KOBELCO

WELDING OF EUROPE

INTRODUCTION TO FLUX CORED WIRE

FAMILIARC™

TRUSTARC™

PREMIARC™

KOBELCO WELDING OF EUROPE

Contents

Corporate profile

The Kobe Steel Group operates in a wide range of fields that provide the very foundation of society, including both the materials sector (iron and steel, welding, aluminium and copper) and the machinery sector (industrial machinery, construction machinery, engineering, and the environmental business).
The Kobe Steel Group also engage in diverse operations such as electric power supply, real estate and electronic materials.

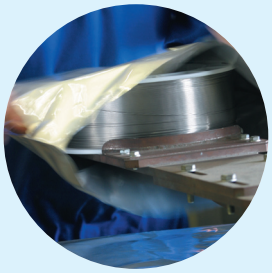
KOBELCO is the corporate logo mark and brand name of the Kobe Steel Group. Kobe Steel Group aims to maintain the reputation of "KOBELCO, as the one and only trustworthy brand" by supplying the same top quality products, irregardless of where in the world these are manufactured and enhancing our technical support infrastructure which makes it possible for all our customers to carry out their welding jobs confidently.

We will continually research and develop new products and welding processes to contribute and meet the needs of industry and society.

Our corporate goal is to gain recognition as being not only the leading manufacturer in Japan but also the leading welding products manufacturer in the world.


KOBELCO WELDING

KOBELCO WELDING OF EUROPE B.V.



Introduction

Kobelco Welding of Europe B.V. (KWE) is a modern manufacturer of Flux Cored Wire (FCW) which was established in 1994 under license from Kobe Steel,Ltd. Benefiting from Kobe Steel, Ltd.'s almost 80 years of expertise in welding consumables. Kobelco Welding of Europe B.V. has established itself as a leading producer and supplier of flux cored wire for stainless and carbon steel. The wide range of welding consumables covers almost the entire market for stainless and carbon steel.

To satisfy market demand for other welding consumables besides FCW, KWE provides a wide range of other consumables manufactured by Kobe Steel, Ltd.

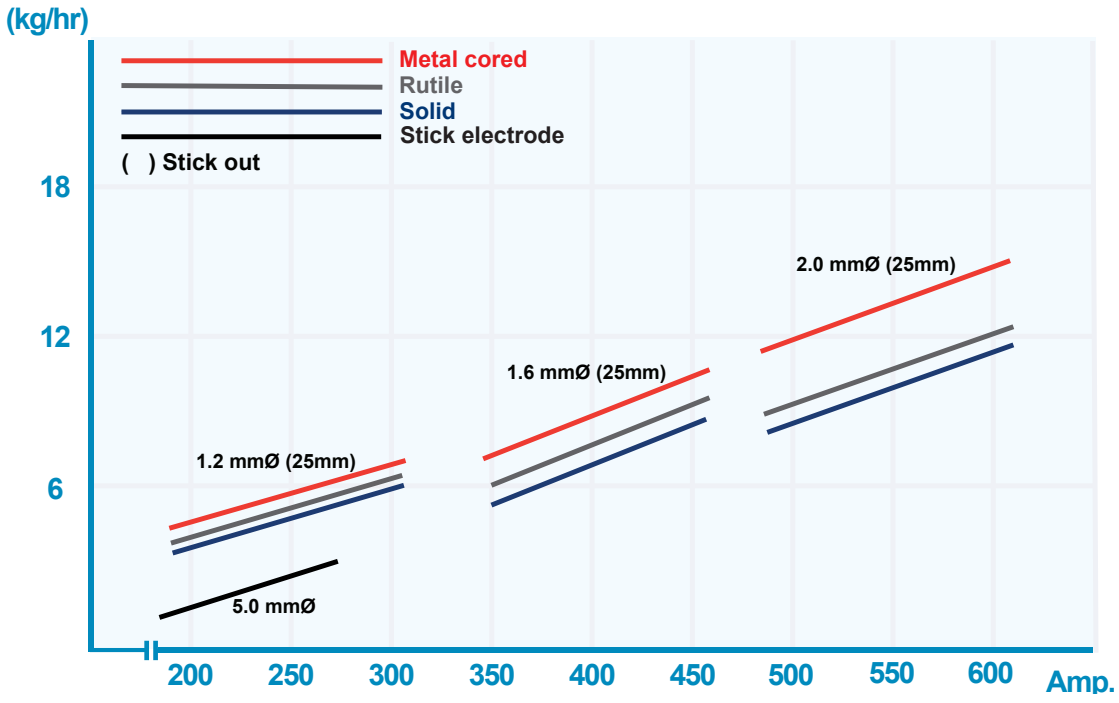
Kobelco welding consumables are used for welding operations all over the world. Industries such as shipbuilding, offshore, construction and many other industrial sectors rely on Kobelco welding consumables.

Introduction of Kobelco Flux Cored Wires

Metal fabricators face the increasingly difficult challenge of decreasing costs while improving product quality, productivity and the workers environment. In addition, high labour force turnover and lower skill levels are dictating a need for welding processes and consumables that are easy to use and require less operator training.
The consumption of flux cored wires (tubular wires) is increasing every year due to their excellent performance and the economical advantages of these wires. Requirements for an increased welded joint quality and productivity pave way for a wide application of flux cored wires.
The gas shielded Flux Cored Arc Welding (FCAW) process using Kobelco flux cored wire has the potential to meet current needs and is flexible enough to meet even more demanding requirements in the future. This is due to more than 30 years of research and development of flux cored wires.
Kobelco flux cored wires come in many different types in response to market requirements. Their main characteristics of superior operability, high deposition rate and excellent wire feeding are well known in the welding industry. They make a great contribution to the reduction of the total costs of welding and the improvement of the welder's working environment.

The important difference between welding with solid wire and tubular flux cored wire (FCW) is performance in productivity and weld metal integrity, particularly with respect to lack of fusion (penetration). The productivity (higher deposition rate) from FCW relies on the I^2R effect (resistance heating), which is much greater than with solid wire at a given current. With solid wire the total cross section carries all the current, but with metal cored wires a part amount of the current is carried by the core and, in the case of rutile FCW's, all of the current is conducted by the outer metal sheath (tube) to give the highest current density (A/mm^2).

High efficiency



Welding with Kobelco Flux Cored Wires

Before welding, the shielding gas to be applied, parameters and welding method must be determined.

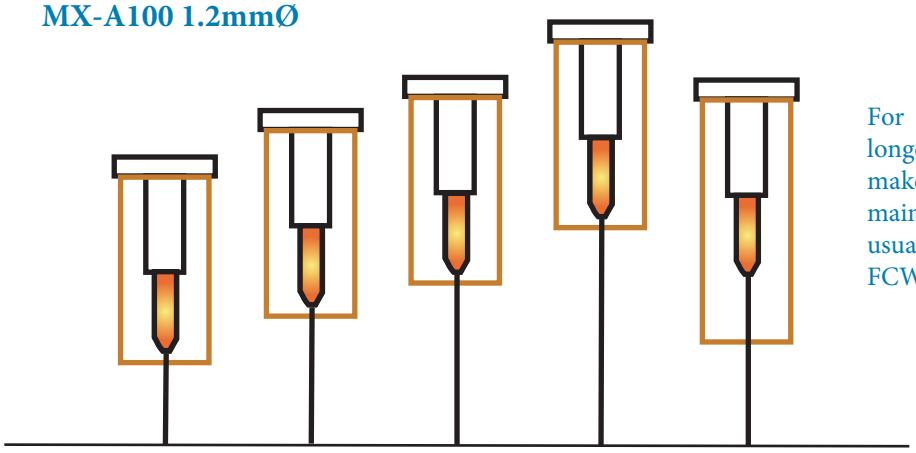
Shielding gases
The proper gas flow rate (20 - 25 litres/min) and gas composition is very important for the bead appearance, weldability and the mechanical properties of the weld metal.

Welding parameters
Welding current and voltage influence the arc stability, bead appearance, penetration, spatter, etc. A proper welding current depends on type and size of wire and welding position. Welding speed and stick-out should also be adjusted for optimum results.

Welding technique and torch angle
For welding stainless steel FCW, backhand welding achieves best results. Either backhand or forehand can be used with carbon steel FCW.

Importance of wire stick-out length
Wire stick-out describes the distance between the contact tip of the welding torch and the base material. For a given wire feed rate, lengthening of the wire stick out has the effect of reducing the amperage drawn from the power source.
Increasing the wire feed speed to compensate for the current (amperage) drop will result in a significant increase in weld metal deposition rate.
The higher deposition rate is due to the I^2R effect (resistance heating of the wire) as all of the current is conducted by the thin outer metal sheath (tube) to give a high current density (A/mm^2) in the FCW.

MX-A100 1.2mmØ



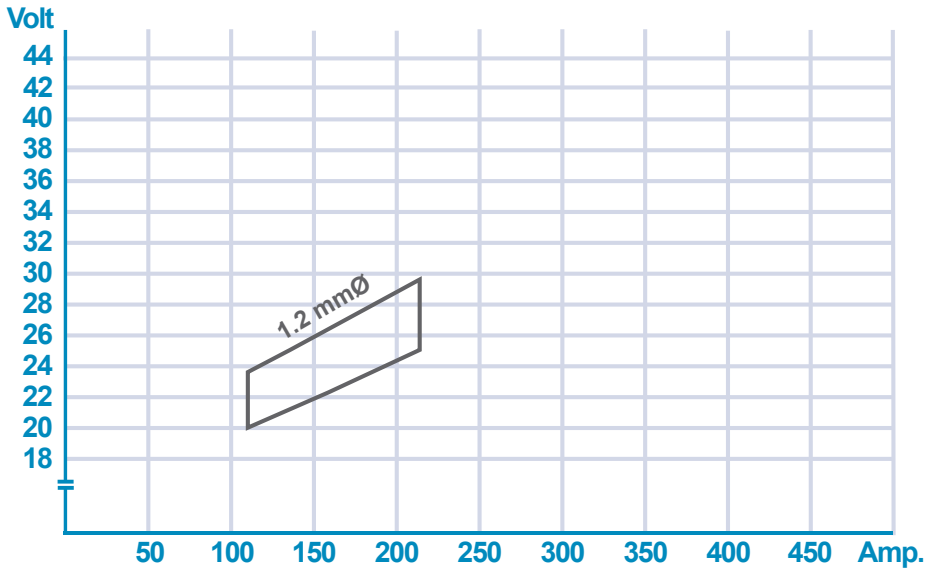
For non mechanised welding, a longer gas cup (gas shroud) can make it easier for the welder to maintain a long stick-out and it is usual to use a longer gas cup for FCW than with solid wire.

Wire Stick Out (mm)	12	18	25	30	25
Wire Feed (m/min)	8.5	8.5	8.5	8.5	12
Current (Amps)	300	260	230	220	300
Deposition (Kg/hr)	4	4	4	4	6

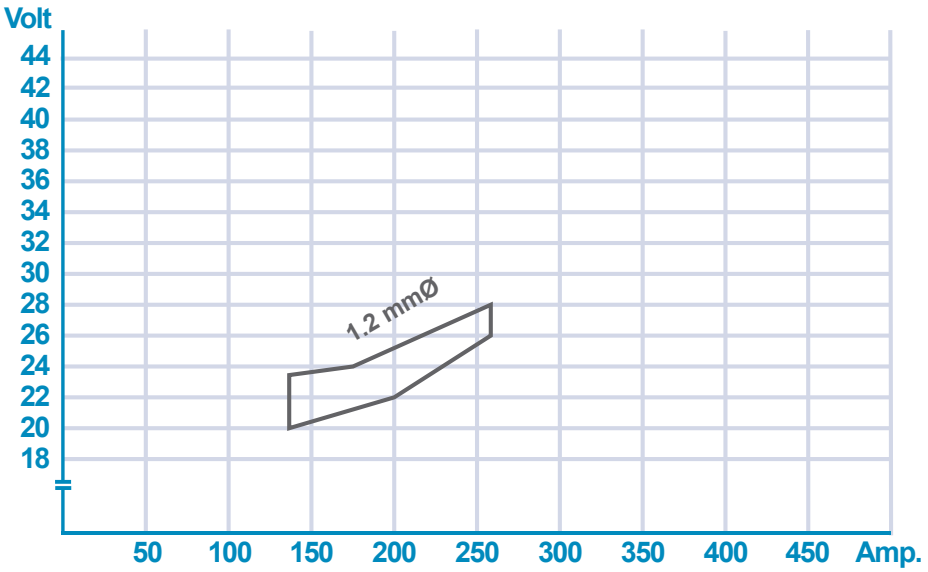
The table above shows that increasing stick-out length leads to a decrease in welding current. Due to constant wire feed speed, deposition rate remains the same. When the wire feed speed is increased to restore the original welding current, deposition rate increases substantially.

Example welding parameters for positional welding

- **Recommended Parameter Range, for vertical up position**

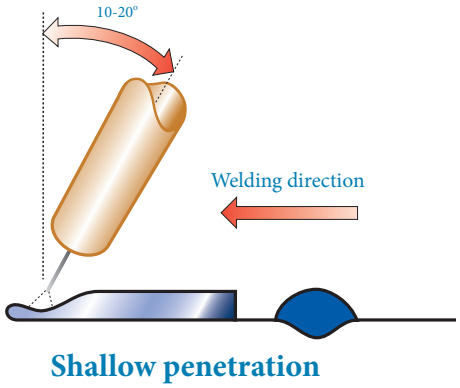


DW-316LP
80%Ar+20%CO_2



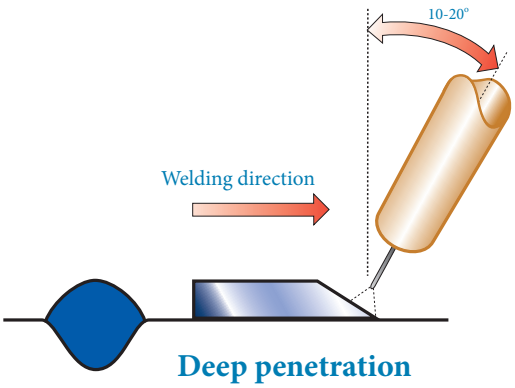
DW-50
100%CO_2

- **Forehand welding**



Shallow penetration

- **Backhand welding**



Deep penetration

Detailed Product Information

• Carbon Steel

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DW-588	Weather proof steel	35

• Stainless Steel and Nickel Alloy

FAMILIARC™ DW-50

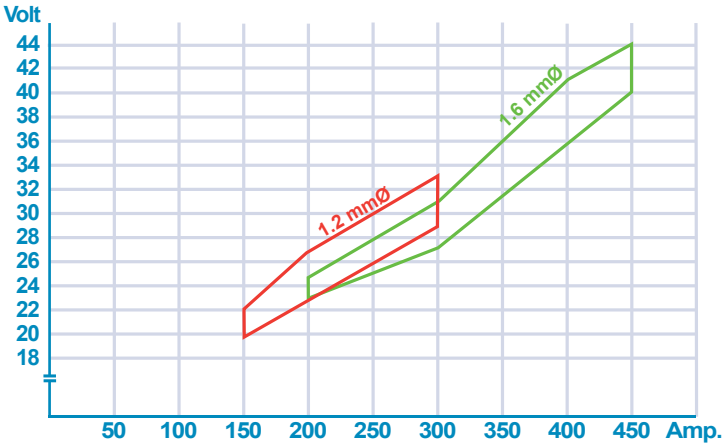
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17632-A-T 42 2 P C/M 1 H5
AWS A5.20 E71T-1C/1M,-9C/9M

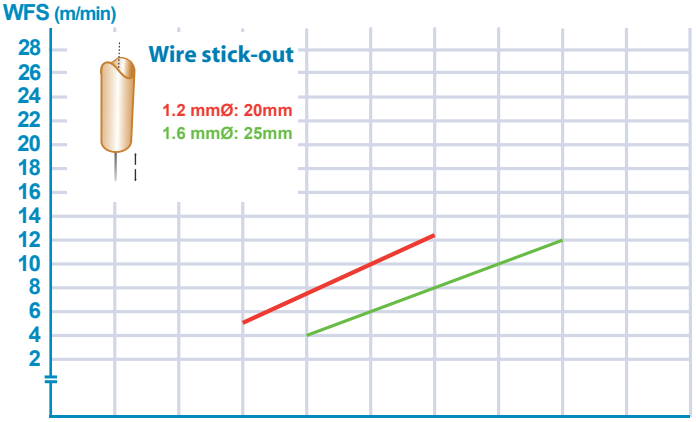
Description and Application

This rutile flux cored wire is very versatile due to its excellent welding characteristics. It is an all positional wire with negligible spatter loss, easy slag removal, soft stable arc, excellent bead profile and appearance, resulting in superb welder appeal.

FAMILIARC™ DW-50 is used for butt or fillet welding of mild and 490 MPa high tensile strength steels.
Due to its good mechanical properties combined with less than 5ml/100g hydrogen content in all weld metal (according to EN ISO), this wire is very well suited for constructional steel work, ship building, bridge construction, tank building, etc.

Recommended Parameter Range, for flat position*





* The above values and parameters are for all weld metal produced using 100%CO_2 shielding gas

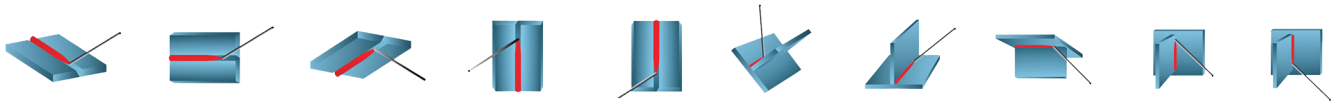
Typical Chemical Analysis (wt. %)

Shielding gas	C	Si	Mn	P	S	Ni	Cr	Mo
100%CO_2	0.04	0.67	1.29	0.011	0.008	-	-	-
80%Ar-20%CO_2	0.04	0.69	1.32	0.013	0.009	-	-	-

Typical Mechanical Properties

Shielding gas	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-20°C	CV(J)-30°C
100%CO_2	540	607	30	76	68
80%Ar-20%CO_2	567	626	29	121	89
Guarantee	min.420	500~640	min.20	min.47	min.27

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
3YS	IIIYMS	SA3YM	3YS	3SA,3YSA	3Y40MS	RRR,RINA,CWB

FAMILIARC™ DW-A50

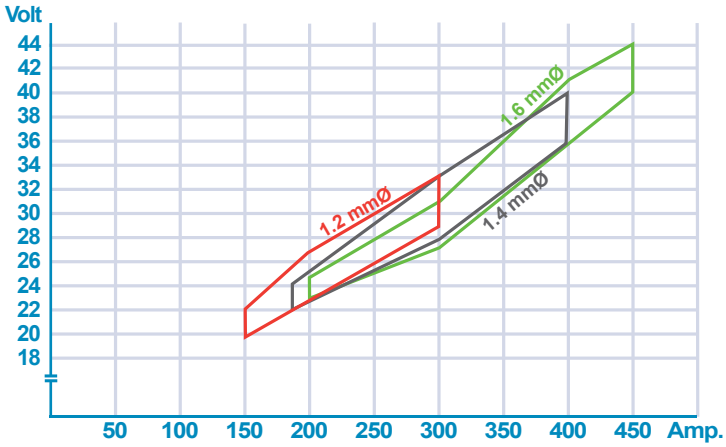
80%Ar - 20%CO_2
EN ISO 17632-A-T 42 2 P M 1 H5
AWS A5.20 E71T-1M

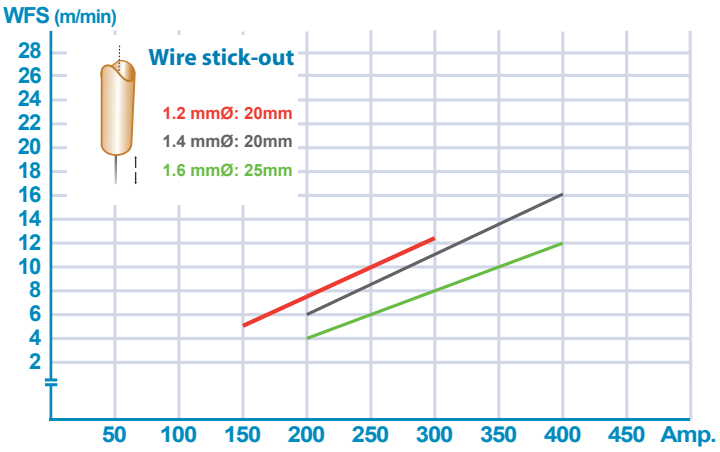
Description and Application

This rutile flux cored wire is very versatile due to its excellent welding characteristics. It is an all positional wire with negligible spatter loss, easy slag removal, soft stable arc, excellent bead profile and appearance, resulting in superb welder appeal.

FAMILIARC™ DW-A50 is used for butt or fillet welding of mild and 490 MPa high tensile strength steels.
Due to its good mechanical properties combined with less than 5ml/100g hydrogen content in all weld metal (according to EN ISO), this wire is very well suited for constructional steel work, ship building, bridge construction, tank building, etc.

Recommended Parameter Range, for flat position





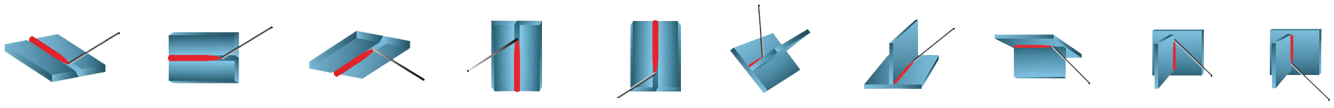
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.48	1.22	0.013	0.009	-	-	-

Typical Mechanical Properties

	R_e (MPa)	R_m (MPa)	A_5 (%)	CV(J)-20°C
	510	570	30	110
Guarantee	min.420	500~640	min.20	min.47

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
3YS	IIIYMS	SA3YM	3YS	3SA,3YSA	3Y40MS	TÜV, DB, RINA

FAMILIARC™ MX-A100

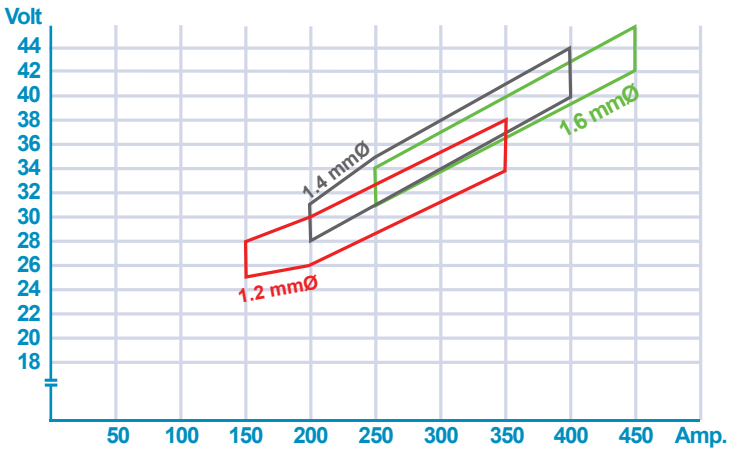
80%Ar - 20%CO_2
EN ISO 17632-A-T 42 4 M M 3 H5
AWS A5.18 E70C-6M

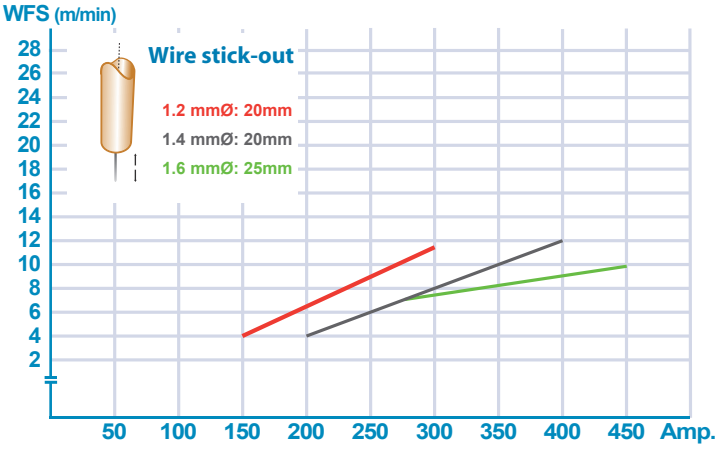
Description and Application

FAMILIARC™ MX-A100 has a high percentage of metal powders in its core which provide many advantages over solid wire, such as high recovery together with high deposition rate. The deposition rate is often as much as 20% or more than that of solid wires, due to superior weldability enabling the use of higher welding currents. This wire operates with a very stable smooth arc giving very little spatter and deep penetration. Slag removal between runs is not necessary because this wire produces almost no silicate slag.

Thanks to its good arc re-striking characteristics combined with excellent wire feeding properties, this wire is an ideal choice for robotic or other kinds of mechanized welding applications.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.63	1.58	0.017	0.011	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-30°C	CV(J)-40°C
	450	550	33	102	89
Guarantee	min.420	500~640	min.20	min.47	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
4YS	IVYMS	SA4YM	4YS	4YSA	4YMS	TÜV, DB, RINA

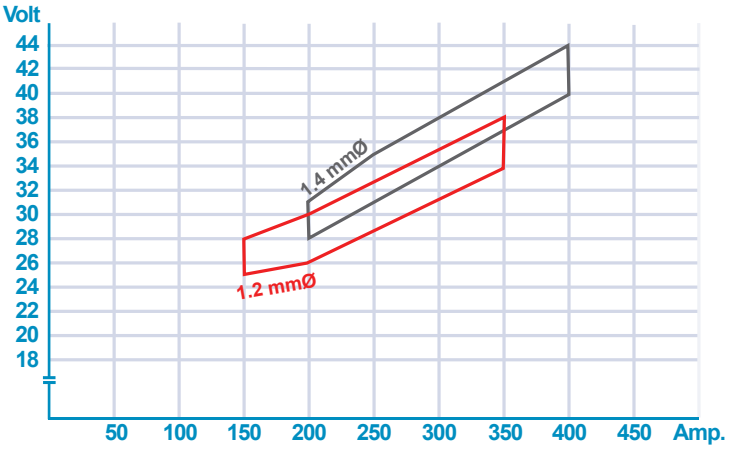
FAMILIARC™ MX-A70C6LF

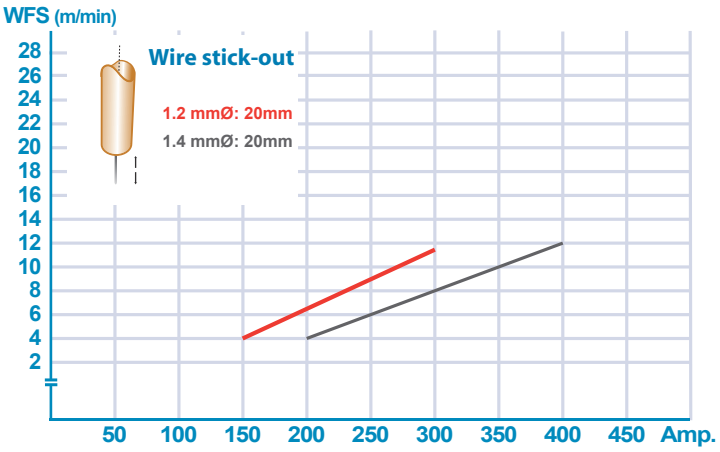
80%Ar - 20%CO_2
EN ISO 17632-A-T 42 3 M M 3 H5
AWS A5.18 E70C-6M

Description and Application

FAMILIARC™ MX-A70C6LF is a metal-cored wire for mild steel and 490MPa high tensile strength steel. This wire can be welded with less fume level in lower optimum voltage as well comparing with our conventional metal cored wire **FAMILIARC™ MX-A100**. That is the simple reason why this newly developed metal cored wire is named as "LF" which stands for "Low Fume".

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.03	0.85	1.70	0.008	0.010	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-30°C
	445	552	31	87
Guarantee	min.420	500~640	min.20	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	SA3YM	-	-	-	-

FAMILIARC™ MX-100T

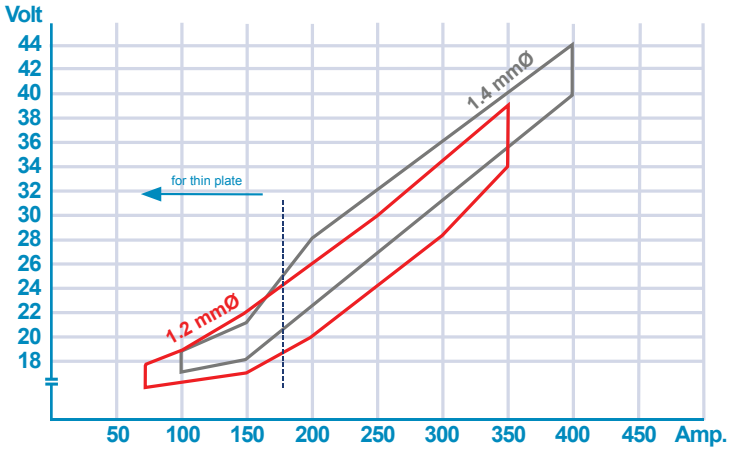
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17632-A-T 42 2 M C/M 1 H5
AWS A5.18 E70C-6C/6M

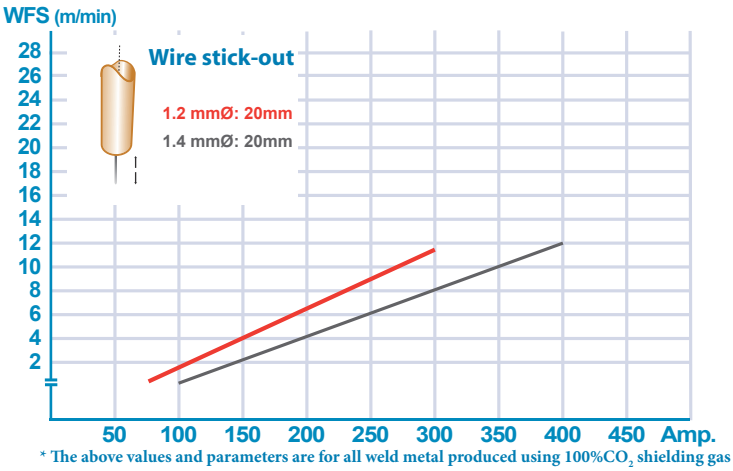
Description and Application

FAMILIARC™ MX-100T is an all positional metal cored wire. Thanks to its excellent arc re-striking characteristics combined with excellent wire feeding properties, this wire is very well suited for welding thin plates.

This wire is especially well suited for root passes without ceramic backing, for example in pipeline construction, which leads to significant increases in productivity when compared to the TIG or stick electrode process.

Recommended Parameter Range, for flat position*





* The above values and parameters are for all weld metal produced using 100%CO_2 shielding gas

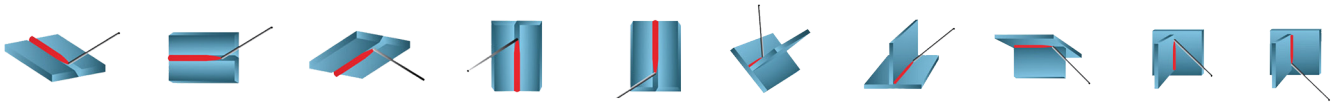
Typical Chemical Analysis (wt. %)

Shielding gas	C	Si	Mn	P	S	Ni	Cr	Mo
100%CO_2	0.08	0.49	1.53	0.013	0.015	-	-	-
80%Ar-20%CO_2	0.07	0.61	1.75	0.011	0.014	-	-	-

Typical Mechanical Properties

Shielding gas	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-20°C	CV(J)-30°C
100%CO_2	480	560	31	71	62
80%Ar-20%CO_2	500	605	28	73	65
Guarantee	min.420	500~640	min.20	min.47	min.27

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
3YS	IIIYMS	SA3YM	3YS	3SA,3YSA	3Y40MS	TÜV,DB

FAMILIARC™ MX-A55S

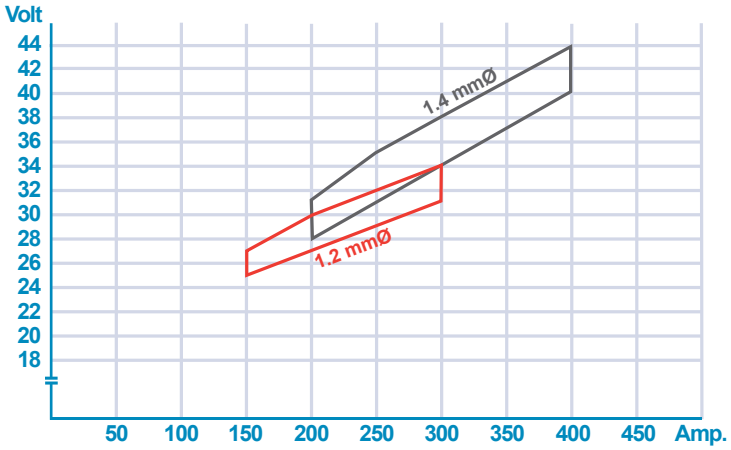
80%Ar - 20%CO_2
EN ISO 17632-A-T 46 4 M M 1 H5
AWS A5.18 E70C-6M

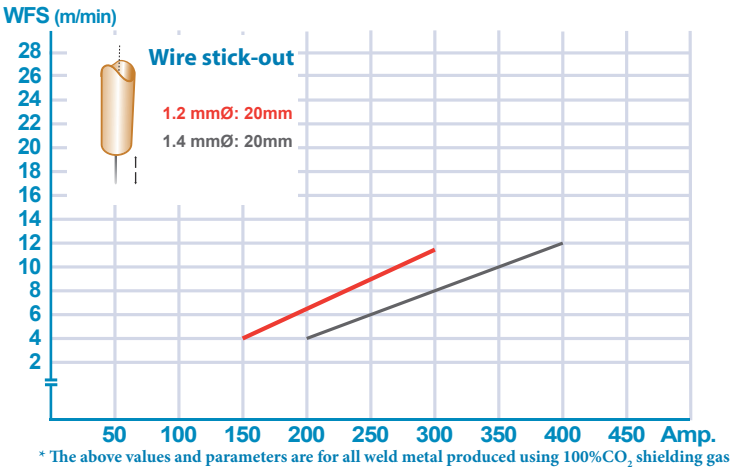
Description and Application

FAMILIARC™ MX-A55S is a metal cored wire that produces low hydrogen weld-metal with good mechanical properties. The ability of **FAMILIARC™ MX-A55S** to be welded with negative polarity (=/-) greatly widens its application range, especially for high speed vertical down welding.

This wire is very well suited for constructional steel work, ship building, bridge construction, tank building. etc.

Recommended Parameter Range, for flat position*





* The above values and parameters are for all weld metal produced using 100%CO_2 shielding gas

Typical Chemical Analysis (wt. %)

Polarity	C	Si	Mn	P	S	Ni	Cr	Mo
DC+	0.08	0.52	1.43	0.008	0.009	-	-	-
DC-	0.08	0.50	1.39	0.009	0.009	-	-	-

Typical Mechanical Properties

Polarity	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-30°C	CV(J)-40°C
DC+	510	600	30	122	110
DC-	523	604	29	130	116
Guarantee	min.460	530~680	min.20	min.47	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
4Y42	IVY42	-	4Y40S	-	-	TÜV,DB

FAMILIARC™ MX-A200

80%Ar - 20%CO_2
EN ISO 17632-A-T 42 2 R M 3 H5
AWS A5.20 E70T-1M

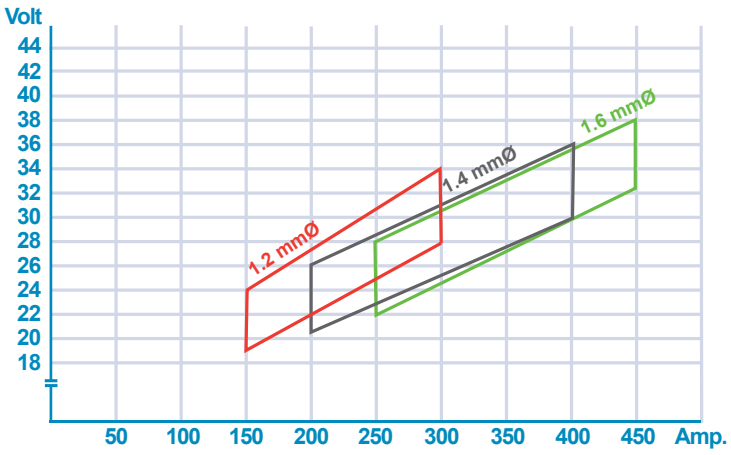
Description and Application

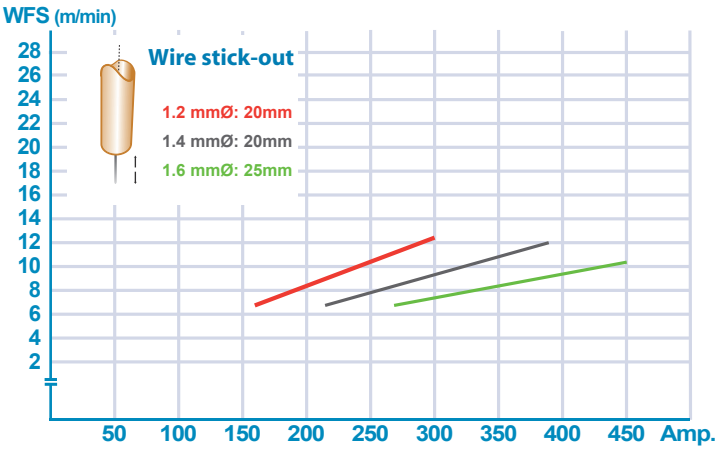
FAMILIARC™ MX-A200 is a metal type flux cored wire. This wire is designed for welding on plate coated with inorganic zinc primer or rusty plate and it has a high resistance to porosity.

FAMILIARC™ MX-A200 produces a clean and shiny weld bead which is totally free from any traces of silicate slag nornally associated with metal cored or solid wires.

Due to the absence of silicate slag, painting or other surface treatments can be easily performed after welding.

Recommended Parameter Range, for flat position





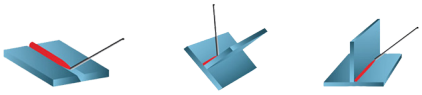
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.56	1.52	0.010	0.009	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)0°C	CV(J)-20°C
	520	590	29	93	67
Guarantee	min.420	500~640	min.20	min.47	min.47

Welding Positions



Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	3S,3YS	IIIYMS	-	-	3SA,3YSA	-	-

FAMILIARC™ MX-200E

100%CO_2
EN ISO 17632-A-T 42 3 R C 3 H5
AWS A5.20 E70T-9C

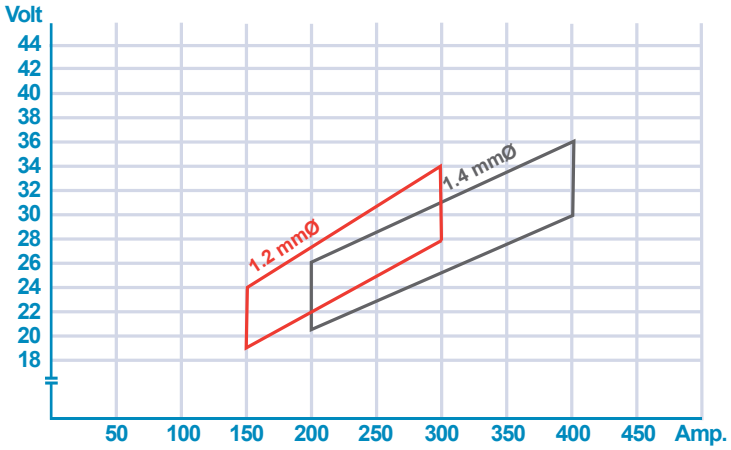
Description and Application

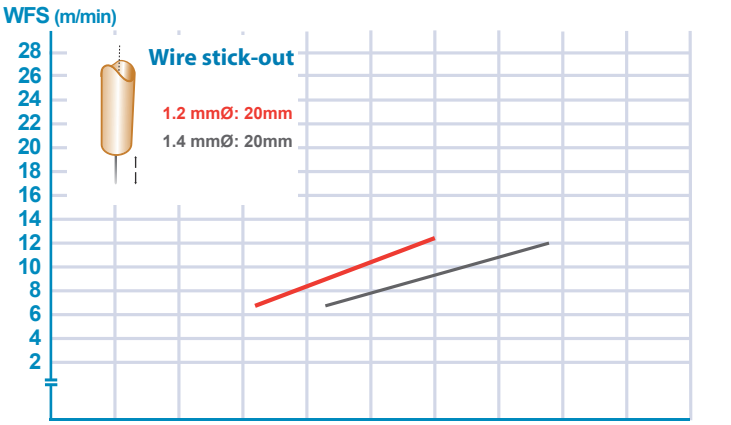
FAMILIARC™ MX-200E is a metal type flux cored wire. This special metal cored wire has been formulated for high speed fillet welding of plate coated with modern inorganic zinc primers, or plate contaminated with rust or mill scale.

FAMILIARC™ MX-200E produces a weld bead totally free from any traces of silicate slag normally associated with the welding of metal cored or solid wires.

This wire is an excellent choice for mechanised welding of horizontal fillets as it meets the requirements of superior wire feeding properties combined with high deposition efficiency and excellent resisistance to porosity.

Recommended Parameter Range, for flat position*





* The above values and parameters are for all weld metal produced using 100%CO_2 shielding gas

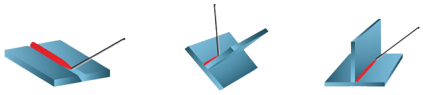
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.60	1.60	0.008	0.007	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-30°C
	540	600	29	100
Guarantee	min.420	500~640	min.20	min.47

Welding Positions



Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	4Y40S	IV40MS	SA4Y40M	4Y40S	4Y400SA	4Y40MS	P.R.S.

FAMILIARC™ DW-A51B

80%Ar - 20%CO_2
EN ISO 17632-A-T 42 2 B M 1 H5
AWS A5.20 E71T-5M-J

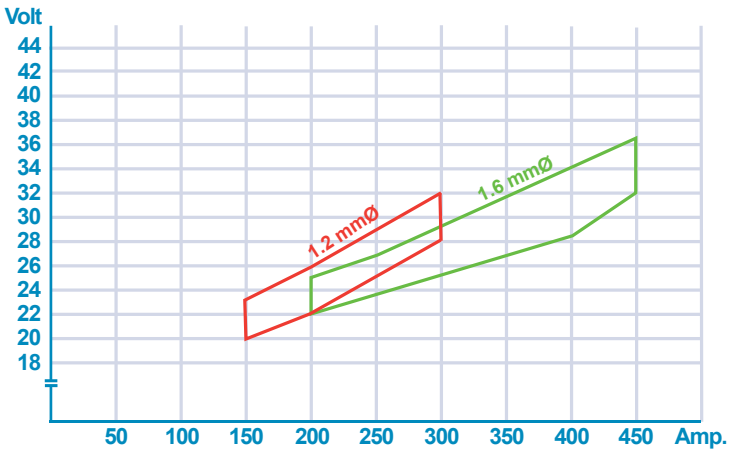
Description and Application

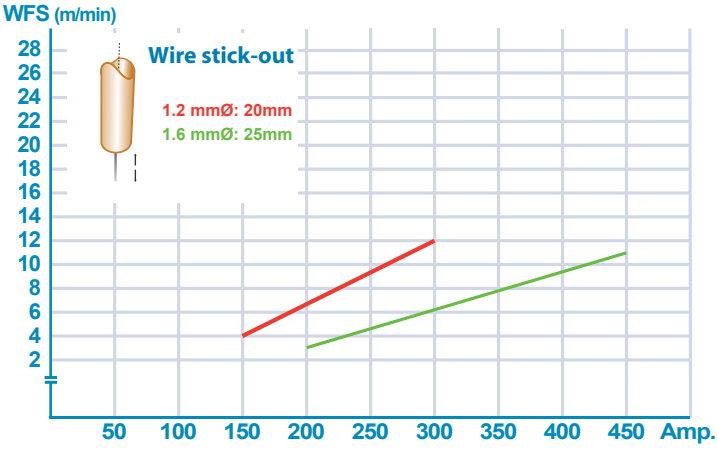
FAMILIARC™ DW-A51B is a fully basic FCW which produces very low hydrogen weld metal of excellent crack resistance.

This wire is particularly suitable for multipass welding of medium to heavy sections where conditions of high restraint exist and where extra low hydrogen levels are necessary.

FAMILIARC™ DW-A51B is also often applied in situations where an ideal joint fit-up can not be achieved, leading to an increased risk of cracking when applying other welding consumables, for example when welding root passes on ceramic backing.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

Polarity	C	Si	Mn	P	S	Ni	Cr	Mo
DC+	0.08	0.49	1.43	0.012	0.008	-	-	-
DC-	0.08	0.46	1.45	0.011	0.008	-	-	-

Typical Mechanical Properties

Polarity	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-20°C	CV(J)-40°C
DC+	490	569	29	130	108
DC-	473	560	31	139	127
Guarantee	min.420	500~640	min.20	min.47	min.27

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
3YS	IIIYMS	SA3YM	3YS	-	-	TÜV,DB

FAMILIARC™ DW-55E

100%CO_2
EN ISO 17632-A-T 42 4 P C 1 H5
AWS A5.20 E71T-9C-J

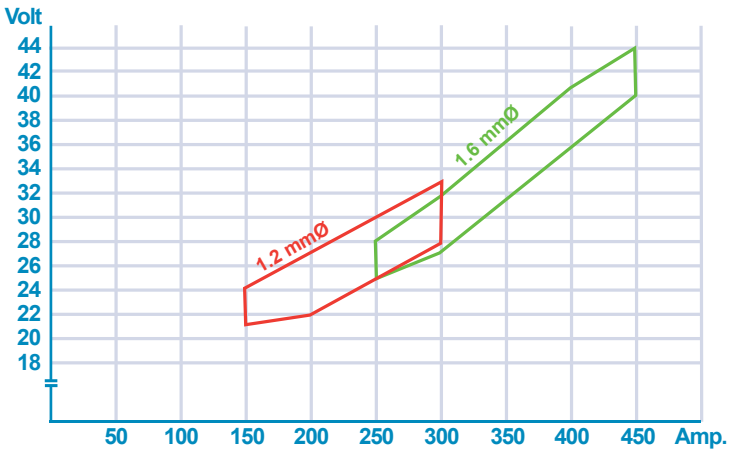
Description and Application

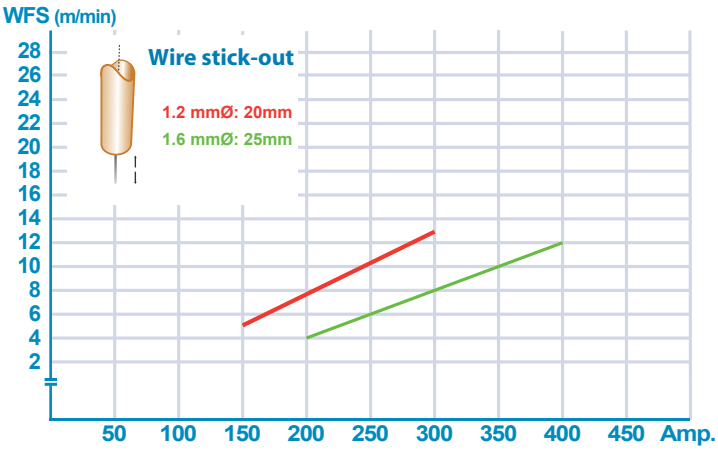
FAMILIARC™ DW-55E is a rutile flux cored wire that has been specially formulated to meet rigorous demands for low temperature service steels. It is applied particularly where really good thoughness is required down to -40°C.

The fast freezing slag promotes easy and very productive positional welding with slag removing easily to reveal a weld bead of smooth appearance.

This wire is used for butt or fillet welding of medium to heavy section carbon steels and is used widely in the shipbuilding and bridge construction industries.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.40	1.42	0.012	0.010	0.41	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C
	540	590	29	80
Guarantee	min.420	500~640	min.20	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	4Y40S	III YMS	SA3,SA3YM	3YS	3SA,3Y400SA	-	NK, CR

FAMILIARC™ DW-A55E

80%Ar - 20%CO_2
EN ISO 17632-A-T 42 4 P M 1 H5
AWS A5.20 E71T-9M-J

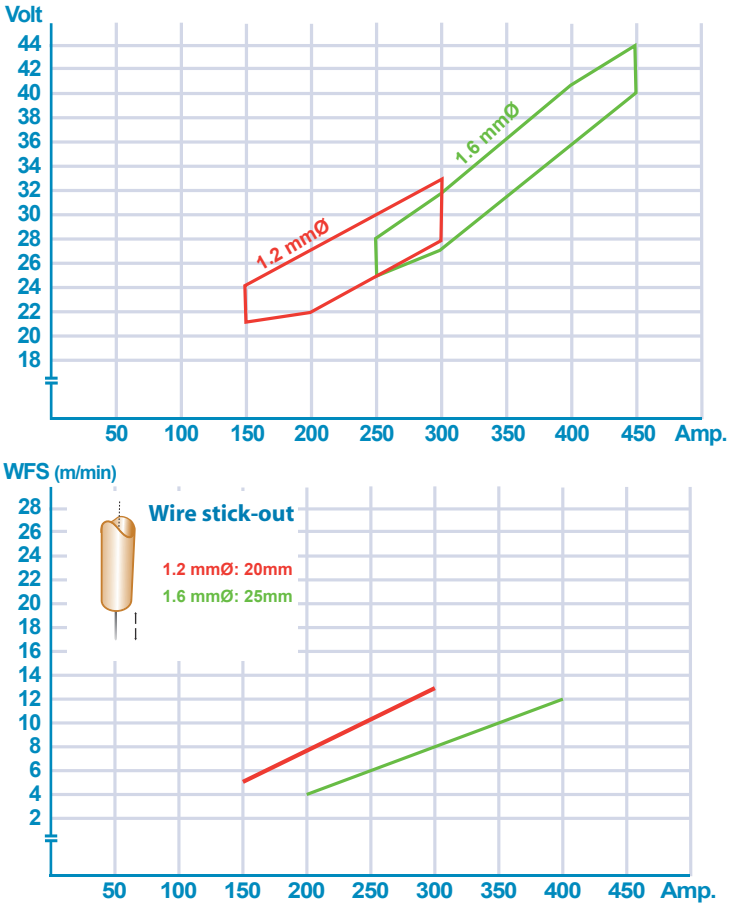
Description and Application

FAMILIARC™ DW-A55E is a rutile flux cored wire that was specially formulated to meet rigorous demands for low temperature service steels. This wire is applied particularly where really good thoughness is required down to -40°C.

The fast freezing slag promotes easy and very productive positional welding with slag removing easily to reveal a weld bead of smooth appearance.

This wire is used for the butt or fillet welding of medium to heavy section carbon steels and is used widely in the shipbuilding and bridge construction industries.

Recommended Parameter Range, for flat position



Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.54	1.31	0.013	0.009	0.34	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C
	540	600	28	100
Guarantee	min.420	500~640	min.20	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	4Y40S	IV YMS	SA4Y40M	4Y40S	4Y400SA	-	TÜV,DB,RINA

TRUSTARC™ DW-A81Ni1

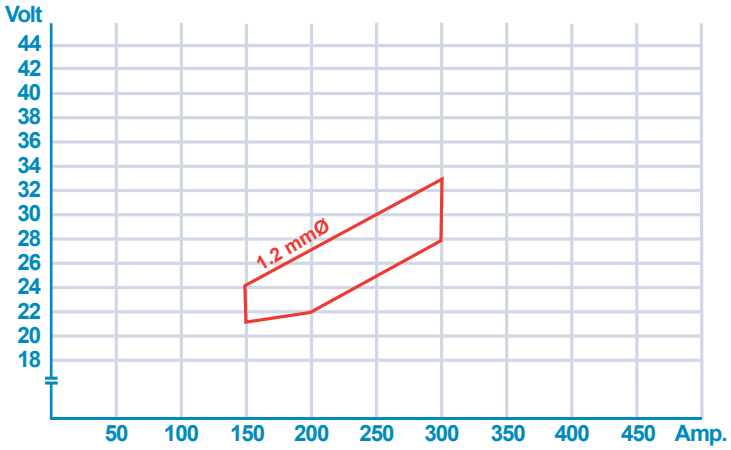
80%Ar - 20%CO_2
EN ISO 17632-A-T 46 6 1Ni P M 2 H5
AWS A5.29 E81T1-Ni1M-J

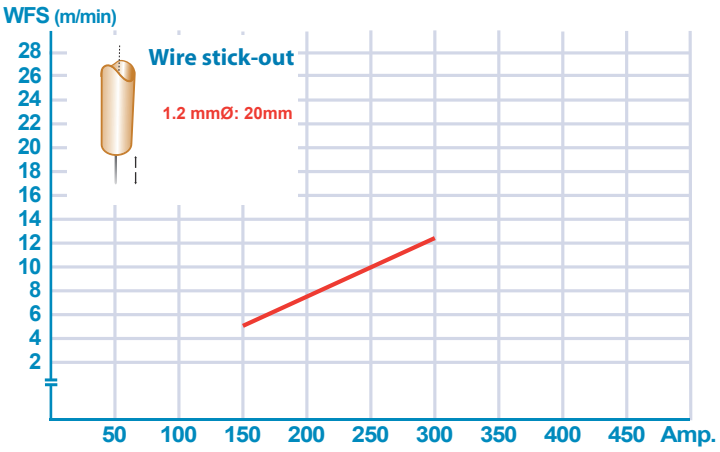
Description and Application

TRUSTARC™ DW-A81Ni1 is a rutile flux cored wire which has been specially formulated to meet the rigorous demands for low temperature service steels.

TRUSTARC™ DW-A81Ni1 fullfills NACE requirements for oil and gas production equipment in sour gas service and these properties make for a varied range of usages in pipeline construction, offshore applications and pressure vessels.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.32	1.26	0.006	0.006	0.95	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	517	582	29	142
Guarantee	min.460	530~680	min.20	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y42S	V Y42MS	-	-	5YQ420SA	-	-

TRUSTARC™ MX-A55Ni1

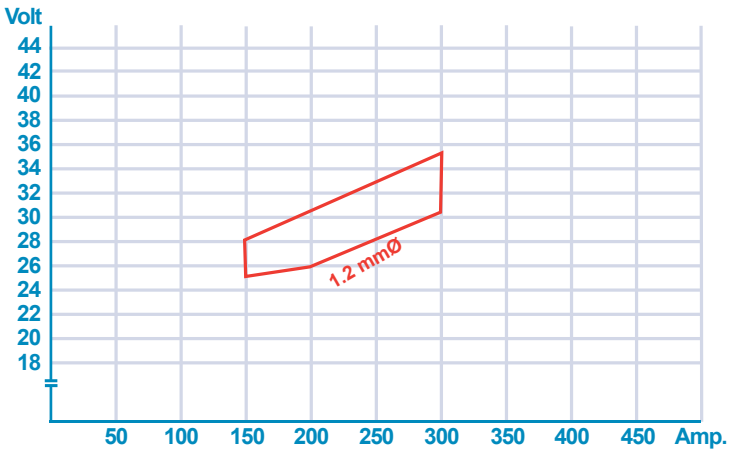
80%Ar - 20%CO_2
EN ISO 17632-A-T 46 6 Mn1Ni M M 3 H5
AWS A5.28 E80C-GM

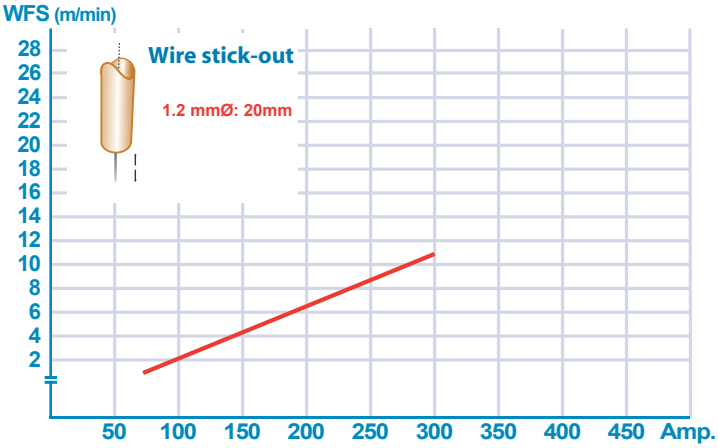
Description and Application

TRUSTARC™ MX-A55Ni1 is a metal cored wire, which has been specially formulated to meet the rigorous demands for low temperature service steels.

TRUSTARC™ MX-A55Ni1 fullfills the NACE requirements for oil and gas production equipment in sour gas service and these properties make for a varied range of usages in pipeline construction, offshore applications and pressure vessels.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.34	1.67	0.007	0.008	0.86	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	542	607	29	123
Guarantee	min.460	530~680	min.20	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

TRUSTARC™ DW-55L

100%CO_2
EN ISO 17632-A-T 46 6 1.5Ni P C 1 H5
AWS A5.29 E81T1-K2C

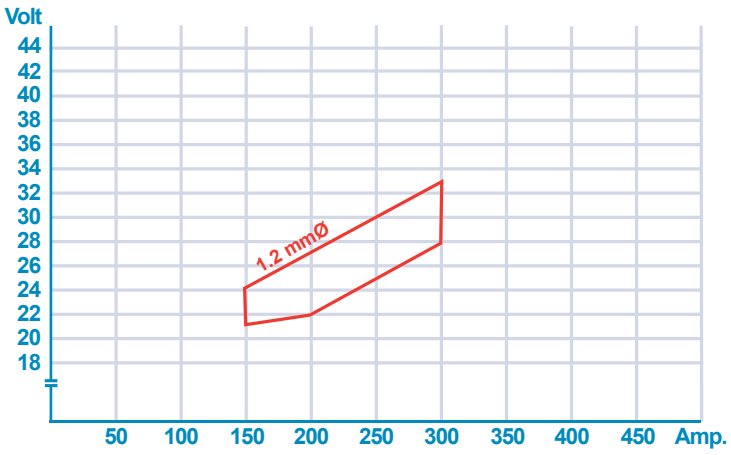
Description and Application

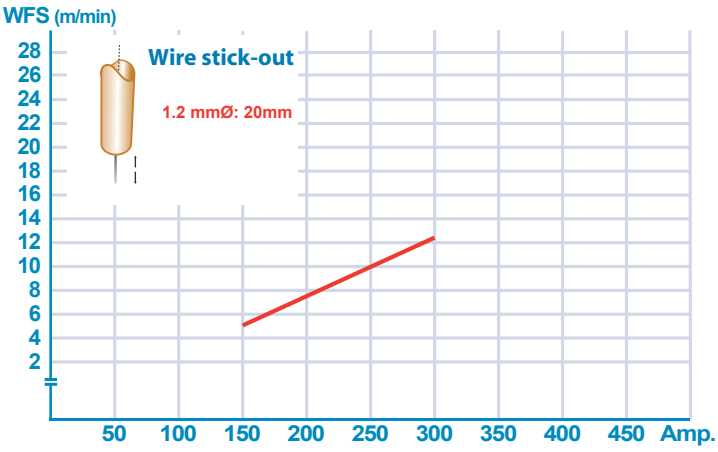
TRUSTARC™ DW-55L is a rutile flux cored wire that has been specially formulated to meet the rigorous demands for low temperature service as found in the offshore, shipbuilding and chemical industries.

This wire has excellent weld metal toughness down to -60°C and still exhibits superb welding characteristics such as a very smooth, but forceful, stable arc producing little spatter and a fast freezing self releasing slag.

This wire is widely applied to the welding of thin to heavy section carbon steels.

Recommended Parameter Range, for flat position





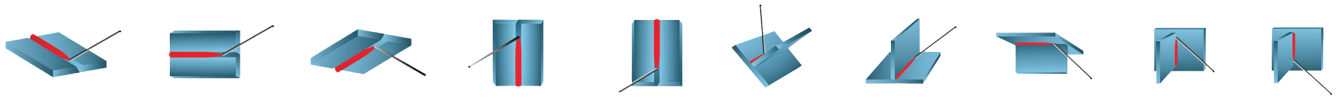
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.04	0.38	1.32	0.010	0.008	1.40	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	550	620	27	70
Guarantee	min.460	530~680	min.20	min.47

Welding Positions



Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y40S	V YMS NV2-4,4-4	SA5Y40M	6Y40H15S MG	3SA,4Y400SA, MG	-	NK.KR.CCS

TRUSTARC™ DW-A55L

80%Ar - 20%CO_2
EN ISO 17632-A-T 46 6 1.5Ni P M 1 H5
AWS A5.29 E81T1-K2M

Description and Application

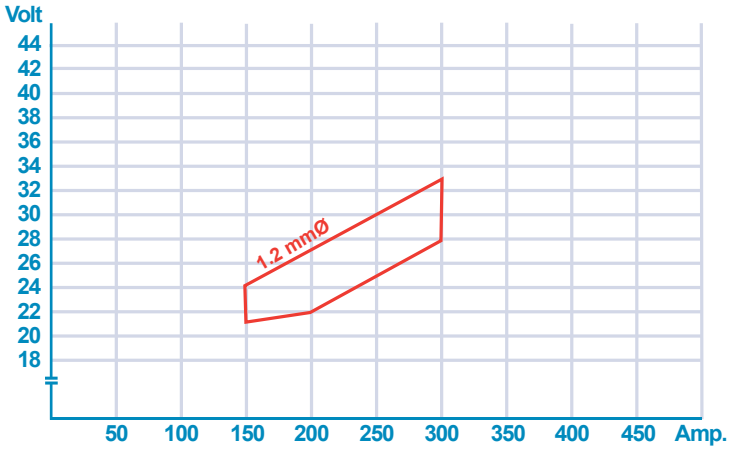
TRUSTARC™ DW-A55L is a rutile flux cored wire that has been specially formulated to meet the rigorous demands for low temperature service as found in the offshore, shipbuilding and chemical industries.

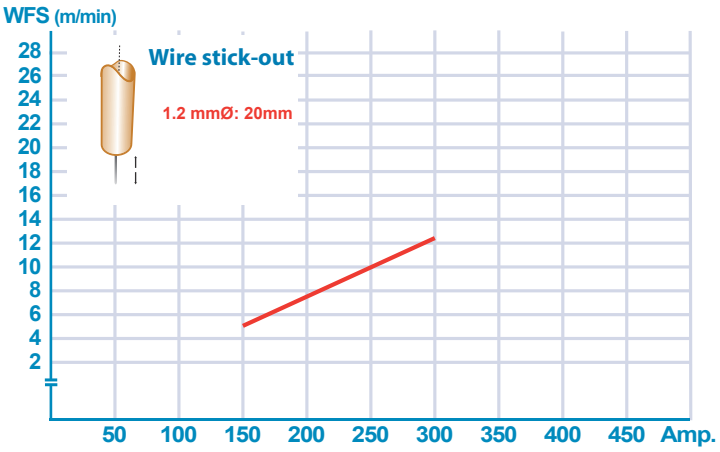
This wire has excellent weld metal toughness down to -60°C and still exhibits superb welding characteristics such as a very smooth, but forceful, stable arc producing little spatter and a fast freezing self releasing slag.

This wire is widely applied to the welding of thin to heavy section carbon steels.

Not only does this wire have excellent CTOD values at the standard -10°C test temperature, but is also has excellent CTOD values at the very severe test temperature of -40°C.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.06	0.30	1.15	0.009	0.007	1.41	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	558	626	27	94
Guarantee	min.460	530~680	min.20	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y46S	V Y46MS NV2-4,4-4	S5Y46	5Y46S	3SA,3YSA, MG	5Y46MS	RINA,TÜV

TRUSTARC™ MX-A55T

80%Ar - 20%CO_2
EN ISO 17632-A-T 46 6 1.5Ni M M 2 H5
AWS A5.28 E80C-G

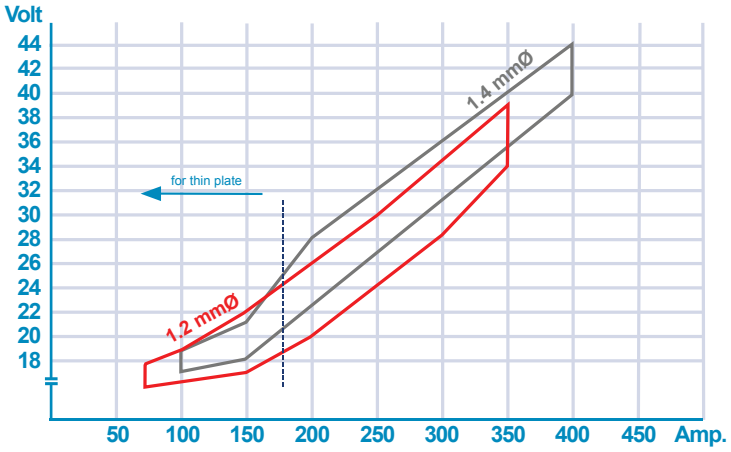
Description and Application

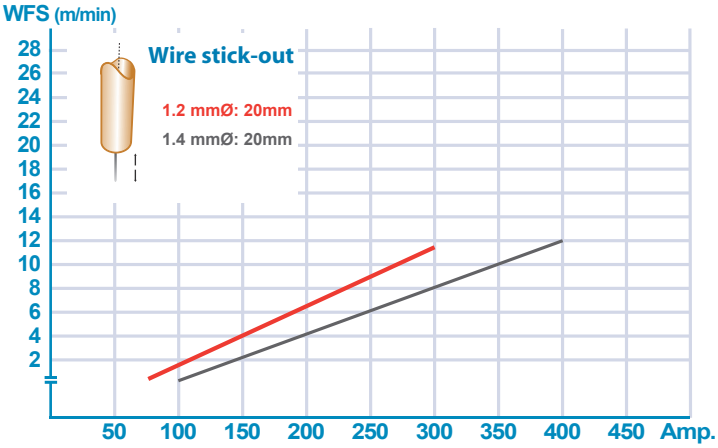
TRUSTARC™ MX-A55T is a metal cored wire which has been developed for use with mixed gas and is specially designed to give good low temperature toughness, thus making it suitable for low temperature applications where conventional metal cored wires may not prove suitable.

This wire is applied for horizontal and downhand welding of thick sections and also for root pass welding with short circuit transfer.

These properties result in a wire which is ideally suited to offshore fabrication and other applications where service temperatures down to -60°C are required.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.06	0.35	1.41	0.011	0.017	1.48	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C	CV(J)-60°C
	517	598	31	100	97
Guarantee	min.460	530~680	min.20	min.47	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y40S	V YMS	SA3YM HHH	-	-	-	-
		NV2-4,4-4	MG				

TRUSTARC™ DW-55LSR

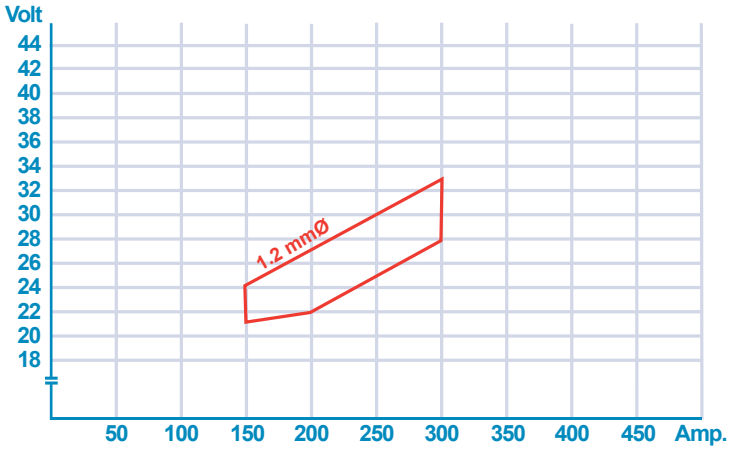
100%CO_2
EN ISO 17632-A-T 46 6 1.5Ni P C 1 H5
AWS A5.29 E81T1-K2C

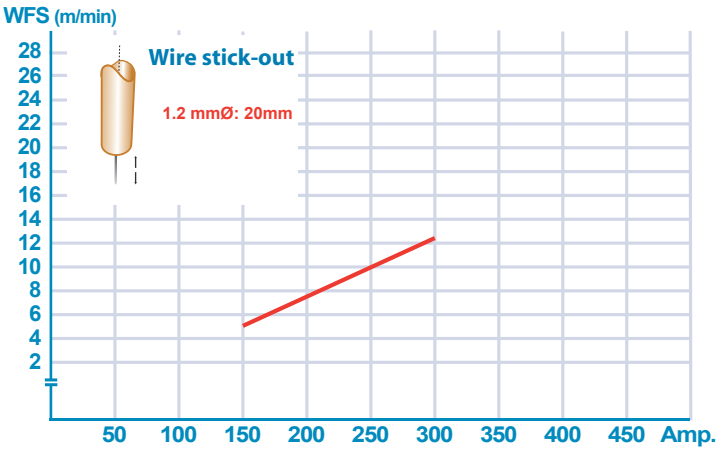
Description and Application

TRUSTARC™ DW-55LSR is a rutile flux cored wire whose weld metal tolerates post weld heat treatment (PWHT) without an adverse degradation of mechanical properties.

These properties make for a varied range of usages in pipeline construction and offshore applications.

Recommended Parameter Range, for flat position





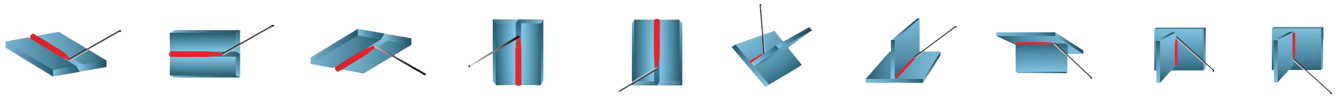
Typical Chemical Analysis (wt. %)

C	Si	Mn	P	S	Ni	Cr	Mo
0.06	0.26	1.15	0.008	0.007	1.51	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
As welded	480	565	33	115
620°C x 1 hr (SR)	440	530	34	100
Guarantee (as welded)	min.460	530~680	min.20	min.47

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
5Y42S, 5Y42srS,MG	V Y42MS, MG NV2-4L,4-4L	SA4Y40M	-	5YQ420SA 4Y400SA	-	NK

TRUSTARC™ DW-A55LSR

80%Ar - 20%CO_2
EN ISO 17632-A-T 46 6 Z P M 1 H5
AWS A5.29 E81T1-Ni1M

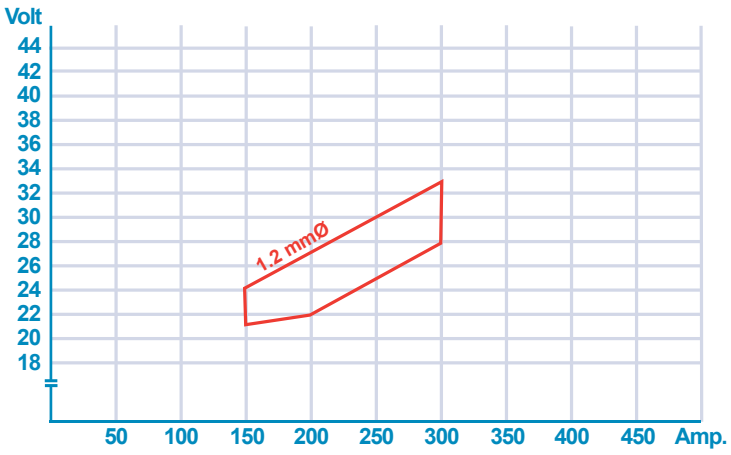
Description and Application

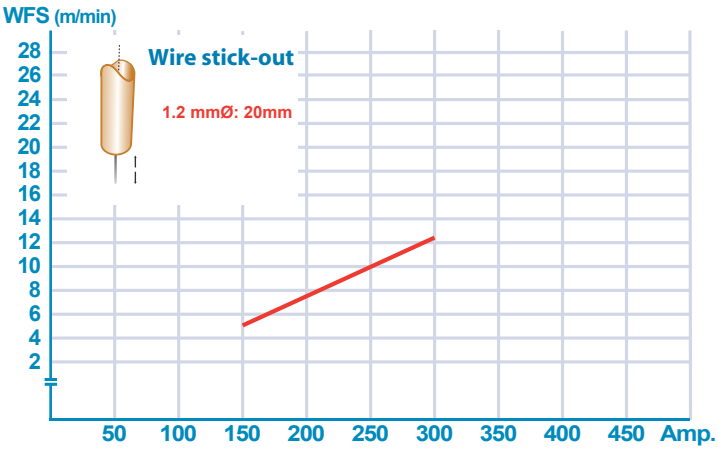
TRUSTARC™ DW-A55LSR is a rutile flux cored wire whose weld metal tolerates post weld heat treatment (PWHT) without an adverse degradation of mechanical properties.

TRUSTARC™ DW-A55LSR produces a nominal 0.9%Ni weld metal which means that it fulfils NACE requirements for oil and gas production equipment in sour gas service.

These properties make for a varied range of usages in pipeline construction and offshore applications.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

C	Si	Mn	P	S	Ni	Cr	Mo
0.05	0.33	1.32	0.009	0.008	0.90	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
As welded	510	570	29	120
620°C x 2 hr (SR)	450	530	33	70
Guarantee (as welded)	min.460	530~680	min.20	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
5Y42S	V Y42MS NV2-4L,4-4L	SA5Y42	-	5YQ420SA	-	-

TRUSTARC™ DW-62L

100%CO_2
EN ISO 17632-A-T 50 6 Z P C 2 H5
AWS A5.29 E91T1-Ni2C-J

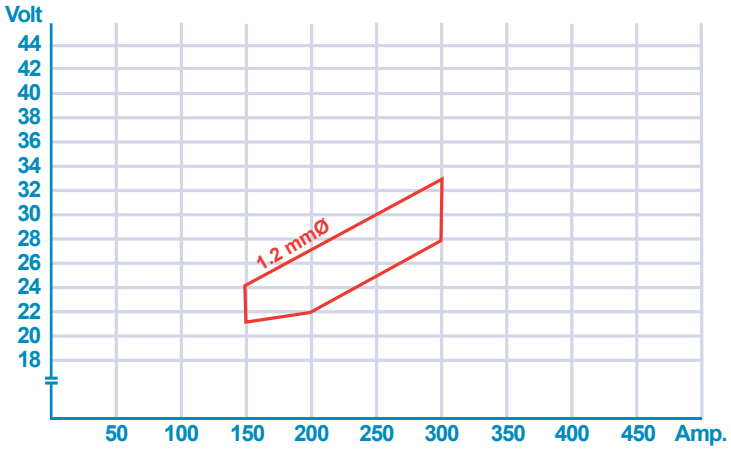
Description and Application

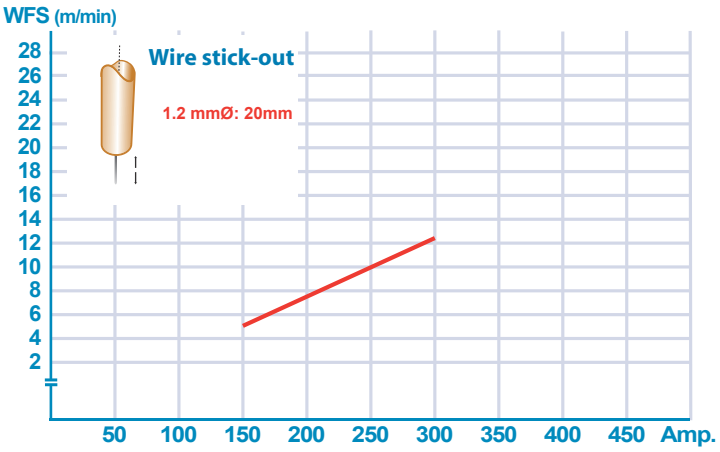
TRUSTARC™ DW-62L is a rutile flux cored wire specially formulated to meet the rigorous demands for 500MPa yield strength class low temperature service steels, as found in the offshore shipbuilding and chemical industries.

Not only does this wire have excellent CTOD values at the standard -10°C test temperature, but is also has excellent CTOD values at the very severe test temperature of -40°C.

This wire is applied to the welding of medium to heavy section butt or fillet weld joints.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.08	0.27	1.32	0.009	0.007	2.6	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	601	660	25	100
Guarantee	min.500	560~720	min.18	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	5YQ500	5Y50 MS	-

TRUSTARC™ DW-A62L

80%Ar - 20%CO_2
EN ISO 17632-A-T 50 6 Z P M 2 H5
AWS A5.29 E91T1-GM

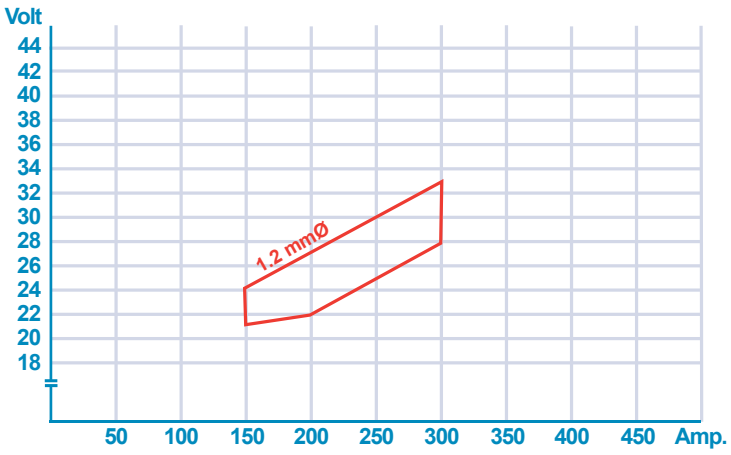
Description and Application

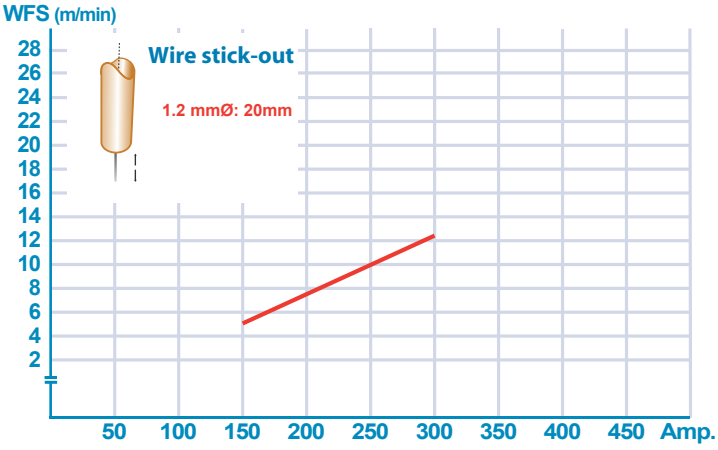
TRUSTARC™ DW-A62L is a rutile flux cored wire specially formulated to meet the rigorous demands for 500MPa yield strength class low temperature service steels, as found in the offshore shipbuilding and chemical industries.

Not only does this wire have excellent CTOD values at the standard -10°C test temperature, but is also have excellent CTOD values at the very severe test temperature of -40°C.

This wire is applied to the welding of medium to heavy section butt or fillet weld joints.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.07	0.32	1.33	0.007	0.011	2.1	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-60°C
	561	641	27	82
Guarantee	min.500	560~720	min.18	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y50	5Y50	-	-	-	-	-

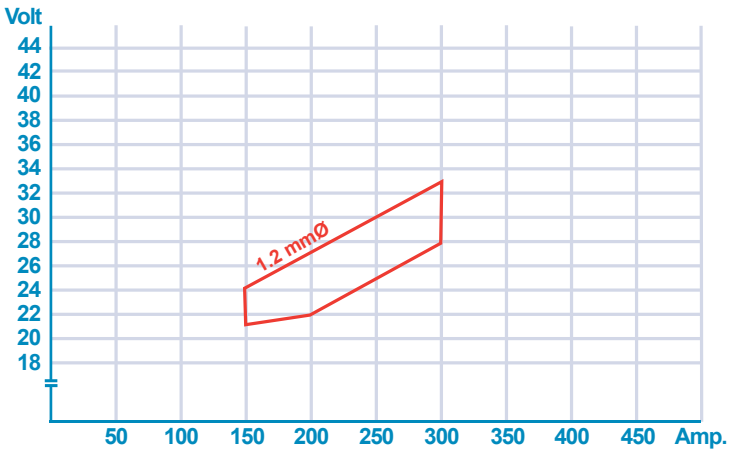
TRUSTARC™ DW-A65L

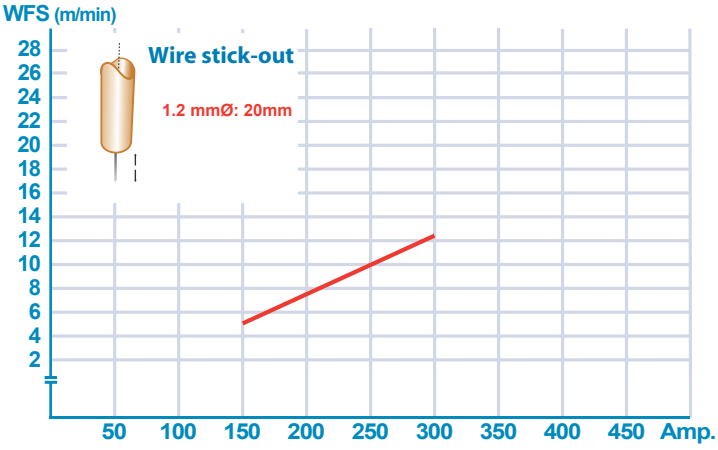
80%Ar - 20%CO_2
EN ISO 18276-A-T 55 4 Z P M 2 H5
AWS A5.29 E91T1-K2M-J

Description and Application

TRUSTARC™ DW-A65L is rutile flux cored wire specially formulated to meet the rigorous demands for 640MPa tensile strength class low temperature service steels, as found in the offshore shipbuilding and chemical industries.
This wire is applied to the welding of medium to heavy section butt or fillet weld joints.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.35	1.17	0.010	0.009	1.69	-	0.11

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C
	601	660	24	82
Guarantee	min.550	640~820	min.18	min.47

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
		-	-	-	-	-

TRUSTARC™ DW-A70L

80%Ar - 20%CO_2
EN ISO 18276-A-T 62 5 Mn1NiMo P M 2 H5
AWS A5.29 E101T1-GM

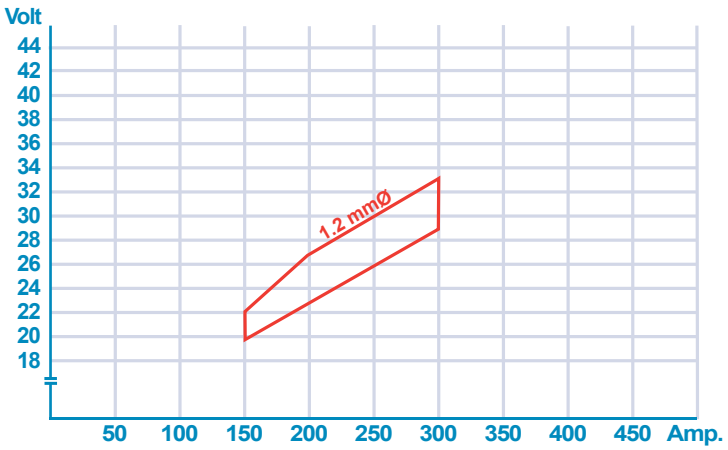
Description and Application

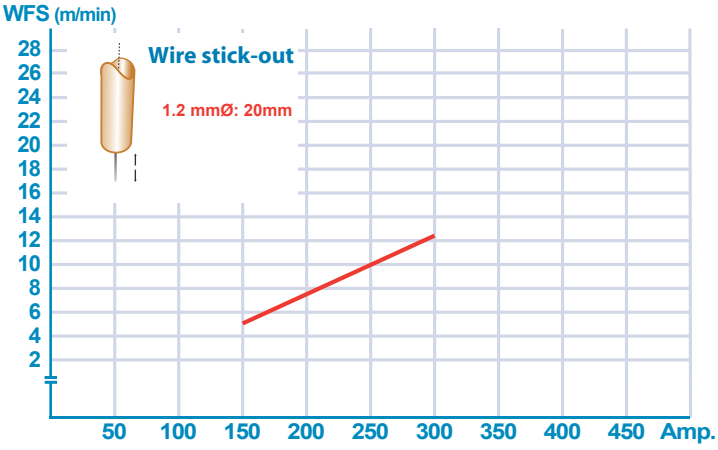
TRUSTARC™ DW-A70L is especially designed to meet the increasing demands in On-Shore and Off-Shore pipelines with the introduction of high strength steels such as X70 and X80, including matching, and/or, requirements for overmatching the nominal yield levels of these materials.

TRUSTARC™ DW-A70L produces a weld metal containing max 1.0%Ni, something that also makes the TRUSTARC™ DW-A70L comply with the NACE requirements for sour gas service, making this product very versatile for pipeline application operating on both "sweet" and "sour" conditions.

TRUSTARC™ DW-A70L is a fully rutile flux cored wire, ensuring good operability and weldability on fixed pipes in vertical up PH (5G) position. The wire is designed for manual and fully automated welding processes currently applied by pipeline contractors.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.05	0.36	1.90	0.008	0.011	0.97	-	0.46

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-50°C
	663	739	21	72
Guarantee	min.620	700~890	min.18	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	4Y62S	IVY62MS	-	-	-	-	-

TRUSTARC™ DW-A80L

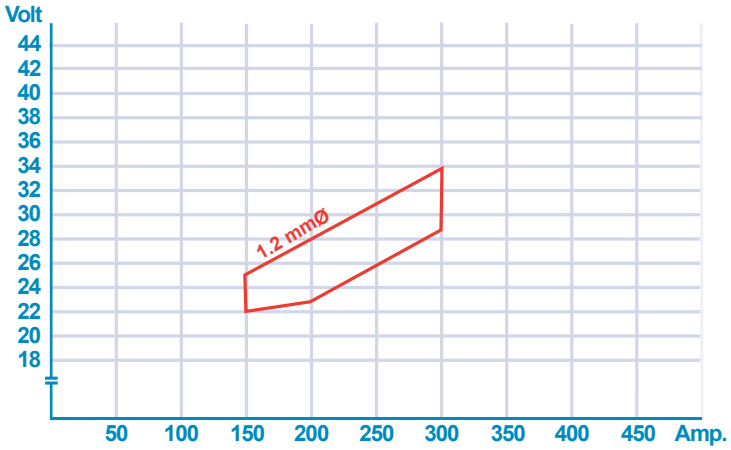
80%Ar - 20%CO_2
EN ISO 18276-A-T 69 4 Z P M 2 H5
AWS A5.29 E111T1-GM

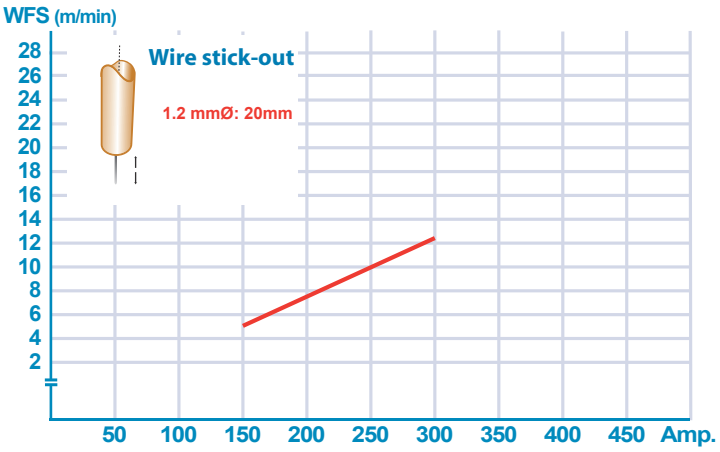
Description and Application

TRUSTARC™ DW-A80L is designed for welding 690 MPa yield strength steels that are used in heavy industries such as offshore, pipeline, crane, construction machinery, etc.

TRUSTARC™ DW-A80L is a rutile flux cored wire for all positional welding. This wire provides excellent mechanical properties and crack resistance.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.07	0.31	1.86	0.007	0.006	2.49	-	0.16

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C
	764	813	21	90
Guarantee	min.690	770~940	min.17	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	4Y69	IVY69MS	-	4Y69	4YQ69OSA	-	-

TRUSTARC™ MX-A80L

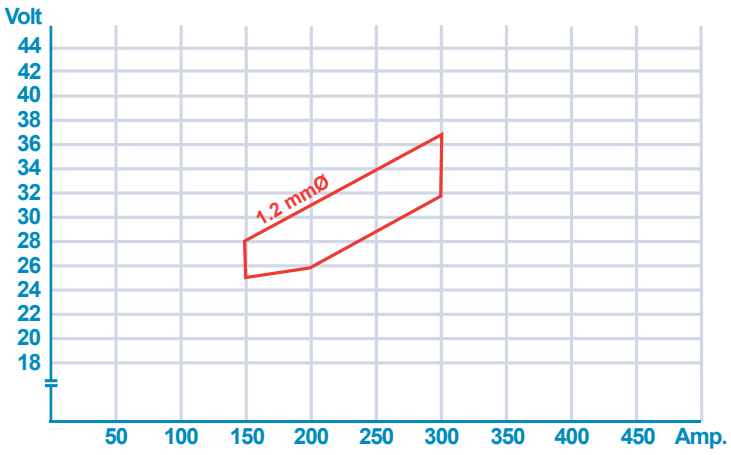
80%Ar - 20%CO_2
EN ISO 18276-A-T 69 6 Mn2.5Ni M M 3 H5
AWS A5.28 E110C-G

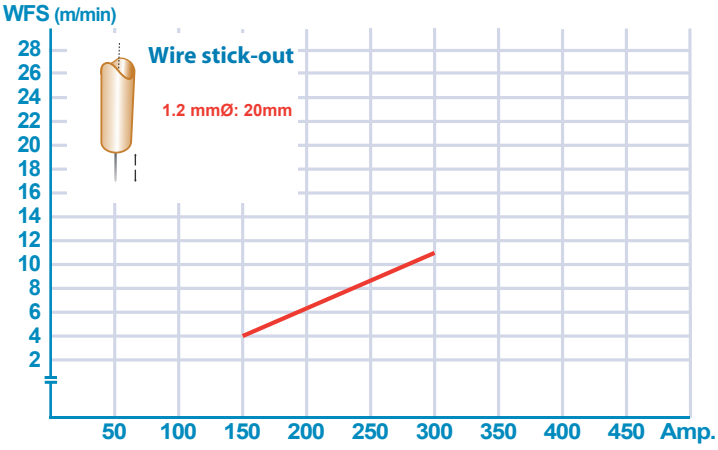
Description and Application

TRUSTARC™ MX-A80L is designed for welding 690 MPa yield strength steels that are used in heavy industries such as offshore, pipeline, crane, construction machinery, etc.

TRUSTARC™ MX-A80L is a metal cored wire for flat and horizontal welding. This wire provides excellent mechanical properties and crack resistance.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo
	0.06	0.48	1.87	0.008	0.010	2.37	-	0.09

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C	CV(J)-60°C
	720	791	24	145	121
Guarantee	min.690	770~940	min.17	min.47	min.47

Welding Positions

Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	5Y69	VY69MS	-	6Y69	5YQ690SA	-	-

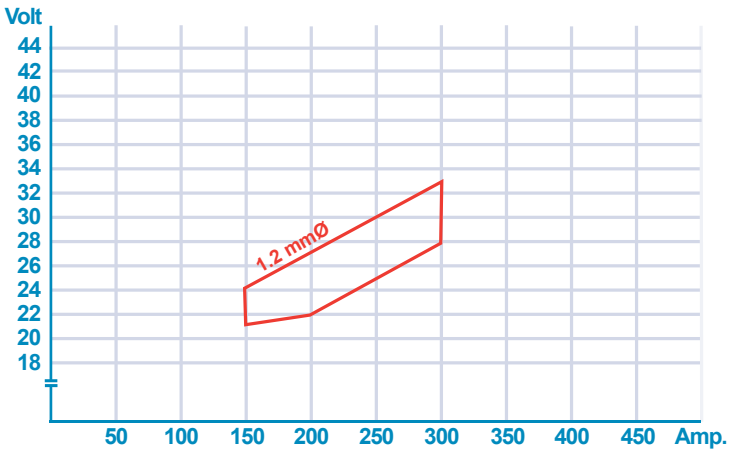
FAMILIARC™ DW-588

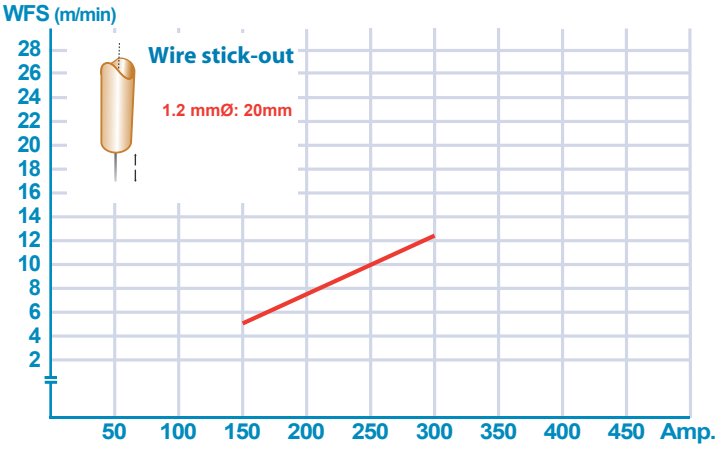
100%CO_2
EN ISO 17632-A-T 50 0 Z P C 1 H10
AWS A5.29 E81T1-W2C

Description and Application

FAMILIARC™ DW-588 is suitable for butt or fillet welding of 570 MPa weather proof steel and A588 steel (which are normally used without painting). It is a rutile type FCW applicable for all positional welding. It shows good bead appearance, bead shape and low spatter generation.

Recommended Parameter Range, for flat position





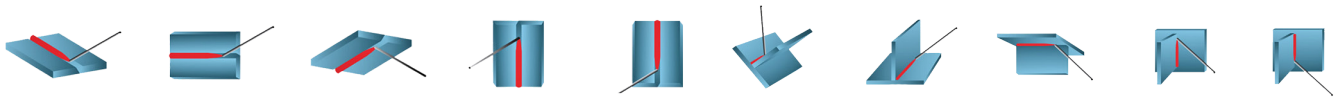
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Cu
	0.04	0.55	1.14	0.012	0.010	0.48	0.52	0.41

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)0°C	CV(J)-30°C
	530	610	29	90	60
Guarantee	min.500	560~720	min.18	min.47	min.27

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-308L

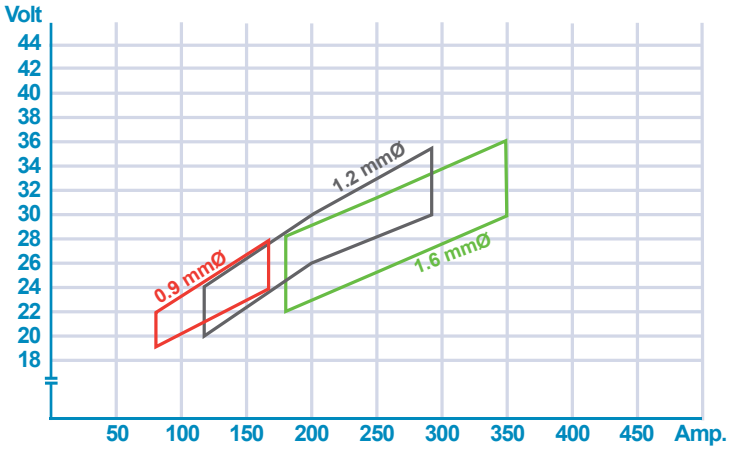
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A-T 19 9 L R C/M 3
AWS A5.22 E308LT0-1/4
EN 1.4316

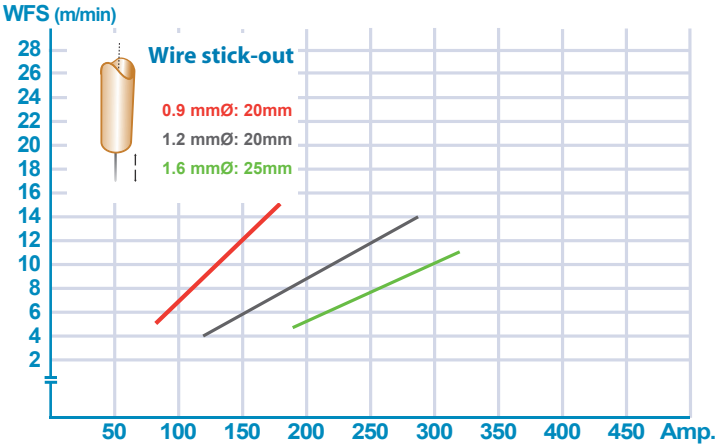
Description and Application

This is rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

This wire is designed for welding 18%Cr-10%Ni type stainless steels like type 304L or EN 1.4307. Due to the low carbon content in the weld metal, it is possible to obtain high resistance to intergranular corrosion.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.60	1.60	0.020	0.005	10.1	19.7	-	-	-	8.9	12.4	10.8

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	410	570	40	45
Guarantee	min.320	min.520	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
304L	308L	-	4550S	MG	-	TÜV,DB,CWB

PREMIARC™ DW-308LP

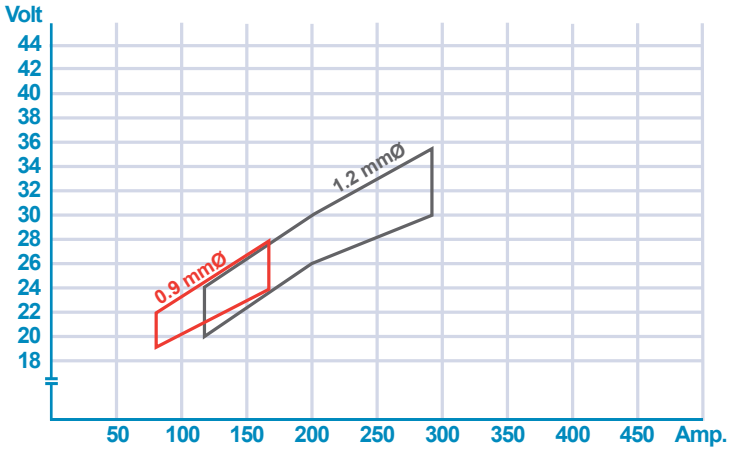
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A-T 19 9 L P C/M 1
AWS A5.22 E308LT1-1/4
EN 1.4316

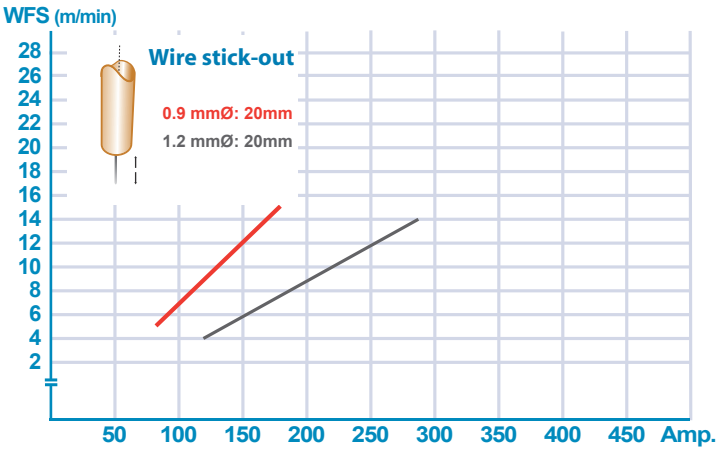
Description and Application

This is rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

This wire is designed for welding 18%Cr-10%Ni type stainless steels like type 304L or EN 1.4307. Due to the low carbon content in the weld metal, it is possible to obtain high resistance to intergranular corrosion.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.70	1.70	0.019	0.004	9.9	19.5	-	-	-	9.0	12.5	10.3

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	410	580	41	50
Guarantee	min.320	min.520	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	4550S	E 308LT1-4 MG	-	DB,CWB,TÜV

PREMIARC™ DW-309L

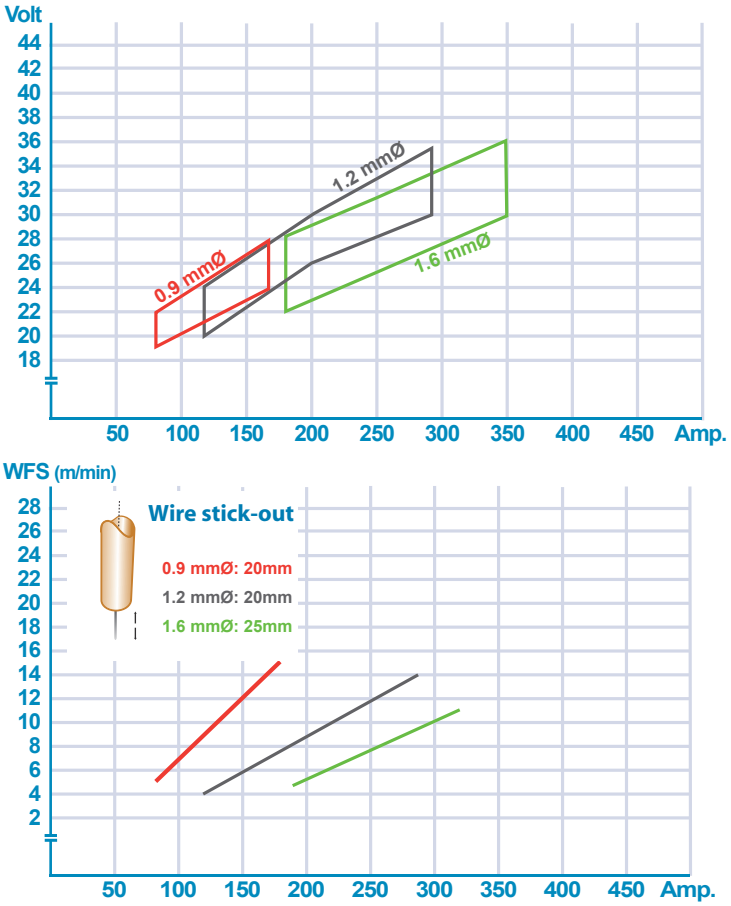
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 23 12 L R C/M 3
AWS A5.22 E309LT0-1/-4
EN 1.4332

Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

This wire deposit low carbon weld of about 24%Cr-13%Ni. It is designed for dissimilar welding such as welding stainless steel to mild steel or low alloy steel. The wire also suitable for the first layer on mild or low alloy steel prior to overlaying with **PREMIARC™ DW-308L** or **PREMIARC™ DW-308LP**

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.70	1.40	0.019	0.005	12.6	23.9	-	-	-	13.2	>18.0	19.9

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	450	580	35	43
Guarantee	min.320	min.520	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
SS/CMn Dup/CMn	309L	309L	4332S	MG	-	TÜV,DB,CWB

PREMIARC™ DW-309LP

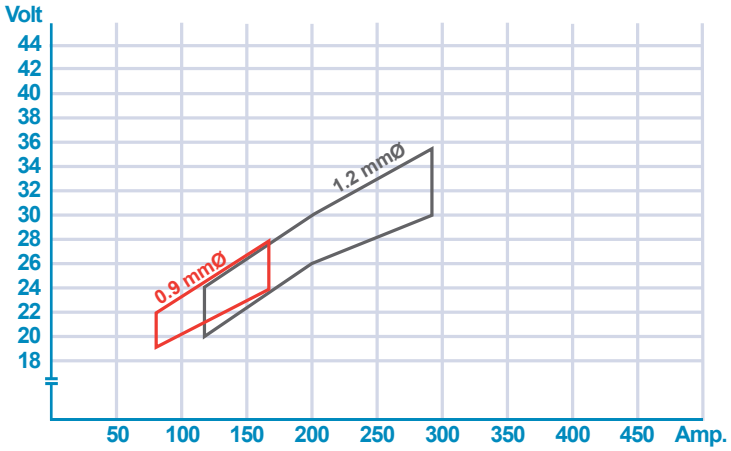
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 23 12 L P C/M 1
AWS A5.22 309LT1-1/-4
EN 1.4332

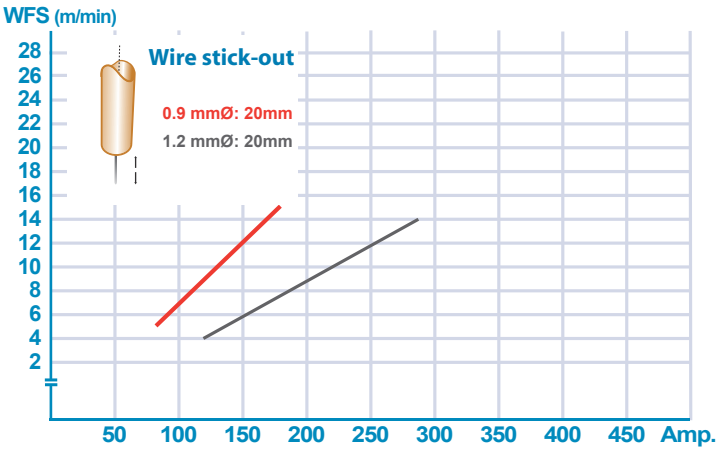
Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

This wire deposit low carbon weld of about 24%Cr-13%Ni. It is designed for dissimilar welding such as welding stainless steel to mild steel or low alloy steel. The wire is also suitable for the first layer on mild or low alloy steel prior to overlaying with **PREMIARC™ DW-308L** or **PREMIARC™ DW-308LP**.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

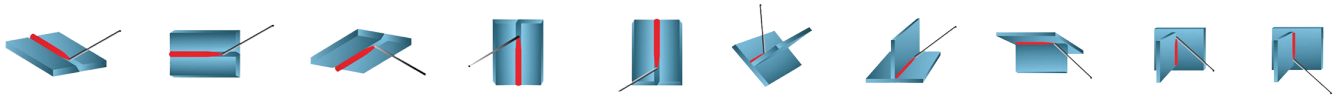
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.42	0.80	0.017	0.005	12.6	23.2	-	-	-	11.7	17.0	14.7

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	410	580	41	50
Guarantee	min.320	min.520	min.25	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
SS/CMn	309L	309L	4332S	E309LT1-1/4	A-93P	CWB,DB,TÜV

PREMIARC™ DW-309MoL

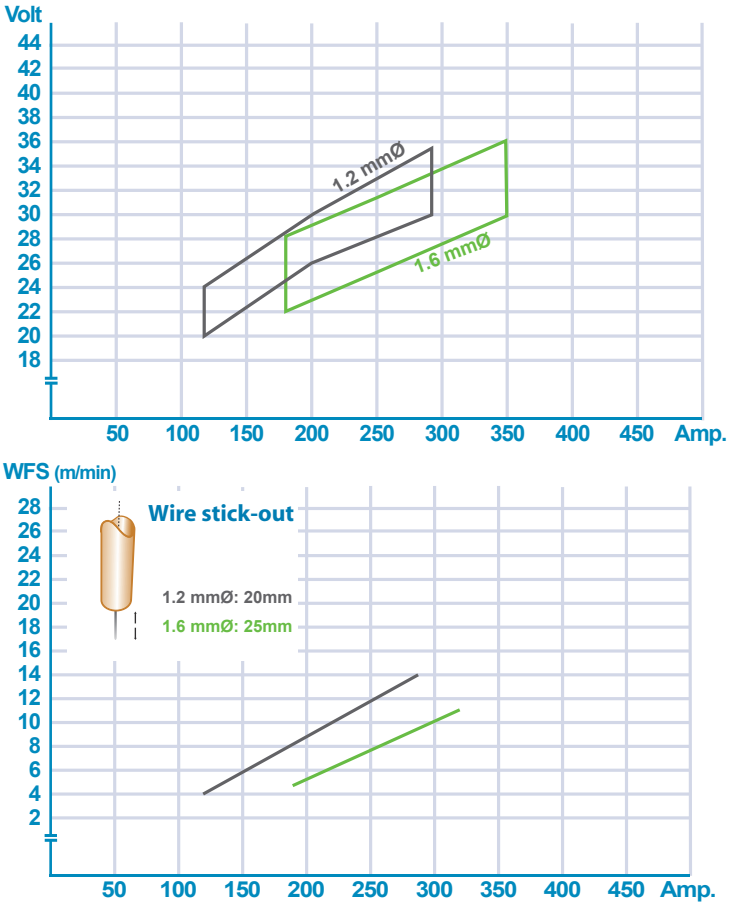
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 23 12 2 L R C/M 3
AWS A5.22 E309LMoT0-1/-4
EN 1.4459

Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arcs producing bright, smooth weld bead surfaces and self releasing slag.

This wire deposits low carbon weld metal of about 23%Cr-13%Ni-2.3%Mo and is designed for dissimilar welding such as welding stainless steel to mild or low alloy steel. This wire is also suitable for the first layer welding on mild steel or low alloy steel prior to overlaying with **PREMIARC™ DW-316L/LP** or **PREMIARC™ DW-317L**.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.70	1.40	0.018	0.007	12.7	23.2	2.3	-	-	16.8	>18.0	27.0

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	540	700	30	42
Guarantee	min.350	min.550	min.25	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
ss/cmn	309MoL	309MoL	4459S	-	-	TÜV,DB

PREMIARC™ DW-309MoLP

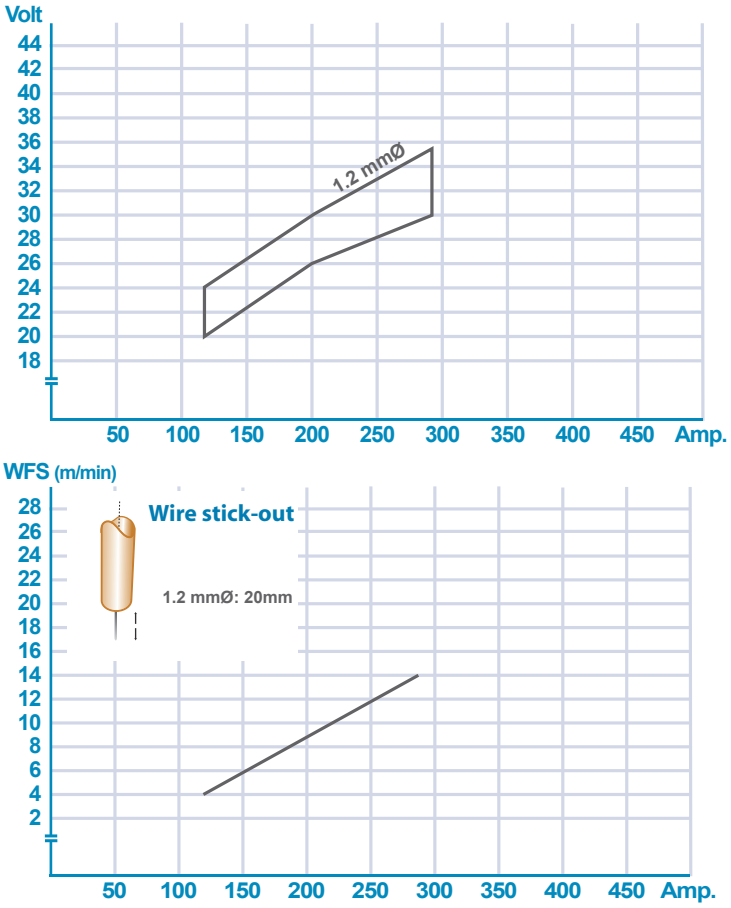
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 23 12 2 L P C/M 1
AWS A5.22 E309LMoT1-1/-4
EN 1.4459

Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arcs producing bright, smooth weld bead surfaces and self releasing slag.

This wire deposits low carbon weld metal of about 23%Cr-13%Ni-2.3%Mo and is designed for dissimilar welding such as welding stainless steel to mild or low alloy steel. This wire is also suitable for the first layer welding on mild steel or low alloy steel prior to overlaying with **PREMIARC™ DW-316L/LP** or **PREMIARC™ DW-317L.**

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

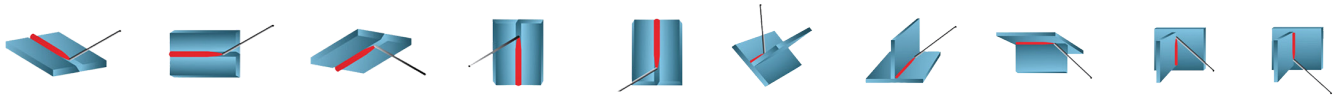
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.60	0.90	0.018	0.006	12.5	22.5	2.3	-	-	16.6	>18.0	24.4

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	530	690	31	48
Guarantee	min.350	min.550	min.25	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

	LR	DNV	BV	GL	ABS	R.M.R.S	Others
	ss/cmn	309MoL	309MoL	-	-	-	-

PREMIARC™ DW-316L

80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 19 12 3 L R C/M 3
AWS A5.22 E316LT0-1/-4
EN 1.4430

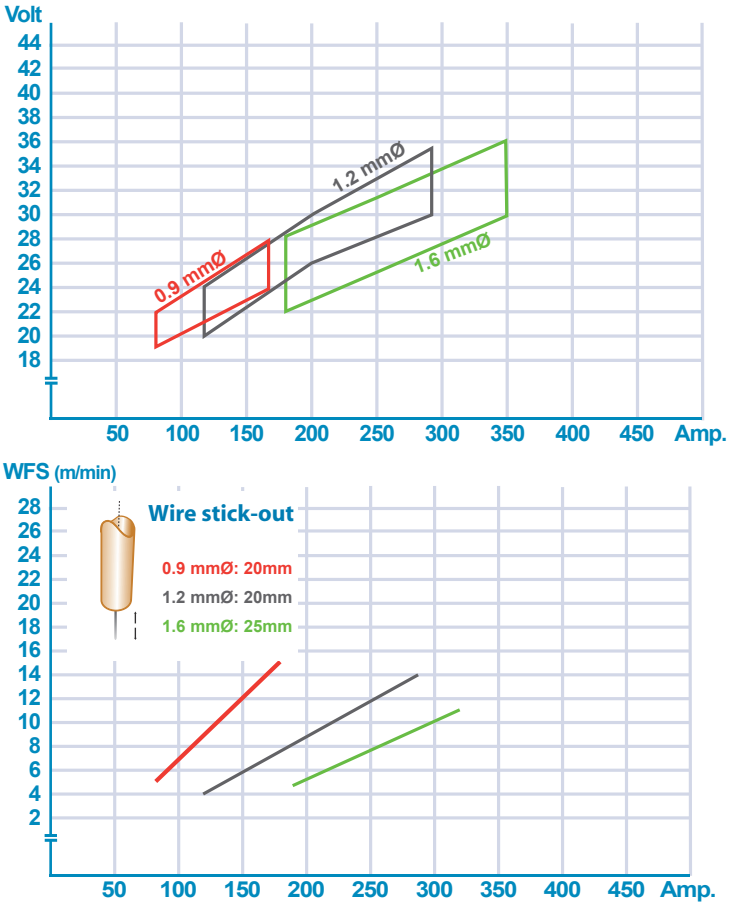
Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arcs producing bright, smooth weld bead surfaces and self releasing slag.

This wire is desinged for welding 18%Cr-12%Ni-2.5%Mo stainless steels like type 316L or EN 1.4435. Due to the low carbon content in the weld metal, it is possible to obtain high resistance to intergranular corrosion.

PREMIARC™ DW-316L is used mainly for downhand and horizontal fillet welding.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.60	1.60	0.020	0.006	12.2	18.7	2.80	-	-	7.7	12.8	9.7

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	430	570	39	44
Guarantee	min.320	min.510	min.25	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
316L	316L	316L	4571S	MG	-	TÜV,DB,CWB

PREMIARC™ DW-316LP

80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 19 12 3 L P C/M 1
AWS A5.22 E316LT1-1/-4
EN 1.4430

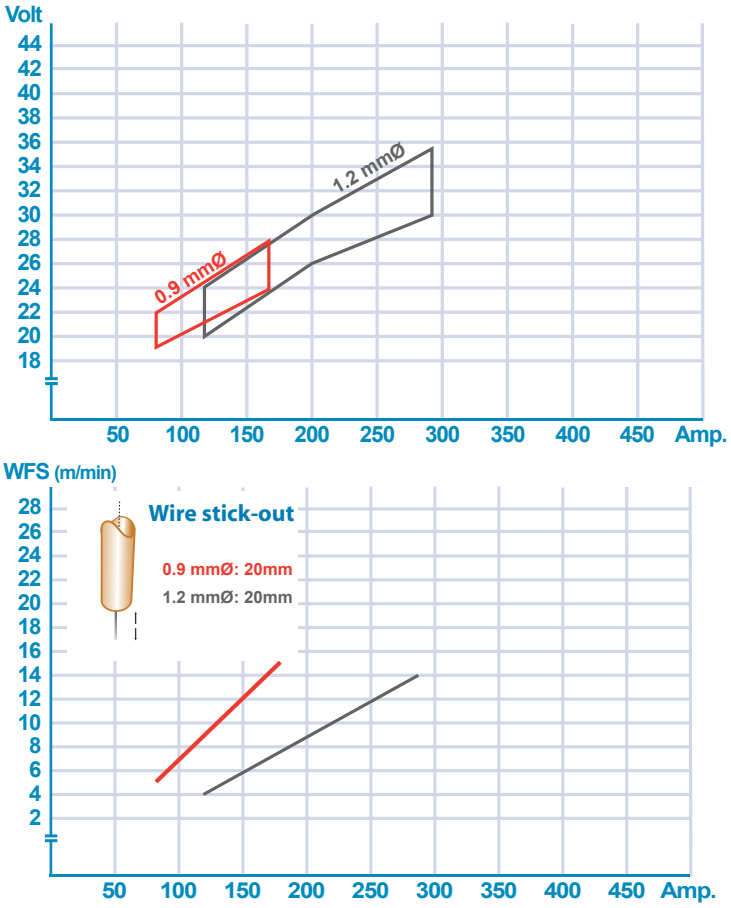
Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arcs producing bright, smooth weld bead surfaces and self releasing slag.

This wire is desinged for welding 18%Cr-12%Ni-2.5%Mo stainless steels like type 316L or EN 1.4435. Due to the low carbon content in the weld metal, it is possible to obtain high resistance to intergranular corrosion.

PREMIARC™ DW-316LP is an all positional wire and is ideal for high productivity welding in the vertical up position.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

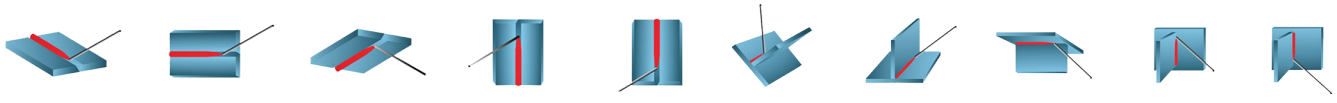
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.70	1.40	0.019	0.006	12.3	18.4	2.90	-	-	7.0	11.5	7.8

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)-20°C
	430	570	40	46
Guarantee	min.320	min.510	min.25	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
316L	316L	316L	4571S	E316LT1-4	A-6	CWB,TÜV

PREMIARC™ DW-329A

80%Ar - 20%CO_2/100%CO_2
EN ISO 17633-A T 22 9 3 N L R C/M 3
AWS A5.22 E2209T0-1/-4
EN 1.4462

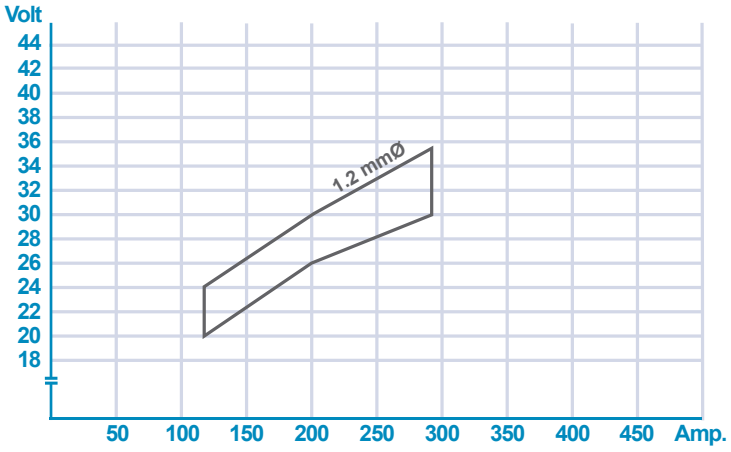
Description and Application

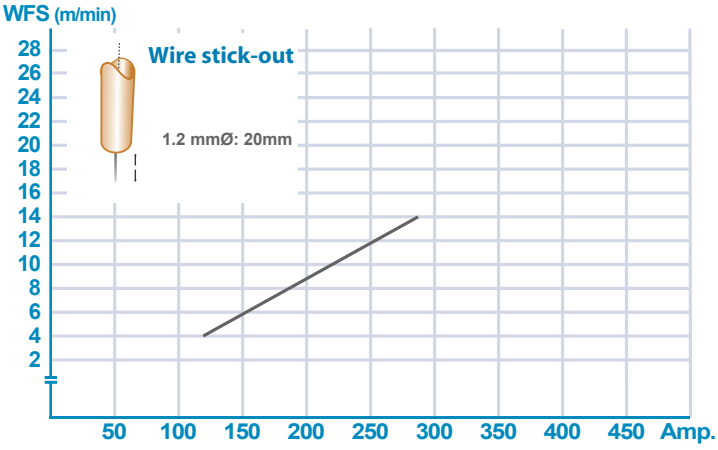
This is a rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces.

This wire is designed for welding duplex stainless steel such as AISI S31803 or EN 1.4462 stainless steels.

Due to the high nitrogen and high molybdenum in the weld metal, it is possible to obtain excellent resistance to chloride induced pitting corrosion.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FNW
0.03	0.75	0.97	0.019	0.006	9.3	23.3	3.4	0.14	-	49.0

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-20°C	CV(J)-46°C
	656	850	29	49	43
Guarantee	min.450	min.690	min.20		

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
S31803	DUPLEX	2205	-	-	-	TÜV

PREMIARC™ DW-329AP

80%Ar - 20%CO_2/100%CO_2
EN ISO 17633-A T 22 9 3 N L P C/M 1
AWS A5.22 E2209T1-1/-4
EN 1.4462

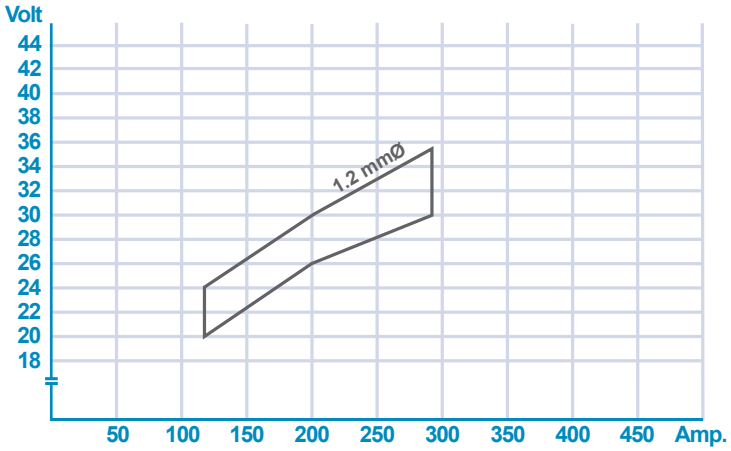
Description and Application

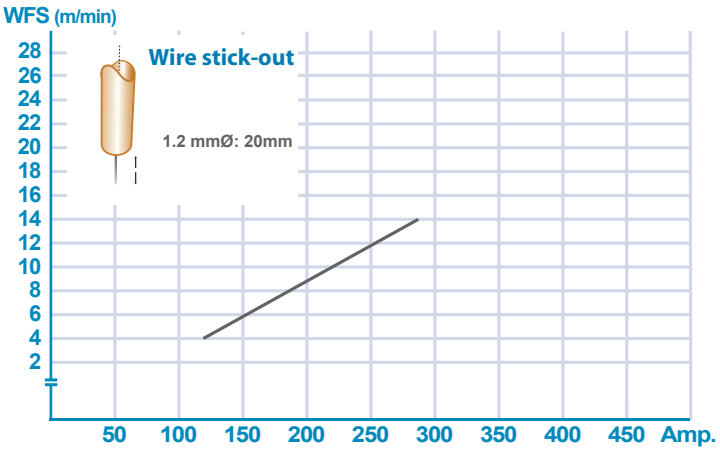
This is a rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces.

This wire is designed for welding duplex stainless steel such as AISI S31803 or EN 1.4462 stainless steels.

Due to the high nitrogen and high molybdenum in the weld metal, it is possible to obtain excellent resistance to chloride induced pitting corrosion.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

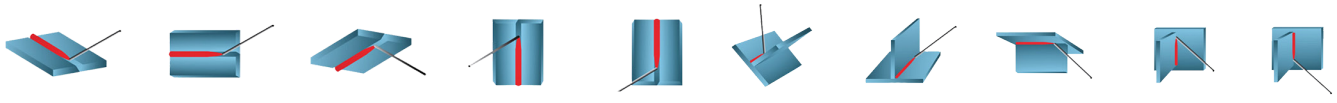
C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FNW
0.03	0.58	0.78	0.019	0.008	9.4	22.9	3.5	0.15	-	42.7

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-20°C	CV(J)-46°C
	670	850	29	45	40
Guarantee	min.450	min.690	min.20		

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
S31803	DUPLEX	-	4462S	-	-	TÜV

PREMIARC™ DW-2307

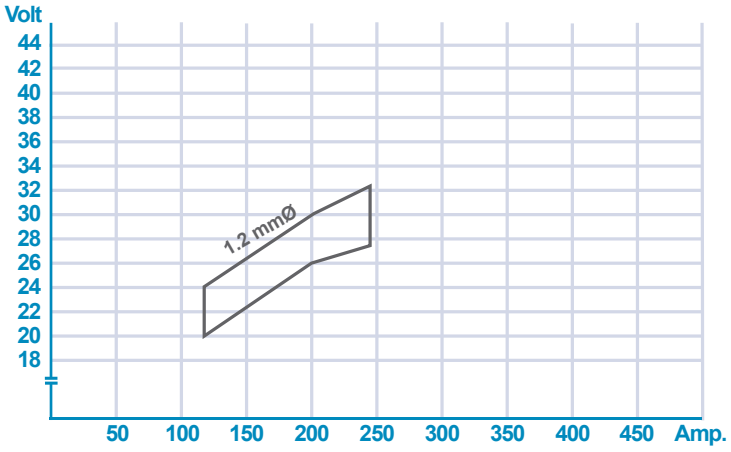
80%Ar - 20%CO_2 / 100%CO_2
EN 1.4162

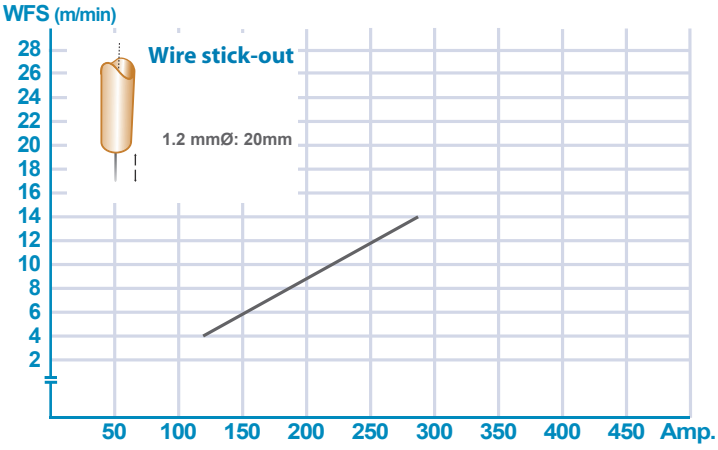
Description and Application

PREMIARC™ DW-2307 is a rutile flux cored wire designed for welding lean duplex stainless steel EN 1.4162 / ASTM 32101 grade such as LDX2101®.

This wire operates with a stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FNW
0.03	0.45	1.26	0.020	0.003	7.9	24.6	-	0.16	-	45

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-46°C
	571	750	29	45
Guarantee	min.450	min.650	min.15	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-2594

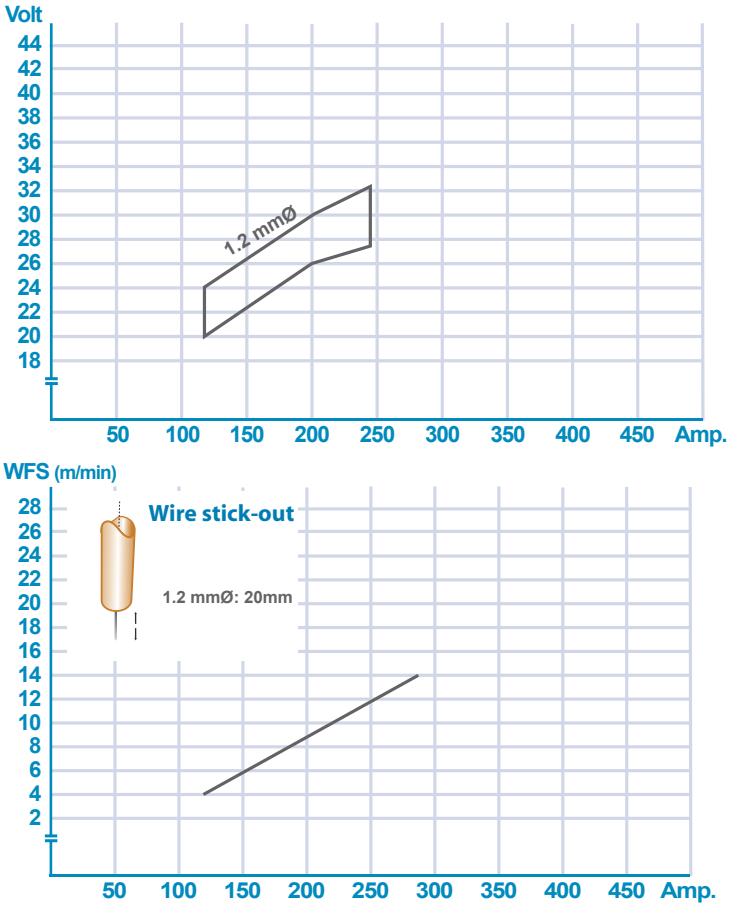
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 25 9 4 N L P C/M 1
AWS A5.22 E2594T1-1/-4
EN 1.4501

Description and Application

PREMIARC™ DW-2594 is a rutile flux cored wire designed for welding super duplex stainless steel EN 1.4410 /ASTM 32750 grade and EN 1.4501 / ASTM 32760 grade.

This wire operates with a stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FNW
0.03	0.50	1.20	0.019	0.004	9.7	25.9	3.90	0.25	-	48

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV(J)-40°C
	701	906	27	39
Guarantee	min.550	min.760	min.18	min.27

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-310

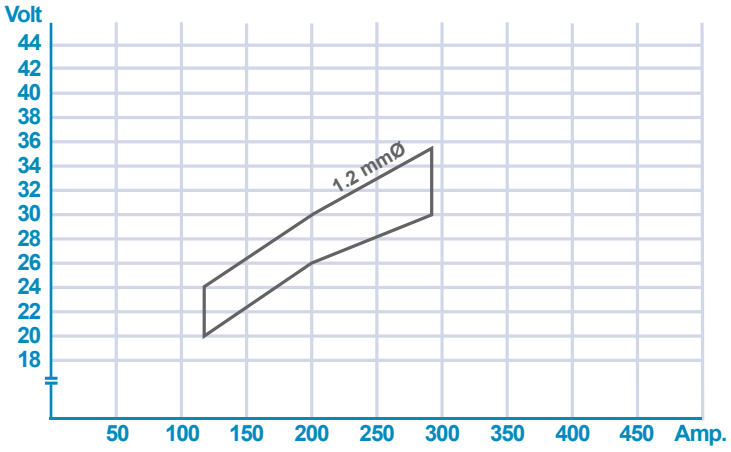
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A-T 25 20 R C/M 1
AWS A5.22 E310T0-1/4
EN 1.4842

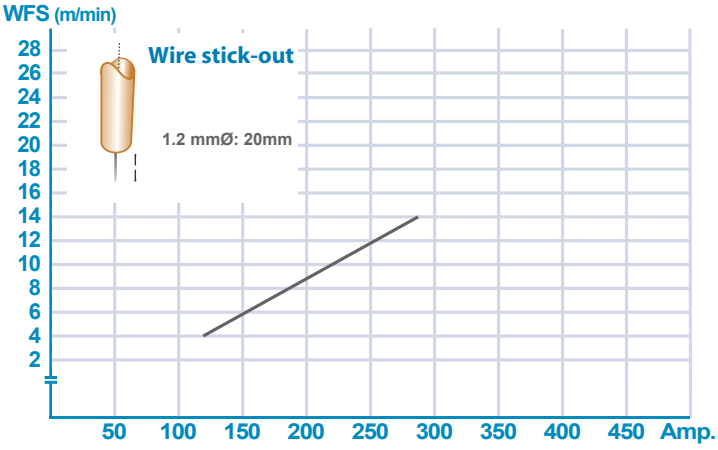
Description and Application

This rutile flux cored wire operatea with very stable, spatter free arc producing a bright, smooth weld bead surface and self releasing slag.

PREMIARC™ DW-310 is suitable for welding heat resistant CrNi steels. The service temperature range between +600-900°C should be avoided owing to the risk of embrittlement.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.18	0.60	2.10	0.016	0.005	20.4	25.5	-	-	-	-	-	-

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	420	620	33	68
Guarantee	min.350	min.550	min.20	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-312

80%Ar - 20%CO_2
EN ISO 17633-A T 29 9 R M 3
AWS A5.22 E312T0-4
EN 1.4337

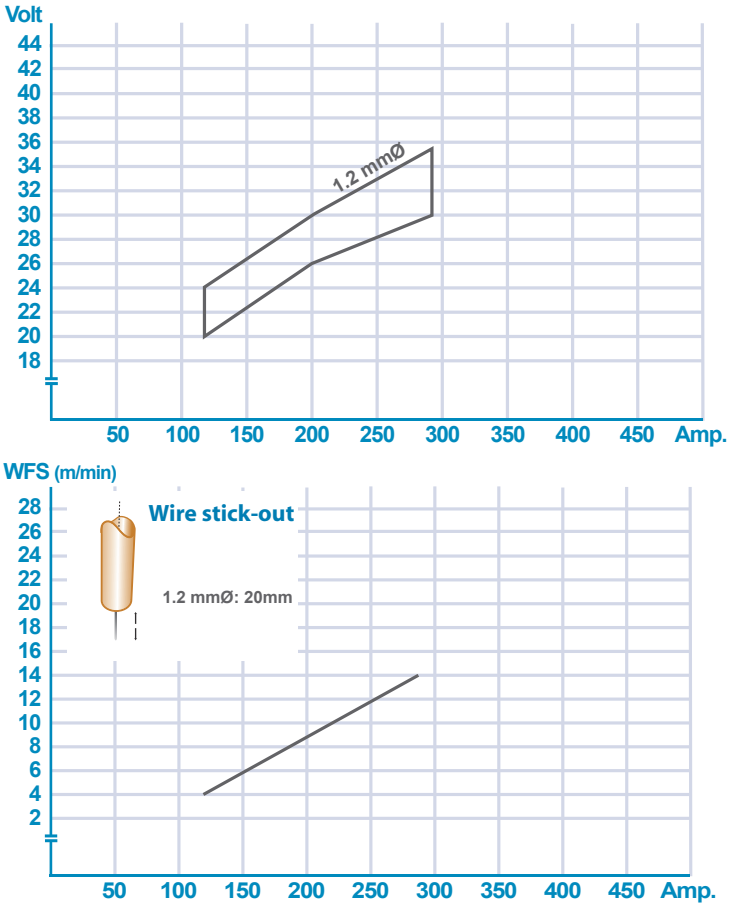
Description and Application

This rutile flux cored wire welds with a stable and almost spatter free arc to produce a shiny, bright, smooth weld bead surface with self-releasing slag.

Excelent crack resistance is due to a combination of high alloy and high ferrite content, which gives extreme tolerance to dilution on a wide range of hardenable and alloy steels with minimum or no preheating. The weld deposit also work-hardens and provides good wear and friction resistance.

PREMIARC™ DW-312 is applied for welding medium and high carbon hardenable steels, of known or unknown specifications, for example tool steels, shafts, free-cutting steels, dissimilar alloy combinations, overlaying, buffer layers prior to hard facing.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.12	0.60	1.20	0.018	0.006	10.2	28.4	-	-	-	60.0	>18.0	50.7

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	580	740	23	-
Guarantee	min.450	min.660	min.15	

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-308LT

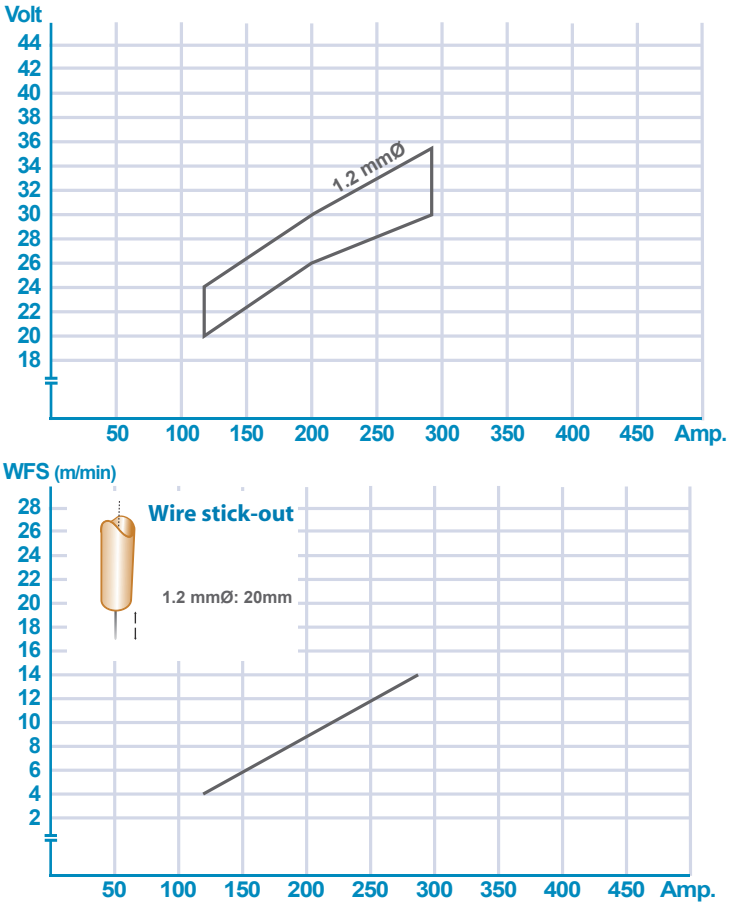
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A-T 19 9 L R C/M 3
AWS A5.22 E308LT0-1/-4
EN 1.4316

Description and Application

This is a rutile flux cored wire which operates with a very stable, spatter free arc producing bright, smooth weld bead surfaces with self releasing slag.

This wire is designed for welding 18%Cr-10%Ni stainless steels for cryogenic use like liquified natural gas (LNG) tanks.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.50	2.30	0.018	0.007	10.3	18.6	-	-	-	3.0	4.8	5.0

Typical Mechanical Properties*

				CV (J)	L.E.(mm)	CV (J)	L.E.(mm)	CV (J)	L.E.(mm)
	R_e(MPa)	R_m(MPa)	A_5(%)	0 °C		-100 °C		-196 °C	
	380	530	51	69	1.40	51	0.92	39	0.52
Guarantee	min.320	min.520	min.30			min.27	min.0.34		

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-308LTP

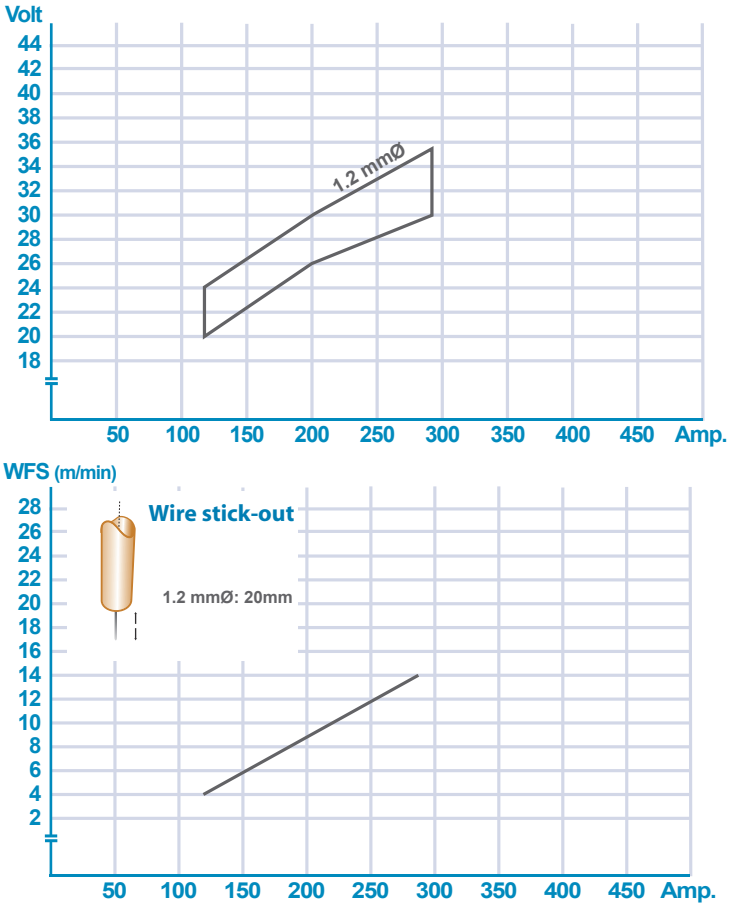
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 19 9 L P C/M 1
AWS A5.22 E308LT1-1/-4
EN 1.4316

Description and Application

This is a rutile flux cored wire which operates with a very stable, spatter free arc producing bright, smooth weld bead surfaces with self releasing slag.

This wire is designed for welding 18%Cr-10%Ni stainless steels for cryogenic use like liquified natural gas (LNG) tanks.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

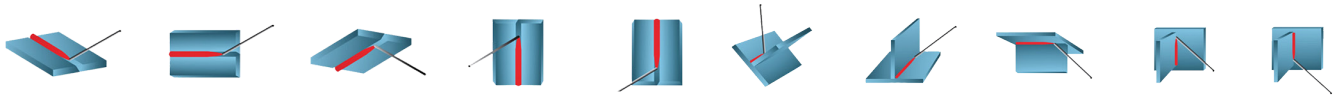
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.70	1.40	0.016	0.002	10.1	19.0	-	-	-	6.8	7.6	5.3

Typical Mechanical Properties*

				CV (J)	L.E.(mm)	CV (J)	L.E.(mm)	CV (J)	L.E.(mm)
	R_e(MPa)	R_m(MPa)	A_5(%)	0 °C		-100 °C		-196 °C	
	420	640	40	61	1.12	51	0.82	42	0.45
Guarantee	min.320	min.520	min.30			min.27	min.0.34		

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-316LT

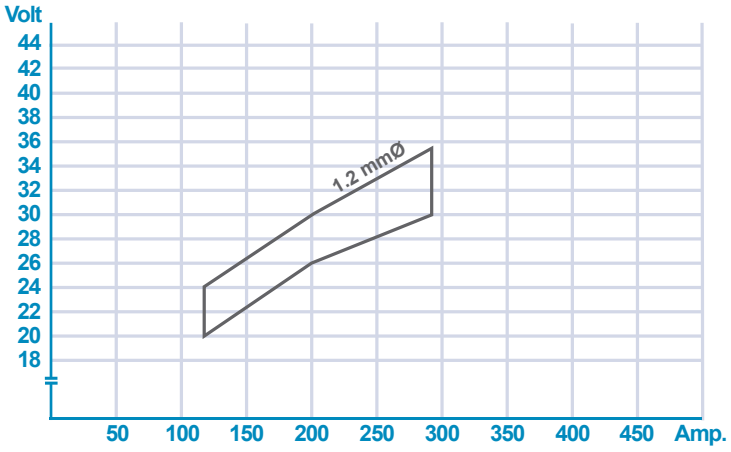
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A-T 19 12 3 L P C/M 3
AWS A5.22 E316LT1-1/-4
EN 1.4430

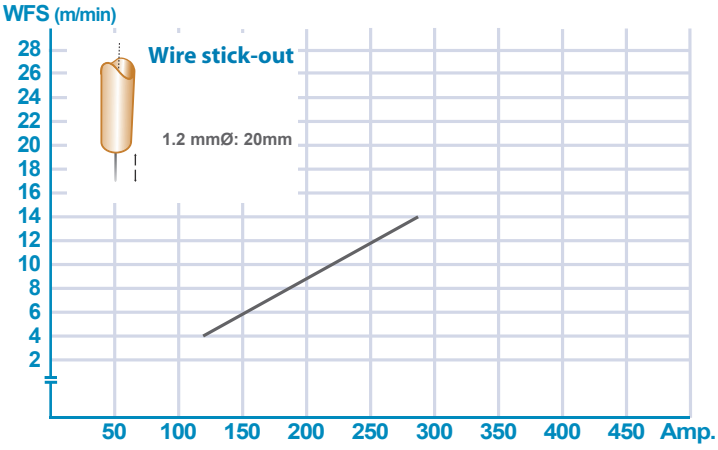
Description and Application

This is a rutile flux cored wire which operates with a very stable, spatter free arc producing a bright, smooth weld bead surface and self releasing slag.

The wire is designed for welding 18%Cr-12%Ni-2.5%Mo stainless steels for cryogenic use like liquified natural gas (LNG) tanks.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.40	1.20	0.021	0.008	12.4	17.6	2.20	-	-	2.7	4.8	4.3

Typical Mechanical Properties*

				CV (J)	L.E.(mm)	CV (J)	L.E.(mm)	CV (J)	L.E.(mm)
	R_e(MPa)	R_m(MPa)	A_5(%)	0 °C		-100 °C		-196 °C	
	405	537	44	74	1.51	53	0.96	34	0.59
Guarantee	min.320	min.510	min.25			min.27	min.0.34		

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

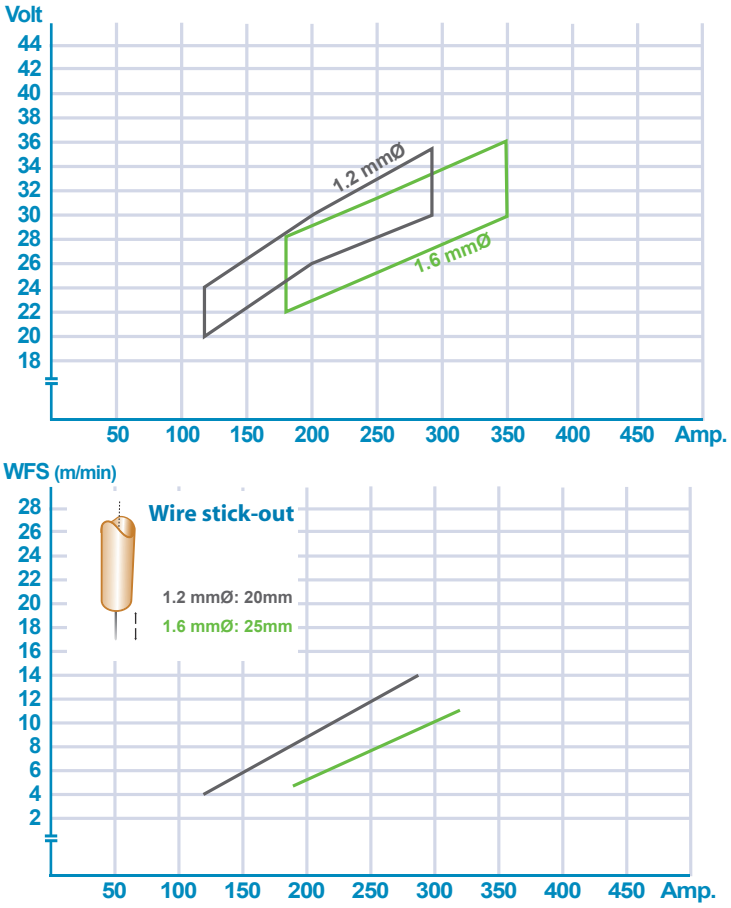
PREMIARC™ DW-308H

80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A TZ 19 9 H R C/M 3
AWS A5.22 E308HT1-1/-4
EN 1.4948

Description and Application

PREMIARC™ DW-308H is designed for welding 18%Cr-10%Ni stainless steels which will be applied for elevated temperatures (more than 600 °C). This wire is also suitable for welding of stainless steel which is to be solution treated at elevated temperatures.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.06	0.50	1.30	0.018	0.004	9.5	19.3	-	-	-	6.6	7.5	5.6

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	420	600	44	72
Guarantee	min.350	min.550	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

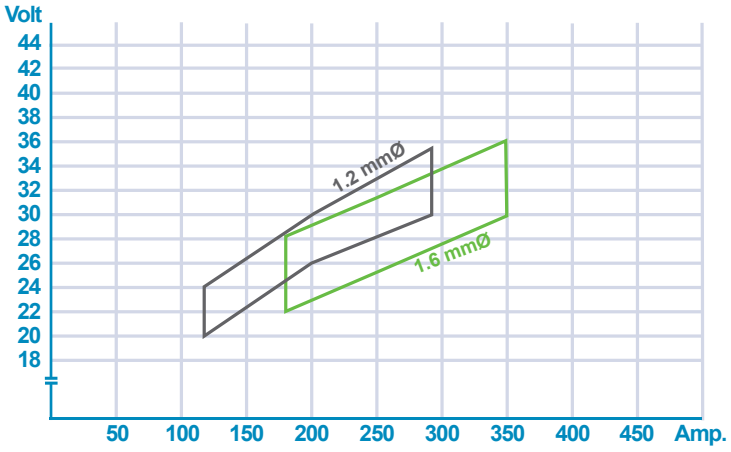
PREMIARC™ DW-347H

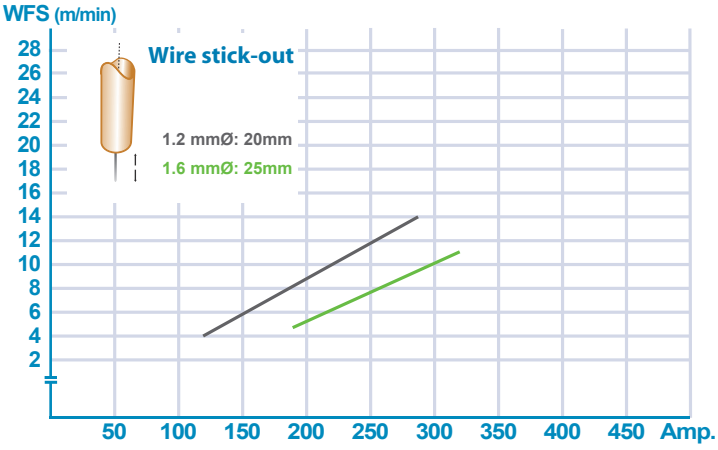
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 19 9 Nb P C/M 2
AWS A5.22 E347T1-1/-4
EN 1.4551

Description and Application

PREMIARC™ DW-347H is for welding titanium or niobium stabilized stainless steel such as 18%Cr-8%Ni-Ti or 18%Cr-8%Ni-Nb stainless steels. Due to the high niobium content in the weld metal, it is possible to prevent Cr-carbide precipitation which leads to intergranular corrosion.

Recommended Parameter Range, for flat position*





Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.60	1.30	0.018	0.004	10.4	18.7	-	-	0.6	6.7	7.3	6.3

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	440	617	37	83
Guarantee	min.350	min.550	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	TÜV

PREMIARC™ DW-309LH

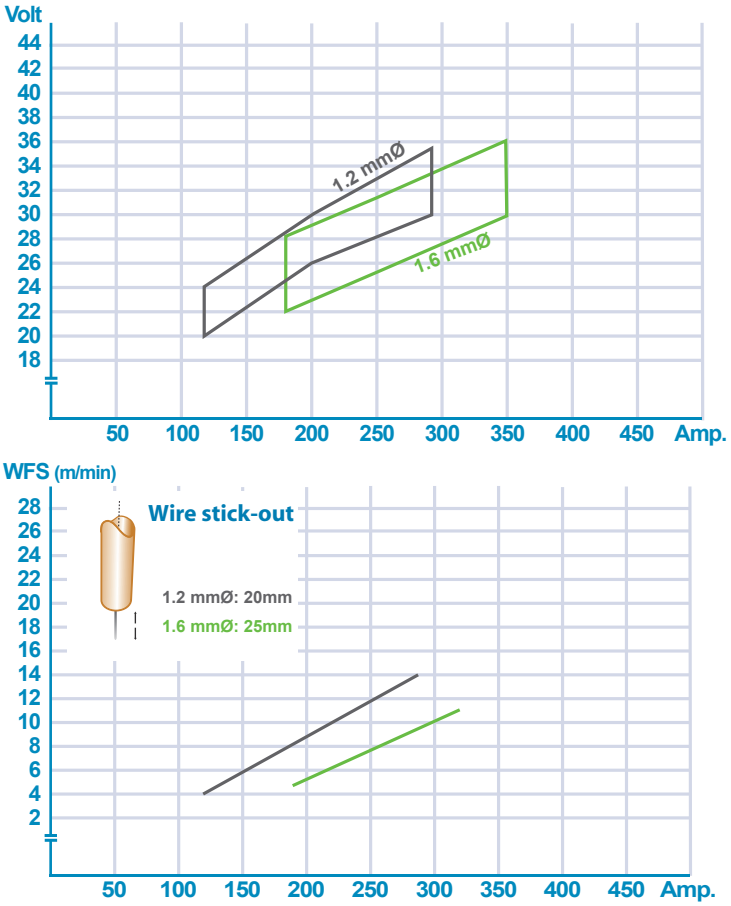
80%Ar - 20%CO_2 / 100%CO_2
EN ISO 17633-A T 23 12 L R C/M 3
AWS A5.22 E309LT1-1/4
EN 1.4332

Description and Application

This wire is a rutile flux cored wire that operates with a very stable spatter free arc.

PREMIARC™ DW-309LH is applied for high temperature applications where a high resistance to oxidation is required, like industrial furnaces (ovens).

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.41	1.25	0.021	0.008	12.6	23.8	-	-	-	-	-	-

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	380	590	36	-
Guarantee	min.320	min.520	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-316LH

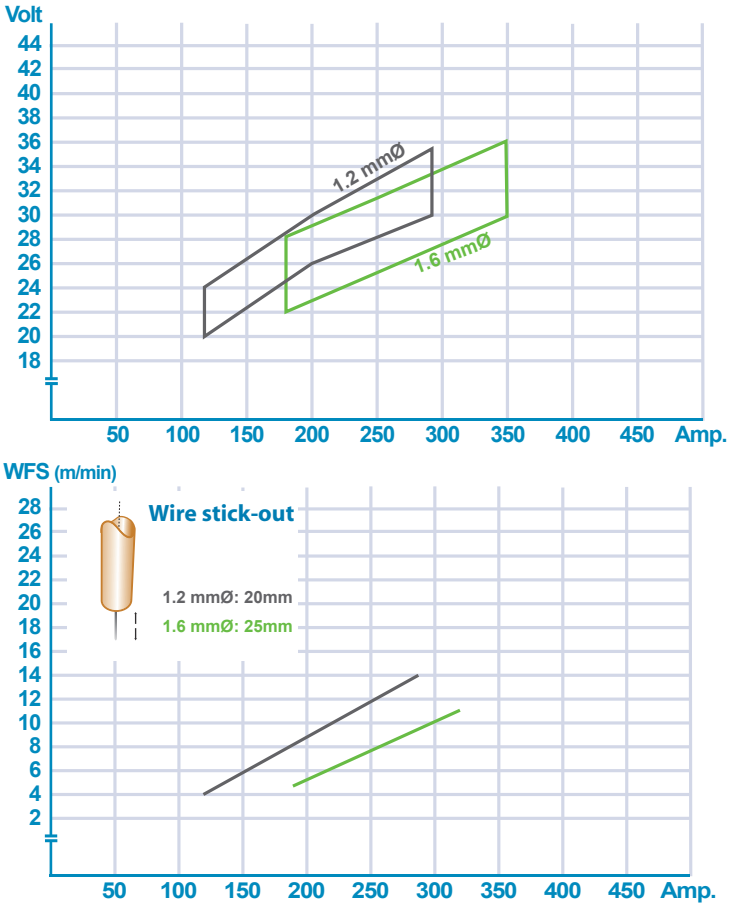
80%Ar - 20%CO_2 / 100%CO_2
AWS A5.22 E316LT1-1/4
EN 1.4430

Description and Application

This wire is a rutile flux cored wire that operates with a very stable spatter free arc.

PREMIARC™ DW-316LH is designed for welding 18%Cr-12%Ni-2.5%Mo stainless steels which will be applied for elevated temperatures.

Recommended Parameter Range, for flat position*



Typical Chemical Analysis (wt. %)*

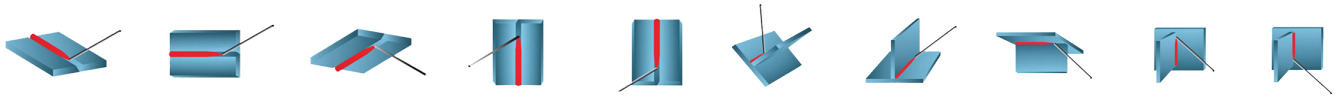
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.45	1.08	0.020	0.007	11.9	18.5	2.45	-	-	-	-	-

Typical Mechanical Properties*

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	390	540	44	66
Guarantee	min.320	min.520	min.30	

* The above values and parameters are for all weld metal produced using Ar+CO_2 shielding gas

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-307

80%Ar - 20%CO_2
EN ISO 17633-A T 18 8 Mn R M 3
EN 1.4370

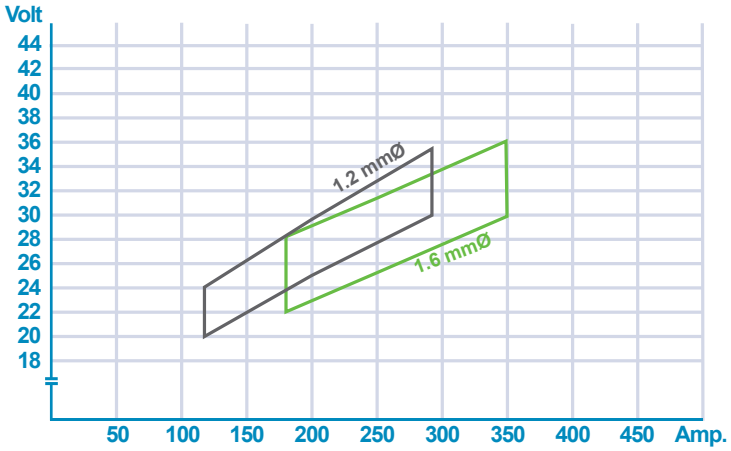
Description and Application

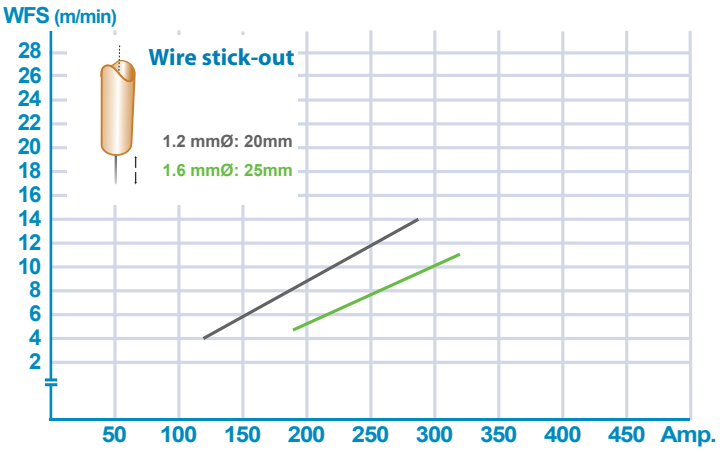
This is a versatile CrNiMn rutile flux cored wire that operates with a stable, almost spatter free arc to produce a shiny, smooth weld bead surface with a self-releasing slag.

The weld metal offers exceptionally high ductility and elongation combined with outstanding crack resistance due to the high manganese content. The weld deposit also work-hardens and provides good wear and friction resistance.

PREMIARC™ DW-307 was primarily designed for difficult to weld steels such as austenitic high manganese steels and for use in buffer layers under hard facing materials. But due to its low nickel content, it also provides a cost effective alternative to 309 welding materials for general dissimilar welding of mild steel to stainless steel.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.07	0.60	6.4	0.02	0.008	8.1	19.2	-	-	-	1.6	3.3	9.1

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	393	583	41	48
Guarantee	min.350	min.500	min.25	

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	4370S	-	-	TÜV,DB

PREMIARC™ DW-317L

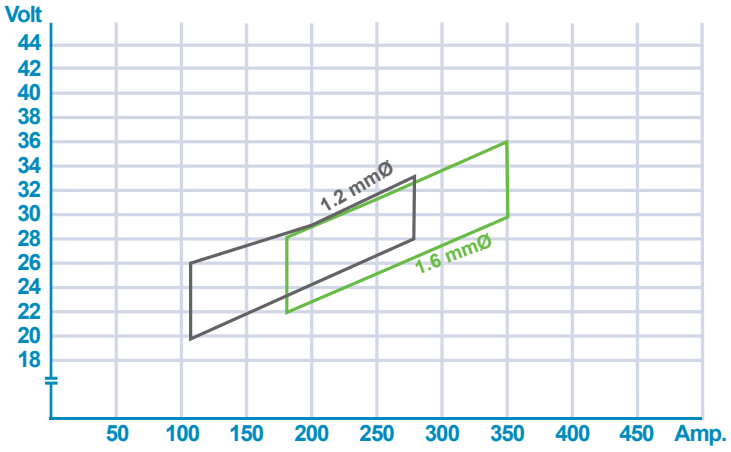
80%Ar - 20%CO2 / 100%CO_2
EN ISO 17633-A TZ 19 13 4 L R C/M 3
AWS A5.22 E317LT0-1/4
EN 1.4440

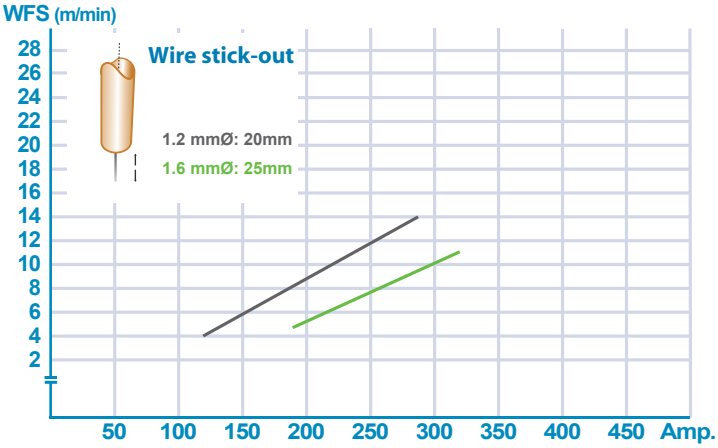
Description and Application

This is a rutile flux cored wire which operates with very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

PREMIARC™ DW-317L is designed for welding 18%Cr-12%Ni-2.5%Mo-N (type 316LN) or 19%Cr-12%Ni-3.5%Mo (type 317L) stainless steels. Due to the low carbon contents in the weld metal, it is possible to obtain high resistance to intergranular corrosion.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.03	0.60	1.10	0.02	0.008	12.6	19.1	3.5	-	-	9.2	11.6	8.7

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	490	620	35	50
Guarantee	min.350	min.550	min.25	

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	317L	-	-	-	-	-

PREMIARC™ DW-318

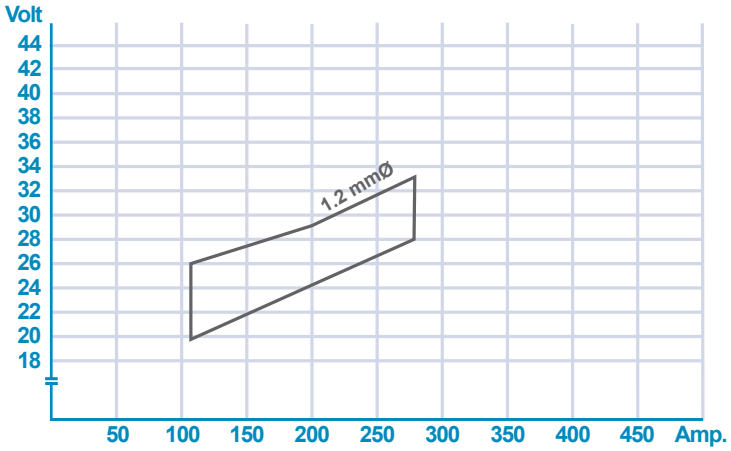
80%Ar - 20%CO_2
EN ISO 17633-A-T 19 12 3 Nb P M 2
EN 1.4576

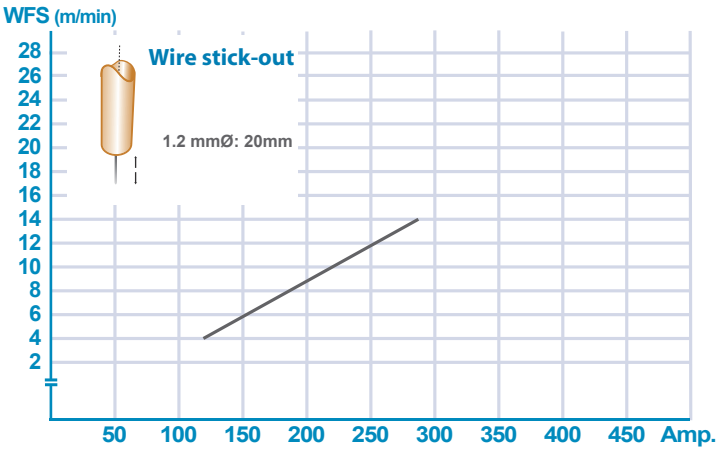
Description and Application

This is a rutile flux cored wire which operates with a very stable, spatter free arc producing bright, smooth weld bead surfaces and self releasing slag.

PREMIARC™ DW-318 is designed for welding 18%Cr-12%Ni-2%Mo-Nb or Ti stainless steel. Due to its Mo and Nb content, DW-318 provides good resistance against intergranular corrosion and non-oxidizing acid.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.50	1.30	0.02	0.012	11.6	18.5	2.8	-	0.4	8.9	16.0	12.9

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
	511	680	31	57
Guarantee	min.350	min.550	min.25	

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ MX-A430M

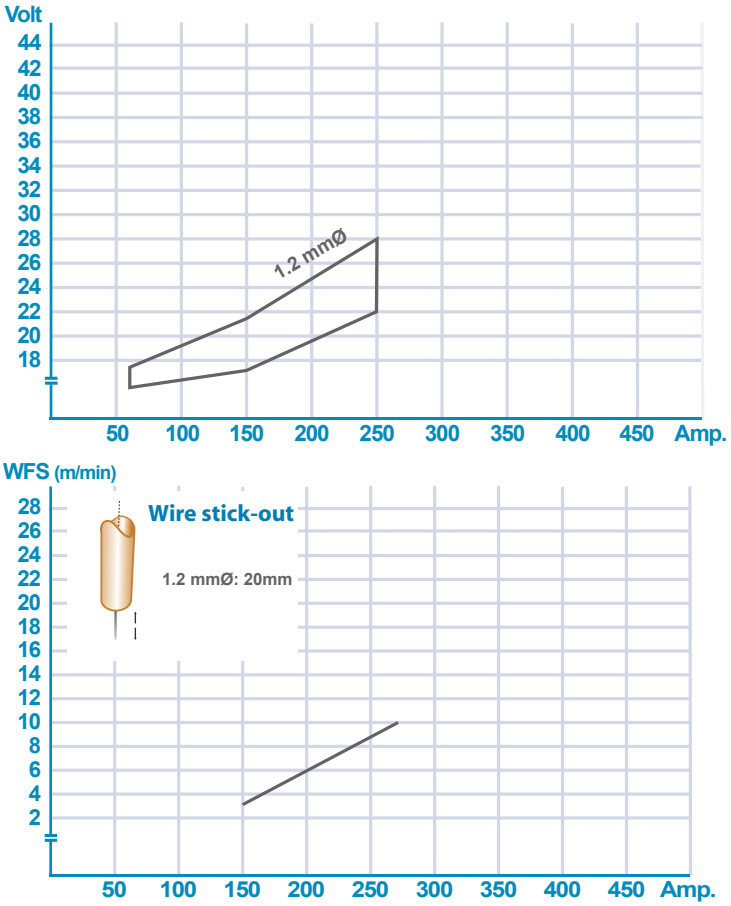
80%Ar - 20%CO_2

Description and Application

PREMIARC™ MX-A430M is a metal cored wire for welding 17Cr and 13Cr ferritic stainless steels used in automotive exhaust systems, catalytic converters and mufflers.

In comparision with standard 430 type solid wires, **PREMIARC™ MX-A430M** offers higher resistance to burn-through when welding thin plate such as 0.8~2.0mm, superior crack resistance when welding auto parts contaminated with oil from press-forming processes and excellent corrosion and oxidation resistance.

Recommended Parameter Range, for flat position



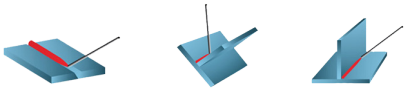
Typical Chemical Analysis (wt. %)

C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
0.05	0.40	0.14	0.008	0.017	0.08	17.0	-	-	0.75	-	-	-

Typical Mechanical Properties

R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C
390	540	26	-

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ MX-A410NiMo

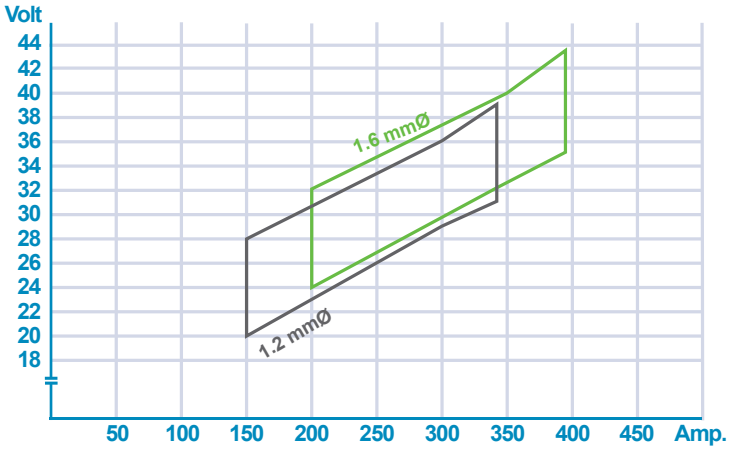
80%Ar - 20%CO_2
EN ISO 17633-A T134 MM3
AWS A5.22 EC410NiMo
EN 1.4313

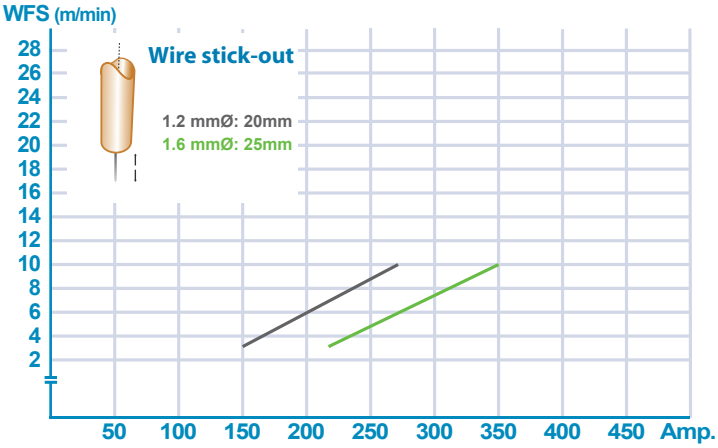
Description and Application

PREMIARC™ MX-A410NiMo is a metal cored wire for 13CrNi-Mo martensitic stainless steel.

Features of these wires are low hydrogen content and high strength in deposited weld metal. Due to their corrosion resistance combined with their high abrasion resistance, these wires find widespread use for welding water turbines used in hydropower genaration plants.

Recommended Parameter Range, for flat position





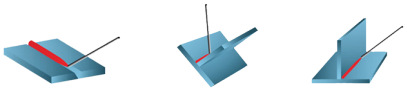
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb	FS	FN	FNW
	0.02	0.23	0.46	0.021	0.005	4.4	11.8	0.61	-	-	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C	PWHT
	813	888	19	67	595°C x 8hrs AC
Guarantee	min.500	min.760	min.15		

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-N82

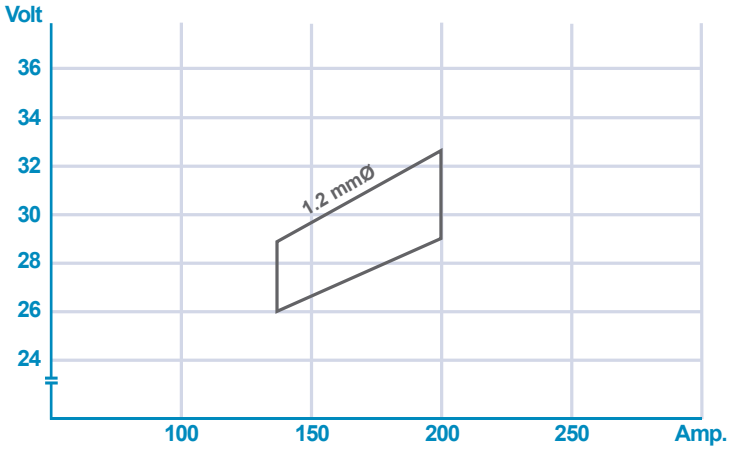
80%Ar - 20%CO_2
EN ISO 12153 T Ni6082 R M 3
AWS A5.34 ENiCr3T0-4
EN 2.4806

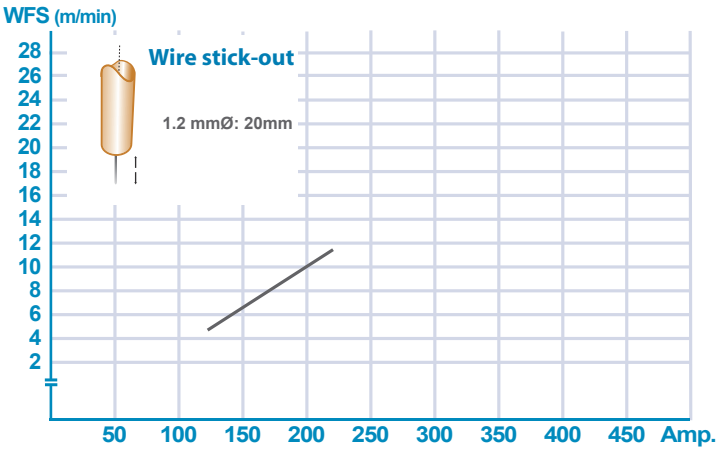
Description and Application

PREMIARC™ DW-N82 is a nickel based flux cored wire for welding alloy 600, 800.

PREMIARC™ DW-N82 is recommended for a variety of applications, including overlay welding of carbon steels or low alloy steels and a wide variety of dissimilar metal joints.

Recommended Parameter Range, for flat position





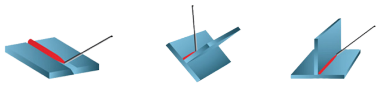
Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Fe	Nb+Ta	Ti	Co	W	V
	0.047	0.27	3.20	0.003	0.004	<0.005	70.2	21.0	-	2.2	2.7	0.30	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C	CV (J) -196°C
	383	649	46	128	-
Guarantee	min.360	min.550	min.25		

Welding Positions



Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-N625

80%Ar - 20%CO_2
EN ISO 12153 T Ni 6625 P M 2
AWS A5.34 ENiCrMo3T1-4
EN 2.4831

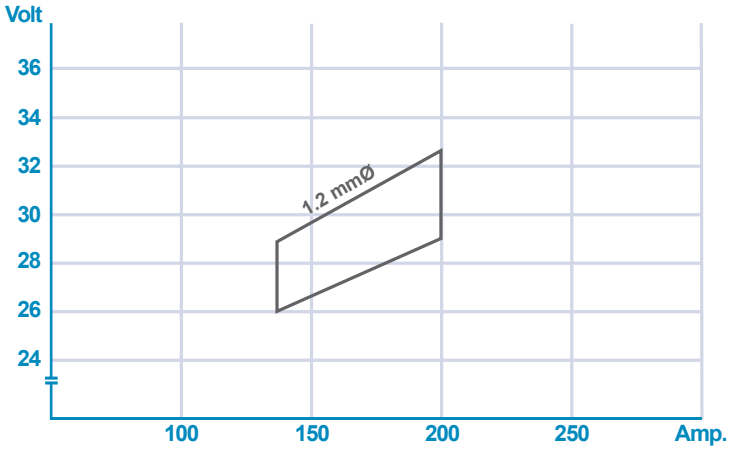
Description and Application

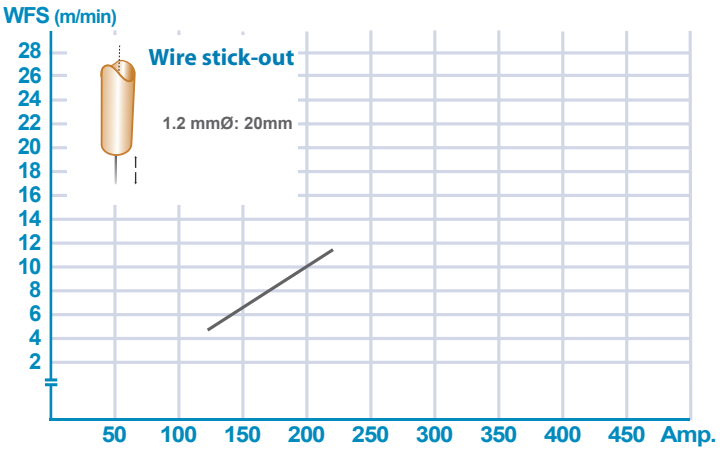
PREMIARC™ DW-N625 is a nickel based flux cored wire for welding nickel based alloys 625, 825 and also super austenitic stainless steels.

PREMIARC™ DW-N625 has a stable arc with minimal spatter, which makes it also an excellent product for welding in all positions.

This wire is recommended for a wide variety of applications, including overlay welding of carbon steel or low alloy steels and a wide variety of dissimilar metal joints.
Please note that for circumferential joining of pipes in fixed positions, DW-N625P is a better choice than DW-N625.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Fe	Nb+Ta	Ti	Co	W	V
	0.028	0.38	0.36	0.006	0.003	0.010	63.3	21.6	8.5	2.1	3.45	0.16	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C	CV (J) -100°C	CV (J) -196°C
	472	752	38	67	63	52
Guarantee	min.420	min.690	min.25			

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™ DW-N625P

80%Ar - 20%CO_2
EN ISO 12153 T Ni 6625 P M 2
AWS A5.34 ENiCrMo3T1-4
EN 2.4831

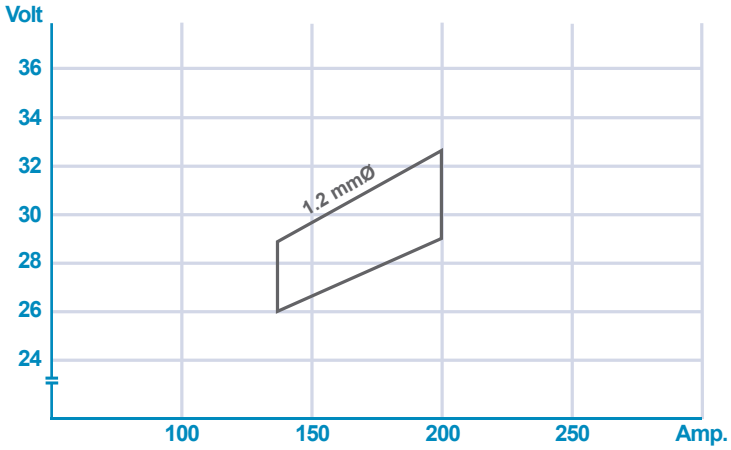
Description and Application

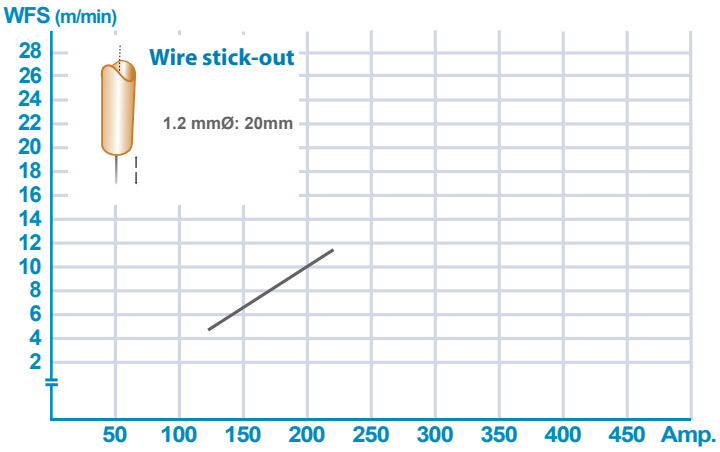
PREMIARC™ DW-N625P is a nickel based flux cored wire for welding nickel alloys 625, 825 and super austenitic stainless steels.

PREMIARC™ DW-N625P is an ideal wire for circumferential joining of pipes including clad pipes in fixed positions. Excellent bead wetting, very stable arc, little spatter and easy slag removal on circumferential joining of pipes can be obtained by both fully automated and manual welding.

For circumferential welding of pipes in fixed position, DW-N625P offers better weld metal soundness when compared with conventional 625 type FCWs. DW-N625P still retains the advantage of much higher productivity when compared with traditional SMAW, GTAW and MIG.

Recommended Parameter Range, for flat position





Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Fe	Nb+Ta	Ti	Co	W	V
	0.030	0.21	0.02	0.007	0.004	0.010	65.2	21.1	8.8	1.7	3.23	0.17	-	-	-

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C	CV (J) -100°C	CV (J) -196°C
	479	765	45	84	78	70
Guarantee	min.420	min.690	min.25			

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

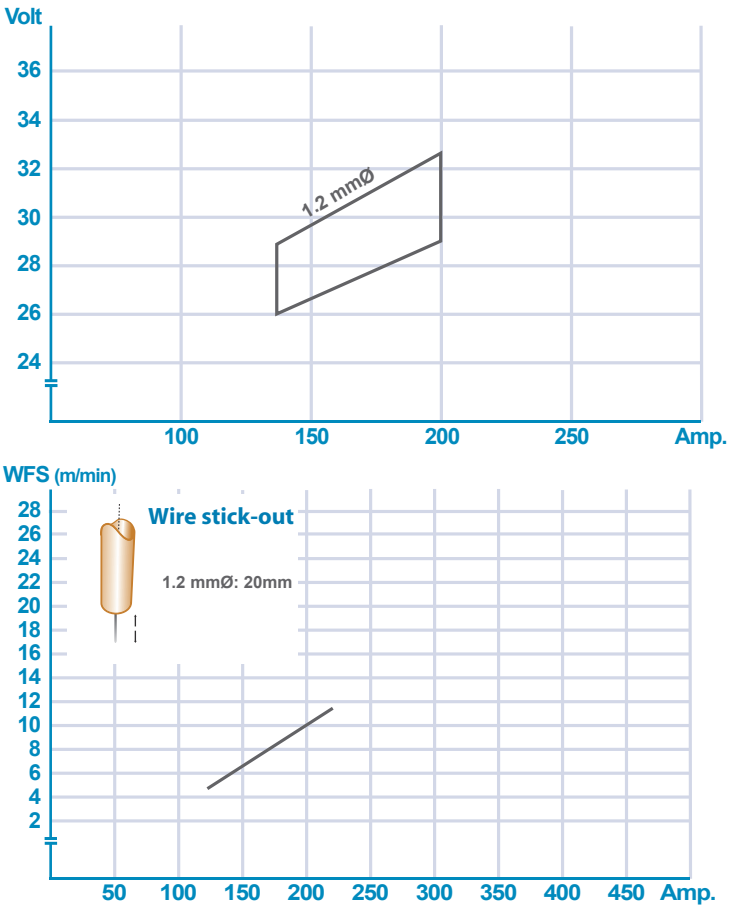
PREMIARC™ DW-NC276

80%Ar - 20%CO_2
AWS A5.34 ENiCrMo4T1-4
EN 2.4886

Description and Application

PREMIARC™ DW-NC276 is a nickel based flux cored wire for alloy C276 and super austenitic stainless steel, and is suitable for welding in all positions with Ar-CO_2 mixture gas.

Recommended Parameter Range, for flat position



Typical Chemical Analysis (wt. %)

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Fe	Nb+Ta	Ti	Co	W	V
	0.014	0.17	0.64	0.007	0.004	0.03	58.3	15.1	16.0	5.4	-	-	0.04	3.6	0.01

Typical Mechanical Properties

	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J) 0°C	CV (J) -100°C	CV (J) -196°C
	466	719	46	67	59	53
Guarantee	min.400	min.690	min.25			

Welding Positions

Approvals

LR	DNV	BV	GL	ABS	R.M.R.S	Others
-	-	-	-	-	-	-

PREMIARC™

TG-X308L
100%Ar
AWS A5.22 R 308LT1-5
EN 1.4316

TG-X309L
100%Ar
AWS A5.22 R 309LT1-5
EN 1.4332

TG-X316L
100%Ar
AWS A5.22 R 316LT1-5
EN 1.4430

TG-X347
100%Ar
AWS A5.22 R 347T1-5
EN 1.4551

Description and Application

These are all rutile flux cored TIG filler rods for root pass welding of stainless steel pipe without the need for a reverse side back purge (internal shielding gas). As they produce a slag, they are not recommended for multi-pass welding.

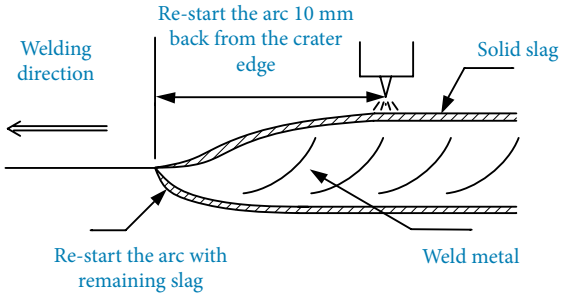
TG-X308L is for welding 18%Cr-8%Ni type stainless steel.

TG-X309L is for dissimilar joints between stainless and mild steel or medium carbon steels.

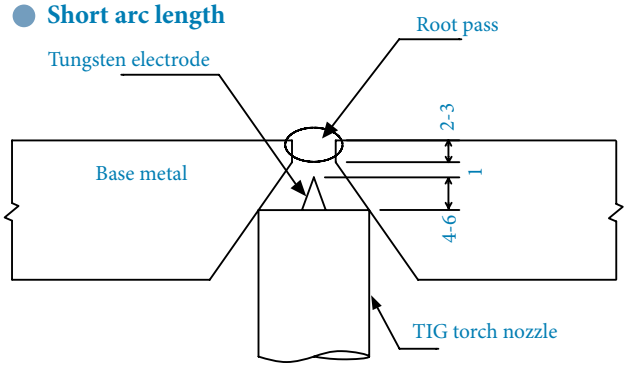
TG-X316L is for 18%Cr-12%Ni-2%Mo stainless steel.

TG-X347 is for 18%Cr-8%Ni+Ti or 18%Cr-8%Ni+Nb stabilized stainless steel.

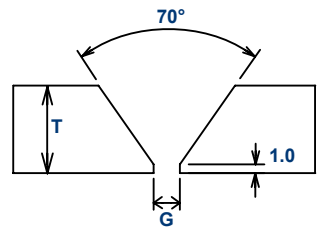
Proper bead connection



Short arc length

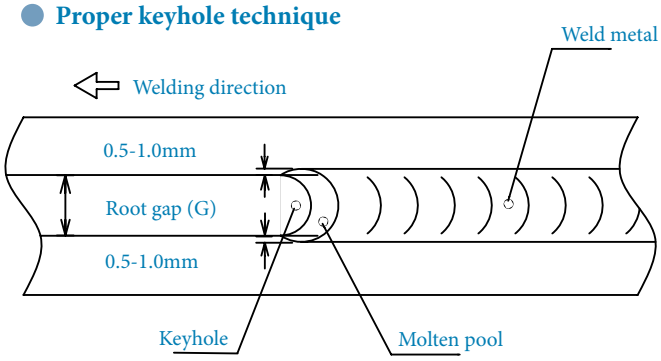


Proper root gap



Groove Preparation			
Plate thickness (T)	4 mm	6 mm	10 mm min.
Root gap (G)	2.0 mm	2.5 mm	3.0 mm

Proper keyhole technique



Typical Chemical Analysis (wt. %)

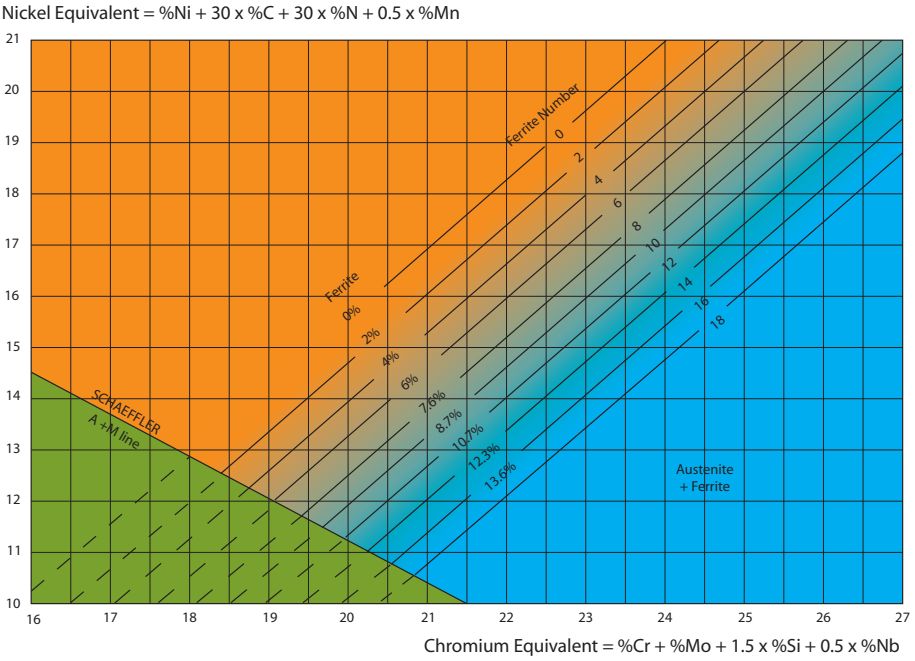
	C	Si	Mn	P	S	Ni	Cr	Mo	N	Nb+Ta	FS	FN
TG-X308L	0.02	0.80	1.70	0.023	0.005	10.3	19.6	-	-	-	9	13
TG-X309L	0.02	0.80	1.50	0.022	0.006	12.6	24.3	-	-	-	14	>18
TG-X316L	0.02	0.90	1.60	0.023	0.004	12.5	18.9	2.3	-	-	8	13
TG-X347	0.02	0.80	1.60	0.021	0.004	10.2	19.0	-	-	0.7	9	13

Typical Mechanical Properties

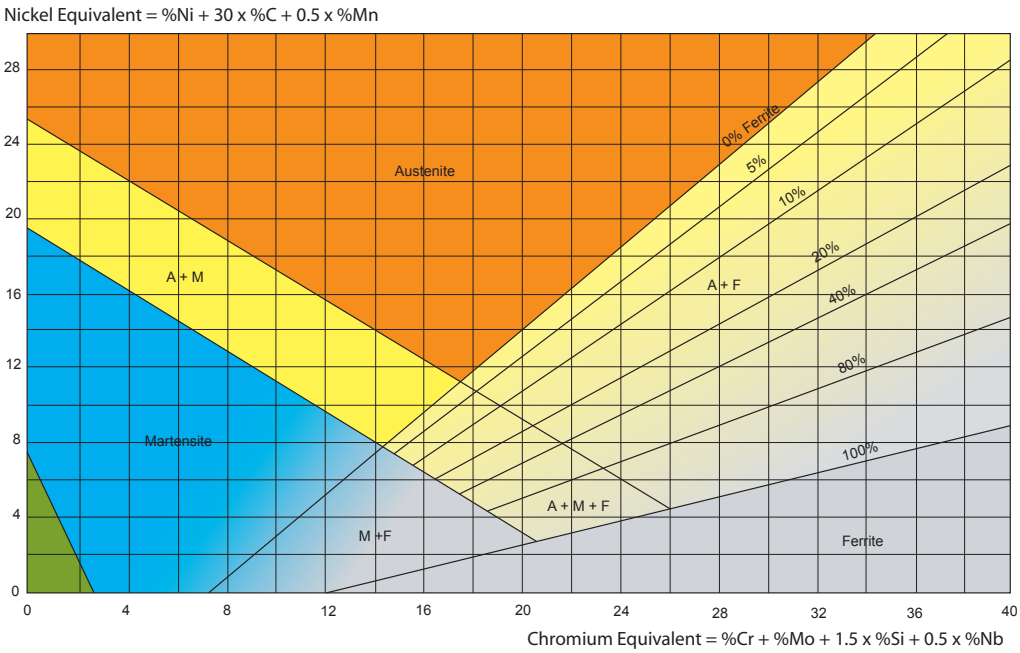
	R_e(MPa)	R_m(MPa)	A_5(%)	CV (J)	°C
TG-X308L	450	620	47	60	-196
TG-X309L	530	680	32	-	-
TG-X316L	440	600	38	110	0
TG-X347	460	630	48	130	0

Welding Positions

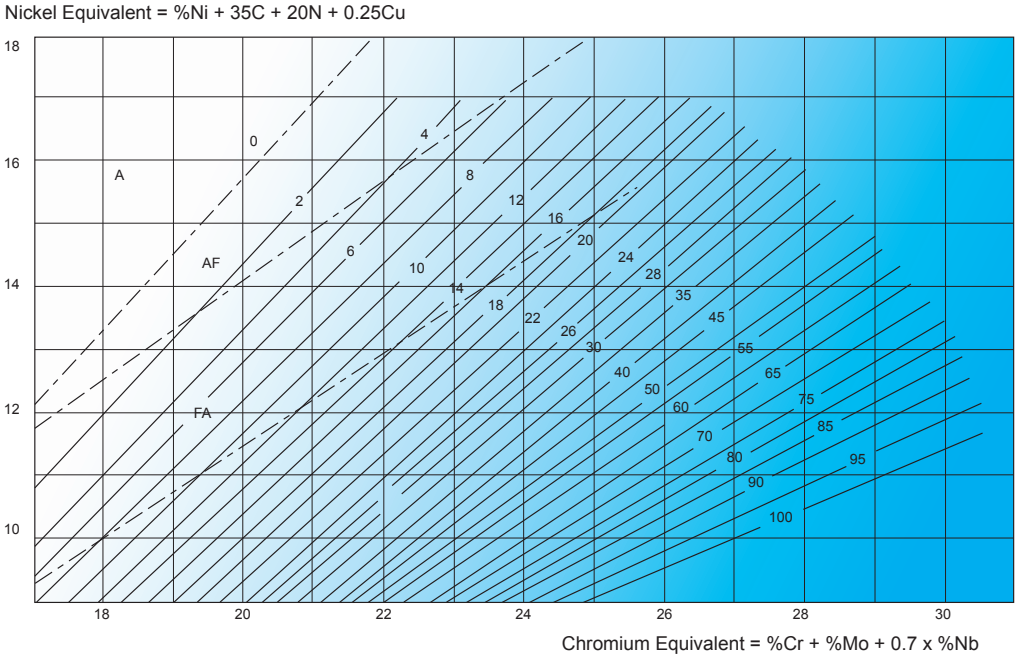
DeLong Diagram



Schaeffler Diagram

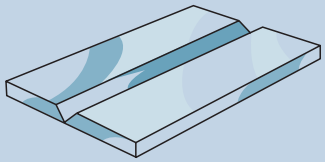


WRC Diagram-1992

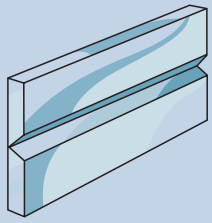


WELDING POSITIONS

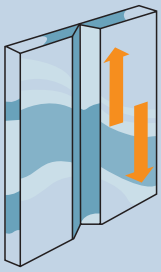
• Butt welds



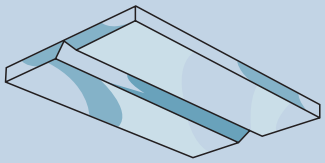
AWS: 1G
EN: PA



AWS: 2G
EN: PC

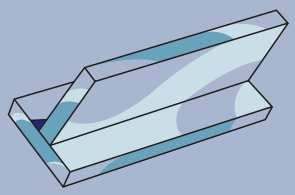


AWS: 3G
EN: PG • Down
PF • Up

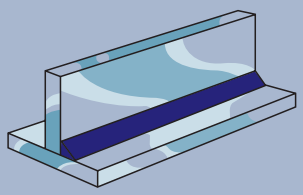


AWS: 4G
EN: PE

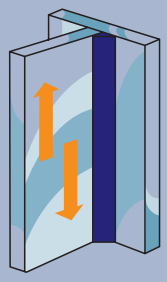
• Fillet welds



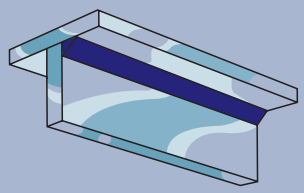
AWS: 1F
EN: PA



AWS: 2F
EN: PB

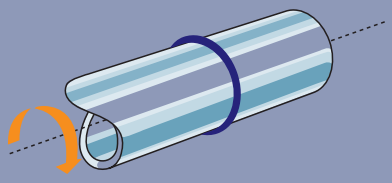


AWS: 3F
EN: PG • Down
PF • Up

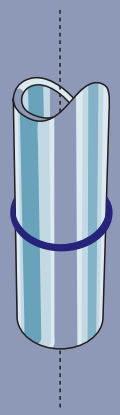


AWS: 4F
EN: PD

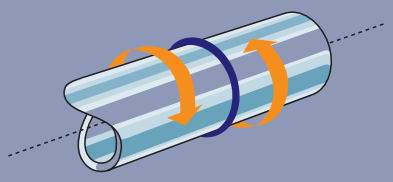
• Pipe welds



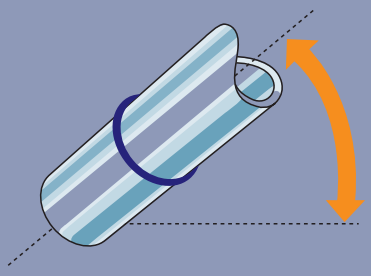
AWS: 1G
EN: PA



AWS: 2G
EN: PC



AWS: 5G
EN: PJ • Down
PH • Up



AWS: 6G
EN: H-LO45 - up
J-LO45 - down

A5.20: Carbon steel electrodes for flux cored arc welding
A5.29: Low alloy electrodes for flux cored arc welding

- Classification system

A 5.20 : E (1) (2) (3) (4) **T -** **- J HZ** **(Ex.) E7 1 T-1 M - J H8**

A 5.29 : E (1) (2) (3) **T -** (5) (4) **-** **- J HZ** **(Ex.) E8 1 T-1 - B2 M - J H8**

- E: Designates electrodes
- T: Designates flux-cored electrodes

(1) All-weld metal tensile strength and related requirement [1]

Code	Tensile Strength		Impact absorbed energy, Min. ft-lb (J)
	ksi	MPa	
6	60-80	410-550	Average 20 (27) Each 15 (20) at specific temperature depending on classification
7	70-90	480-620	
8	80-100	550-690	
9	90-110	620-760	
10	100-120	690-830	
11	110-130	760-900	
12	120-140	830-970	

Note: (1) PWHT is required depending on classification

(2) Welding position

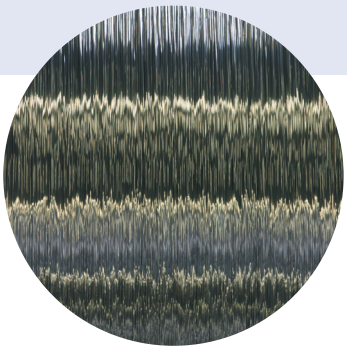
Code	Designation
0	F, HF
1	All positions

(4) Shielding gas

Suffix	Designation
M	75%-80%Ar/Bal. CO_2
C	CO_2
None	Self-shield

(5) Chemical composition of all-weld metal (A 5.29)

Suffix	Type	Suffix	Type
A1	C-Mo steel	Ni1 Ni2 Ni3	Ni steel
B1 B1L B2 B2L B2H B3 B3L B3H B6 B6L B8 B8L	Cr-Mo steel	D1 D2 D3	Mn-Mo steel
		K1 K2 K3 K4 K5 K6 K7 K8 K9 W2 G	Other low-alloy steels



3 Performances

Suffix (1)	Performances (Type of flux, Polarity, Application)
1	MAG, Rutile type, Fillet welding (Multi-pass)
2	MAG, Rutile type, Fillet welding (Single-pass)
3	Self-shielded, DC-EP, High welding speed
4	Self-shielded, DC-EP, High deposition rate
5	MAG, Lime type, High impact value, Good crack resistance
6	Self-shielded, DC-EP, High impact value
7	Self-shielded, DC-EN, High deposition rate
8	Self-shielded, DC-EN, High deposition rate
9	MAG, Rutile type, DC-EP, Small size: for all positions
10	Self-shielded, DC-EN, High welding speed
11	Self-shielded, DC-EN, Good usability
12	MAG, Rutile type, DC-EP, High impact value
13	Self-shielded, DC-EN, Root pass welding of pipes
14	Self-shielded, DC-EN, All positions, High welding speed
G	Not specified, For multiple-pass welding
GS	Not specified, For single-pass welding

Note: (1) A 5.29 designates 1, 4, 5, 6, 7, 8, 11 or G only.

Option.

J: Satisfies the minimum Charpy impact value 27J at -40ºC (A5.20) or at a test temperature of 11ºC lower (A5.29) than the specified temperature.

HZ: Diffusible hydrogen

Suffix	Diffusible hydrogen, Max. ml/100g deposited metal
H16	16.0
H8	8.0
H4	4.0
None (1)	8.0

Note: (1) A 5.29 only.

AWS A5.22-2010

Stainless steel electrodes for flux cored arc welding
Stainless steel flux-cored rods for gas tungsten arc welding

- Classification system

E (1) (2) **T** (3) **-** **(Ex.) E 308L T 1 -1**

R (1) (2) **T** (3) **-** **(Ex.) R 308L T 1 -5**

- E: Designates welding electrodes
- R: Designates welding rods
- T: Designates flux-cored electrodes or rods

(1) Weld metal chemical composition and related requirements (See A5.22 for self-shielded wires)

	• Chemical composition of all-weld metal (%) (1)(2)										Typical Mechanical Properties of all-weld metal (as welded)		
											TS, Min		EL., Min.
Classification	C	Cr	Ni	Mo	Cb+Ta	Mn	Si	P	S	Cu	ksi	MPa	(%)
E307	0.13	18.0-20.5	9.0-10.5	0.5-1.5	-	3.30-4.75	1.0	0.04	0.03	0.5	85	590	30
E308	0.08	18.0-21.0	9.0-11.0	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	80	550	35
E308H	0.04-0.08	18.0-21.0	9.0-11.0	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	80	550	35
E308L	0.04	18.0-21.0	9.0-11.0	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	35
E308Mo	0.08	18.0-21.0	9.0-11.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	80	550	35
E308LMo	0.04	18.0-21.0	9.0-12.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	35
E309	0.10	22.0-25.0	12.0-14.0	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	80	550	30
E309L	0.04	22.0-25.0	12.0-14.0	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	30
E309LCb	0.04	22.0-25.0	12.0-14.0	0.5	0.70-1.00	0.5-2.5	1.0	0.04	0.03	0.5	75	520	30
E309Mo	0.12	21.0-25.0	12.0-16.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	80	550	25
E309LMo	0.04	21.0-25.0	12.0-16.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	25
E309LNiMo	0.04	20.5-23.5	15.0-17.0	2.5-3.5	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	25
E310	0.20	25.0-28.0	20.0-22.5	0.5	-	1.0-2.5	1.0	0.03	0.03	0.5	80	550	30
E312	0.15	28.0-32.0	8.0-10.5	0.5	-	0.5-2.5	1.0	0.04	0.03	0.5	95	660	22
E316	0.08	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	30
E316L	0.04	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.0	0.04	0.03	0.5	70	485	30
E317L	0.04	18.0-21.0	12.0-14.0	3.0-4.0	-	0.5-2.5	1.0	0.04	0.03	0.5	75	520	20
E347	0.08	18.0-21.0	9.0-11.0	0.5	8xC-1.00	0.5-2.5	1.0	0.04	0.03	0.5	75	520	30
R308L	0.03	18.0-21.0	9.0-11.0	0.5	-	0.5-2.5	1.2	0.04	0.03	0.5	75	520	35
R309L	0.03	22.0-25.0	12.0-14.0	0.5	-	0.5-2.5	1.2	0.04	0.03	0.5	75	520	30
R316L	0.03	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	1.2	0.04	0.03	0.5	70	485	30
R347	0.08	18.0-21.0	9.0-11.0	0.5	8xC-1.00	0.5-2.5	1.2	0.04	0.03	0.5	75	520	30

Classification	Chemical composition of all-weld metal (%) [1][2]									Typical Mechanical Properties of all-weld metal [3]			
										TS, Min		El., Min. (%)	PWHT
	C	Cr	Ni	Mo	Mn	Si	P	S	Cu	ksi	MPa		
E409	0.10	10.5-13.5	0.60	0.5	0.80	1.0	0.04	0.03	0.5	65	450	15	None
E410	0.12	11.0-13.5	0.60	0.5	1.2	1.0	0.04	0.03	0.5	75	520	20	(a)
E410NiMo	0.06	11.0-12.5	4.0-5.0	0.40-0.70	1.0	1.0	0.04	0.03	0.5	110	760	15	(b)
E410NiTi	0.04	11.0-12.0	3.6-4.5	0.5	0.70	0.50	0.03	0.03	0.5	110	760	15	(b)
E430	0.10	15.0-18.0	0.60	0.5	1.2	1.0	0.04	0.03	0.5	65	450	20	(c)
E502	0.10	4.0-6.0	0.40	0.45-0.65	1.2	1.0	0.04	0.03	0.5	60	415	20	(d)
E505	0.10	8.0-10.5	0.40	0.85-1.20	1.2	1.0	0.04	0.03	0.5	60	415	20	(d)

Classification	Chemical composition of all-weld metal (%) [1][2]										Typical Mechanical Properties of all-weld metal [3]			
											TS, Min		El., Min. (%)	PWHT
	C	Cr	Ni	Mo	Mn	Si	P	S	N	Cu	ksi	MPa		
E2209	0.04	21.0-24.0	7.5-10.0	2.5-4.0	0.5-2.0	1.0	0.04	0.03	0.08-0.20	0.75	100	690	20	None
E2553	0.04	24.0-27.0	8.5-10.5	2.9-3.9	0.5-1.5	0.75	0.04	0.03	0.10-0.20	1.5-2.5	110	760	15	None
E2594	0.04	24.0-27.0	8.0-10.5	2.5-4.5	0.5-2.5	1.0	0.04	0.03	0.20-0.30	0.20-0.30	110	760	15	None

Note: (1) Single values are maximum

(2) The total of other elements, except iron, shall not present in excess of 0.5%.

(3) All-weld-metal mechanical properties are obtained after the following PWHT:

a: Heated to 1350 to 1400°F (732 to 760°C), held for 1 hour, then furnace cooled to 600°F (315°C) at a rate not to exceed 100°F (55°C) per hour, then cooled in air to room temperature.

b: Heated to 1100 to 1150°F (593 to 621°C), held for 1 hour, then cooled in air to room temperature.

c: Heated to 1400 to 1450°F (760 to 788°C), held for 4 hours, then furnace cooled to 1100°F (593°C) at a rate not to exceed 100°F (55°C) per hour, then cooled in air to room temperature.

d: Heated to 1550 to 1600°F (840 to 870°C), held for 2 hours, then furnace cooled to 1100°F (593°C) at a rate not to exceed 100°F (55°C) per hour, then cooled in air to room temperature.

2 Position of welding

Code	Welding position
0	Flat and horizontal
1	All positions

3 External shielding medium and related requirements

Code	External shielding medium	Welding polarity	Welding process
1	CO_2	DC-EP	FCAW
3	None (self-shielded)	DC-EP	FCAW
4	75%-80%Ar/bal. CO_2	DC-EP	FCAW
5	100%Argon	DC-EN	GTAW

EN ISO 17632:2008

Tubular cored electrodes for gas shielded or self-shielded metal arc welding of non-alloy and fine-grain steels.

- Classification (system A)

EN ISO 17632-A-T 1 2 3 4 5 6 7

[Ex.] EN ISO 17632-A-T **46 3 1Ni B M 4 H5**

- T: Designates tubular cored electrodes for metal arc welding

1 Yield strength and related requirements

(a) Multiple-layer welding

Yield strength of all-weld metal

Code	Yield strength or 0.2% offset strength Min. (MPa)	Tensile strength (MPa)	Elongation (L=5D) Min. (%)
35	355	440~570	22
38	380	470~600	20
42	420	500~640	20
46	460	530~680	20
50	500	560~720	18

(b) Single pass welding

Yield strength of weld joint

Code	Yield strength of base metal Min. (MPa)	Tensile strength of weld joint Min. (MPa)
3T	355	470
4T	420	520
5T	500	600

2 Impact value of all-weld metal or weld joint

Code	Test temp. (°C)	Impact absorbed energy Min. (J)
Z	Not required	Average 47
A	+20	
0	0	
2	-20	
3	-30	
4	-40	
5	-50	
6	-60	

3 Chemical composition of all-weld metal

Code	Chemical composition (1) (%)		
	Mn	Ni	Mo
-	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	-
1.5Ni	1.6	1.2-1.8	-
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	0.6-1.2	0.3-0.6
Z	Other elements as agreed		

Note: (1) Single values are maximum.
Where no specification, Mo<0.2%
Ni<0.5%, Cr<0.2%, V<0.08%,
Nb<0.05%, Cu<0.3%, and for
self-shielded wires, Al<2.0%

4 Type of cored flux

Code	Features	Type of welding	Shielding gas
R	Rutile, Slow-freezing slag	Single pass or multiple pass	Required
P	Rutile, Fast-freezing slag		
B	Basic		
M	Metal powder		
V	Basic/Fluorides or Rutile	Single pass	Not required
W	Basic/Fluorides Slow-freezing slag	Single pass or multiple pass	
Y	Basic/Fluorides Fast-freezing slag		
Z	Other types		

5 Shielding gas

Code	Designation
M	Gas mixtures (Gases specified as M2 per ISO 14175 except He)
C	CO_2 (Gases specified as C1 per ISO 14175)
N	Self-shielded

6 Welding position (Option)

Code	Designation
1	All positions
2	All positions except vertical downward
3	Flat butt and fillet, Horizontal fillet
4	Flat butt and fillet
5	Vertical downward and those specified in the code 3

7 Diffusible hydrogen (option)

Code	Diffusible hydrogen, max. ml/100g deposited metal
H5	5
H10	10
H15	15

EN ISO 17633:2010

Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels

- Classification (system A)

EN ISO 17633-A-T (1) (2) (3) (4)

[Ex.] EN ISO 17633-A-T 19 12 3L R M 4

- T: Designates tubular cored electrodes for gas shielded and non-gas shielded metal arc welding

(1) Chemical composition and mechanical properties of all-weld metal

	Chemical composition (%)				Proof strength Min. Rp0.2 (MPa)	Tensile strength Min. Rm (MPa)	El. (L=5D) Min. A %	PWHT
Classification	Cr	Ni	Mo	Others				
Martensite/ferrite type								
13	11.0-14.0	-	-	-	250	450	15	(3)
13 Ti	10.5-13.0	-	-	Ti(1)	250	450	15	(3)
13 4	11.0-14-5	3.0-5.0	0.4-1.0	-	500	750	15	(4)
17	16.0-18.0	-	-	-	300	450	15	(5)
Austenite type								
19 9 L	18.0-21.0	9.0-11.0	-	-	320	510	30	None
19 9 Nb	18.0-21.0	9.0-11.0	-	Nb(2)	350	550	25	None
19 12 3 L	17.0-20.0	10.0-13.0	2.5-3.0	-	320	510	25	None
19 12 3 Nb	17.0-20.0	10.0-13.0	2.5-3.0	Nb(2)	350	550	25	None
Austenite-ferrite high corrosion resistant type								
22 9 3 N L	21.0-24.0	7.5-10.5	2.5-4.0	N:0.08-0.20	450	550	20	None
23 7 N L	22.5-25.5	6.5-10.0	-	N:0.10-0.20	450	570	20	None
25 9 4 N L	24.0-27.0	8.0-10.5	2.5-4.5	N:0.20-0.30	550	620	18	None
25 9 4 Cu N L	24.0-27.0	8.0-10.5	2.5-4.5	N:0.20-0.30 Cu: 1.0-2.5	550	620	18	None
Full-austenite high corrosion resistant type								
18 16 5 N L	17.0-20.0	15.5-19.0	3.5-5.0	N:0.08-0.20	300	480	25	None
19 13 4 N L	17.0-20.0	12.0-15.0	3.0-4.5	N: 0.08-0.20	350	550	25	None
20 25 5 Cu N L	19.0-22.0	24.0-27.0	4.0-6.0	N:0.10-0.20 Cu:1.0-2.0	320	510	25	None
Special type								
18 8 Mn	17.0-20.0	7.0-10.0	-	-	350	500	25	None
20 10 3	19.5-22.0	9.0-11.0	2.0-4.0	-	400	620	20	None
23 12 L	22.0-25.0	11.0-14.0	-	-	320	510	25	None
23 12 2 L	22.0-25.0	11.0-14.0	2.0-3.0	-	350	550	25	None
29 9	27.0-31.0	8.0-12.0	-	-	450	650	15	None
Heat resistant type								
19 9 H	18.0-21.0	9.0-11.0	-	-	350	550	25	None
22 12 H	20.0-23.0	10.0-13.0	-	-	350	550	20	None

Note: (1) Ti:10xC%-1.5%
(2) Nb:8xC%-1.1%: Nb can be replaced with Ta up to 20%
(3) 840-870°Cx2H heating, followed by FC to 600°C and later AC
(4) 580-620°Cx2H heating, followed by AC
(5) 760-790°Cx2H heating, followed by FC to 600°C and later AC

2 Type of cored flux

Code	Features
R	Rutile, Slow-freezing slag
P	Rutile, Fast-freezing slag
M	Metal powder
U	Self-shielded
Z	Other types

3 Shielding gas

Code	Designation
M	Gas mixtures (Gases specified as M2 per ISO 14175 except He)
C	CO_2 (Gases specified as C1 per ISO 14175)
N	Self-shielded

4 Welding position (Option)

Code	Designation
1	All positions
2	All positions except vertical downward
3	Flat butt and fillet, Horizontal fillet
4	Flat butt and fillet
5	Vertical downward and those specified in the code 3

EN ISO 18276:2006

Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of heat-strength steels.

- Classification (system A)

EN ISO 18276-A-T 1 2 3 4 5 6 7 8

[Ex.] EN ISO 18276-A-T 55 5 Mn1.5Ni B M 4 H5 T

- T: Designates tubular cored electrodes for gas shielded and non-gas shielded metal arc welding

1 All-weld metal yield strength and related requirements

Code	Yield strength or 0.2% offset strength Min. (MPa)	Tensile strength (MPa)	Elongation (L=5D) Min. (%)
55	550	640~820	18
62	620	700~890	18
69	690	770~940	17
79	790	880~1080	16
89	890	940~1180	15

2 Impact value of all-weld metal

Code	Absorbed energy of 47J, Three-specimen average, (1) Test temp. (°C)
Z	Not required
A	+20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60

Note: (1) One value can be lower than 47 J but be 32 J or higher

3 Chemical composition of all-weld metal

Code	Chemical composition (1) (%)			
	Mn	Ni	Cr	Mo
Z	Elements as agreed			
MnMo	1.4-2.0	-	-	0.3-0.6
Mn1Ni	1.4-2.0	0.6-1.2	-	-
Mn1, 5Ni	1.1-1.8	1.3-1.8	-	-
Mn2, 5Ni	1.1-2.0	2.1-3.0	-	-
1NiMo	1.4	0.6-1.2	-	0.3-0.6
1, 5NiMo	1.4	1.2-1.8	-	0.3-0.7
2NiMo	1.4	1.8-2.6	-	0.3-0.7
Mn1NiMo	1.4-2.0	0.6-1.2	-	0.3-0.7
Mn2NiMo	1.4-2.0	1.8-2.6	-	0.3-0.7
Mn2NiCrMo	1.4-2.0	1.8-2.6	0.3-0.6	0.3-0.6
Mn2Ni1CrMo	1.4-2.0	1.8-2.6	0.6-1.0	0.3-0.6

Note: (1) Single values are maximum.

4 Type of cored flux

Code	Features
R	Rutile, Slow-freezing slag
P	Rutile, Fast-freezing slag
B	Basic
M	Metal powder
Z	Other types

5 Shielding gas

Code	Designation
M	Gas mixtures
C	CO_2

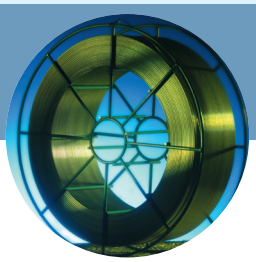
6 Welding position (Option)

Code	Designation
1	All positions
2	All positions except vertical downward
3	Flat butt and fillet, Horizontal fillet
4	Flat butt and fillet
5	Vertical downward and those specified in the code 3

7 Diffusible hydrogen (option)

Code	Diffusible hydrogen, max. ml/100g deposited metal
H5	5
H10	10

8 Heat treatment: T: 560-600°Cx1h, Furnace Cooling to 300°C for mechanical tests of all-weld metal



Abbreviations

General

A	Ampere
AC	Air Cooling
ASTM	American Society for Testing and Materials
AWS	American Welding Society
A_5	Elongation
CO_2	Carbon dioxide
CTOD	Crack Tip Opening Displacement
CV	Charpy Impact Value
EN	European Norm
FC	Furnace Cooling
FCW	Flux Cored Wire
FN	Ferrite according to DeLong Diagram
FNW	Ferrite according to WRC Diagram - 1992
FS	Ferrite according to Schaeffler Diagram
HAZ	Heat Affected Zone
ISO	International Standards Organisation
KSL	KOBE STEEL, LTD.
KWE	KOBELCO WELDING OF EUROPE B.V.
MAG	Metal Active Gas
NACE	National Association of Corrosion Engineers
PWHT	Post Weld Heat Treatment
R_e	0.2% Proof Stress
R_m	Tensile Strength
SR	Stress Relief
TIG	Tungsten Inert Gas
=/-	Direct Current Straight Polarity (DCSP)
=/+	Direct Current Reverse Polarity (DCRP)

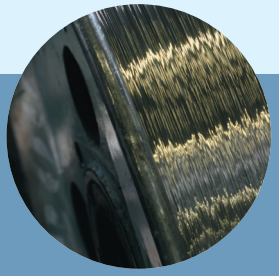
Approval Bureaus

ABS	American Bureau of Shipping
BV	Bureau Veritas
CCS	China Classification Society
CWB	Canadian Welding Bureau
DNV	Det Norske Veritas
DB	Deutsche Bahn
GL	Germanischer Lloyd
KR	Korean Register of Shipping
LR	Lloyd's Register of Shipping
NK	Nippon Kaiji Kyokai
P.R.S.	Polski Rejestr Statkow
RINA	Registro Italiano Navale
R.M.R.S	Russian Maritime Resister of Shipping
RRR	Russian River Register
TÜV	Technischer Überwachungs-Verein

Positions (EN and AWS A3.0)

PA	Flat Fillet (1F), Flat Butt (1G) and rotating horizontal Pipe weld (1G)
PB	Horizontal Fillet / Standing Fillet (2F)
PC	Horizontal Vertical Butt or Pipe weld (2G)
PD	Overhead Fillet weld (4F)
PE	Overhead Butt weld (4G)
PF	Vertical Up for both Butt (3G) and Fillet welds (3F)
PG	Vertical Down for both Butt (3G) and Fillet welds (3F)
PH	Vertical up welding on fixed horizontal pipe (5G)
PJ	Vertical down welding on fixed horizontal pipe (5G)
H-L045	Fixed pipe welded under 45 degree angle welding upwards (6G uphill)
J-L045	Fixed pipe welded downwards under 45 degree angle (6G downhill)

List of addresses



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