~BCuP-6	CP 105	L-Ag2P
<b>L-Ag 5 P *</b>	5,0	89,0	6,0	-	645-815°C	BCuP-3	CP 105	L-Ag5P
<b>L-Ag 15 P *</b>	14,5	80,0	4,8	-	645-800°C	BCuP-5	CP 102	L-Ag15P

Cadmium free Silver Brazing Rods								
Type	Composition				Melting range	Classification		
	Ag	Cu	Zn	others		AWS A5.8	EN 1044	DIN 8513
<b>L-Ag 20</b>	20,0	44,0	35,8	Si: 0,2	690-810°C	-	AG 206	L-Ag20
<b>L-Ag 25</b>	25,0	41,0	34,0	-	700-800°C	-	~AG 205	L-Ag25
<b>L-Ag 25 Sn</b>	25,0	40,0	33,0	Sn: 2,0	680-760°C	BAG-37	AG 108	-
<b>L-Ag 30</b>	30,0	34,5	35,5	-	695-770°C	~BAG-20	~AG 204	-
<b>L-Ag 34 Sn *</b>	34,0	36,0	27,0	Sn: 3,0	630-730°C	~BAG-35	AG 106	L-Ag34Sn
<b>L-Ag 38 Sn <sup>1</sup></b>	38,0	31,0	28,8	Sn: 2,2	660-700°C	BAG-34	~AG 105	-
<b>L-Ag 44 <sup>1</sup></b>	44,0	30,0	26,0	-	675-735°C	BAG-5	AG 203	L-Ag44
<b>L-Ag 45 Sn *</b>	45,0	27,0	25,0	Sn: 3,0	640-680°C	BAG-36	AG 104	L-Ag45Sn
<b>L-Ag 55 Sn <sup>*1</sup></b>	55,0	21,0	22,0	Sn: 2,0	630-660°C	~BAG-7	AG 103	L-Ag55Sn
<b>L-Ag 60</b>	60,0	26,0	14,0	-	695-730°C	-	AG 202	L-Ag60
<b>L-Ag 64</b>	64,0	20,0	16,0	-	690-720°C	BAG-9	~AG 201	L-Ag64

Cadmium containing Silver Brazing Rods								
Type	Composition				Melting range	Classification		
	Ag	Cu	Zn	others		AWS A5.8	EN 1044	DIN 8513
<b>L-Ag 20 Cd <sup>*1</sup></b>	20,0	39,0	29,0	Cd: 12,0	600-760°C	-	~AG 309	L-Ag20Cd
<b>L-Ag 30 Cd <sup>*1</sup></b>	30,0	28,0	21,0	Cd: 21,0	600-690°C	BAG-2a	AG 306	L-Ag30Cd
<b>L-Ag 34 Cd</b>	34,0	25,0	20,0	Cd: 21,0	610-670°C	~BAG-2	~AG 305	L-Ag34Cd
<b>L-Ag 40 Cd <sup>*1</sup></b>	40,0	19,0	21,0	Cd: 20,0	595-630°C	-	AG 304	L-Ag40Cd
<b>L-Ag 45 Cd</b>	45,0	15,0	16,0	Cd: 24,0	605-620°C	BAG-1	AG 302	L-Ag45Cd
<b>L-Ag 50 Cd *</b>	50,0	15,5	16,5	Cd: 18,0	625-635°C	~BAG-1a	AG 301	L-Ag50Cd

These Silver Brazing Rods contain **CADMIUM!** Take precautions when brazing.

## Notes:

\* for these Silver Brazing Rods an extensive data-sheet can be found in this handbook

<sup>1</sup> these Silver Brazing Rods are also available as fluxcoated rods (FC)

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 2 P is our Silver-Copper-Phosphorous based brazing rod mainly used for brazing copper and copper alloys. The addition of silver improves the flowing characteristics and makes L-AG 2 P especially suitable for capillary brazing. If the joint is subject to stresses it is recommended to use either L-Ag 5 P or L-Ag 15 P. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Refrigerator industry
- Air conditioner industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	Phosphorbr. 93-7

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				6,50*		2,0		91,50			

Note: \* AWS classification requires presence of min. 6,8% P

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	-	645-825°C

Note: Electrical conductivity 5 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 5 P is our Silver-Copper-Phosphorous based brazing rod mainly used for brazing copper and copper alloys. The addition of 5% silver improves the flowing characteristics and makes L-Ag 5 P especially suitable for usage in the electrical industry and apparatus- and ship construction for electric motors and copper tubes. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Refrigerator industry
- Air conditioner industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				6,0		5,0		89,0			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	-	645-815°C

Note: Electrical conductivity 6 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene gas mixture

L-Ag 15 P is our thin flowing Silver-Copper-Phosphorous based brazing rod that gives ductile joints when used for brazing copper to copper. L-Ag 15 P is especially suitable for usage as a preform in brazing particularly with resistance heating. Typical applications include assembling motors and busbars in the electrical industry. The rod is self fluxing, no need for separate flux, when joining copper to copper.

## Base materials to be welded:

- Joining copper to copper
- Joining copper to brass (Silver solder flux required)

## Applications:

- Shipyards/offshore
- Construction works
- Repair shops
- Refrigerator industry
- Air conditioner industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
				4,8		14,5		80,0			

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 250	-	645-800°C

Note: Electrical conductivity 10 Sm/mm<sup>2</sup>

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5



## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 30 Cd is our silver brazing rod for similar and dissimilar joining steel, stainless steel, nickel and nickel alloys, copper and copper alloys. Typical applications include electrical industry, equipment engineering, household appliances, sanitary installations, shipbuilding, brazing nipples, fittings and copper pipework. L-Ag 30 Cd is standard available as bare rod which is used in combination with silver solder brazing flux. Fluxcoated rods are available on request (L-Ag30CdFC). **CONTAINS CADMIUM!**

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						30,0		28,0		21,0	

Note: Cd - 21,0%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 450	≥ 30	600-690°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 34 Sn is our cadmium free silver brazing rod for similar and dissimilar joining steel, nickel and nickel alloys, copper and copper alloys. Suitable for working temperatures up to 200°C. Typical applications include food processing industry, breweries, dairy industry, household products and copper tube installations. L-Ag 34 Sn has good flowing characteristics, is standard available as bare rod which is used in combination with silver solder brazing flux.

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Food processing industry
- Dairy industry
- Beer breweries

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						34,0		36,0		27,0	

Note: Sn - 3,0%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 380	≥ 20	630-730°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 40 Cd is our silver brazing rod with very strong capillary action. Suitable for similar and dissimilar joining steel, stainless steel, grey and malleable cast iron, nickel and nickel alloys, copper and copper alloys, brass, bronzes, tungsten carbide, silver and gold. Typical applications include production of instruments, equipment engineering, watchmaking, shipbuilding, electrical engineering. L-Ag 40 Cd is standard a bare rod which is used in combination with silver solder brazing flux. Fluxcoated rods are available on request (L-Ag40CdFC). **CONTAINS CADMIUM!**

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						40,0		19,0		21,0	

Note: Cd - 20,0%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 480	≥ 30	595-630°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 45 Sn is our cadmium free silver brazing rod for similar and dissimilar joining steel, stainless steel, nickel and nickel alloys, copper and copper alloys. L-Ag 45 Sn is mainly used for production brazing. Typical applications include household articles, cool aggregates, distilling plants, winepress equipment, dishes and jewellery. L-Ag 45 Sn has good flowing characteristics, is standard available as bare rod which is used in combination with silver solder brazing flux.

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Food processing industry
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						45,0		27,0		25,0	

Note: Sn - 3,0%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 400	≥ 14	640-680°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 50 Cd is our silver brazing rod with superb flowing characteristics. The high silver content in combination with the ratio between copper : zinc + cadmium ensures excellent resistance to corrosion in chlorine, sulphur and steam environments. Suitable for similar and dissimilar joining steel, stainless steel, grey and malleable cast iron, nickel and nickel alloys, copper and copper alloys, brass, bronzes, tungsten carbide, silver and gold. L-Ag 50 Cd is standard a bare rod which is used in combination with silver solder brazing flux. **CONTAINS CADMIUM!**

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Shipyards/offshore
- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						50,0		15,5		16,5	

Note: Cd - 18,0%

## Mechanical properties, weld metal – typical:

Condition	Yield strength Rp 0,2 MPa	Tensile strength Rm MPa	Elongation A5 - %	Melting range
As welded	-	≥ 450	≥ 35	625-635°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

## Wire type:

OAW Solid wire

## Welding positions:



## Approvals:

-

## Shielding gas:

Oxy-acetylene

L-Ag 55 Sn is our cadmium free silver brazing rod for similar and dissimilar joining steel, stainless steel, nickel and nickel alloys, copper and copper alloys. Typical applications include food equipment where cadmium must be avoided, to minimize stress corrosion cracking of nickel and nickel alloys at low brazing temperatures, where color match with the base metal is required. L-Ag 55 Sn is standard available as bare rod which is used in combination with silver solder brazing flux. Fluxcoated rods are available on request (L-Ag 55 SnFC).

## Base materials to be welded:

- Brazing steel, copper and nickel

## Applications:

- Pressure vessel & boiler industry
- Construction works
- Repair shops
- Food processing industry
- Office furniture industry

## Equivalent product in alternative welding process:

SMAW	GMAW	FCAW	GTAW	SAW	Gas welding / brazing
-	-	-	-	-	-

## Chemical composition, wt.% weld metal – typical:

C	Mn	Si	S	P	Ni	Ag	Sn	Cu	Ti	Zn	Al
						55,0		21,0		22,0	

Note: Sn - 2,0%

## Mechanical properties, weld metal – typical:

Condition	0,2% Yield strength MPa	Tensile strength MPa	Elongation Lo=5d - %	Melting range
As welded	-	≥ 500	≥ 11	630-660°C

## Packaging data:

Dia. mm.	Length mm.	Weight / package kg.
1,5	500	5
2,0	500	5

**HILCO Brazing Fluxes** are suitable for use on copper, brass, mild steel and most other common materials. Special purpose fluxes are available for brazing aluminium, cast iron and silver brazing alloys. Silver brazing fluxes are not effective on aluminium, magnesium, titanium or their alloys.

The application field of HILCO Brazing Fluxes strongly depend on the melting points of the various brazing alloys and varies between 450-900°C. In this respect we supply a number of brazing fluxes each having their typical application. Use of the wrong flux or a poor application technique can have a negative effect on the quality of the joint.

HILCO Brazing Fluxes are available in powder for only. These powders can be made into pastes by stirring in water until the mixture has the consistency of thick cream. HILCO Brazing Fluxes can be applied by hot rodding i.e. dipping a warm rod into flux powder and the flux adhering to the rod is transferred to the joint area.

A molten brazing alloy will only wet and flow over a parent metal if both are substantially free of surface oxide. Simply removing surface oxide before brazing is not effective, since a new oxide layer is rapidly formed on heating. To achieve a oxide free surface it is necessary to:

- Remove oxide as it is formed using a suitable brazing flux, or
- Prevent oxidation during brazing by heating in a protective atmosphere, or
- Use a self-fluxing brazing alloy (possible when copper-to-copper brazing only!)








Brazing Flux	Application	EN 1045	Temperature range	Packaging	To be used in combination with
<b>Bronze flux</b>	General purpose, brazing cast iron, steel, brass, bronze and copper	FH 21	750-1100°C	500 gr. jars	Bronze C, Bronze N, Tinbronzes, Phosphorbronzes
<b>Aluminium flux</b>	Brazing aluminium sheet and extruded shapes and corner joints	FH 11	550-800°C	500 gr. jars	AL Si 5, AL Si 12
<b>Cast Iron flux</b>	Oxy-acetylene welding and repairing cast iron	FH 21	750-1100°C	500 gr. jars	Cast iron rods
<b>Silver solder flux (F-Flux)</b>	Silver brazing, dissimilar joining copper to ...	FH 10	550-800°C	500 gr. jars	Silver brazing rods, Silver phosphorous rods
<b>Y-flux</b>	Similar and dissimilar joining copper to ...	FH 10	550-800°C	20 kilo drums	Silver brazing rods

## Flux residue removal

We recommend to remove flux residues after brazing, due to the danger of corrosive attack when the flux hydrolyses on exposure to moist air. The method of removal depends on the classification of the brazing flux.

Classification	Removal of residues
FH10, FH11	Residues are corrosive and have to be removed by washing or pickling
FH21	Residues are non-corrosive and have to be removed mechanically or by pickling

**HILCO tungsten electrodes** are used for TIG welding and for plasma welding and cutting. In order to improve the service life and arc striking characteristics oxides are added to them during production.

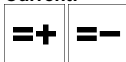
Type	W	Composition Oxides (%)	Cont.	Color code	Application	Current
<b>W</b> AWS A5.12: EWP	Bal.	-	≤0,2	Green	TIG welding aluminium, aluminium alloys	
<b>WT 20</b> AWS A5.12: EWTh-2	Bal.	1,8-2,2 Th O <sub>2</sub>	≤0,2	Red	TIG welding stainless steel, low alloyed steel, copper and copper alloys	
<b>WT 40</b> -	Bal.	3,8-4,2 Th O <sub>2</sub>	≤0,2	Orange	TIG welding stainless steel, low alloyed steel, copper and copper alloys, higher current carrying capacity than WT20	
<b>WC 20</b> AWS A5.12: EWCe-2	Bal.	1,8-2,2 Ce O <sub>2</sub>	≤0,2	Grey	Thorium free alternative to WT20	
<b>WS 2</b> AWS A5.12: EWG	Bal.	Rare earths	≤0,2	Turquoise	Thorium free alternative to WT20	
<b>WL 20</b> AWS A5.12: EWLa-1	Bal.	1,8-2,2 La <sub>2</sub> O <sub>3</sub>	≤0,2	Blue	Thorium free alternative to WT20	
<b>WZ 8</b> AWS A5.12: EWZr-1	Bal.	0,7-0,9 Zr O <sub>2</sub>	≤0,2	White	TIG welding aluminium and magnesium alloys, also for use in applications where thorium should be avoided	

Type	Standard length 175 mm. (other lengths upon request) Packaging 10 pieces per package				
	Ø 1,6 mm.	Ø 2,0 mm.	Ø 2,4 mm.	Ø 3,2 mm.	Ø 4,0 mm.
<b>W</b>	•	•	•	•	•
<b>WT 20</b>	•	•	•	•	•
<b>WT 40</b>	•		•		
<b>WC 20</b>			•		
<b>WS 2</b>	•		•		
<b>WL 20</b>	•		•		
<b>WZ 8</b>			•	•	



**Coating type:**  
Copper coated

**Current:**



**Arc voltage:** 35-55V - power source needs OCV  $\geq$  60V

Carbon gouging rods are copper-coated air carbon arc cutting rods made from a mixture of graphite and pure carbon. Typical applications can be found in every field of metalworking, in foundries, steel constructions, shipbuilding, repair & maintenance. Carbon gouging rods are used for weld edge preparations, back-gouging in multipass welding, removing unsatisfactory welds, bolt and wire ends, spatter removal, all kinds of cutting.

## Base materials to be welded:

- Carbon, low-alloyed steels
- Stainless steels
- Aluminium
- Nickel alloys
- Cast iron
- Copper alloys
- Magnesium

## Applications:

- All industries related to welding

## Process description, recommendations for usage

Carbon gouging rods remove molten metal with a jet of air. The intense heat of an arc between the carbon-graphite electrode and a workpiece melts a portion of the metal, while simultaneously a jet of air is passed through the arc to blow away the molten metal. The process (Air carbon arc cutting - CAC-A) is used for cutting and gouging, and it can be done manually or mechanized. Carbon steel, stainless steel, copper alloys, cast irons, aluminium, magnesium and nickel alloys can all be cut with Carbon gouging rods. The process requires an electrode holder, cutting electrodes, a power source and an air supply. Manual electrode holders are similar to shielded metal arc electrode holders (stick electrode holders). The electrode is held in a rotatable head containing air orifices. A valve is provided to turn the air on and off. Carbon gouging rods are round, pointed and copper coated. They are intended to use at DC current.

Base material	Electrode	Current	Remarks
Carbon, low-alloyed steels	DC	= +	-
Stainless steels	DC	= +	-
Aluminium	DC	= +	Extend electrode no more than 10 cm.
Nickel alloys	DC	= -	-
Cast iron	DC	= -	At middle of electrode current range
	DC	= +	At maximum current only
Copper alloys	DC	= +	At maximum current only
Magnesium	DC	= +	Clean surface before welding

## Packaging and welding data:

Dia. mm.	Length mm.	Current Amps.
4,0	305	90-150
5,0	305	150-200
6,3	305	200-400
8,0	305	250-450
10,0	305	350-600

Hilcoflex is our double insulated welding cable made from a special NBR compound rubber, which is highly resistant to abrasion, oil, grease, ozone and most industrial solvents. The orange colour improves the visibility of the cable, even in dark confined areas and reduces the number of accidents in your working environment. The inner sheath takes care of insulating the copper conductors and improves the flexibility of the welding cable. The number of wires inside the cable is higher in comparison to usual neoprene cables improving the duty cycle of the cable. Hilcoflex welding cable can also be used as ground cable in your welding process.

## Mechanical Properties:

Tensile strength MPa	Working temperature	Electrical conductivity
> 16	-40 up to + 85°C	At 20°C $4,6 \times 10^{12} \Omega$

## Packaging and welding data:

Cable Size mm <sup>2</sup>	Length bundle meters	Weight / bundle kg.	Current carrying capacity / duty cycle - Amps			
			100%	85%	60%	30%
25	100	34,0	180	195	230	330
35	50	23,0	225	245	290	410
50	50	30,3	285	310	370	520
70	50	43,0	355	385	460	650

Anti Spatter is our CFC free weld spatter release agent that is used as an anti-adhesion preparation in your welding process. Anti spatter is stick and MIG process compatible, non fuming.

## Applications:

Anti Spatter is used on all metals in both SMAW and GMAW welding processes. Spray welding gun and workpieces before welding to prevent stoppages in your liner and to improve spatter-release. The film applied has an oily character, is non-toxic and can withstand the temperatures of normal operation. Anti Spatter has no negative effects to the weld, the welding process and the composition of the weld metal.

## Directions for usage:

Hold the can upright and apply a thin, just visible, film from a distance of 30 cm to the workpiece. Please be aware that the can is pressurized, avoid usage at temperature > 50°C, store away from direct sunlight, do not puncture or incinerate the can even when empty, keep the can away from direct heat. Do not spray in open fire, flames or red-hot metal sheets. Use Anti Spatter in a well ventilated area.

## Packaging data:

Content ml.	Weight	Pieces / carton
500	450 g.	12

Thermometer 314C is our temperature gauge to be used during the welding process. This thermometer is held in its place by means of magnetic contact plates and is, thus, on suitable for usage on ferritic steel grades.

## Properties:

Measuring system	Working temperature	Accuracy
Mechanical, no batteries required	+10 up to + 400°C	+/- 2%

## Packaging data:

Per piece
-----------

Soapstone is our marking device to be used during the welding process. Soapstone marks all kinds of steel grades by means of chalking. The flat soapstone can be supplied with a steel refillable holder.

**Packaging data:**

Per gross = 144 pieces
---------------------------

Adaptor is our device to fit the environmental friendly B300 basket spools on MIG welding machines. The robust Adaptor secures the welding wire and spools during transportation to the welding gun. It guarantees problem-free usage during the welding process. Adaptor is also available of B200 basket spools.

**Packaging data:**

Per piece
-----------

Designates an <b>Electrode</b>	<b>E</b>
--------------------------------	----------

Mechanical properties				<b>70</b>
Symbol	Yield strength min. MPa	Tensile strength min. MPa	Elongation A min %	
60	331	414	22	
<b>70</b>	<b>399</b>	<b>482</b>	<b>22</b>	

Symbol	Type of covering, welding position, welding current			<b>18</b>
	covering	position	current	
10	High cellulose sodium	F, V, OH, H	DCEP	<b>- 1</b>
11	High cellulose potassium	F, V, OH, H	AC / DCEP	
12	High titania sodium	F, V, OH, H	AC / DCEN	
13	High titania potassium	F, V, OH, H	AC / DCEN or DCEP	
14	Iron powder, titania	F, V, OH, H	AC / DCEN or DCEP	<b>H8</b>
15	Low hydrogen sodium	F, V, OH, H	DCEP	
16	Low hydrogen potassium	F, V, OH, H	AC / DCEP	
<b>18</b>	<b>Low hydrogen potassium, iron powder</b>	<b>F, V, OH, H</b>	<b>AC / DCEP</b>	
19	Iron oxide titania potassium	F, V, OH, H	AC / DCEN or DCEP	<b>R</b>
20	High iron oxide	H-fillets F	AC / DCEN AC / DCEN or DCEP	
22	High iron oxide	F, H	AC / DCEN	
24	Iron powder, titania	H-fillets, F	AC / DCEP or DCEN	
27	High iron oxide, iron powder	H-fillets F	AC / DCEN AC / DCEN or DCEP	
28	Low hydrogen potassium, iron powder	H-fillets, F	AC / DCEP	
48	Low hydrogen potassium, iron powder	F, V, OH, H, vertical down	AC / DCEP	

<b>Min. toughness for E7018 type = 27J at -46°C</b>
Min. toughness for E7024 type = 27J at -18°C
Designates improved ductility for E7024 type

<b>Hydrogen limits metal ml (H2) 100 gr. weld metal</b>
H 16 = 16,0 ml
<b>H 8 = 8,0 ml</b>
H 4 = 4,0 ml

Absorbed moisture test	
As received or conditioned	As-exposed
0,3% by Wt.	0,4% by Wt.



# Specification AWS A5.4 & A5.9

Specification for stainless steel electrodes for shielded metal arc welding

Specification for bare stainless steel welding electrodes and rods

Hilchrome 316R – AWS A5.4: E316L-17

Hilchrome G316L Si - AWS A5.9: ER316L Si

Designates an <b>Electrode (E)</b>
Designates usages as either an <b>electrode or rod (ER)</b>

**E**  
**ER**

Indicates the specific composition of undiluted weld metal / basic composition weld metal deposit	
Symbol	Composition
<b>316L</b> (A5.4)	<b>C 0,04 - Cr 17,0-20,0 - Ni 11,0-14,0 - Mo 2,0-3,0 - Mn 0,5-2,5 - Si 0,90</b>
<b>316L Si</b> (A5.9)	<b>C 0,03 - Cr 18,0-20,0 - Ni 11,0-14,0 - Mo 2,0-3,0 - Mn 1,0-2,5 - Si 0,65-1,00</b>

**316L**  
**316LSi**

Designates the usability	
-15	DC+ only, Basic coated, all positions
-25	DC+ only, Basic coating on a mild steel core wire Flat & horizontal
-16	DC+ and AC, Rutile-basic coated, All positions
-26	DC+ and AC, Rutile-basic coating on a mild steel core wire, Flat & horizontal
-17	DC+ and AC, Rutile coated, All positions

**17**



Designates usage as either an **electrode or rod**, or use only as an electrode (E)

**ER**

Minimum tensile strength of the weld metal produced			
Symbol	Yield strength min. N/mm <sup>2</sup>	Tensile strength min. N/mm <sup>2</sup>	Elongation A min %
60	331	414	22
<b>70</b>	<b>399</b>	<b>482</b>	<b>22</b>

**70**

**C**

Indicates the filler metal	
S	Solid
<b>C</b>	<b>Composite wire</b>

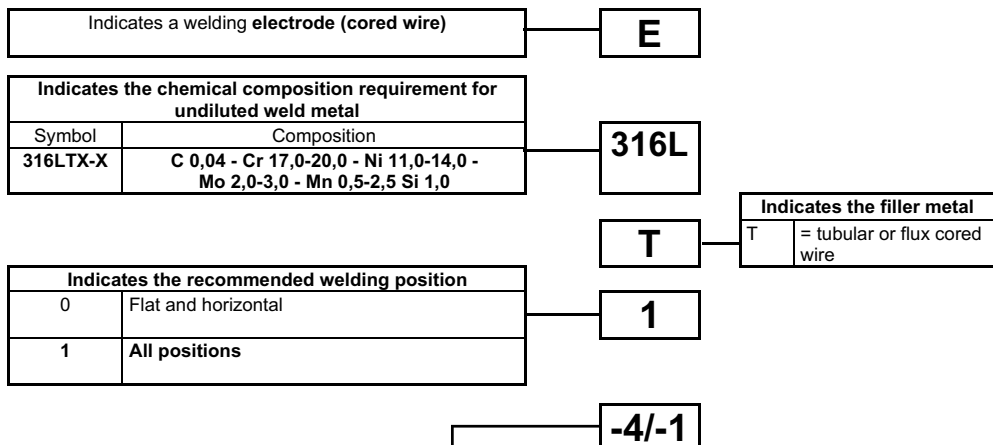
Chemical composition requirement for solid electrodes and rods													
Symbol	C	Mn	Si	P	S	Ni	Cr	Mo	V	Cu	Ti	Zr	Al
- 2	0,07	0,90-1,40	0,40-0,70	0,025	0,035	*	*	*	*	0,50	0,05-0,12	0,02-0,12	0,05-0,15
- 3	0,06-0,15	0,90-1,40	0,45-0,75	0,025	0,035	*	*	*	*	0,50	-	-	-
- 4	0,07-0,15	1,00-1,50	0,65-0,85	0,025	0,035	*	*	*	*	0,50	-	-	-
- 5	0,07-0,19	0,90-1,40	0,30-0,60	0,025	0,035	*	*	*	*	0,50	-	-	0,50-0,90
- 6	0,06-0,15	1,40-1,85	0,80-1,15	0,025	0,035	*	*	*	*	0,50	-	-	-
- 7	0,07-0,15	1,50-2,00	0,50-0,80	0,025	0,035	*	*	*	*	0,50	-	-	-
- G	Not specified												
Chemical composition requirements for composite electrodes (metal cored wires)													
Class.	Shielding gas		C	Mn	Si	S	P	Cu max.					
Multi-pass requirements													
E70C-3	ArCO <sup>2</sup> or CO <sup>2</sup>			0,12	1,75	0,90	0,03	0,03	0,50				
E70C-6	ArCO <sup>2</sup> or CO <sup>2</sup>			0,12	1,75	0,90	0,03	0,03	0,50				
E70C-G	As agreed			Not specified									
Single-pass requirement													
E70C-GS	As agreed			Not specified									

**Table 2: position of welding, shielding, polarity, application requirements**

AWS Classification	Position of welding	External shielding	Polarity	Application
E70T-1	H and F	CO <sub>2</sub>	DCEP	M
E70T-1M	H and F	ArCO <sub>2</sub> mixture	DCEP	M
E71T-1	H, F, VU, OH	CO <sub>2</sub>	DCEP	M
E71T-1M	H, F, VU, OH	ArCO <sub>2</sub> mixture	DCEP	M
E70T-2	H and F	CO <sub>2</sub>	DCEP	S
E70T-2M	H and F	ArCO <sub>2</sub> mixture	DCEP	S
E71T-2	H, F, VU, OH	CO <sub>2</sub>	DCEP	S
E71T-2M	H, F, VU, OH	ArCO <sub>2</sub> mixture	DCEP	S
E70T-3	H and F	-	DCEP	S
E70T-4	H and F	-	DCEP	M
E70T-5	H and F	CO <sub>2</sub>	DCEP	M
E70T-5M	H and F	ArCO <sub>2</sub> mixture	DCEP	M
E71T-5	H, F, VU, OH	CO <sub>2</sub>	DCEP or DCEN	M
E71T-5M	H, F, VU, OH	ArCO <sub>2</sub> mixture	DCEP or DCEN	M
E70T-6	H and F	-	DCEP	M
E70T-7	H and F	-	DCEP	M
E71T-7	H, F, VU, OH	-	DCEP	M
E70T-8	H and F	-	DCEP	M
E71T-8	H, F, VU, OH	-	DCEP	M
E70T-9	H and F	CO <sub>2</sub>	DCEP	M
E70T-9M	H and F	ArCO <sub>2</sub> mixture	DCEP	M
E71T-9	H, F, VU, OH	CO <sub>2</sub>	DCEP	M
E71T-9M	H, F, VU, OH	ArCO <sub>2</sub> mixture	DCEP	M
E70T-10	H and F	-	DCEP	S
E70T-11	H and F	-	DCEP	M
E71T-11	H, F, VU, OH	-	DCEP	M
E70T-12	H and F	CO <sub>2</sub>	DCEP	M
E70T-12M	H and F	ArCO <sub>2</sub> mixture	DCEP	M
E71T-12	H, F, VU, OH	CO <sub>2</sub>	DCEP	M
E71T-12M	H, F, VU, OH	ArCO <sub>2</sub> mixture	DCEP	M
E61T-13	H, F, VU, OH	-	DCEP	S
E71T-13	H, F, VU, OH	-	DCEP	S
E71T-14	H, F, VU, OH	-	DCEP	S
EX0T-G	H and F	Not specified	Not specified	M
EX1T-G	H, F, VD or VU, OH	Not specified	Not specified	M
EX0T-GS	H and F	Not specified	Not specified	S
EX1T-GS	H, F, VD or VU, OH	Not specified	Not specified	S

**Notes:**

- Position of welding: H = horizontal position, F = flat, OH = overhead, VD = vertical downwards, VU = vertical upwards
- Application: M = single or multipass, S = single pass only



**Table 2: required shielding medium, polarity, and welding process**

Classification	External shielding medium	Welding polarity	Welding process
<b>EXXXTX-1</b>	<b>CO<sub>2</sub></b>	<b>DCEP</b>	<b>FCAW</b>
<b>EXXXTX-3</b>	Self-shielded (none)	DCEP	FCAW
<b>EXXXTX-4</b>	<b>ArCO<sub>2</sub></b>	<b>DCEP</b>	<b>FCAW</b>
<b>EXXXTX-G</b>	Not specified	DCEN	FCAW

Electrode, symbol for process

**E**

## Min. yield strength

Symbol	Re min. MPa	Rm min. MPa	Elongation A <sub>5</sub> min %
35	355	440-570	22
38	380	470-600	20
<b>42</b>	<b>420</b>	<b>500-640</b>	<b>20</b>
46	460	530-680	20
50	500	560-720	18

**42**

**5**

Symbol	Min. impact of avg. 47J at (temp.)
Z	No requirements
A	+ 20°C
0	0°C
2	- 20°C
3	- 30°C
4	- 40°C
<b>5</b>	<b>- 50°C</b>
6	- 60°C

## Chemical Composition

Symbol	Mn	Mo	Ni
-	<b>2,0</b>	-	-
Mo	1,4	0,3-0,6	-
MnMo	> 1,4-2,0	0,3-0,6	-
1Ni	1,4	-	0,6-1,2
2Ni	1,4	-	1,8-2,6
3Ni	1,4	-	> 2,6-3,8
Mn1Ni	> 1,4-2,0	-	0,6-1,2
1NiMo	1,4	0,3-0,6	0,6-1,2
Z	Other compositions, as agreed		

**-**

**B**

Symbol	Electrode covering
A	Acid
C	Cellulose
R	Rutile
RR	Rutile, thick coated
RC	Rutile-cellulose
RA	Rutile-acid
RB	Rutile-basic
<b>B</b>	<b>Basic</b>

## Recovery %

Symbol	Recovery %	Type of current
1	≤ 105	AC / DC
2	≤ 105	DC
3	> 105 ≤ 125	AC / DC
<b>4</b>	<b>&gt; 105 ≤ 125</b>	<b>DC</b>
5	> 125 ≤ 160	AC / DC
6	> 125 ≤ 160	DC
7	> 160	AC / DC
8	> 160	DC

**4**

**2**

**H5**

Symbol	Welding position
1	All positions
<b>2</b>	<b>All positions, except vertical down</b>
3	Flat and horizontal vertical butt / fillet weld
4	Flat butt and fillet weld
5	Vertical down and according to symbol 3

Symbol	Max. diffusible hydrogen content / 100 gr. weld metal
<b>H5</b>	<b>5 ml</b>
H10	10 ml
H15	15 ml

**Submerged arc welding, symbol for process**

**S**

Symbol for method of manufacture	
F	Fused flux
<b>A</b>	<b>Agglomerated flux</b>
M	Mixed flux

**A**

**AB**

Flux class	
<b>1</b>	<b>Fluxes for sub-arc welding non alloy and low alloy steels</b>
2	Fluxes for joint welding and surfacing of stainless steels
3	Fluxes mainly for surfacing purposes

**1**

Symbol for metallurgical behaviour / flux class 1 - burn-out or pick-up of the elements Si and Mn (in this sequence)		
Metallurgical behaviour	S.	Contribution from flux on all weld metal, %
Burn-out	1	Over 0,7
	2	Over 0,5 up to 0,7
	3	Over 0,3 up to 0,5
	4	Over 0,1 up to 0,3
Pick-up and/or burn-out	5	0 up to 0,1
<b>Pick-up</b>	<b>6</b>	<b>Over 0,1 up to 0,3</b>
	<b>7</b>	<b>Over 0,3 up to 0,5</b>
	8	Over 0,5 up to 0,7
	9	Over 0,7

**67**

**AC**

Symbol	Type of flux
MS	Manganese-silicate
CS	Calcium-silicate
ZS	Zirconium-silicate
RS	Rutile-silicate
AR	Aluminate-rutile
<b>AB</b>	<b>Aluminate-basic</b>
AS	Aluminate-silicate
AF	Aluminate-fluoride-basic
FB	Fluoride-basic
Z	Any other composition

Type of current	
<b>AC</b>	<b>Alternating current, suitability for AC generally also implies suitability for DC</b>
DC	Direct current

**H5**

Hydrogen content ml/100 g. all-weld metal max.	
<b>H5</b>	<b>5</b>
H10	10
H15	15

Submerged arc welding, symbol for process

**S**

Symbol for tensile properties by multi-run technique

Symbol	Re min. MPa	Rm min. MPa	Elongation A <sub>5</sub> min %
35	355	440-570	22
38	380	470-600	20
<b>42</b>	<b>420</b>	<b>500-640</b>	<b>20</b>
46	460	530-680	20
50	500	560-720	18

**42**

**3**

Symbol	Min. impact of avg. 47J at (temp.)
Z	No requirements
A	+ 20°C
0	0°C
2	- 20°C
<b>3</b>	<b>- 30°C</b>
4	- 40°C
5	- 50°C
6	- 60°C

Symbol for type of welding flux  
- see also EN 760

**AB**

AB	Aluminate-basic
----	-----------------

Chemical composition wire electrodes in %

Symbol	C	Si	Mn	P	S	Mo	Ni	Cr	Cu
S0	As agreed upon and not defined in this classification								
S1	0,05-0,15	0,15	0,35-0,60	0,025	0,025	0,15	0,15	0,15	≤ 0,30
<b>S2</b>	<b>0,07-0,15</b>	<b>0,15</b>	<b>0,80-1,30</b>	<b>0,025</b>	<b>0,025</b>	<b>0,15</b>	<b>0,15</b>	<b>0,15</b>	<b>≤ 0,30</b>
S3	0,07-0,15	0,15	>1,30-1,75	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S4	0,07-0,15	0,15	>1,75-2,25	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S1 Si	0,07-0,15	0,15-0,40	0,35-0,60	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S2 Si	0,07-0,15	0,15-0,40	0,80-1,30	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S2 Si 2	0,07-0,15	0,40-0,60	0,80-1,30	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S3 Si	0,07-0,15	0,15-0,40	>1,30-1,85	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S4 Si	0,07-0,15	0,15-0,40	>1,85-2,25	0,025	0,025	0,15	0,15	0,15	≤ 0,30
S1 Mo	0,05-0,15	0,05-0,25	0,35-0,60	0,025	0,025	0,45-0,65	0,15	0,15	≤ 0,30
S2 Mo	0,07-0,15	0,05-0,25	0,80-1,30	0,025	0,025	0,45-0,65	0,15	0,15	≤ 0,30
S3 Mo	0,07-0,15	0,05-0,25	>1,30-1,75	0,025	0,025	0,45-0,65	0,15	0,15	≤ 0,30
S4 Mo	0,07-0,15	0,05-0,25	>1,75-2,25	0,025	0,025	0,45-0,65	0,15	0,15	≤ 0,30
S2 Ni 1	0,07-0,15	0,05-0,25	0,80-1,30	0,020	0,020	0,15	0,80-1,20	0,15	≤ 0,30
S2 Ni 1,5	0,07-0,15	0,05-0,25	0,80-1,30	0,020	0,020	0,15	>1,20-1,80	0,15	≤ 0,30
S2 Ni 2	0,07-0,15	0,05-0,25	0,80-1,30	0,020	0,020	0,15	>1,80-2,40	0,15	≤ 0,30
S2 Ni 3	0,07-0,15	0,05-0,25	0,80-1,30	0,020	0,020	0,15	>2,80-3,70	0,15	≤ 0,30
S2 Ni 1 Mo	0,07-0,15	0,05-0,25	0,80-1,30	0,020	0,020	0,45-0,65	0,80-1,20	0,20	≤ 0,30
S3 Ni 1,5	0,07-0,15	0,05-0,25	>1,30-1,70	0,020	0,020	0,15	>1,20-1,80	0,20	≤ 0,30
S3 Ni 1 Mo	0,07-0,15	0,05-0,25	>1,30-1,80	0,020	0,020	0,45-0,65	0,80-1,20	0,20	≤ 0,30
S3 Ni 1,5 Mo	0,07-0,15	0,05-0,25	1,20-1,80	0,020	0,020	0,30-0,50	1,20-1,80	0,20	≤ 0,30

**Tubular cored, symbol for process**

**T**

## Min. yield strength

**46**

Symbol	Re min. MPa	Rm min. MPa	Elongation A <sub>5</sub> min %
35	355	440-570	22
38	380	470-600	20
42	420	500-640	20
<b>46</b>	<b>460</b>	<b>530-680</b>	<b>20</b>
50	500	560-720	18

**2**

Symbol	Min. impact of avg. 47J at (temp.)
Z	No requirements
A	+ 20°C
0	0°C
<b>2</b>	<b>- 20°C</b>
3	- 30°C
4	- 40°C
5	- 50°C
6	- 60°C

## Chemical Composition

**-**

Symbol	Mn	Mo	Ni
-	2,0	-	-
Mo	1,4	0,3-0,6	-
MnMo	> 1,4-2,0	0,3-0,6	-
1Ni	1,4	-	0,6-1,2
2Ni	1,4	-	1,8-2,6
3Ni	1,4	-	> 2,6-3,8
Mn1Ni	> 1,4-2,0	-	0,6-1,2
1NiMo	1,4	0,3-0,6	0,6-1,2
Z	Other compositions, as agreed		

**M**

Symbol	Electrode core
R	Rutile, slow freezing
P	Rutile, fast freezing
B	Basic
<b>M</b>	<b>Metal powder</b>
V	Rutile or basic/fluoride
W*	Basic/fluoride, slow freezing
Y*	Basic/fluoride, fast freezing
Z*	Other types
Types W, Y, Z do not require shielding gas	

## Shielding gas

**M**

Symbol	Shielding gas
<b>M</b>	<b>Mixed gases in acc. with EN 439 - M2 classification</b>
C	Carbon dioxide gases (CO <sub>2</sub> ) in acc. with EN 439 C1 classification
N	To be used for cored electrodes not requiring gas shielding

**1**

Symbol	Welding position
<b>1</b>	<b>All positions</b>
2	All positions, except vertical down
3	Flat and horizontal vertical butt / fillet weld
4	Flat butt and fillet weld
5	Vertical down and according to symbol 3

**H5**

Symbol	Max. diffusible hydrogen content / 100 gr. weld metal
<b>H5</b>	<b>5 ml</b>
H10	10 ml
H15	15 ml

Page	Process	Group	Productname	AWS Specification		EN Classification	
				Spec		Class	
15	SMAW	Unalloyed	Red Extra	A5.1	E 6013	499	E 42 0 RC 11
16	SMAW	Unalloyed	Red	A5.1	E 6013	499	E 42 0 RC 11
17	SMAW	Unalloyed	Brown	A5.1	E 6012	499	E 42 0 RC 11
18	SMAW	Unalloyed	Pipeweld 6010	A5.1	E 6010	499	E 38 3 C 21
19	SMAW	Unalloyed	Performa	A5.1	E 6013	499	E 42 0 RC 11
20	SMAW	Unalloyed	Velora	A5.1	E 6013	499	E 42 0 RR 12
21	SMAW	Unalloyed	Velveta	A5.1	E 6013	499	E 42 0 RR 32
22	SMAW	Unalloyed	Basic 55	A5.1	E 7016	499	E 42 2 RB 12 H10
23	SMAW	Unalloyed	Basic	A5.1	E 7018	499	E 42 4 B 32 H5
24	SMAW	Unalloyed	Basic Super	A5.1	E 7018-1	499	E 46 4 B 32 H5
25	SMAW	Unalloyed	Basic Directa	A5.1	E 7018-1	499	E 42 5 B 42 H5
26	SMAW	Unalloyed	Regina 140	A5.1	E 7024	499	E 42 0 RR 53
27	SMAW	Unalloyed	Regina 150	A5.1	E 7024-1	499	E 42 2 RA 53
28	SMAW	Unalloyed	Regina 160	A5.1	E 7024	499	E 42 0 RR 53
29	SMAW	Unalloyed	Basic 160	A5.1	E 7028	499	E 42 2 RB 53
30	SMAW	Unalloyed	Regina 180	A5.1	E 7024	499	E 42 0 RR 73
31	SMAW	Unalloyed	Pipeweld 6010	A5.1	E 6010	499	E 38 3 C 21
32	SMAW	Unalloyed	Pipeweld 8010	A5.5	E 8010-P1	499	E 46 3 C 25
33	GMAW	Unalloyed	SG 1	A5.18	ER 70S-3	440	G 42 2 M G2 Si 1
34	GMAW	Unalloyed	SG 1A Superflow	A5.18	ER 70S-2	440	G 42 2 M G2 Ti
35	GMAW	Unalloyed	SG 2	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 42 4 M G3 Si 1
36	GMAW	Unalloyed	K 60	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 46 2 M G3 Si 1
37	GMAW	Unalloyed	SG 3	A5.18	ER 70S-6	440	G 46 2 C G4 Si 1 G 46 4 M G4 Si 1
38	FCAW	Unalloyed	Hilcord 40	A5.20	E 71T-1 E 71T-12 M	758	T 46 3 P M 1 H5
39	FCAW	Unalloyed	Hilcord 40C	A5.20	E 71T-1	758	T 46 2 P C 1 H5
40	FCAW	Unalloyed	Hilcord 41	A5.20	E 71T-1 M	758	T 42 2 P M 1 H5
41	FCAW	Unalloyed	Hilcord 41C	A5.20	E 71T-1	758	T 42 2 P C 1 H5
42	FCAW	Unalloyed	Hilcord 2040	A5.20	E 71T-GS	758	T 42 A Z N 2
43	FCAW	Unalloyed	Hilcord 2048	A5.20	E 71T-8	758	T 42 2 Z N 1
44	FCAW	Unalloyed	Hilcord 51	A5.20	E 70T-5 E 70T-5 M	758	T 42 4 B C 3 H5 T 42 4 B M 3 H5
45	FCAW	Unalloyed	Hilcord 51.71	A5.20	E 71T-5 E 71T-5 M	758	T 42 4 B C 1 H5 T 42 5 B M 1 H5
46	FCAW	Unalloyed	Hilcord 50	A5.18	E 70C-6 M	758	T 42 3 M M 2 H5
47	FCAW	Unalloyed	Hilcord 52	A5.18	E 70C-6 M	758	T 46 2 M M 1 H5
48	FCAW	Unalloyed	Hilcord 54	A5.18	E 70C-6 M	758	T 46 4 M M 1 H5
49	GTAW	Unalloyed	Fer SG 1	A5.18	ER 70S-3	1668	W 42 2 W 2 Si 1
50	GTAW	Unalloyed	Fer SG 1A	A5.18	ER 70S-2	1668	W 42 2 W 2 Ti
51	GTAW	Unalloyed	Fer SG 2	A5.18	ER 70S-6	1668	W 46 2 W 3 Si 1
52	GTAW	Unalloyed	Fer SG 3	A5.18	ER 70S-6	1668	W 46 4 W 4 Si 1
53	Gas welding	Unalloyed	Fer G 1	A5.2	R 45	12536	O I
54	Gas welding	Unalloyed	Fer G 2	A5.2	R 60	12536	O II
55	Gas welding	Unalloyed	Fer G 3	A5.2	R 60-G	12536	O III
56	Gas welding	Unalloyed	Fer G 4	A5.2	R 60-G	12536	O IV
57	SAW	Unalloyed	H 60	A5.17	EL 12	756	S 1
58	SAW	Unalloyed	H 100	A5.17	EM 12	756	S 2



Page	Process	Group	Productname	AWS Specification		EN Classification	
				Spec		Class	
59	SAW	Unalloyed	H 100Si	A5.17	EM 12K	756	S2 Si
60	SAW	Unalloyed	Hilcord 100	A5.18	EC 1	756	S 0
61	SAW	Unalloyed	HW 150	-	-	760	S F MS 1 67 AC
62	SAW	Unalloyed	HW 155	-	-	760	S F MS 1 67 AC
63	SAW	Unalloyed	HW 430	-	-	760	S A AR 1 87 AC
64	SAW	Unalloyed	HW 450	-	-	760	S A MS 1 99 AC
65	SAW	Unalloyed	HW 530	-	-	760	S A AB 1 67 AC H5
66	SAW	Unalloyed	HW 400	-	-	760	S A AR 3 CrMo AC
67	SMAW	Cutting	Cuttl	-	-	-	-
68	CAC-A	Cutting	Carbon gouging rods	-	-	-	-
72	SMAW	Low alloyed	B 12Mo	A5.5	E 7018-A1	1599	E Mo 32 B H5
73	SMAW	Low alloyed	B 19CrMo	A5.5	E 8018-B2	1599	E CrMo 1 B 42 H5
74	SMAW	Low alloyed	B 20CrMo	A5.5	E 9018-B3	1599	E CrMo 2 B 42 H5
75	SMAW	Low alloyed	Basic 70	A5.5	E 8018-C3	499	E 46 6 1Ni B 32 H5
76	GMAW	Low alloyed	SG Cor-Ten	A5.28	ER 80S-G	440	G 42 2 C G 0 G 46 2 M G 0
77	GMAW	Low alloyed	K 80	A5.28	ER 110S-G	-	-
78	GMAW	Low alloyed	SG Mo	A5.28	ER 80S-D2	440	G 46 2 M G 2 Mo
78	GMAW	Low alloyed	SG Mo	A5.28	ER 80S-D2	12070	G MoSi
79	GMAW	Low alloyed	SG CrMo1	A5.28	ER 80S-B2	12070	G CrMo 1 Si
80	GMAW	Low alloyed	SG CrMo2	A5.28	ER 90S-B3	12070	G CrMo 2 Si
81	GMAW	Low alloyed	SG Ni1	A5.28	ER 80S-Ni1	440	G 46 6 M G3 Ni 1
82	GMAW	Low alloyed	SG Ni2,5	A5.28	ER 80S-Ni2	440	G 46 6 M G2 Ni 2
83	FCAW	Low alloyed	Hilcord Cor-Ten	A5.29	E 70T5-G	758	T 42 4 1Ni B H5
84	FCAW	Low alloyed	Hilcord 59M	A5.28	E 110C-G	12535	T 69 4 Mn2NiCrMo MM 2
85	FCAW	Low alloyed	Hilcord 60M	A5.28	E 80C-G	758	T 46 2 Mo M M 2 H5
85	FCAW	Low alloyed	Hilcord 60M	A5.28	E 80C-G	12071	T Mo M M 2 H5
86	FCAW	Low alloyed	Hilcord 61M	A5.28	E 80C-G	12071	T CrMo 1 M M 2 H5
87	FCAW	Low alloyed	Hilcord 62M	A5.28	E 90C-G	12071	T CrMo 2 M M 2 H5
88	FCAW	Low alloyed	Hilcord 43	A5.29	E 81T-1 Ni1	758	T 50 5 1Ni P M 1 H5
89	FCAW	Low alloyed	Hilcord 44	A5.29	E 81T-1 Ni1	758	T 50 5 1Ni P M 1 H5
90	GTAW	Low alloyed	Fer Cor-Ten	A5.28	ER 80S-G	1668	W 46 2 W 0
91	GTAW	Low alloyed	K 80 (TIG)	A5.28	ER 110S-G	-	-
92	GTAW	Low alloyed	Fer SG Mo	A5.28	ER 70S-A1	1668	W 46 2 W 2 Mo
92	GTAW	Low alloyed	Fer SG Mo	A5.28	ER 70S-A1	12070	W MoSi
93	GTAW	Low alloyed	Fer SG CrMo1	A5.28	ER 80S-B2	12070	W CrMo 1 Si
94	GTAW	Low alloyed	Fer SG CrMo2	A5.28	ER 90S-B3	12070	W CrMo 2 Si
95	GTAW	Low alloyed	Fer SG CrMo5	A5.28	ER 80S-B6	12070	W CrMo 5 Si
96	GTAW	Low alloyed	Fer SG CrMo9	A5.28	ER 80S-B8	12070	W CrMo 9 Si
97	GTAW	Low alloyed	Fer SG Ni1	A5.28	ER 80S-Ni1	1668	W 46 6 W 3 Ni 1
98	GTAW	Low alloyed	Fer SG Ni2,5	A5.28	ER 80S-Ni2	1668	W 46 6 W 2 Ni 2
99	Gas welding	Low alloyed	Fer G 4	A5.2	R 60-G	12536	O IV
100	SAW	Low alloyed	H 100	A5.17	EM 12	756	S 2
101	SAW	Low alloyed	H 150	-	-	756	S 3
102	SAW	Low alloyed	H 150Si	A5.17	EH 12K	756	S 3 Si
102	SAW	Low alloyed	H 150Si	A5.17	EM 12K	756	S 3 Si
103	SAW	Low alloyed	H 200	A5.17	EH 14	756	S 4
104	SAW	Low alloyed	Cor-Ten	A5.23	EG	756	S 0
105	SAW	Low alloyed	H 150NiCrMo1	A5.23	EG	756	S 0

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106	SAW	Low alloyed	<a href="#">H 100Mo</a>	A5.23 EA 2	756	S 2 Mo
106	SAW	Low alloyed	<a href="#">H 100Mo</a>	A5.23 EA 2	12070	S Mo
107	SAW	Low alloyed	<a href="#">H 100CrMo1</a>	A5.23 EB 2	12070	S CrMo 1
108	SAW	Low alloyed	<a href="#">H 60CrMo2</a>	A5.23 EB 3	12070	S CrMo 2
109	SAW	Low alloyed	<a href="#">H 100Ni1</a>	A5.23 E Ni 1	756	S 2 Ni 1
110	SAW	Low alloyed	<a href="#">H 100Ni2</a>	A5.23 E Ni 2	756	S 2 Ni 2
111	SAW	Low alloyed	<a href="#">HW 530</a>	- -	760	S A AB 1 67 AC H5
112,113	SAW	Low alloyed	<a href="#">HW 580</a>	- -	760	S A FB 1 55 AC H5
122	SMAW	Stainless	<a href="#">Hilchrome 307R</a>	A5.4 E 307-16	1600	E 18 8 Mn R 12
123	SMAW	Stainless	<a href="#">Hilchrome 309R</a>	A5.4 E 309L-17	1600	E 23 12 L R 32
124	SMAW	Stainless	<a href="#">Hilchrome 309MoR</a>	A5.4 E 309MoL-17	1600	E 23 12 2 L R 32
125	SMAW	Stainless	<a href="#">Hilchrome 312R</a>	A5.4 E 312-17	1600	E 29 9 R 32
126	SMAW	Stainless	<a href="#">Hilchrome 308R</a>	A5.4 E 308L-17	1600	E 19 9 L R 32
127	SMAW	Stainless	<a href="#">Hilchrome 347R</a>	A5.4 E 347-17	1600	E 19 9 Nb R 32
128	SMAW	Stainless	<a href="#">Hilchrome 316R</a>	A5.4 E 316L-17	1600	E 19 12 3 L R 12
129	SMAW	Stainless	<a href="#">Hilchrome 316R-V</a>	A5.4 E 316L-17	1600	E 19 12 3 L R 12
130	SMAW	Stainless	<a href="#">Hilchrome 318R</a>	A5.4 E 318-17	1600	E 19 12 3 Nb R 32
131	SMAW	Stainless	<a href="#">Hilchrome 310R</a>	A5.4 E 310-16	1600	E 25 20 R 12
132	SMAW	Stainless	<a href="#">Hilchrome 2209</a>	A5.4 E 2209-17	1600	E 22 9 3 L R 22
133	SMAW	Stainless	<a href="#">Hilchrome 600</a>	A5.11 E NiCrFe-3	D1736	EL-NiCr15FeMn
134	SMAW	Stainless	<a href="#">Hilchrome 625</a>	A5.11 E NiCrMo-3	D1736	EL-NiCr20Mo9Nb
135	SMAW	Stainless	<a href="#">NiCu7</a>	A5.11 E NiCu-7	D1736	EL-NiCu30Mn
136	GMAW	Stainless	<a href="#">Hilchrome G307</a>	A5.9 ER 307	12072	G 18 8 Mn
137	GMAW	Stainless	<a href="#">Hilchrome G309L Si</a>	A5.9 ER 309LSi	12072	G 23 12 L Si
138	GMAW	Stainless	<a href="#">Hilchrome G312</a>	A5.9 ER 312	12072	G 29 9
139	GMAW	Stainless	<a href="#">Hilchrome G308L Si</a>	A5.9 ER 308LSi	12072	G 19 9 L Si
140	GMAW	Stainless	<a href="#">Hilchrome G316L Si</a>	A5.9 ER 316LSi	12072	G 19 12 3 L Si
141	GMAW	Stainless	<a href="#">Hilchrome G2209</a>	A5.9 ER 2209	12072	G 22 9 3 L
142	GMAW	Stainless	<a href="#">Hilchrome G600</a>	A5.14 ER NiCr-3	D1736	MSG-NiCr20Nb
143	GMAW	Stainless	<a href="#">Hilchrome G625</a>	A5.14 ER NiCrMo-3	D1736	MSG-NiCr21Mo9Nb
144	GMAW	Stainless	<a href="#">G NiCu7</a>	A5.14 ER NiCu-7	D1736	MSG-NiCu30MnTi
145	FCAW	Stainless	<a href="#">Hilcord 82</a>	A5.22 E 307T0-G	12073	T 18 8 Mn R M 3
146	FCAW	Stainless	<a href="#">Hilcord 85</a>	A5.22 E 309LT 1-4	12073	T 23 12 LPM 1
146	FCAW	Stainless	<a href="#">Hilcord 85</a>	A5.22 E 309LT 0-4	12073	T 23 12 LRM 3
146	FCAW	Stainless	<a href="#">Hilcord 85</a>	A5.22 E 309LT 1-1	12073	T 23 12 LPC 1
146	FCAW	Stainless	<a href="#">Hilcord 85</a>	A5.22 E 309LT 0-1	12073	T 23 12 LRC 3
147	FCAW	Stainless	<a href="#">Hilcord 85Mo</a>	A5.22 E 309MoLT 1-4	12073	T 23 12 2 LPM 1
147	FCAW	Stainless	<a href="#">Hilcord 85Mo</a>	A5.22 E 309MoLT 0-4	12073	T 23 12 2 LRM 3
147	FCAW	Stainless	<a href="#">Hilcord 85Mo</a>	A5.22 E 309MoLT 1-1	12073	T 23 12 2 LPC 1
147	FCAW	Stainless	<a href="#">Hilcord 85Mo</a>	A5.22 E 309MoLT 0-1	12073	T 23 12 2 LRC 3
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22 E 308LT 1-4	12073	T 19 9 LPM 1
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22 E 308LT 0-4	12073	T 19 9 LRM 3
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22 E 308LT 1-1	12073	T 19 9 LPC 1
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22 E 308LT 0-1	12073	T 19 9 LRC 3
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22 E 316LT 1-4	12073	T 19 12 3 LPM 1
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22 E 316LT 0-4	12073	T 19 12 3 LRM 3
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22 E 316LT 1-1	12073	T 19 12 3 LPC 1
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22 E 316LT 0-1	12073	T 19 12 3 LRC 3

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150	FCAW	Stainless	Hilcord 83LT-1	A5.22	E 316LT 1-4	12073	T 19 12 3 LPM 1
150	FCAW	Stainless	Hilcord 83LT-1	A5.22	E 316LT 1-1	12073	T 19 12 3 LPC 1
151	GTAW	Stainless	Hilchrome W307	A5.9	ER 307	12072	W 18 8 Mn
152	GTAW	Stainless	Hilchrome W309L	A5.9	ER 309L	12072	W 23 12 L
153	GTAW	Stainless	Hilchrome W309L Si	A5.9	ER 309LSi	12072	W 23 12 L Si
154	GTAW	Stainless	Hilchrome W309L Mo	A5.9	ER 309L Mo	12072	W 23 12 2 L Si
155	GTAW	Stainless	Hilchrome W312	A5.9	ER 312	12072	W 29 9
156	GTAW	Stainless	Hilchrome W308L Si	A5.9	ER 308LSi	12072	W 19 9 L Si
157	GTAW	Stainless	Hilchrome W347 Si	A5.9	ER 347Si	12072	W 19 9 Nb Si
158	GTAW	Stainless	Hilchrome W316L Si	A5.9	ER 316LSi	12072	W 19 12 3 L Si
159	GTAW	Stainless	Hilchrome W318 Si	A5.9	ER 318Si	12072	W 19 12 3 Nb Si
160	GTAW	Stainless	Hilchrome W2209	A5.9	ER 2209	12072	W 22 9 3 L
161	GTAW	Stainless	Hilchrome W600	A5.14	ER NiCr-3	D1736	WSG-NiCr20Nb
162	GTAW	Stainless	Hilchrome W625	A5.14	ER NiCrMo-3	D1736	WSG-NiCr21Mo9Nb
163	GTAW	Stainless	W NiCu7	A5.14	ER NiCu-7	D1736	WSG-NiCu30MnTi
164	SAW	Stainless	Hilchrome S307	A5.9	ER 307	12072	S 18 8 Mn
165	SAW	Stainless	Hilchrome S309L	A5.9	ER 309L	12072	S 23 12 L
166	SAW	Stainless	Hilchrome S308L	A5.9	ER 308L	12072	S 19 9 L
167	SAW	Stainless	Hilchrome S316L	A5.9	ER 316L	12072	S 19 12 3 L
168	SAW	Stainless	Hilchrome S2209	A5.9	ER 2209	12072	S 22 9 3 L N
169	SAW	Stainless	HW 100	-	-	760	S A AB 2 78 9Cr AC
170	SAW	Stainless	HW 120	-	-	760	S A FB 2 53 AC
176	SMAW	Repair & M.	Red Extra	A5.1	E 6013	499	E 42 0 RC 11
177	SMAW	Repair & M.	Performa	A5.1	E 6013	499	E 42 0 RC 11
178	SMAW	Repair & M.	Basic 55	A5.1	E 7016	499	E 42 2 RB 12 H10
179	SMAW	Repair & M.	Basic	A5.1	E 7018	499	E 42 4 B 32 H5
180	SMAW	Repair & M.	B 19 CrMo	A5.5	E 8018-B2	1599	E CrMo 1 B 42 H5
181	SMAW	Repair & M.	Hilchrome 307R	A5.4	E 307-16	1600	E 18 8 Mn R 12
182	SMAW	Repair & M.	Hilchrome 312R	A5.4	E 312-17	1600	E 29 9 R 32
183	SMAW	Repair & M.	Hilchrome 600	A5.11	E NiCrFe-3	D1736	EL-NiCr15FeMn
184	SMAW	Repair & M.	Hilchrome 600S	A5.11	E NiCrFe-3	-	-
185	SMAW	Repair & M.	Hardmelt 350	-	-	D8555	E 1-UM-350
186	SMAW	Repair & M.	Hardmelt 600	-	-	D8555	E 6-UM-60-GP
187	SMAW	Repair & M.	Hardmelt 620	A5.13	E Fe-5B	D8555	E 4-UM-60-ST
188	SMAW	Repair & M.	Hardmelt 638	-	-	D8555	E 10-UM-60-GR
189	SMAW	Repair & M.	Sugarhard	-	-	D8555	E 10-UM-60-GR
190	SMAW	Repair & M.	Hardmelt 643	-	-	D8555	E 10-UM-65-GR
191	SMAW	Repair & M.	Hardmelt 645	-	-	D8555	E 10-UM-65-GR
192	SMAW	Repair & M.	Manganil	A5.13	E FeMn-B	D8555	E 7-UM-200-KP
193	SMAW	Repair & M.	Pure Nickel	A5.15	E Ni-Cl	D8573	E Ni BG 22
194	SMAW	Repair & M.	Nickel Iron	A5.15	E Ni Fe-Cl	D8573	E Ni Fe BG 22
195	SMAW	Repair & M.	Hilcostel 6E	A5.13	E CoCr-A	D8555	E 20-UM-40-CTZ
196	SMAW	Repair & M.	Hilcostel 12E	A5.13	E CoCr-B	D8555	E 20-UM-50-CSTZ
197	SMAW	Repair & M.	Aluminil Si5	A5.3	E 4043	D1732	EL-AI Si 5
198	SMAW	Repair & M.	Aluminil Si12	A5.3	E 4047	D1732	EL-AI Si 12
199	SMAW	Repair & M.	Bronsil	A5.6	E CuSn-C	D1733	EL-CuSn 7
200	SMAW	Repair & M.	Cuni	A5.6	E CuNi	D1733	EL-CuNi 30 Mn
201	SMAW	Repair & M.	Cutil	-	-	-	-
202	CAC-A	Repair & M.	Carbon gouging rods	-	-	-	-

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203	GMAW	Repair & M.	SG 2	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 42 4 M G3 Si 1
204	SMAW	Repair & M.	SG CrMo1	A5.28	ER 80S-B2	12070	G CrMo 1 Si
205	SMAW	Repair & M.	Hilchrome G307	A5.9	ER 307	12072	G 18 8 Mn
206	SMAW	Repair & M.	Hilchrome G312	A5.9	ER 312	12072	G 29 9
207	SMAW	Repair & M.	Hilchrome G600	A5.14	ER NiCr-3	D1736	MSG-NiCr 20 Nb
208	SMAW	Repair & M.	H-350	-	-	D8555	MSG 2-GZ-400
209	SMAW	Repair & M.	H-600	-	-	D8555	MSG 6-GZ-60-S
210	SMAW	Repair & M.	Tinbronze 94-6	A5.7	ER CuSn-A	D1733	MSG CuSn 6
211	SMAW	Repair & M.	Albronze 8	A5.7	ER CuAl-A1	D1733	MSG CuAl 8
212	FCAW	Repair & M.	Hilcord 51	A5.20	E 70T-5 E 70T-5 M	758	T 42 4 B C 3 H5 T 42 4 B M 3 H5
213	FCAW	Repair & M.	Hilcord 61M	A5.28	E 80C-G	12071	T CrMo 1 M M 2 H5
214	FCAW	Repair & M.	Hilcord 82	A5.22	E 307T0-G	12073	T 18 8 Mn R M 3
215	FCAW	Repair & M.	Hilcord 600	-	-	D8555	MF 6-60
216	GTAW	Repair & M.	Fer SG 2	A5.18	ER 70S-6	1668	W 46 2 W 3 Si 1
217	GTAW	Repair & M.	Fer SG CrMo1	A5.28	ER 80S-B2	12070	W CrMo 1 Si
218	GTAW	Repair & M.	Fer SG CrMo5	A5.28	ER 80S-B6	12070	W CrMo 5 Si
219	GTAW	Repair & M.	Hilchrome W307	A5.9	ER 307	12072	W 18 8 Mn
220	GTAW	Repair & M.	Hilchrome W312	A5.9	ER 312	12072	W 29 9
221	GTAW	Repair & M.	Hilchrome W600	A5.14	ER NiCr-3	D1736	WSG NiCr 20 Nb
222	GTAW	Repair & M.	Hilcostel 6T	A5.13	R CoCr-A	D8555	WSG 20-GO-40-CTZ
222	Gas welding	Repair & M.	Hilcostel 6T	A5.13	R CoCr-A	D8555	G 20-GO-40-CTZ
223	GTAW	Repair & M.	Hilcostel 12T	A5.13	R CoCr-B	D8555	WSG 20-GO-50-CSTZ
223	Gas welding	Repair & M.	Hilcostel 12T	A5.13	R CoCr-B	D8555	G 20-GO-50-CSTZ
224	GTAW	Repair & M.	Cunifer 70-30	A5.7	ER CuNi	D1733	WSG CuNi30Fe
225	Gas welding	Repair & M.	Fluxcored AL 99.5	A5.10	ER 1100	D1732	G-Al 99.5
226	Gas welding	Repair & M.	Fluxcored Al Si5	A5.10	ER 4043	D1732	G-Al Si 5
227	Gas welding	Repair & M.	Bronze C	A5.8	RB CuZn-A	1044	CU 304
228	Gas welding	Repair & M.	Bronze E	A5.8	RB CuZn-A	1044	CU 301
229	Gas welding	Repair & M.	Bronze N	A5.8	RB CuZn-D	1044	CU 305
230	Gas welding	Repair & M.	Phosphorbr. 93-7	A5.8	B CuP-2	1044	CP 202
231	SAW	Repair & M.	HW 430	-	-	760	S A AR 1 87 AC
232	SAW	Repair & M.	HW 100	-	-	760	S A AB 2 78 9Cr AC
233	SAW	Repair & M.	HW 400	-	-	760	S A AR 3 CrMo AC
239	SMAW	Aluminium	Aluminil 99.8	A5.3	E 1100	D1732	EL-Al 99.8
240	SMAW	Aluminium	Aluminil Si5	A5.3	E 4043	D1732	EL-Al Si 5
241	SMAW	Aluminium	Aluminil Si12	A5.3	E 4047	D1732	EL-Al Si 12
242	SMAW	Aluminium	Aluminil Mn	A5.3	E 3003	D1732	EL-Al Mn 1
243	GMAW	Aluminium	AL 99.5	A5.10	ER 1100	D1732	MSG-Al 99.5
244	GMAW	Aluminium	AL Si5	A5.10	ER 4043	D1732	MSG-Al Si 5
245	GMAW	Aluminium	AL Si12	A5.10	ER 4047	D1732	MSG-Al Si 12
246	GMAW	Aluminium	AL Mg3	A5.10	ER 5754	D1732	MSG-Al Mg 3
247	GMAW	Aluminium	AL Mg4.5 Mn	A5.10	ER 5183	D1732	MSG-Al Mg 4,5 Mn
248	GMAW	Aluminium	AL Mg5	A5.10	ER 5356	D1732	MSG-Al Mg 5
249	GTAW	Aluminium	AL 99.5 (TIG)	A5.10	ER 1100	D1732	WSG-Al 99.5
250	GTAW	Aluminium	AL Si5 (TIG)	A5.10	ER 4043	D1732	WSG-Al Si 5
251	GTAW	Aluminium	AL Si12 (TIG)	A5.10	ER 4047	D1732	WSG-Al Si 12
252	GTAW	Aluminium	AL Mg3 (TIG)	A5.10	ER 5754	D1732	WSG-Al Mg 3
253	GTAW	Aluminium	AL Mg4.5 Mn (TIG)	A5.10	ER 5183	D1732	WSG-Al Mg 4,5 Mn

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254	GTAW	Aluminium	AL Mg5 (TIG)	A5.10	ER 5356	D1732	WSG-Al Mg 5
255	Gas welding	Aluminium	AL Si5 (OXY)	A5.10	ER 4043	D1732	G-Al Si 5
256	Gas welding	Aluminium	AL Si12 (OXY)	A5.10	ER 4047	D1732	G-Al Si 12
257	Gas welding	Aluminium	Fluxcored AL 99.5	A5.10	ER 1100	D1732	G-Al 99.5
258	Gas welding	Aluminium	Fluxcored AL Si5	A5.10	ER 4043	D1732	G-Al Si 5
263	SMAW	Non ferrous	Bronsil	A5.6	E CuSn-C	D1733	EL-CUSn 7
264	SMAW	Non ferrous	Cuni	A5.6	E CuNi	D1733	EL-CuNi 30 Mn
265	GMAW	Non ferrous	Tinbronze 94-6	A5.7	ER CuSn-A	D1733	MSG-CuSn 6
266	GMAW	Non ferrous	Albronze 8	A5.7	ER CuAl-A1	D1733	MSG-CuAl 8
267	GMAW	Non ferrous	Albronze 35	A5.7	ER CuNiAl	D1733	MSG-CuAl 8 Ni 6
268	GMAW	Non ferrous	Albronze 300	A5.7	ER CuMnNiAl	D1733	MSG-CuMn 13 Al 7
269	GMAW	Non ferrous	Cusi 3	A5.7	ER CuSi-A	D1733	MSG-CuSi 3
270	GTAW	Non ferrous	Tinbronze 94-6 (TIG)	A5.7	ER CuSn-A	D1733	WSG-CuSn 6
271	GTAW	Non ferrous	Cunifer 70-30	A5.7	ER CuNi	D1733	WSG-CuNi 30 Fe
272	GTAW	Non ferrous	Cunifer 90-10	A5.7	ER CuNi	D1733	WSG-CuNi 10 Fe
273	Gas welding	Non ferrous	Bronze C	A5.8	RB CuZn-A	1044	CU 304
274	Gas welding	Non ferrous	Bronze F	A5.8	RB CuZn-A	1044	CU 301
275	Gas welding	Non ferrous	Bronze P	A5.8	RB CuZn-A	1044	CU 306
276	Gas welding	Non ferrous	Autobronze	A5.8	RB CuZn-A	1044	CU 306
277	Gas welding	Non ferrous	Bronze N	A5.8	RB CuZn-D	1044	CU 305
278	Gas welding	Non ferrous	Phosphorbr. 92-8	A5.8	B CuP-2	1044	CP 202
279	Gas welding	Non ferrous	Phosphorbr. 93-7	A5.8	B CuP-2	1044	CP 202
280	Gas welding	Non ferrous	Phosphorbr. 94-6	A5.8	B CuP-2	1044	CP 202
281	Gas welding	Non ferrous	L-Ag 20	-	-	1044	AG 206
281	Gas welding	Non ferrous	L-Ag 20 Cd	-	-	1044	AG 309
281	Gas welding	Non ferrous	L-Ag 25	-	-	1044	AG 205
281	Gas welding	Non ferrous	L-Ag 25 Sn	A5.8	B Ag-37	1044	AG 108
281	Gas welding	Non ferrous	L-Ag 30	A5.8	B Ag-20	1044	AG 204
281	Gas welding	Non ferrous	L-Ag 34 Cd	A5.8	B Ag-2	1044	AG 305
281	Gas welding	Non ferrous	L-Ag 44	A5.8	B Ag-5	1044	AG 203
281	Gas welding	Non ferrous	L-Ag 45 Cd	A5.8	B Ag-1	1044	AG 302
281	Gas welding	Non ferrous	L-Ag 60	-	-	1044	AG 202
281	Gas welding	Non ferrous	L-Ag 64	A5.8	B Ag-9	1044	AG 201
282	Gas welding	Non ferrous	L-Ag2 P	A5.8	B CuP-6	1044	CP 105
283	Gas welding	Non ferrous	L-Ag5 P	A5.8	B CuP-3	1044	CP 104
284	Gas welding	Non ferrous	L-Ag15 P	A5.8	B CuP-5	1044	CP 102
285	Gas welding	Non ferrous	L-Ag 30 Cd	A5.8	B Ag-2a	1044	AG 306
286	Gas welding	Non ferrous	L-Ag 34 Sn	A5.8	B Ag-35	1044	AG 106
287	Gas welding	Non ferrous	L-Ag 40 Cd	-	-	1044	AG 304
288	Gas welding	Non ferrous	L-Ag 45 Sn	A5.8	B Ag-36	1044	AG 104
289	Gas welding	Non ferrous	L-Ag 38 Sn	A5.8	B Ag34	1044	AG 105
289	Gas welding	Non ferrous	L-Ag 50 Cd	A5.8	B Ag-1a	1044	AG 301
290	Gas welding	Non ferrous	L-Ag 55 Sn	A5.8	B Ag-7	1044	AG 103
291	Gas welding	Non ferrous	Bronze flux	-	-	1045	FH 21
291	Gas welding	Non ferrous	Aluminium flux	-	-	1045	FH 11
291	Gas welding	Non ferrous	Cast Iron flux	-	-	1045	FH 21
291	Gas welding	Non ferrous	Silver solder flux (F)	-	-	1045	FH 10
291	Gas welding	Non ferrous	Y-flux	-	-	1045	FH 10

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292	GTAW	Accessories	<a href="#">W</a>	A5.12	EWp	-	-
292	GTAW	Accessories	<a href="#">WT 20</a>	A5.12	EWTh-2	-	-
292	GTAW	Accessories	<a href="#">WT 40</a>	-		-	-
292	GTAW	Accessories	<a href="#">WC 20</a>	A5.12	EWCe-2	-	-
292	GTAW	Accessories	<a href="#">WS 2</a>	A5.12	EWG	-	-
292	GTAW	Accessories	<a href="#">WL 20</a>	A5.12	EWLa-1	-	-
292	GTAW	Accessories	<a href="#">WZ 8</a>	A5.12	EWZr-1	-	-
293	CAC-A	Accessories	<a href="#">Carbon gouging rods</a>	-	-	-	-
294	-	Accessories	<a href="#">Hilcoflex cable</a>	-	-	-	-
295	-	Accessories	<a href="#">Anti Spatter</a>	-	-	-	-
296	-	Accessories	<a href="#">Thermometer 314C</a>	-	-	-	-
297	-	Accessories	<a href="#">Soapstone</a>	-	-	-	-
298	-	Accessories	<a href="#">Adaptor</a>	-	-	-	-

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298	-	Accessories	Adaptor	-	-	-	-
243	GMAW	Aluminium	AL 99,5	A5.10	ER 1100	D1732	MSG-Al 99,5
249	GTAW	Aluminium	AL 99,5 (TIG)	A5.10	ER 1100	D1732	WSG-Al 99,5
246	GMAW	Aluminium	AL Mg3	A5.10	ER 5754	D1732	MSG-Al Mg 3
252	GTAW	Aluminium	AL Mg3 (TIG)	A5.10	ER 5754	D1732	WSG-Al Mg 3
247	GMAW	Aluminium	AL Mg4,5 Mn	A5.10	ER 5183	D1732	MSG-Al Mg 4,5 Mn
253	GTAW	Aluminium	AL Mg4,5 Mn (TIG)	A5.10	ER 5183	D1732	WSG-Al Mg 4,5 Mn
248	GMAW	Aluminium	AL Mg5	A5.10	ER 5356	D1732	MSG-Al Mg 5
254	GTAW	Aluminium	AL Mg5 (TIG)	A5.10	ER 5356	D1732	WSG-Al Mg 5
245	GMAW	Aluminium	AL Si12	A5.10	ER 4047	D1732	MSG-Al Si 12
256	Gas welding	Aluminium	AL Si12 (OXY)	A5.10	ER 4047	D1732	G-Al Si 12
251	GTAW	Aluminium	AL Si12 (TIG)	A5.10	ER 4047	D1732	WSG-Al Si 12
244	GMAW	Aluminium	AL Si5	A5.10	ER 4043	D1732	MSG-Al Si 5
255	Gas welding	Aluminium	AL Si5 (OXY)	A5.10	ER 4043	D1732	G-Al Si 5
250	GTAW	Aluminium	AL Si5 (TIG)	A5.10	ER 4043	D1732	WSG-Al Si 5
268	GMAW	Non ferrous	Albronze 300	A5.7	ER CuMnNiAl	D1733	MSG-CuMn 13 Al 7
267	GMAW	Non ferrous	Albronze 35	A5.7	ER CuNiAl	D1733	MSG-CuAl 8 Ni 6
211	SMAW	Repair & M.	Albronze 8	A5.7	ER CuAl-A1	D1733	MSG CuAl 8
266	GMAW	Non ferrous	Albronze 8	A5.7	ER CuAl-A1	D1733	MSG-CuAl 8
239	SMAW	Aluminium	Aluminil 99,8	A5.3	E 1100	D1732	EL-Al 99,8
242	SMAW	Aluminium	Aluminil Mn	A5.3	E 3003	D1732	EL-Al Mn 1
198	SMAW	Repair & M.	Aluminil Si12	A5.3	E 4047	D1732	EL-Al Si 12
241	SMAW	Aluminium	Aluminil Si12	A5.3	E 4047	D1732	EL-Al Si 12
197	SMAW	Repair & M.	Aluminil Si5	A5.3	E 4043	D1732	EL-Al Si 5
240	SMAW	Aluminium	Aluminil Si5	A5.3	E 4043	D1732	EL-Al Si 5
291	Gas welding	Non ferrous	Aluminium flux	-	-	1045	FH 11
295	-	Accessories	Anti Spatter	-	-	-	-
276	Gas welding	Non ferrous	Autobronze	A5.8	RB CuZn-A	1044	CU 306
72	SMAW	Low alloyed	B 12Mo	A5.5	E 7018-A1	1599	E Mo 32 B H5
180	SMAW	Repair & M.	B 19 CrMo	A5.5	E 8018-B2	1599	E CrMo 1 B 42 H5
73	SMAW	Low alloyed	B 19CrMo	A5.5	E 8018-B2	1599	E CrMo 1 B 42 H5
74	SMAW	Low alloyed	B 20CrMo	A5.5	E 9018-B3	1599	E CrMo 2 B 42 H5
23	SMAW	Unalloyed	Basic	A5.1	E 7018	499	E 42 4 B 32 H5
179	SMAW	Repair & M.	Basic	A5.1	E 7018	499	E 42 4 B 32 H5
29	SMAW	Unalloyed	Basic 160	A5.1	E 7028	499	E 42 2 RB 53
22	SMAW	Unalloyed	Basic 55	A5.1	E 7016	499	E 42 2 RB 12 H10
178	SMAW	Repair & M.	Basic 55	A5.1	E 7016	499	E 42 2 RB 12 H10
75	SMAW	Low alloyed	Basic 70	A5.5	E 8018-C3	499	E 46 6 1Ni B 32 H5
25	SMAW	Unalloyed	Basic Directa	A5.1	E 7018-1	499	E 42 5 B 42 H5
24	SMAW	Unalloyed	Basic Super	A5.1	E 7018-1	499	E 46 4 B 32 H5
199	SMAW	Repair & M.	Bronsil	A5.6	E CuSn-C	D1733	EL-CuSn 7
263	SMAW	Non ferrous	Bronsil	A5.6	E CuSn-C	D1733	EL-CuSn 7
227	Gas welding	Repair & M.	Bronze C	A5.8	RB CuZn-A	1044	CU 304
273	Gas welding	Non ferrous	Bronze C	A5.8	RB CuZn-A	1044	CU 304
228	Gas welding	Repair & M.	Bronze F	A5.8	RB CuZn-A	1044	CU 301
274	Gas welding	Non ferrous	Bronze F	A5.8	RB CuZn-A	1044	CU 301
291	Gas welding	Non ferrous	Bronze flux	-	-	1045	FH 21
229	Gas welding	Repair & M.	Bronze N	A5.8	RB CuZn-D	1044	CU 305
277	Gas welding	Non ferrous	Bronze N	A5.8	RB CuZn-D	1044	CU 305
275	Gas welding	Non ferrous	Bronze P	A5.8	RB CuZn-A	1044	CU 306

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17	SMAW	Unalloyed	Brown	A5.1	E 6012	499	E 42 0 RC 11
202	CAC-A	Repair & M.	<a href="#">Carbon gouging rods</a>	-	-	-	-
68	CAC-A	Cutting	<a href="#">Carbon gouging rods</a>	-	-	-	-
293	CAC-A	Accessories	<a href="#">Carbon gouging rods</a>	-	-	-	-
291	Gas welding	Non ferrous	<a href="#">Cast Iron flux</a>	-	-	1045	FH 21
104	SAW	Low alloyed	<a href="#">Cor-Ten</a>	A5.23	EG	756	S 0
200	SMAW	Repair & M.	<a href="#">Cuni</a>	A5.6	E CuNi	D1733	EL-CuNi 30 Mn
264	SMAW	Non ferrous	<a href="#">Cuni</a>	A5.6	E CuNi	D1733	EL-CuNi 30 Mn
224	GTAW	Repair & M.	<a href="#">Cunifer 70-30</a>	A5.7	ER CuNi	D1733	WSG CuNi30Fe
271	GTAW	Non ferrous	<a href="#">Cunifer 70-30</a>	A5.7	ER CuNi	D1733	WSG-CuNi 30 Fe
272	GTAW	Non ferrous	<a href="#">Cunifer 90-10</a>	A5.7	ER CuNi	D1733	WSG-CuNi 10 Fe
269	GMAW	Non ferrous	<a href="#">Cusi 3</a>	A5.7	ER CuSi-A	D1733	MSG-CuSi 3
201	SMAW	Repair & M.	<a href="#">Cutil</a>	-	-	-	-
67	SMAW	Cutting	<a href="#">Cutil</a>	-	-	-	-
90	GTAW	Low alloyed	<a href="#">Fer Cor-Ten</a>	A5.28	ER 80S-G	1668	W 46 2 W 0
53	Gas welding	Unalloyed	<a href="#">Fer G 1</a>	A5.2	R 45	12536	O I
54	Gas welding	Unalloyed	<a href="#">Fer G 2</a>	A5.2	R 60	12536	O II
55	Gas welding	Unalloyed	<a href="#">Fer G 3</a>	A5.2	R 60-G	12536	O III
56	Gas welding	Unalloyed	<a href="#">Fer G 4</a>	A5.2	R 60-G	12536	O IV
99	Gas welding	Low alloyed	<a href="#">Fer G 4</a>	A5.2	R 60-G	12536	O IV
49	GTAW	Unalloyed	<a href="#">Fer SG 1</a>	A5.18	ER 70S-3	1668	W 42 2 W 2 Si 1
50	GTAW	Unalloyed	<a href="#">Fer SG 1A</a>	A5.18	ER 70S-2	1668	W 42 2 W 2 Ti
51	GTAW	Unalloyed	<a href="#">Fer SG 2</a>	A5.18	ER 70S-6	1668	W 46 2 W 3 Si 1
216	GTAW	Repair & M.	<a href="#">Fer SG 2</a>	A5.18	ER 70S-6	1668	W 46 2 W 3 Si 1
52	GTAW	Unalloyed	<a href="#">Fer SG 3</a>	A5.18	ER 70S-6	1668	W 46 4 W 4 Si 1
217	GTAW	Repair & M.	<a href="#">Fer SG CrMo1</a>	A5.28	ER 80S-B2	12070	W CrMo 1 Si
93	GTAW	Low alloyed	<a href="#">Fer SG CrMo1</a>	A5.28	ER 80S-B2	12070	W CrMo 1 Si
94	GTAW	Low alloyed	<a href="#">Fer SG CrMo2</a>	A5.28	ER 90S-B3	12070	W CrMo 2 Si
218	GTAW	Repair & M.	<a href="#">Fer SG CrMo5</a>	A5.28	ER 80S-B6	12070	W CrMo 5 Si
95	GTAW	Low alloyed	<a href="#">Fer SG CrMo5</a>	A5.28	ER 80S-B6	12070	W CrMo 5 Si
96	GTAW	Low alloyed	<a href="#">Fer SG CrMo9</a>	A5.28	ER 80S-B8	12070	W CrMo 9 Si
92	GTAW	Low alloyed	<a href="#">Fer SG Mo</a>	A5.28	ER 80S-D2	1668	W 46 2 W 2 Mo
92	GTAW	Low alloyed	<a href="#">Fer SG Mo</a>	A5.28	ER 80S-D2	12070	W MoSi
97	GTAW	Low alloyed	<a href="#">Fer SG Ni1</a>	A5.28	ER 80S-Ni1	1668	W 46 6 W 3 Ni 1
98	GTAW	Low alloyed	<a href="#">Fer SG Ni2,5</a>	A5.28	ER 80S-Ni2	1668	W 46 6 W 2 Ni 2
225	Gas welding	Repair & M.	<a href="#">Fluxcored AL 99,5</a>	A5.10	ER 1100	D1732	G-Al 99,5
257	Gas welding	Aluminium	<a href="#">Fluxcored AL 99,5</a>	A5.10	ER 1100	D1732	G-Al 99,5
226	Gas welding	Repair & M.	<a href="#">Fluxcored Al Si5</a>	A5.10	ER 4043	D1732	G-Al Si 5
258	Gas welding	Aluminium	<a href="#">Fluxcored AL Si5</a>	A5.10	ER 4043	D1732	G-Al Si 5
144	GMAW	Stainless	<a href="#">G NiCu7</a>	A5.14	ER NiCu-7	D1736	MSG-NiCu30MnTi
58	SAW	Unalloyed	<a href="#">H 100</a>	A5.17	EM 12	756	S 2
100	SAW	Low alloyed	<a href="#">H 100</a>	A5.17	EM 12	756	S 2
107	SAW	Low alloyed	<a href="#">H 100CrMo1</a>	A5.23	EB 2	12070	S CrMo 1
106	SAW	Low alloyed	<a href="#">H 100Mo</a>	A5.23	EA 2	756	S 2 Mo
106	SAW	Low alloyed	<a href="#">H 100Mo</a>	A5.23	EA 2	12070	S Mo
109	SAW	Low alloyed	<a href="#">H 100Ni1</a>	A5.23	E Ni 1	756	S 2 Ni 1
110	SAW	Low alloyed	<a href="#">H 100Ni2</a>	A5.23	E Ni 2	756	S 2 Ni 2
59	SAW	Unalloyed	<a href="#">H 100Si</a>	A5.17	EM 12K	756	S2 Si
101	SAW	Low alloyed	<a href="#">H 150</a>	-	-	756	S 3



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105	SAW	Low alloyed	<a href="#">H 150NiCrMo1</a>	A5.23	EG	756	S 0
102	SAW	Low alloyed	<a href="#">H 150Si</a>	A5.17	EH 12K	756	S 3 Si
102	SAW	Low alloyed	<a href="#">H 150Si</a>	A5.17	EM 12K	756	S 3 Si
103	SAW	Low alloyed	<a href="#">H 200</a>	A5.17	EH 14	756	S 4
57	SAW	Unalloyed	<a href="#">H 60</a>	A5.17	EL 12	756	S 1
108	SAW	Low alloyed	<a href="#">H 60CrMo2</a>	A5.23	EB 3	12070	S CrMo 2
208	SMAW	Repair & M.	<a href="#">H-350</a>	-	-	D8555	MSG 2-GZ-400
209	SMAW	Repair & M.	<a href="#">H-600</a>	-	-	D8555	MSG 6-GZ-60-S
185	SMAW	Repair & M.	<a href="#">Hardmelt 350</a>	-	-	D8555	E 1-UM-350
186	SMAW	Repair & M.	<a href="#">Hardmelt 600</a>	-	-	D8555	E 6-UM-60-GP
187	SMAW	Repair & M.	<a href="#">Hardmelt 620</a>	A5.13	E Fe-5B	D8555	E 4-UM-60-ST
188	SMAW	Repair & M.	<a href="#">Hardmelt 638</a>	-	-	D8555	E 10-UM-60-GR
190	SMAW	Repair & M.	<a href="#">Hardmelt 643</a>	-	-	D8555	E 10-UM-65-GR
191	SMAW	Repair & M.	<a href="#">Hardmelt 645</a>	-	-	D8555	E 10-UM-65-GR
132	SMAW	Stainless	<a href="#">Hilchrome 2209</a>	A5.4	E 2209-17	1600	E 22 9 3 L R 22
122	SMAW	Stainless	<a href="#">Hilchrome 307R</a>	A5.4	E 307-16	1600	E 18 8 Mn R 12
181	SMAW	Repair & M.	<a href="#">Hilchrome 307R</a>	A5.4	E 307-16	1600	E 18 8 Mn R 12
126	SMAW	Stainless	<a href="#">Hilchrome 308R</a>	A5.4	E 308L-17	1600	E 19 9 L R 32
124	SMAW	Stainless	<a href="#">Hilchrome 309MoR</a>	A5.4	E 309MoL-17	1600	E 23 12 2 L R 32
123	SMAW	Stainless	<a href="#">Hilchrome 309R</a>	A5.4	E 309L-17	1600	E 23 12 L R 32
131	SMAW	Stainless	<a href="#">Hilchrome 310R</a>	A5.4	E 310-16	1600	E 25 20 R 12
125	SMAW	Stainless	<a href="#">Hilchrome 312R</a>	A5.4	E 312-17	1600	E 29 9 R 32
182	SMAW	Repair & M.	<a href="#">Hilchrome 312R</a>	A5.4	E 312-17	1600	E 29 9 R 32
128	SMAW	Stainless	<a href="#">Hilchrome 316R</a>	A5.4	E 316L-17	1600	E 19 12 3 L R 12
129	SMAW	Stainless	<a href="#">Hilchrome 316R-V</a>	A5.4	E 316L-17	1600	E 19 12 3 L R 12
130	SMAW	Stainless	<a href="#">Hilchrome 318R</a>	A5.4	E 318-17	1600	E 19 12 3 Nb R 32
127	SMAW	Stainless	<a href="#">Hilchrome 347R</a>	A5.4	E 347-17	1600	E 19 9 Nb R 32
133	SMAW	Stainless	<a href="#">Hilchrome 600</a>	A5.11	E NiCrFe-3	D1736	EL-NiCr15FeMn
183	SMAW	Repair & M.	<a href="#">Hilchrome 600</a>	A5.11	E NiCrFe-3	D1736	EL-NiCr15FeMn
184	SMAW	Repair & M.	<a href="#">Hilchrome 600S</a>	A5.11	E NiCrFe-3	-	-
134	SMAW	Stainless	<a href="#">Hilchrome 625</a>	A5.11	E NiCrMo-3	D1736	EL-NiCr20Mo9Nb
141	GMAW	Stainless	<a href="#">Hilchrome G2209</a>	A5.9	ER 2209	12072	G 22 9 3 L
205	SMAW	Repair & M.	<a href="#">Hilchrome G307</a>	A5.9	ER 307	12072	G 18 8 Mn
136	GMAW	Stainless	<a href="#">Hilchrome G307</a>	A5.9	ER 307	12072	G 18 8 Mn
139	GMAW	Stainless	<a href="#">Hilchrome G308L Si</a>	A5.9	ER 308LSi	12072	G 19 9 L Si
137	GMAW	Stainless	<a href="#">Hilchrome G309L Si</a>	A5.9	ER 309LSi	12072	G 23 12 L Si
206	SMAW	Repair & M.	<a href="#">Hilchrome G312</a>	A5.9	ER 312	12072	G 29 9
138	GMAW	Stainless	<a href="#">Hilchrome G312</a>	A5.9	ER 312	12072	G 29 9
140	GMAW	Stainless	<a href="#">Hilchrome G316L Si</a>	A5.9	ER 316LSi	12072	G 19 12 3 L Si
207	SMAW	Repair & M.	<a href="#">Hilchrome G600</a>	A5.14	ER NiCr-3	D1736	MSG-NiCr 20 Nb
142	GMAW	Stainless	<a href="#">Hilchrome G600</a>	A5.14	ER NiCr-3	D1736	MSG-NiCr20Nb
143	GMAW	Stainless	<a href="#">Hilchrome G625</a>	A5.14	ER NiCrMo-3	D1736	MSG-NiCr21Mo9Nb
168	SAW	Stainless	<a href="#">Hilchrome S2209</a>	A5.9	ER 2209	12072	S 22 9 3 L N
164	SAW	Stainless	<a href="#">Hilchrome S307</a>	A5.9	ER 307	12072	S 18 8 Mn
166	SAW	Stainless	<a href="#">Hilchrome S308L</a>	A5.9	ER 308L	12072	S 19 9 L
165	SAW	Stainless	<a href="#">Hilchrome S309L</a>	A5.9	ER 309L	12072	S 23 12 L
167	SAW	Stainless	<a href="#">Hilchrome S316L</a>	A5.9	ER 316L	12072	S 19 12 3 L
160	GTAW	Stainless	<a href="#">Hilchrome W2209</a>	A5.9	ER 2209	12072	W 22 9 3 L
151	GTAW	Stainless	<a href="#">Hilchrome W307</a>	A5.9	ER 307	12072	W 18 8 Mn

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219	GTAW	Repair & M.	<a href="#">Hilchrome W307</a>	A5.9	ER 307	12072	W 18 8 Mn
156	GTAW	Stainless	<a href="#">Hilchrome W308L Si</a>	A5.9	ER 308LSi	12072	W 19 9 L Si
152	GTAW	Stainless	<a href="#">Hilchrome W309L</a>	A5.9	ER 309L	12072	W 23 12 L
153	GTAW	Stainless	<a href="#">Hilchrome W309L Si</a>	A5.9	ER 309LSi	12072	W 23 12 L Si
154	GTAW	Stainless	<a href="#">Hilchrome W309L Mo</a>	A5.9	ER 309L Mo	12072	W 23 12 2 L Si
155	GTAW	Stainless	<a href="#">Hilchrome W312</a>	A5.9	ER 312	12072	W 29 9
220	GTAW	Repair & M.	<a href="#">Hilchrome W312</a>	A5.9	ER 312	12072	W 29 9
158	GTAW	Stainless	<a href="#">Hilchrome W316L Si</a>	A5.9	ER 316LSi	12072	W 19 12 3 L Si
159	GTAW	Stainless	<a href="#">Hilchrome W318 Si</a>	A5.9	ER 318Si	12072	W 19 12 3 Nb Si
157	GTAW	Stainless	<a href="#">Hilchrome W347 Si</a>	A5.9	ER 347Si	12072	W 19 9 Nb Si
161	GTAW	Stainless	<a href="#">Hilchrome W600</a>	A5.14	ER NiCr-3	D1736	WSG-NiCr20Nb
221	GTAW	Repair & M.	<a href="#">Hilchrome W600</a>	A5.14	ER NiCr-3	D1736	WSG NiCr 20 Nb
161	GTAW	Stainless	<a href="#">Hilchrome W625</a>	A5.14	ER NiCrMo-3	D1736	WSG-NiCr21Mo9Nb
294	-	Accessories	<a href="#">Hilcoflex cable</a>	-	-	-	-
60	SAW	Unalloyed	<a href="#">Hilcord 100</a>	A5.18	EC 1	756	S 0
42	FCAW	Unalloyed	<a href="#">Hilcord 2040</a>	A5.20	E 71T-GS	758	T 42 A Z N 2
43	FCAW	Unalloyed	<a href="#">Hilcord 2048</a>	A5.20	E 71T-8	758	T 42 2 Z N 1
38	FCAW	Unalloyed	<a href="#">Hilcord 40</a>	A5.20	E 71T-1 E 71T-12 M	758	T 46 3 P M 1 H5
39	FCAW	Unalloyed	<a href="#">Hilcord 40C</a>	A5.20	E 71T-1	758	T 46 2 P C 1 H5
40	FCAW	Unalloyed	<a href="#">Hilcord 41</a>	A5.20	E 71T-1 M	758	T 42 2 P M 1 H5
41	FCAW	Unalloyed	<a href="#">Hilcord 41C</a>	A5.20	E 71T-1	758	T 42 2 P C 1 H5
88	FCAW	Low alloyed	<a href="#">Hilcord 43</a>	A5.29	E 81T-1 Ni1	758	T 50 5 1Ni P M 1 H5
89	FCAW	Low alloyed	<a href="#">Hilcord 44</a>	A5.29	E 81T-1 Ni1	758	T 50 5 1Ni P M 1 H5
46	FCAW	Unalloyed	<a href="#">Hilcord 50</a>	A5.18	E 70C-6 M	758	T 42 2 M M 2 H5
44	FCAW	Unalloyed	<a href="#">Hilcord 51</a>	A5.20	E 70T-5 E 70T-5 M	758	T 42 4 B C 3 H5 T 42 4 B M 3 H5
212	FCAW	Repair & M.	<a href="#">Hilcord 51</a>	A5.20	E 70T-5 E 70T-5 M	758	T 42 4 B C 3 H5 T 42 4 B M 3 H5
45	FCAW	Unalloyed	<a href="#">Hilcord 51.71</a>	A5.20	E 71T-5 E 71T-5 M	758	T 42 4 B C 1 H5 T 42 5 B M 1 H5
47	FCAW	Unalloyed	<a href="#">Hilcord 52</a>	A5.18	E 70C-6 M	758	T 46 2 M M 1 H5
48	FCAW	Unalloyed	<a href="#">Hilcord 54</a>	A5.18	E 70C-6 M	758	T 46 4 M M 1 H5
84	FCAW	Low alloyed	<a href="#">Hilcord 59M</a>	A5.28	E 110C-G	12535	T 69 4 Mn2NiCrMo MM 2
215	FCAW	Repair & M.	<a href="#">Hilcord 600</a>	-	-	D8555	MF 6-60
85	FCAW	Low alloyed	<a href="#">Hilcord 60M</a>	A5.28	E 80C-G	758	T 46 2 Mo M M 2 H5
85	FCAW	Low alloyed	<a href="#">Hilcord 60M</a>	A5.28	E 80C-G	12071	T Mo M M 2 H5
213	FCAW	Repair & M.	<a href="#">Hilcord 61M</a>	A5.28	E 80C-G	12071	T CrMo 1 M M 2 H5
86	FCAW	Low alloyed	<a href="#">Hilcord 61M</a>	A5.28	E 80C-G	12071	T CrMo 1 M M 2 H5
87	FCAW	Low alloyed	<a href="#">Hilcord 62M</a>	A5.28	E 90C-G	12071	T CrMo 2 M M 2 H5
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22	E 308LT 1-4	12073	T 19 9 LPM 1
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22	E 308LT 0-4	12073	T 19 9 LRM 3
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22	E 308LT 1-1	12073	T 19 9 LPC 1
148	FCAW	Stainless	<a href="#">Hilcord 81</a>	A5.22	E 308LT 0-1	12073	T 19 9 LRC 3
145	FCAW	Stainless	<a href="#">Hilcord 82</a>	A5.22	E 307T0-G	12073	T 18 8 Mn R M 3
214	FCAW	Repair & M.	<a href="#">Hilcord 82</a>	A5.22	E 307T0-G	12073	T 18 8 Mn R M 3
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22	E 316LT 1-4	12073	T 19 12 3 LPM 1
149	FCAW	Stainless	<a href="#">Hilcord 83</a>	A5.22	E 316LT 0-4	12073	T 19 12 3 LRM 3

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149	FCAW	Stainless	Hilcord 83	A5.22	E 316LT 1-1	12073	T 19 12 3 LPC 1
149	FCAW	Stainless	Hilcord 83	A5.22	E 316LT 0-1	12073	T 19 12 3 LRC 3
150	FCAW	Stainless	Hilcord 83LT-1	A5.22	E 316LT 1-4	12073	T 19 12 3 LPM 1
150	FCAW	Stainless	Hilcord 83LT-1	A5.22	E 316LT 1-1	12073	T 19 12 3 LPC 1
146	FCAW	Stainless	Hilcord 85	A5.22	E 309LT 1-4	12073	T 23 12 LPM 1
146	FCAW	Stainless	Hilcord 85	A5.22	E 309LT 0-4	12073	T 23 12 LRM 3
146	FCAW	Stainless	Hilcord 85	A5.22	E 309LT 1-1	12073	T 23 12 LPC 1
146	FCAW	Stainless	Hilcord 85	A5.22	E 309LT 0-1	12073	T 23 12 LRC 3
147	FCAW	Stainless	Hilcord 85Mo	A5.22	E 309MoLT 1-4	12073	T 23 12 2 LPM 1
147	FCAW	Stainless	Hilcord 85Mo	A5.22	E 309MoLT 0-4	12073	T 23 12 2 LRM 3
147	FCAW	Stainless	Hilcord 85Mo	A5.22	E 309MoLT 1-1	12073	T 23 12 2 LPC 1
147	FCAW	Stainless	Hilcord 85Mo	A5.22	E 309MoLT 0-1	12073	T 23 12 2 LRC 3
83	FCAW	Low alloyed	Hilcord Cor-Ten	A5.29	E 70T5-G	758	T 42 4 1 Ni B H5
196	SMAW	Repair & M.	Hilcostel 12E	A5.13	E CoCr-B	D8555	E 20-UM-50-CSTZ
223	GTAW	Repair & M.	Hilcostel 12T	A5.13	R CoCr-B	D8555	WSG 20-GO-50-CSTZ
223	Gas welding	Repair & M.	Hilcostel 12T	A5.13	R CoCr-B	D8555	G 20-GO-50-CSTZ
195	SMAW	Repair & M.	Hilcostel 6E	A5.13	E CoCr-A	D8555	E 20-UM-40-CTZ
222	GTAW	Repair & M.	Hilcostel 6T	A5.13	R CoCr-A	D8555	WSG 20-GO-40-CTZ
222	Gas welding	Repair & M.	Hilcostel 6T	A5.13	R CoCr-A	D8555	G 20-GO-40-CTZ
169	SAW	Stainless	HW 100	-	-	760	S A AB 2 78 9Cr AC
232	SAW	Repair & M.	HW 100	-	-	760	S A AB 2 78 9Cr AC
170	SAW	Stainless	HW 120	-	-	760	S A FB 2 53 AC
61	SAW	Unalloyed	HW 150	-	-	760	S F MS 1 67 AC
62	SAW	Unalloyed	HW 155	-	-	760	S F MS 1 67 AC
66	SAW	Unalloyed	HW 400	-	-	760	S A AR 3 CrMo AC
233	SAW	Repair & M.	HW 400	-	-	760	S A AR 3 CrMo AC
63	SAW	Unalloyed	HW 430	-	-	760	S A AR 1 87 AC
231	SAW	Repair & M.	HW 430	-	-	760	S A AR 1 87 AC
64	SAW	Unalloyed	HW 450	-	-	760	S A MS 1 99 AC
65	SAW	Unalloyed	HW 530	-	-	760	S A AB 1 67 AC H5
111	SAW	Low alloyed	HW 530	-	-	760	S A AB 1 67 AC H5
112,113	SAW	Low alloyed	HW 580	-	-	760	S A FB 1 55 AC H5
36	GMAW	Unalloyed	K 60	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 46 2 M G3 Si 1
77	GMAW	Low alloyed	K 80	A5.28	ER 110S-G	-	-
91	GTAW	Low alloyed	K 80 (TIG)	A5.28	ER 110S-G	-	-
281	Gas welding	Non ferrous	L-Ag 20	-	-	1044	AG 206
281	Gas welding	Non ferrous	L-Ag 20 Cd	-	-	1044	AG 309
281	Gas welding	Non ferrous	L-Ag 25	-	-	1044	AG 205
281	Gas welding	Non ferrous	L-Ag 25 Sn	A5.8	B Ag-37	1044	AG 108
281	Gas welding	Non ferrous	L-Ag 30	A5.8	B Ag-20	1044	AG 204
285	Gas welding	Non ferrous	L-Ag 30 Cd	A5.8	B Ag-2a	1044	AG 306
281	Gas welding	Non ferrous	L-Ag 34 Cd	A5.8	B Ag-2	1044	AG 305
286	Gas welding	Non ferrous	L-Ag 34 Sn	A5.8	B Ag-35	1044	AG 106
289	Gas welding	Non ferrous	L-Ag 38 Sn	A5.8	B Ag34	1044	AG 105
287	Gas welding	Non ferrous	L-Ag 40 Cd	-	-	1044	AG 304
281	Gas welding	Non ferrous	L-Ag 44	A5.8	B Ag-5	1044	AG 203
281	Gas welding	Non ferrous	L-Ag 45 Cd	A5.8	B Ag-1	1044	AG 302
288	Gas welding	Non ferrous	L-Ag 45 Sn	A5.8	B Ag-36	1044	AG 104

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289	Gas welding	Non ferrous	L-Ag 50 Cd	A5.8	B Ag-1a	1044	AG 301
290	Gas welding	Non ferrous	L-Ag 55 Sn	A5.8	B Ag-7	1044	AG 103
281	Gas welding	Non ferrous	L-Ag 60	-	-	1044	AG 202
281	Gas welding	Non ferrous	L-Ag 64	A5.8	B Ag-9	1044	AG 201
284	Gas welding	Non ferrous	L-Ag15 P	A5.8	B CuP-5	1044	CP 102
282	Gas welding	Non ferrous	L-Ag2 P	A5.8	B CuP-6	1044	CP 105
283	Gas welding	Non ferrous	L-Ag5 P	A5.8	B CuP-3	1044	CP 104
192	SMAW	Repair & M.	Manganil	A5.13	E FeMn-B	D8555	E 7-UM-200-KP
194	SMAW	Repair & M.	Nickel Iron	A5.15	E Ni Fe-Cl	D8573	E Ni Fe BG 22
135	SMAW	Stainless	NiCu7	A5.11	E NiCu-7	D1736	EL-NiCu30Mn
19	SMAW	Unalloyed	Performa	A5.1	E 6013	499	E 42 0 RC 11
177	SMAW	Repair & M.	Performa	A5.1	E 6013	499	E 42 0 RC 11
278	Gas welding	Non ferrous	Phosphorbr. 92-8	A5.8	B CuP-2	1044	CP 202
230	Gas welding	Repair & M.	Phosphorbr. 93-7	A5.8	B CuP-2	1044	CP 202
279	Gas welding	Non ferrous	Phosphorbr. 93-7	A5.8	B CuP-2	1044	CP 202
280	Gas welding	Non ferrous	Phosphorbr. 94-6	A5.8	B CuP-2	1044	CP 202
18	SMAW	Unalloyed	Pipeweld 6010	A5.1	E 6010	499	E 38 3 C 21
31	SMAW	Unalloyed	Pipeweld 6010	A5.1	E 6010	499	E 38 3 C 21
32	SMAW	Unalloyed	Pipeweld 8010	A5.5	E 8010-P1	499	E 46 3 C 25
193	SMAW	Repair & M.	Pure Nickel	A5.15	E Ni-Cl	D8573	E Ni BG 22
16	SMAW	Unalloyed	Red	A5.1	E 6013	499	E 42 0 RC 11
15	SMAW	Unalloyed	Red Extra	A5.1	E 6013	499	E 42 0 RC 11
176	SMAW	Repair & M.	Red Extra	A5.1	E 6013	499	E 42 0 RC 11
26	SMAW	Unalloyed	Regina 140	A5.1	E 7024	499	E 42 0 RR 53
27	SMAW	Unalloyed	Regina 150	A5.1	E 7024-1	499	E 42 2 RA 53
28	SMAW	Unalloyed	Regina 160	A5.1	E 7024	499	E 42 0 RR 53
30	SMAW	Unalloyed	Regina 180	A5.1	E 7024	499	E 42 0 RR 73
33	GMAW	Unalloyed	SG 1	A5.18	ER 70S-3	440	G 42 2 M G2 Si 1
34	GMAW	Unalloyed	SG 1A Superflow	A5.18	ER 70S-2	440	G 42 2 M G2 Ti
35	GMAW	Unalloyed	SG 2	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 42 4 M G3 Si 1
203	GMAW	Repair & M.	SG 2	A5.18	ER 70S-6	440	G 42 2 C G3 Si 1 G 42 4 M G3 Si 1
37	GMAW	Unalloyed	SG 3	A5.18	ER 70S-6	440	G 46 2 C G4 Si 1 G 46 4 M G4 Si 1
76	GMAW	Low alloyed	SG Cor-Ten	A5.28	ER 80S-G	440	G 42 2 C G 0 G 46 2 M G 0
204	SMAW	Repair & M.	SG CrMo1	A5.28	ER 80S-B2	12070	G CrMo 1 Si
79	GMAW	Low alloyed	SG CrMo1	A5.28	ER 80S-B2	12070	G CrMo 1 Si
80	GMAW	Low alloyed	SG CrMo2	A5.28	ER 90S-B3	12070	G CrMo 2 Si
78	GMAW	Low alloyed	SG Mo	A5.28	ER 70S-A1	440	G 46 2 M G 2 Mo
78	GMAW	Low alloyed	SG Mo	A5.28	ER 70S-A1	12070	G MoSi
81	GMAW	Low alloyed	SG Ni1	A5.28	ER 80S-Ni1	440	G 46 6 M G3 Ni 1
82	GMAW	Low alloyed	SG Ni2,5	A5.28	ER 80S-Ni2	440	G 46 6 M G2 Ni 2
291	Gas welding	Non ferrous	Silver solder flux (F)	-	-	1045	FH 10
297	-	Accessories	Soapstone	-	-	-	-
189	SMAW	Repair & M.	Sugarhard	-	-	D8555	E 10-UM-60-GR
296	-	Accessories	Thermometer 314C	-	-	-	-
210	SMAW	Repair & M.	Tinbronze 94-6	A5.7	ER CuSn-A	D1733	MSG CuSn 6
265	GMAW	Non ferrous	Tinbronze 94-6	A5.7	ER CuSn-A	D1733	MSG-CuSn 6
270	GTAW	Non ferrous	Tinbronze 94-6 (TIG)	A5.7	ER CuSn-A	D1733	WSG-CuSn 6

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20	SMAW	Unalloyed	<a href="#">Velora</a>	A5.1	E 6013	499	E 42 0 RR 12
21	SMAW	Unalloyed	<a href="#">Velveta</a>	A5.1	E 6013	499	E 42 0 RR 32
292	GTAW	Accessories	<a href="#">W</a>	A5.12	EW P	-	-
163	GTAW	Stainless	<a href="#">W NiCuZ</a>	A5.14	ER NiCu-7	D1736	WSG-NiCu30MnTi
292	GTAW	Accessories	<a href="#">WC 20</a>	A5.12	EW Ce-2	-	-
292	GTAW	Accessories	<a href="#">WL 20</a>	A5.12	EW La-1	-	-
292	GTAW	Accessories	<a href="#">WS 2</a>	A5.12	EW G	-	-
292	GTAW	Accessories	<a href="#">WT 20</a>	A5.12	EW Th-2	-	-
292	GTAW	Accessories	<a href="#">WT 40</a>	-		-	-
292	GTAW	Accessories	<a href="#">WZ 8</a>	A5.12	EW Zr-1	-	-
291	Gas welding	Non ferrous	<a href="#">Y-flux</a>	-	-	1045	FH 10