



MEGAFIL[®] Seamless Flux- and Metal-cored Welding Wires



ITW Welding -

Your Route to Full Performance in Welding

We are passionate about welding and this is reflected by our unique offering to the market. When you use Hobart's best in class welding consumables or Miller's welding equipment, you will enjoy the most advanced and productive products.

Hobart is a recognized leader in the development of filler metal technologies and has the expertise to address the toughest welding challenges. Under this brand, we have been bringing together a wealth of welding expertise and consumables with unequalled welding performance since 1917.

Special wires have been developed to meet specific requirements of demanding industries, such as offshore, oil & gas and pipe mills. Hobart MIG/MAG welding consumables are manufactured using state-of-the-art production technology. They carry the name MEGAFIL® for the advanced range of low-hydrogen cored wires.

MEGAFIL® seamless flux and metal cored products are brought to the market supported by a dedicated team of specialists, capable of providing integrated welding solutions. Partnering with ITW Welding, you will have the deep knowledge and experience of our engineers at your side, along with fully equipped laboratories for sound application research.

ITW Welding is a total solution provider for welding processes, including welding heads, torches, tractors, orbital welding equipment, column & booms, ceramic backings, flux drying, handling equipment and preheating equipment. The offer includes engineering and automation and turnkey solutions, making us the ideal partner for one-stop shopping.

Contact us and discover ways to optimize your existing processes to their full potential.

**MEGAFIL® – A PRODUCT OF HOBART –
WELCOMES YOUR CHALLENGES**

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Disclaimer: The information contained herein is furnished for reference purposes only and is believed to be accurate and reliable. Typical data are those obtained when welding and testing are performed in accordance with prescribed standards and guidelines. Other tests may produce different results and typical data should not be assumed to yield similar results in a particular application or weldment. ITW Welding does not assume responsibility for any results obtained by persons over whose methods it has no control. It is the user's responsibility to determine the suitability of any products or methods mentioned herein for a particular purpose. In light of the foregoing, ITW Welding specifically disclaims all warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, and further disclaims any liability for consequential or incidental damages of any kind, including lost profits.

MEGAFIL® Quick Selection Guide

Product	Features	Page
Non-alloy and fine grain steels		
MEGAFIL® 710 M	<p>Metal-cored wire for non-alloyed steels < 460 MPa yield strength.</p> <p>Suitable for robot applications. Ideal for use in short arc and spray arc.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas. CTOD tested -20° C.</p>	18
MEGAFIL® 240 M	<p>Metal-cored wire with < 1.0% Ni for non-alloyed steels < 500 MPa yield strength.</p> <p>Suitable for robot applications. Ideal for use in short arc and spray arc.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas. CTOD tested -20° C.</p>	19
MEGAFIL® 713 R	<p>Micro-alloyed rutile flux-cored wire for non-alloyed steels < 460 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p>	20
MEGAFIL® 716 R	<p>Micro-alloyed rutile flux-cored wire for non-alloyed steels < 460 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas, as welded and stress relief annealed. CTOD tested -20° C.</p>	21
MEGAFIL® 821 R	<p>Micro-alloyed rutile flux-cored wire with < 1.0% Ni for non-alloyed steels < 500 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas, as welded and stress relief annealed. CTOD tested -20° C.</p>	22
MEGAFIL® 822 R	<p>Micro-alloyed rutile flux-cored wire with < 1.0% Ni for non-alloyed steels < 500 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas.</p>	23
MEGAFIL® 731 B	<p>Basic flux-cored wire for non-alloyed steels < 460 MPa yield strength.</p> <p>Extremely crack resistant weld metal. Well suited for welding high carbon steels and critical mixed base metal combinations. Ideal metallurgical choice for repair welding and buffer layers.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂) and 100% Carbon Dioxide (CO₂).</p>	24
MEGAFIL® 740 B	<p>Basic flux-cored wire with < 1.0% Ni for non-alloyed steels < 500 MPa yield strength.</p> <p>Extremely crack resistant weld metal. Well suited for welding high carbon steels and critical mixed base metal combinations. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -60° C with mixed gas.</p>	25
Weather resisting steels		
MEGAFIL® 281 M	<p>Metal-cored wire with < 1.0% Ni, 0.5% Cu and 0.5% Cr for weatherproof steels < 460 MPa yield strength.</p> <p>High deposition rate, excellent impact toughness properties down to -40° C.</p> <p>Suitable for robot applications. Ideal for use in short arc and spray arc.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p>	26
MEGAFIL® 781 R	<p>Micro-alloyed rutile flux-cored wire with < 1.0% Ni and 0.5% Cu for weatherproof steels < 460 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>Excellent impact toughness properties down to -40° C with mixed gas.</p>	27

Product	Features	Page
High-strength fine grain steels		
MEGAFIL® 940 M	Metal-cored wire with 2% Ni for high strength steel < 550 MPa yield strength. Particularly developed for welding shipbuilding steels such as HY80. WWEB approval and CTOD tested -40°C. Ideal for use in short arc and spray arc. Excellent impact toughness down to -60°C with mixed gas.	28
MEGAFIL® 610 M	Metal-cored wire with 1.0% Ni for high strength steel < 620 MPa yield strength. High deposition rate. Suitable for robot applications. Ideal for use in short arc and spray arc. Excellent impact toughness properties down to -60° C with mixed gas.	29
MEGAFIL® 620 M	Metal-cored wire with 1,7% Ni for high strength steel < 620 MPa yield strength. High deposition rate. Suitable for robot applications. Ideal for use in short arc and spray arc. Excellent impact toughness down to -60°C with mixed gas.	30
MEGAFIL® 742 M	Metal-cored wire with Ni, Mo and Cr for high strength steel < 690 MPa yield strength. High deposition rate. Ideal for use in short arc and spray arc. Suitable for robot applications. Excellent impact toughness properties down to -60° C with mixed gas.	31
MEGAFIL® 1100 M	Metal-cored wire with Ni, Mo and Cr for high strength steel < 960 (1100) MPa yield strength. High deposition rate. Suitable for robot applications. Ideal for use in short arc and spray arc. Excellent impact toughness properties down to -40° C with mixed gas.	32
MEGAFIL® 550 R	Micro-alloyed rutile flux-cored wire with > 1.0% Ni for high strength steel < 550 MPa yield strength. Rapidly solidifying slag for higher deposition rate in all position welding. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂), 100% Carbon Dioxide (CO ₂) possible. Excellent impact toughness properties down to -60° C with mixed gas.	33
MEGAFIL® 610 R	Micro-alloyed rutile flux-cored wire with 1.0% Ni for high strength steel < 620 MPa yield strength. Rapidly solidifying slag for higher deposition rate in all position welding. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂). Excellent impact toughness properties down to -40° C with mixed gas.	34
MEGAFIL® 620 R	Micro-alloyed rutile flux-cored wire with 1.7% Ni for high strength steel < 620 MPa yield strength. Rapidly solidifying slag for higher deposition rate in all position welding. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂). Excellent impact toughness properties down to -40° C with mixed gas.	35
MEGAFIL® 690 R	Micro-alloyed rutile flux-cored wire for high strength steel < 690 MPa yield strength. Rapidly solidifying slag for higher deposition rate in all position welding. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂). Excellent impact toughness properties down to -40° C with mixed gas.	36
MEGAFIL® 610 B	Basic flux-cored wire with 1.0% Ni for high strength steels < 620 MPa yield strength. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂). Extremely crack resistant weld metal. Excellent impact toughness properties down to -60° C with mixed gas.	37

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Product	Features	Page
MEGAFIL® 742 B	Basic flux-cored wire with Ni, Mo and Cr for high strength steel < 690 MPa yield strength. Extremely crack resistant weld metal. Excellent impact toughness properties down to -60° C with mixed gas, as welded and stress relief annealed.	38
MEGAFIL® 745 B	Basic flux-cored wire with Ni, Mo and Cr for high strength steel < 960 (1100) MPa yield strength. Extremely crack resistant weld metal. Excellent impact toughness properties down to -40° C with mixed gas.	39
Quenched and tempered steels		
MEGAFIL® 807 M	Metal-cored wire for non-alloyed steels < 890 MPa yield strength and temperable, high-strength fine grain structural steels < 700 MPa such as 25CrMo4; 34CrMo4; 28NiCrMo5-5; 42CrMo4 typically ASTM A 829 M.	40
Creep resisting steels		
MEGAFIL® 235 M	Metal-cored wire with 0.5% Mo for creep resisting steels < 460 MPa yield strength. Good arc restriking even with cold wire tip, suitable for robot applications. Ideal for use of short arc and spray arc. Excellent gap bridging for root welding. High-efficiency type for economic production of Mo-steels up to 500° C (932° F). Excellent impact toughness properties down to -40° C with mixed gas.	41
MEGAFIL® P36 M	Metal-cored wire with 1.0% Ni and 0.5% Mo for creep resisting steels < 550 MPa yield strength. For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂). Excellent gap bridging for root welding. Well suited for steels such as 20MnMoNi4-5 / 15NiCuMoNb5 (WB36). Excellent impact toughness properties down to -40° C with mixed gas, as welded and stress relief annealed.	42
MEGAFIL® 236 M	Metal-cored wire with 1.0% Cr and 0.5% Mo for creep resisting steels < 460 MPa yield strength. Good arc restriking even with cold wire tip, suitable for robot applications. Ideal for use of short arc and spray arc. Excellent gap bridging for root welding. High-efficiency type for economic production of CrMo-steels up to 550° C (1022° F). Excellent impact toughness properties down to -20° C with mixed gas, stress relief annealed.	43
MEGAFIL® 237 M	Metal-cored wire with 2.25% Cr and 1.0% Mo for creep resisting steels < 460 MPa yield strength. Good arc restriking even with cold wire tip, suitable for robot applications. Ideal for use of short arc and spray arc. High-efficiency type for economic production of creep resisting steels and pressure-hydrogen-resistant 2¼Cr1Mo-steels. Excellent impact toughness properties down to -20° C with mixed gas, stress relief annealed.	44

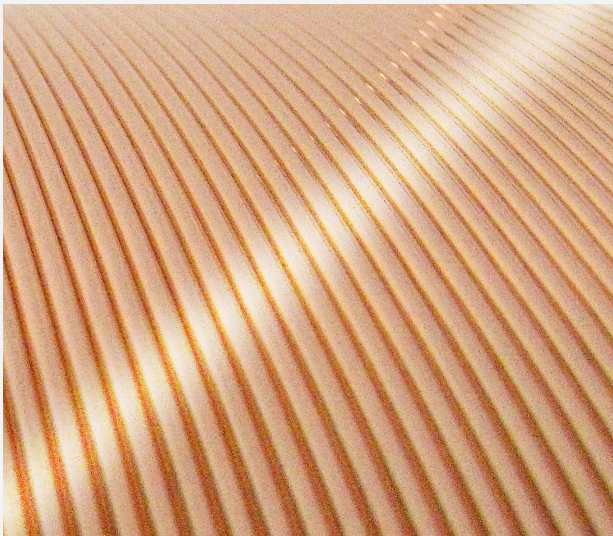
Product	Features	Page
MEGAFIL® P5 M	<p>Metal-cored wire with 5.0% Cr and 0.5% Mo for creep resisting steels < 460 MPa yield strength.</p> <p>Good arc restriking even with cold wire tip, suitable for robot applications.</p> <p>Ideal for use of short arc and spray arc. High-efficiency type for economic production of creep resisting steels and pressure-hydrogen-resistant 5Cr1Mo-steels.</p>	45
MEGAFIL® 825 R	<p>Micro-alloyed rutile flux-cored wire with 0.5% Mo for creep resisting steels < 460 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance.</p> <p>High-efficiency type for economic production of Mo-steels up to 500° C (932° F).</p>	46
MEGAFIL® 836 R	<p>Micro-alloyed rutile flux-cored wire with 1.0% Cr and 0.5% Mo for creep resisting steels < 460 MPa yield strength.</p> <p>Rapidly solidifying slag for higher deposition rate in all position welding.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>High-efficiency type for economic production of CrMo-steels up to 550° C (1022° F).</p>	47
MEGAFIL® 735 B	<p>Basic flux-cored wire with 0.5% Mo for creep resisting steels < 460 MPa yield strength.</p> <p>Extremely crack resistant weld metal.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>High-efficiency type for economic production of Mo-steels up to 500° C (932° F).</p> <p>Excellent impact toughness properties down to -40° C with mixed gas, as welded and stress relief annealed.</p>	48
MEGAFIL® P36 B	<p>Basic flux-cored wire with 1.0% Ni and 0.5% Mo for high strength steel < 550 MPa yield strength.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>Extremely crack resistant weld metal. Well suited for steels such as 20MnMoNi4-5 / 15NiCuMoNb5 (WB36).</p> <p>Excellent impact toughness properties down to -40° C with mixed gas, as welded and stress relief annealed.</p>	49
MEGAFIL® 736 B	<p>Basic flux-cored wire with 1.0% Cr and 0.5% Mo for creep resisting steels < 460 MPa yield strength.</p> <p>Extremely crack resistant weld metal.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>High-efficiency type for economic production of CrMo-steels up to 550° C (1022° F).</p> <p>Excellent impact toughness properties down to -40° C with mixed gas, stress relief annealed.</p>	50
MEGAFIL® 737 B	<p>Basic flux-cored wire with 2.25% Cr and 1.0% Mo for creep resisting steels < 550 MPa yield strength.</p> <p>High-efficiency type for economic production of creep resistant steels and pressure-hydrogen-resistant steels.</p> <p>For mixed gas 75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂).</p> <p>Extremely crack resistant weld metal.</p>	51

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Product	Features	Page
Hardfacing		
MEGAFIL® A 220 M	Metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to impact and shock. Hardness of the pure weld metal from the 3rd layer: 20-30 HRC.	73
MEGAFIL® A 730 M	Metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to impact and shock. Hardness of the pure weld metal from the 3rd layer: 25-35 HRC.	74
MEGAFIL® A 740 M	Metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to heavy impact and shock. Hardness of the pure weld metal from the 3rd layer: 35-45 HRC.	75
MEGAFIL® A 750 M	Metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to heavy impact and shock. Hardness of the pure weld metal from the 3rd layer: 45-55 HRC.	76
MEGAFIL® A 760 M	Metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to heavy impact and shock. Hardness of the pure weld metal from the 3rd layer: 55-65 HRC.	77
MEGAFIL® A 760 B	Basic flux-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Well suited for wear resisting parts subject to heavy impact and shock. Hardness of the pure weld metal from the 3rd layer: 55-65 HRC.	78
MEGAFIL® A 861 M	High-alloyed metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Can also be used without shielding gas. Well suited for wear resisting parts subject to abrasion and heavy impact and shock. Hardness of the pure weld metal from the 2nd layer: 56-64 HRC.	79
MEGAFIL® A 863 M	High-alloyed metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Can also be used without shielding gas. Well suited for wear resisting parts subject to abrasion. Hardness of the pure weld metal from the 2nd layer: 58-66 HRC.	80
MEGAFIL® A 864 M	High-alloyed metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Can also be used without shielding gas. Well suited for wear resisting parts subject to abrasion. Hardness of the pure weld metal from the 2nd layer: 60-68 HRC.	81
MEGAFIL® A 867 M	High-alloyed metal-cored wire for Hardfacing using mixed gas 75-85% Argon (Ar) /Balance Carbon Dioxide (CO ₂). Can also be used without shielding gas. Well suited for wear resisting parts subject to abrasion. Hardness of the pure weld metal from the 2nd layer: 62-70HRC.	82

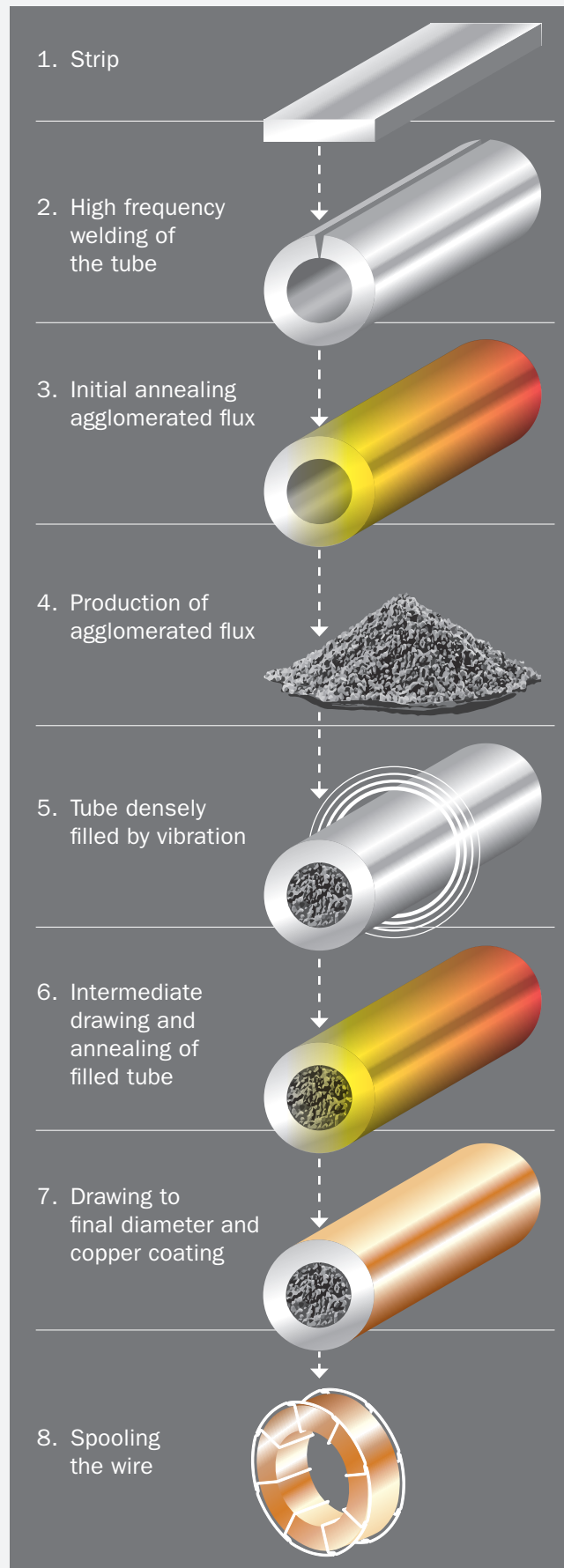
MEGAFIL® Seamless Cored Wires Production Technology

The unique production technology ITW Welding utilizes to manufacture MEGAFIL seamless flux- and metal-cored wires results in valuable product benefits for end users. Strips are folded round, closed by high frequency welding and drawn to filling diameter.



In the next step, the tube is filled with agglomerated flux by means of a vibration system. In several steps the wire is annealed, drawn to final diameter and finally copper-coated.

Subsequently, the wire is precision layer-wound onto various spool sizes. The result is a full penetration closed cored wire with an extremely dry flux core, which is totally insensitive for moisture reabsorption during storage and use.



MEGAFIL® Characteristics and Advantages

Guaranteed no moisture pick-up

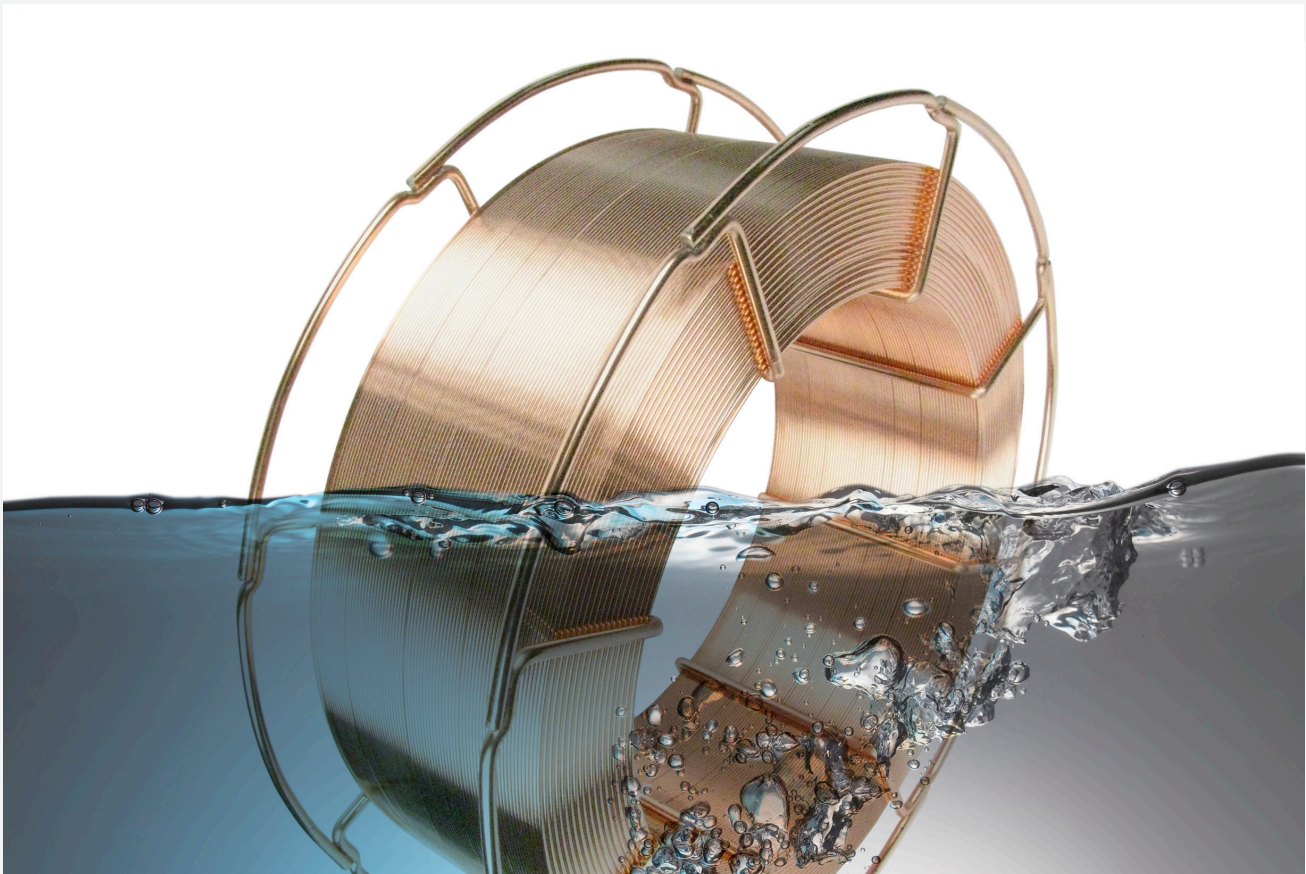
MEGAFIL® seamless flux- and metal-cored wires are closed by full penetration welding and totally insensitive to moisture absorption, even under extreme climatic conditions with tropical temperatures and very high relative humidity. The filling remains dry throughout the entire process of storage and use in welded fabrication, preventing hydrogen induced cracking caused by moisture in the consumable. MEGAFIL® cored wires require no special storage conditions. Re-drying prior to use is never necessary.

The special MEGAFIL® manufacturing technology enables production of cored wires with these and other unique advantages for end users.

- Prevention of hydrogen induced cracking.
Weld metal hydrogen content tested according to EN and AWS is below 4 ml/100 g weld metal.
Typical values below H3.

- No special storage conditions required.
Can be stored like solid wires for an indefinite period, without any risk of moisture absorption.
- Re-drying not necessary - even after storage under humid conditions.
- Resistance to moisture pick-up when mounted on wire feeder, out of packaging.
- No discontinuities in the filling - dependable weld metal properties.
- Copper-coating for optimal current transfer from contact tip to wire and for low contact tip wear.
- Carefully controlled cast, helix and diameter gives good wire feeding and straight delivery at contact tip.
Ideal for robotic welding.

MEGAFIL® flux- and metal-cored wires are available for all construction steel qualities with a wide range of approvals from authorities such as ABS, DNV, LR and TÜV. Wires can be supplied with 3.1 certificates for chemical composition and mechanical properties.



Product Overview MEGAFIL® Seamless Cored Wires

Joint Welding

Non-alloy and fine grain steels				
Type	EN ISO 17632	AWS	AWS A5.36	Page
MEGAFIL® 710 M	T 46 6 M M 1 H5	AWS A5.18: E70C-6M H4	E71T15-M21A8-CS1-H4	18
MEGAFIL® 240 M	T 50 6 1Ni M M 1 H5	AWS A5.28: E80C-Ni1 H4	E81T15-M21A8-Mi1-H4	19
MEGAFIL® 713 R	M21: T 46 4 P M 1 H5	AWS A5.20: M21: E71T1-M-J H4,	M21: E71T1-M21A4-CS1-H4	20
	CO ₂ : T 46 2 P C 1 H5	AWS A5.20: CO ₂ : E71T1C-J H4	CO ₂ : E71T1-C1A0-CS1-H4	
MEGAFIL® 716 R	T 46 6 P M 1 H5	AWS A5.20: E71T-9M-J H4	E71T1-M21A8-CS1-H4	21
MEGAFIL® 821 R	T 50 6 1Ni P M 1 H5	AWS A5.29: E81T1-Ni1M-J H4	E81T1-M21A8-Ni1-H4	22
MEGAFIL® 822 R	CO ₂ : T 46 4 1Ni P C 1 H5	AWS A5.29: CO ₂ : E81T1-Ni1C-J H4	CO ₂ : E81T1-C1A4-Ni1-H4	23
	M21: T 50 6 1Ni P M 1 H5	AWS A5.29: M21: E81T1-Ni1M-J H4	M21: E81T1-M21A8-Ni1-H4	
MEGAFIL® 731 B	M21: T 46 6 B M 3 H5		M21: E70T5-M21A8-CS1-H4	24
	CO ₂ : T 42 4 B C 3 H5		CO ₂ : E70T5-C1A4-CS1-H4	
MEGAFIL® 740 B	T 50 6 1Ni B M 3 H5	AWS A5.29: E80T5-Ni1M-J H4	E80T5-M21A8-Ni1-H4	25

Weather resisting steels				
Type	EN ISO 17632	AWS	AWS A5.36	Page
MEGAFIL® 281 M	T 46 4 Z M M 1 H5	AWS A5.28: E80C-W2 H4	E81T15-M21A4-W2-H4	26
MEGAFIL® 781 R	T 46 4 Z P M 1 H5	AWS A5.29: E81T1-G H4	E81T1-M21A4-G-H4	27

High-strength fine grain steels				
Type	EN ISO 18276	AWS	AWS A5.36	Page
MEGAFIL® 940 M	T 55 6 Mn2,5Ni M M21 1 H5		E91T15-M21A8-K7-H4	28
MEGAFIL® 610 M	T 62 6 Mn1Ni M M21 1 H5		E101T15-M21A8-K2-H4	29
MEGAFIL® 620 M	T 62 6 Mn1,5Ni M M21 1 H5		E101T15-M21A8-K2-H4	30
MEGAFIL® 742 M	T 69 6 Mn2NiCrMo M M21 1 H5	AWS A5.28: E110C-K4 H4	E111T15-M21A8-K4-H4	31
MEGAFIL® 1100 M	T 89 4 Mn2Ni1CrMo M M21 1 H5	AWS A5.28: ~ E120C-K4 H4	E131T15-M21A4-K4-H4	32
MEGAFIL® 550 R	T 55 6 Mn1,5Ni P M1 H5	AWS A5.29: E91T1-K2M-J H4	E91T1-M21A8-K2-H4	33
MEGAFIL® 610 R	T 62 4 Mn1Ni P M21 1 H5		E101T1-M21A4-K2-H4	34
MEGAFIL® 620 R	T 62 4 Mn1,5Ni P M21 1 H5	AWS A5.29: E101T1-K2M H4	E101T1-M21A4-K2-H4	35
MEGAFIL® 690 R	T 69 6 Z P M21 1 H5	AWS A5.29: E111T1-G M-J H4	E111T1-M21A4-G-H4	36
MEGAFIL® 610 B	T 62 6 Mn1Ni B M21 3 H5		E100T5-M21A8-K2-H4	37
MEGAFIL® 742 B	T 69 6 Mn2NiCrMo B M21 3 H5	AWS A5.29: E110T5-K4M H4	E110T5-M21A8-K4-H4	38
MEGAFIL® 745 B	T 89 4 Mn2Ni1CrMo B M21 3 H5		E130T5-M21A4-K4-H4	39

Product Overview MEGAFIL® Seamless Cored Wires

Quenched and tempered steels

Type	EN ISO 18276	AWS	AWS A5.36	Page
MEGAFIL® 807 M	T 69 0 Z M M21 1 H5		E111T15-M21P0-G-H4	40
	T 89 0 Z M M21 1 H5		E131T15-M21A0-G-H4	

Creep resisting steels

Type	EN ISO 17634	EN ISO 18276	AWS	AWS A5.36	Page
MEGAFIL® 235 M	T Mo M M21 1 H5		AWS A5.28: E80C-G H4	E81T15-M21P4-A1-H4	41
MEGAFIL® P36 M	T Z M M21 1 H5	T 55 4 1NiMo M M21 1 H5		E91T15-M21P4-K1-H4	42
MEGAFIL® 236 M	T CrMo1 M M21 1 H5		AWS A5.28: E80C-B2 H4	E81T15-M21P4-B2-H4	43
MEGAFIL® 237 M	T CrMo2 M M21 1 H5		AWS A5.28: E90C-B3 H4	E91T15-M21P0-B3-H4	44
MEGAFIL® P5 M	T CrMo5 M M21 1 H5		AWS A5.28: E80C-B6 H4	E81T15-M21P0-B6-H4	45
MEGAFIL® 825 R	T MoL P M21 1 H5		AWS A5.29: E81T1-A1M H4	E81T1-M21PY-A1-H4	46
MEGAFIL® 836 R	T CrMo1 P M21 1 H5		AWS A5.29: E81T1-B2M H4	E81T1-M21PY-B2-H4	47
MEGAFIL® 735 B	T Mo B M21 3 H5		AWS A5.29: E80T5-G H4	E80T5-M21P4-A1-H4	48
MEGAFIL® P36 B	T Z B M21 3 H5	T 55 4 1NiMo B M21 3 H5		E90T5-M21P4-K1-H4	49
MEGAFIL® 736 B	T CrMo1 B M21 3 H5		AWS A5.29: E80T5-B2M H4	E80T5-M21P4-B2-H4	50
MEGAFIL® 737 B	T CrMo2 B M21 3 H5		AWS A5.29: E90T5-B3M H4	E90T5-M21P0-B3-H4	51

Product Overview MEGAFIL® Seamless Cored Wires

Hardfacing

Type	EN ISO 14700	Page
MEGAFIL® A 220 M	T Fe9	74
MEGAFIL® A 730 M	T Fe1	75
MEGAFIL® A 740 M	T Z Fe2	76
MEGAFIL® A 750 M	T Z Fe2	77
MEGAFIL® A 760 M	T Fe2	78
MEGAFIL® A 760 B	T Fe2	79
MEGAFIL® A 861 M	T Fe8	80
MEGAFIL® A 863 M	T Z Fe14	81
MEGAFIL® A 864 M	T Fe13	82
MEGAFIL® A 867 M	T Z Fe13	83

Storage and Handling Recommendations

MEGAFIL® seamless flux- and metal-cored wires are totally insensitive to moisture absorption. They can be stored for an indefinite period of time. Like solid wire, however, they are copper-coated and direct contact with any liquid - particularly water - must be avoided to prevent the formation of rust on the wire surface. Rust is a potential source of weld metal hydrogen, but it can also cause poor wire feeding.

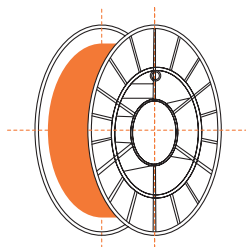
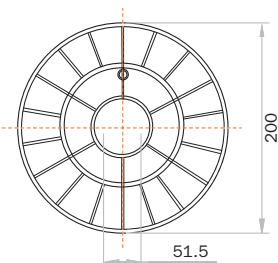
It is therefore recommended to store MEGAFIL® wires in a dry area - away from weather influences - and in their original packaging. Any sudden drop in temperature should be avoided to prevent the formation of condensate water. It is sufficient to slightly warm the storeroom during winter months. Partly used wire spools must be re-packed in their original plastic bag, carefully sealed, and stored in their original cardboard boxes.

Summarized MEGAFIL® storage and handling recommendations are:

- Store wires under dry conditions in the original sealed packaging.
- Avoid contact between wire and substances such as water or any other kind of liquid or vapour, oil, grease or corrosion.
- Do not touch the wire surface with bare hands.
- Avoid exposure of the wire below dew point.
- Do not leave unprotected wire spools in workshops overnight.
- Store the wire in its original plastic bag and box when not used.
- Apply first in - first out for stocked wires.

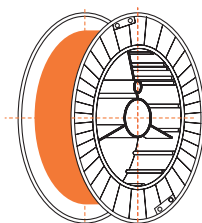
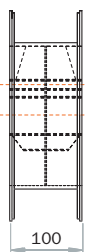
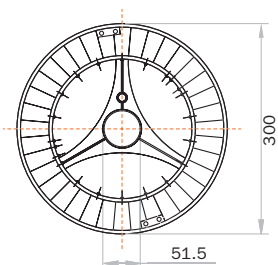
Packaging

Wire or plastic basket spools



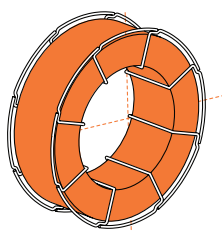
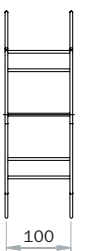
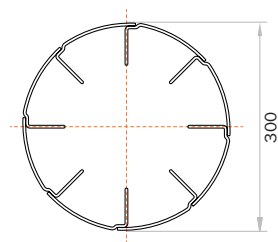
Plastic spool KD 200

Diameter: 200 mm
Width: 55 mm
Suitable for a 50 hub



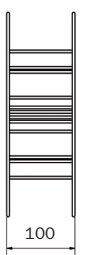
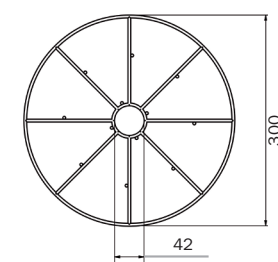
Plastic spool KD 300

Diameter: 300 mm
Width: 103 mm
Suitable for a 50 hub



Basket spool K 300

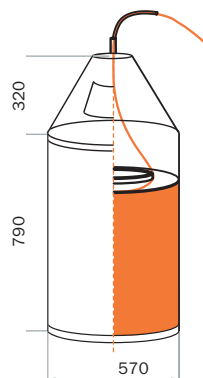
Diameter: 300 mm
Width: 98 mm
Suitable for a 50 hub



Basket spool K 3000

Diameter: 300 mm
Width: 98 mm
Suitable for a 50 hub

Drum



Diameter: 570 mm
Weight: 300 kg

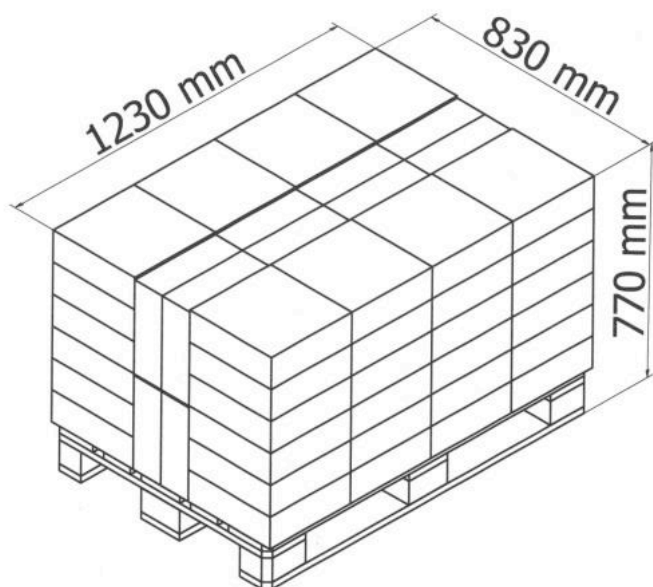
Ø 1.0 mm - 1.4 mm = 300 kg

Ø 1.6 mm = 250 kg

Other types on request

Packing Information

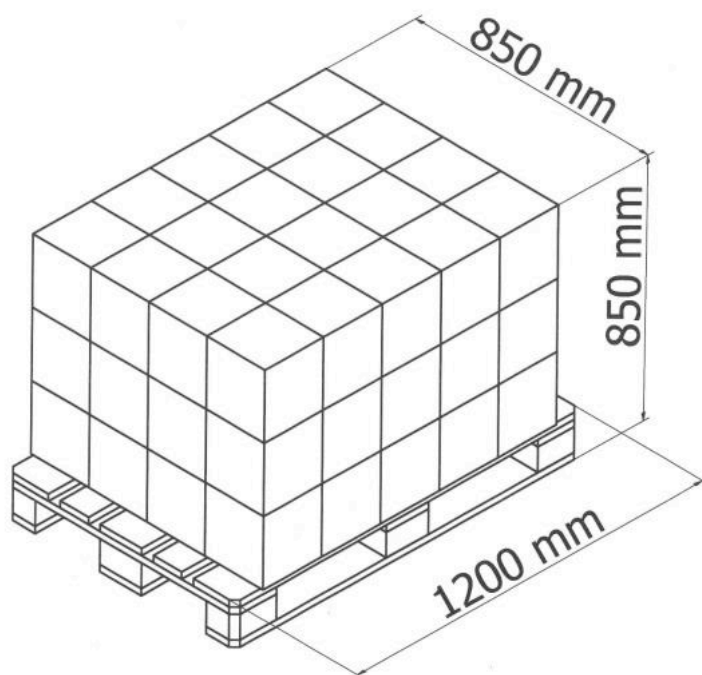
For spool type K 300 / KD 300 / K 3000



64 spools per
Euro-Pallet

Net-weight:
1024 kg

For spool type KD 200



240 spools in
60 cartons per
Euro-Pallet

Net-weight:
1200 kg

Joint Welding



MEGAFIL® 710 M



AWS A5.18: E70C-6M H4

AWS A5.36: E71T15-M21A8-CS1-H4

EN ISO 17632-A: T 46 6 M M 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- CTOD tested -20°C
- Reduces clean-up time, improves productivity
- Root welding without backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.0 - 2.4 mm (0.039 - 3/32")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1
Steels to API-standard	Rel ≤ 460 MPa	X42 - X60
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	-
Manganese (Mn)	1.5	Molybdenum (Mo)	-
Silicon (Si)	0.7	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 680 (80 - 99)
Yield strength Rp0.2	530 (77)	> 460 (67)
Expansion A5	28%	26%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	140 (103)	> 47 (35)
-60° C	100 (74)	> 47 (35)

APPROVALS: TÜV, DB, BV, LR, ABS, CWB, DNV-GL, RINA

MEGAFIL® 240 M



AWS A5.28: E80C-Ni1 H4

AWS A5.36: E81T15-M21A8-Ni1-H4

EN ISO 17632-A: T 50 6 1Ni M M 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- CTOD tested -20°C
- Reduces clean-up time, improves productivity
- Root welding without backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.0 - 1.6 mm (0.039 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 500 MPa	S185 - S500, A 106 Gr.B, A 333 Gr.6, A 516
Boiler steels	Rel ≤ 500 MPa	P235GH - P485GH
Pipe steels	Rel ≤ 500 MPa	P235T1/T2 - P500NL2; L210 - L485MB
Fine grain structural steels	Rel ≤ 500 MPa	S235 - S500QL1
Steels to API-standard	Rel ≤ 500 MPa	X42 - X70
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	0.9
Manganese (Mn)	1.3	Molybdenum (Mo)	-
Silicon (Si)	0.7	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	560 - 720 (81 - 104)
Yield strength Rp0.2	550 (80)	> 500 (73)
Expansion A5	27 %	24 %

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	120 (89)	> 47 (35)
-60° C	90 (66)	> 47 (35)

APPROVALS: TÜV, DB, DNV·GL

MEGAFIL® 713 R



AWS A5.20: M21: E71T-1M-J H4

AWS A5.36: M21: E71T1-M21A4-CS1-H4

EN ISO 17632-A: M21: T 46 4 P M 1 H5

CO₂: E71T-1C-J H4

CO₂: E71T1-C1A0-CS1-H4

CO₂: T 46 2 P C 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- Root welding on ceramic backing
- Automatic root welding on ceramic backing

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.0 - 2.4 mm (0.039 - 3/32")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1
Steels to API-standard	Rel ≤ 460 MPa	X42 - X60
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	-
Manganese (Mn)	1.3	Molybdenum (Mo)	-
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 680 (80 - 99)
Yield strength Rp0.2	530 (77)	> 460 (67)
Expansion A5	26%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂ and 100% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)		ISO Specification [J] (ft.lbf)	
	82% Ar / 18% CO ₂	100% CO ₂	82% Ar / 18% CO ₂	100% CO ₂
-20° C	100 (74)	70 (52)	> 47 (35)	> 47 (35)
-40° C	70 (52)		> 47 (35)	

APPROVALS: TÜV, DB, BV, LR, RINA, ABS, CWB, DNV-GL

MEGAFIL® 716 R



AWS A5.20: E71T-9M-J H4

AWS A5.36: E71T1-M21A8-CS1-H4

EN ISO 17632-A: T 46 6 P M 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- CTOD tested -20°C
- Root welding on ceramic backing
- Automatic root welding on ceramic backing

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfm)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1
Steels to API-standard	Rel ≤ 460 MPa	X42 - X60
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	0.4
Manganese (Mn)	1.3	Molybdenum (Mo)	-
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 670 (80 - 97)
Yield strength Rp0.2	530 (77)	> 460 (67)
Expansion A5	27%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂ and 100% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)		ISO Specification [J] (ft.lbf)	
	82% Ar / 18% CO ₂	100% CO ₂	82% Ar / 18% CO ₂	100% CO ₂
-40° C	100 (74)	60 (44)	> 47 (35)	> 47 (35)
-60° C	70 (52)		> 47 (35)	

APPROVALS: TÜV, DB, DNV-GL

MEGAFIL® 821 R



AWS A5.29: E81T1-Ni1M-J H4

AWS A5.36: E81T1-M21A8-Ni1-H4

EN ISO 17632-A: T 50 6 1Ni P M 1 H5

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none"> Extremely low diffusible hydrogen weld deposit Low fumes and spatter Easy slag removal Able to bridge poor fit-up without burn-through Good impact toughness Smooth arc characteristic 	<ul style="list-style-type: none"> Minimized risk of hydrogen-induced cracking No re-drying Excellent all position welding Resists cracking in severe applications Reduces clean-up time, minimizes risk of inclusions Increases productivity, reduces part rework/rejection CTOD tested -20°C Root welding on ceramic backing Automatic root welding on ceramic backing 	<ul style="list-style-type: none"> Automatic and mechanized welding Steel structures Offshore structures Pipelines Non-alloy and fine grain steels Vessels General fabrication Heavy equipment Single and multi-pass welding

WIRE TYPE	Gas shielded rutile flux-cored wire with rapidly solidifying slag
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂) Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.0 - 1.6 mm (0.039 - 1/16")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤ 500 MPa	Material
Shipbuilding steels		A, B, D, AH 32 - EH 46
Unalloyed structural steels	Rel ≤ 500 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 500 MPa	P235GH - P485GH up to A516; A537; A455
Pipe steels	Rel ≤ 500 MPa	P235T1/T2 - P485NL2; L210 - L485MB up to A 572
Fine grain structural steels	Rel ≤ 500 MPa	S235 - S500(NL1,2) up to A 572
Steels to API-standard	Rel ≤ 500 MPa	X42 - X70
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value	Element	Value
Carbon (C)	0.05	Nickel (Ni)	0.9
Manganese (Mn)	1.3	Molybdenum (Mo)	-
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 690 (80 - 100)
Yield strength Rp0.2	550 (80)	> 500 (73)
Expansion A5	26%	22%
The specified values apply to the as-welded and stress-relieved condition (580°C/120min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	110 (81)	> 47 (35)
-60° C	80 (59)	> 47 (35)
The specified values apply to the as-welded and stress-relieved condition (580°C/120min)		

APPROVALS: TÜV, DB, BV, LR, ABS, CWB, DNV-GL

MEGAFIL® 822 R



AWS A5.29: CO₂: E81T1-Ni1C-J H4

M21: E81T1-Ni1M-J H4

WELDING POSITIONS:

AWS A5.36: CO₂: E81T1-C1A4-Ni1-H4

M21: E81T1-M21A8-Ni1-H4



EN ISO 17632-A: CO₂: T 46 4 1Ni P C 1 H5

M21: T 50 6 1Ni P M 1 H5

FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- Root welding on ceramic backing
- Automatic root welding on ceramic backing

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfm)

Direct Current Electrode Positive (DCEP)

Ø 1.0 - 1.6 mm (0.039 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Strength	Material
Shipbuilding steels		A, B, D, AH 32 - EH 46
Unalloyed structural steels	Rel ≤ 500 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 500 MPa	P235GH - P485GH up to A516; A537; A455
Pipe steels	Rel ≤ 500 MPa	P235T1/T2 - P485NL2; L210 - L485MB up to A 572
Fine grain structural steels	Rel ≤ 500 MPa	S235 - S500(NL1,2) up to A 572
Steels to API-standard	Rel ≤ 500 MPa	X42 - X70
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value (%)	Element	Value (%)
Carbon (C)	0.05	Nickel (Ni)	0,8
Manganese (Mn)	1.2	Molybdenum (Mo)	-
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 680 (80 - 99)
Yield strength Rp0.2	550 (80)	> 460 (67)
Expansion A5	26%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂ and 100 % CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)		ISO Specification [J] (ft.lbf)	
	82% Ar / 18% CO ₂	100% CO ₂	82% Ar / 18% CO ₂	100% CO ₂
-40° C	90 (66)	60 (44)	> 47 (35)	> 47 (35)
-60° C	60 (44)		> 47 (35)	

APPROVALS: TÜV, DB, LR, ABS, DNV-GL

MEGAFIL® 731 B



AWS A5.20: M21: E70T-5M-J H4

CO₂: E70T-5C-J H4

WELDING POSITIONS:

AWS A5.36: M21: E70T5-M21A8-CS1-H4

CO₂: E70T5-C1A4-CS1-H4



EN ISO 17632-A: M21: T 46 6 B M 3 H5

CO₂: T 42 4 B C 3 H5

FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none"> Basic slag system Low hydrogen weld deposit Ideal for use of short arc and spray arc Excellent low temperature impacts Low spatter loss Easy slag removal 	<ul style="list-style-type: none"> Minimized risk of hydrogen-induced cracking No re-drying Provides increased toughness For high carbon steels and dissimilar welds with critical weldability For buffer layers 	<ul style="list-style-type: none"> Automatic and mechanized welding Steel structures Heavy fabrication Severe service Non-alloy and fine grain steels Vessels General fabrication Single and multi-pass welding Railroad rails Earthmoving equipment

WIRE TYPE	Gas shielded basic flux-cored wire
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂); 100% Carbon Dioxide (CO ₂); Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.0 - 1.6 mm (0.039 - 1/16")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Strength	Typical Values
Shipbuilding steels		A, B, D, AH 32 - EH 46
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1
Steels to API-standard	Rel ≤ 460 MPa	X42 - X60
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Carbon (C)	Manganese (Mn)	Silicon (Si)	Sulphur (S)	Phosphorus (P)
Carbon (C)	0.05				
Manganese (Mn)	1.4				
Silicon (Si)	0.6				
Sulphur (S)	0.015				
Phosphorus (P)	0.015				

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 680 (80 - 99)
Yield strength Rp0.2	530 (77)	> 460 (67)
Expansion A5	27%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂ and 100 % CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)		ISO Specification [J] (ft.lbf)	
	82% Ar / 18% CO ₂	100% CO ₂	82% Ar / 18% CO ₂	100% CO ₂
-40° C	140 (103)	100 (74)	> 47 (35)	> 47 (35)
-60° C	100 (74)		> 47 (35)	

APPROVALS: TÜV, DB, BV, DNV, ABS, DNV-GL

MEGAFIL® 740 B



AWS A5.29: E80T5-Ni1M-J H4

AWS A5.36: E80T5-M21A8-Ni1-H4

EN ISO 17632-A: T 50 6 1Ni B M 3 H5

WELDING POSITIONS:



FEATURES

- Basic slag system
- Low hydrogen weld deposit
- Ideal for use of short arc and spray arc
- Excellent low temperature impacts
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Provides increased toughness
- For high carbon steels and dissimilar welds with critical weldability
- For buffer layers

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Heavy fabrication
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Single and multi-pass welding
- Earthmoving equipment

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded basic flux-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂);

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 - 1.6 mm (0.045 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Strength	Material
Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 500 MPa	S185 - S500, A 106 Gr.B, A 333 Gr.6, A 516
Boiler steels	Rel ≤ 500 MPa	P235GH - P485GH
Pipe steels	Rel ≤ 500 MPa	P235T1/T2 - P500NL2; L210 - L485MB
Fine grain structural steels	Rel ≤ 500 MPa	S235 - S500QL1
Steels to API-standard	Rel ≤ 500 MPa	X42 - X70
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value (%)	Element	Value (%)
Carbon (C)	0.05	Nickel (Ni)	0,9
Manganese (Mn)	1.2	Molybdenum (Mo)	-
Silicon (Si)	0.4	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 680 (80 - 99)
Yield strength Rp0.2	550 (80)	> 500 (73)
Expansion A5	27%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	130 (96)	> 47 (35)
-60° C	100 (74)	> 47 (35)

APPROVALS: TÜV, DB

MEGAFIL® 281 M



AWS A5.28: E80C-W2 H4

AWS A5.36: E81T15-M21A4-W2-H4

EN ISO 17632-A: T 46 4 Z M M 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improved productivity
- Root welding without any backing
- Automatic root welding possible

APPLICATIONS

- Weather resistant steels
- Steel structures
- Offshore structures
- Non-alloy and fine grain steels
- General fabrication
- Pipelines
- Single and multi-pass welding
- Automatic and mechanized welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.0 - 1.2 mm (0.039 - 0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Weather resistant steels	CuNi-alloyed steels	S235JRW - S355JRW; 9CrNiCuP3-2-4, A 572, A 588 oder A 709 Gr 50W
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	0.7
Manganese (Mn)	1.2	Molybdenum (Mo)	-
Silicon (Si)	0.7	Chromium (Cr)	0.5
Sulphur (S)	0.015	Copper (Cu)	0.5
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	630 (91)	550 - 680 (80 - 99)
Yield strength Rp0.2	550 (80)	> 470 (68)
Expansion A5	25%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	100 (74)	> 47 (35)
-40° C	70 (52)	> 47 (35)

MEGAFIL® 781 R



AWS A5.29: E81T1-G H4

AWS A5.36: E81T1-M21A4-G-H4

EN ISO 17632-A: T 46 4 Z P M 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- Root welding with ceramic backing
- Automatic root welding with ceramic backing

APPLICATIONS

- Weather resistant steels
- Steel structures
- Offshore structures
- Non-alloy and fine grain steels
- General fabrication
- Pipelines
- Single and multi-pass welding
- Automatic and mechanized welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 - 1.6 mm (0.045 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Weather resistant steels	CuNi-alloyed steels	S235JRW - S355JRW; 9CrNiCuP3-2-4, A 572, A 588 oder A 709 Gr 50W
Unalloyed structural steels	ReI ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	ReI ≤ 355 MPa	P235GH - P355GH
Pipe steels	ReI ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	ReI ≤ 460 MPa	S235 - S460QL1

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	1.0
Manganese (Mn)	1.3	Molybdenum (Mo)	-
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015	Copper (Cu)	0.5
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 680 (80 - 99)
Yield strength Rp0.2	570 (83)	> 460 (67)
Expansion A5	24%	22%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	110 (81)	> 47 (35)
-40° C	80 (59)	> 47 (35)

MEGAFIL® 940 M



AWS A5.36: E91T15-M21A8-K7-H4

EN ISO 18276-A: T 55 6 Mn2,5Ni M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- BWB-WIWEB Approval
- CTOD tested -40°C
- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improves productivity
- Root welding without any backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 550 MPa	Material
Shipbuilding steels	Rel ≤ 550 MPa	15NiCrMo10-6, G19NiCrMo12-6 (HY80)
Pipe steels	Rel ≤ 550 MPa	P235T1/T2 - P460N - L2; L210 - L550MB
Fine grain structural steels	Rel ≤ 550 MPa	S255(NL 1/2) - S550(QL /1)
Steels to API-standard	Rel ≤ 550 MPa	up to X80

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value (%)	Element	Value (%)
Carbon (C)	0.05	Nickel (Ni)	2.2
Manganese (Mn)	1.4	Molybdenum (Mo)	-
Silicon (Si)	0.6	Chromium (Cr)	-
Sulphur (S)	0.010		
Phosphorus (P)	0.010		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	690 (100)	640 - 780 (93 - 113)
Yield strength Rp0.2	600 (87)	> 550 (80)
Expansion A5	23%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	120 (89)	> 47 (35)
-60° C	100 (74)	> 47 (35)

APPROVALS: BWB-WIWEB

MEGAFIL® 610 M



AWS A5.36: E101T15-M21A8-K2-H4

EN ISO 18276-A: T 62 6 Mn1Ni M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improves productivity
- Root welding without any backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.0 - 1.2 mm (0.039 - 0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 620 MPa	Rel ≤ 620 MPa
Unalloyed structural steels	Rel ≤ 620 MPa	A 517, A537
Boiler steels	Rel ≤ 620 MPa	P500GH - P620GH
Pipe steels	Rel ≤ 620 MPa	P500T1/T2 - P620NL2 - L620MB
Fine grain structural steels	Rel ≤ 620 MPa	S500 - S620QL1
Steels to API-standard	Rel ≤ 620 MPa	up to X90

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.05	Nickel (Ni)	1.1
Manganese (Mn)	1.6	Molybdenum (Mo)	< 0.2
Silicon (Si)	0.6	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	750 (109)	690 - 830 (100 - 120)
Yield strength Rp0.2	670 (97)	> 620 (90)
Expansion A5	21%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	110 (81)	> 47 (35)
-60° C	80 (59)	> 47 (35)

MEGAFIL® 620 M



AWS A5.36: E101T15-M21A8-K2-H4

EN ISO 18276-A: T 62 6 Mn1,5Ni M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improves productivity
- Root welding without any backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤ 620 MPa	A 517, A 537
Unalloyed structural steels	Rel ≤ 620 MPa	A 517, A 537
Boiler steels	Rel ≤ 620 MPa	P500GH - P620GH
Pipe steels	Rel ≤ 620 MPa	P500T1/T2 - P620NL2 - L620MB
Fine grain structural steels	Rel ≤ 620 MPa	S500 - S620QL1
Steels to API-standard	Rel ≤ 620 MPa	up to X90

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.05	Nickel (Ni)	1.7
Manganese (Mn)	1.4	Molybdenum (Mo)	< 0,2
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	750 (109)	690 - 890 (100 - 129)
Yield strength Rp0.2	670 (97)	> 620 (90)
Expansion A5	21%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	110 (81)	> 47 (35)
-60° C	80 (59)	> 47 (35)

MEGAFIL® 742 M



AWS A5.28: E110C-K4 H4

AWS A5.36: E111T15-M21A8-K4-H4

EN ISO 18276-A: T 69 6 Mn2NiCrMo M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- BWB-WIWEB Approval
- Minimized risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improves productivity
- Root welding without any backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.0 - 1.2 mm (0.039 - 0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Unalloyed structural steels	Rel ≤ 690 MPa	S620 - S690, A 106, A 600
Boiler steels	Rel ≤ 690 MPa	P620GH - P620GH up to A517; A537; A625
Pipe steels	Rel ≤ 690 MPa	P620 - P690
Fine grain structural steels	Rel ≤ 690 MPa	S620 - S620QLI up to A 625
Steels to API-standard	Rel ≤ 690 MPa	X70 - X100 / HY100

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Nickel (Ni)	0.05	Nickel (Ni)	2.2
Molybdenum (Mo)	1.6	Molybdenum (Mo)	0.5
Chromium (Cr)	0.4	Chromium (Cr)	0.5
Schwefel (S)	0.015		
Phosphor (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	820 (119) (with due regard of the 8/5 time)	770 - 940 (112 - 136)
Yield strength Rp0.2	750 (109) (with due regard of the 8/5 time)	> 690 (100)
Expansion A5	20%	17%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	120 (89)	> 69 (51)
-60° C	90 (66)	> 69 (51)

APPROVALS: TÜV, LR, DNV-GL, ABS, BV, BWB-WIWEB

MEGAFIL® 1100 M



AWS A5.28 : ~ E120C-K4 H4

AWS A5.36: E131T15-M21A4-K4-H4

EN ISO 18276-A: T 89 4 Mn2NiCrMo M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate and efficiencies
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Suitable for robot applications
- Reduces clean-up time, improves productivity
- Root welding without backing
- Automatic root welding possible

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel \leq 890 MPa	up to S890QL1
TM pipesteels	Rel \leq 890 MPa	up to S890QL1
Pipe steels	Rel \leq 890 MPa	X120
Fine grain structural steels	Rel \leq 890 MPa	S890 - S1100QL1
ASTM	Rel \leq 890 MPa	A517
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value (%)	Element	Value (%)
Carbon (C)	0.07	Nickel (Ni)	2.6
Manganese (Mn)	1.5	Molybdenum (Mo)	0.6
Silicon (Si)	0.5	Chromium (Cr)	0.6
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	1050 (152) (with due regard of the 8/5 time)	940 - 1040 (136 - 151)
Yield strength Rp0.2	1000 (145) (with due regard of the 8/5 time)	> 890 (129)
Expansion A5	17%	15%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	80 (59)	> 47 (35)
-40° C	60 (44)	> 47 (35)

APPROVALS: TÜV

MEGAFIL® 550 R



AWS A5.29: M21: E91T1-K2M-J H4

CO₂: E91T1-K2C-J H4

WELDING POSITIONS:

AWS A5.36: M21: E91T1-M21A8-K2-H4

CO₂: E91T1-C1A8-K2-H4



EN ISO 18276-A: M21: T 55 6 Mn1,5Ni P M21 1 H5

CO₂: T 55 6 Mn1,5Ni P C1 1 H5

FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- Root welding with ceramic backing
- Automatic root welding with ceramic backing

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% Carbon Dioxide (CO₂) possible;

Gas Flow 12-18 l/min (25-38 cfm)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Strength	Examples
Shipbuilding steels		A, B, D, AH 32 - EH 46
Unalloyed structural steels	Rel ≤ 550 MPa	S185 - S550, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 550 MPa	P235GH - P550GH bis A516; A537; A455
Pipe steels	Rel ≤ 550 MPa	P235T1/T2 - P550NL2; L210 - L550MB bis A 572
Fine grain structural steels	Rel ≤ 550 MPa	S235 - S550QL1 bis A 572
Steels to API-standard	Rel ≤ 550 MPa	X42 - X80

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical Value (%)	Element	Typical Value (%)
Carbon (C)	0.08	Nickel (Ni)	1.5
Manganese (Mn)	1.5	Molybdenum (Mo)	< 0.2
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	700 (102)	640 - 820 (93 - 119)
Yield strength Rp0.2	620 (90)	> 550 (80)
Expansion A5	24%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂ and 100 % CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)		ISO Specification [J] (ft.lbf)	
	82% Ar / 18% CO ₂	100% CO ₂	82% Ar / 18% CO ₂	100% CO ₂
-40° C	120 (89)		> 55 (41)	
-60° C	90 (66)	80 J	> 55 (41)	> 47 J

APPROVALS: LR, DNV, ABS, DNV-GL

MEGAFIL® 610 R



AWS A5.36: E101T1-M21A4-K2-H4
EN ISO 18276-A: T 62 4 Mn1Ni P M21 1 H5

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none">Extremely low diffusible hydrogen weld depositLow fumes and spatterEasy slag removalAble to bridge poor fit-up without burn-throughGood impact toughnessVirtually no slag coverageSmooth arc characteristic	<ul style="list-style-type: none">Minimized risk of hydrogen-induced crackingNo re-dryingExcellent all position weldingResists cracking in severe applicationsReduces clean-up time, minimizes risk of inclusionsIncreases productivity, reduces part rework/rejectionRoot welding with ceramic backingAutomatic root welding with ceramic backing	<ul style="list-style-type: none">Automatic and mechanized weldingSteel structuresOffshore structuresPipelineNon-alloy and fine grain steelsVesselsGeneral fabricationHeavy equipmentSingle and multi-pass welding

WIRE TYPE	Gas shielded rutile flux-cored wire with rapidly solidifying slag
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂); Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.2 mm (0.045")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤ 620 MPa	Rel ≤ 620 MPa
Unalloyed structural steels	Rel ≤ 620 MPa	A517, A537
Boiler steels	Rel ≤ 620 MPa	P500GH - P620GH
Pipe steels	Rel ≤ 620 MPa	P500T1/T2 - P620NL2 - L620MB
Fine grain structural steels	Rel ≤ 620 MPa	S500 - S620QL1
Steels to API-standard	Rel ≤ 620 MPa	up to X90
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.08	Nickel (Ni)	1.1
Manganese (Mn)	1.6	Molybdenum (Mo)	< 0.2
Silicon (Si)	0.6	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	750 (109)	690 - 830 (100 - 120)
Yield strength Rp0.2	670 (97)	> 620 (90)
Expansion A5	21%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	110 (81)	> 47 (35)
-40° C	80 (59)	> 47 (35)
-60° C	55 (40)	> 47 (35)

APPROVALS: TÜV

MEGAFIL® 620 R



AWS A5.29: E101T1-K2M H4

AWS A5.36: E101T1-M21A4-K2-H4

EN ISO 18276-A: T 62 4 Mn1,5Ni P M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Low fumes and spatter
- Easy slag removal
- Able to bridge poor fit-up without burn-through
- Good impact toughness
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimized risk of hydrogen-induced cracking
- No re-drying
- Excellent all position welding
- Resists cracking in severe applications
- Reduces clean-up time, minimizes risk of inclusions
- Increases productivity, reduces part rework/rejection
- Root welding with ceramic backing
- Automatic root welding with ceramic backing

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Offshore structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Heavy equipment
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfm)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 620 MPa	Material
Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels		A517, A537
Boiler steels		P500GH - P620GH
Pipe steels		P500T1/T2 - P620NL2 - L620MB
Fine grain structural steels		S500 - S620QL1
Steels to API-standard		up to X90
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.08	Nickel (Ni)	1.7
Manganese (Mn)	1.4	Molybdenum (Mo)	< 0.2
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	750 (109)	690 - 820 (100 - 119)
Yield strength Rp0.2	670 (97)	> 620 (90)
Expansion A5	21%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	110 (81)	> 47 (35)
-40° C	80 (59)	> 47 (35)
-60° C	55 (40)	> 47 (35)

APPROVALS: LR, ABS

MEGAFIL® 690 R



AWS A5.36: E111T1-M21A4-G-H4

EN ISO 18276-A: T 69 6 Z P M21 1 H5

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none">Extremely low diffusible hydrogen weld depositLow fumes and spatterEasy slag removalAble to bridge poor fit-up without burn-throughGood impact toughnessVirtually no slag coverageSmooth arc characteristic	<ul style="list-style-type: none">Minimized risk of hydrogen-induced crackingNo re-dryingExcellent all position weldingResists cracking in severe applicationsReduces clean-up time, minimizes risk of inclusionsIncreases productivity, reduces part rework/rejectionRoot welding with ceramic backingAutomatic root welding with ceramic backing	<ul style="list-style-type: none">Automatic and mechanized weldingSteel structuresOffshore structuresPipelinesNon-alloy and fine grain steelsVesselsGeneral fabricationHeavy equipmentSingle and multi-pass welding

WIRE TYPE	Gas shielded rutile flux-cored wire with rapidly solidifying slag
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂) Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.2 mm (0.045")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤ 690 MPa	Material
Unalloyed structural steels	Rel ≤ 690 MPa	S620 - S690, A 106, A 600
Boiler steels	Rel ≤ 690 MPa	P620GH - P690GH up to A517; A537; A625
Pipe steels	Rel ≤ 690 MPa	P620T1/T2 - P690NL2 up to A 625
Fine grain structural steels	Rel ≤ 690 MPa	S620 - S629QL1 up to A 625
Steels to API-standard	Rel ≤ 690 MPa	X70 - X100 / HY100
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value	Element	Value
Carbon (C)	0.08	Nickel (Ni)	2.0
Manganese (Mn)	1.7	Molybdenum (Mo)	0.15
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	820 MPa (119) (with due regard of the 8/5 time)	770 - 940 MPa (112 - 136)
Yield strength Rp0.2	750 MPa (109) (with due regard of the 8/5 time)	> 690 MPa (100)
Expansion A5	18%	17%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	80 (59)	> 69 (51)
-60° C	60 (44)	> 47 (35)

APPROVALS: BV, LR, ABS, DNV-GL, TÜV

MEGAFIL® 610 B



AWS A5.36: E100T5-M21A8-K2-H4

EN ISO 18276-A: T 62 6 Mn1Ni B M21 3 H5

WELDING POSITIONS:



FEATURES

- Basic slag system
- Low hydrogen weld deposit
- Ideal for use of short arc and spray arc
- Excellent low temperature impacts
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Provides increased toughness

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Heavy fabrication
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Single and multi-pass welding
- Earthmoving equipment

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded basic flux-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 620 MPa	A 517, A537
Unalloyed structural steels	Rel ≤ 620 MPa	A 517, A537
Boiler steels	Rel ≤ 620 MPa	P500GH - P620GH
Pipe steels	Rel ≤ 620 MPa	P500T1/T2 - P620NL2 - L620MB
Fine grain structural steels	Rel ≤ 620 MPa	S500 - S620QL1
Steels to API-standard	Rel ≤ 620 MPa	up to X90

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.05	Nickel (Ni)	1.1
Manganese (Mn)	1.6	Molybdenum (Mo)	< 0.2
Silicon (Si)	0.6	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	750 (109)	690 - 830 (100 - 120)
Yield strength Rp0.2	670 (97)	> 620 (90)
Expansion A5	22%	18%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	120 (89)	> 47 (35)
-60° C	90 (66)	> 47 (35)

APPROVALS: TÜV

MEGAFIL® 742 B



AWS A5.29: E110T5-K4M H4

AWS A5.36: E110T5-M21A8-K4-H4

EN ISO 18276-A: T 69 6 Mn2NiCrMo B M21 3 H5

WELDING POSITIONS:



FEATURES

- Basic slag system
- Low hydrogen weld deposit
- Ideal for use of short arc and spray arc
- Excellent low temperature impacts
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Provides increased toughness

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Heavy fabrication
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Single and multi-pass welding
- Earthmoving equipment

WIRE TYPE

SHIELDING GAS

Gas shielded basic flux-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 690 MPa	Rel ≤ 690 MPa
Unalloyed structural steels	Rel ≤ 690 MPa	S620 - S690, A 106, A 600
Boiler steels	Rel ≤ 690 MPa	P620GH - P690GH up to A517; A537; A625
Pipe steels	Rel ≤ 690 MPa	P6205T1/T2 - P690NL2; up to A 625
Fine grain structural steels	Rel ≤ 690 MPa	S620 - S690QL1 up to A 625
Steels to API-standard	Rel ≤ 690 MPa	X70 - X100 / HY100

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical values (%)	Element	Typical values (%)
Carbon (C)	0.05	Nickel (Ni)	2.2
Manganese (Mn)	1.6	Molybdenum (Mo)	0.5
Silicon (Si)	0.4	Chromium (Cr)	0.5
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	820 (119) (with due regard of the 8/5 time)	770 - 900 (112 - 131)
Yield strength Rp0.2	750 (109) (with due regard of the 8/5 time)	> 690 (100)
Expansion A5	20%	17%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-40° C	120 (89)	> 69 (51)
-60° C	90 (66)	> 69 (51)

APPROVALS: TÜV, DB, LR, BV, ABS, DNV-GL

MEGAFIL® 745 B



AWS A5.36: E130T5-M21A4-K4-H4

EN ISO 18276-A: T 89 4 Mn2Ni1CrMo B M21 3 H5

WELDING POSITIONS:



FEATURES

- Basic slag system
- Low hydrogen weld deposit
- Ideal for use of short arc and spray arc
- Excellent low temperature impacts
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- No re-drying
- Provides increased toughness

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Heavy fabrication
- Non-alloy and fine grain steels
- Vessels
- General fabrication
- Single and multi-pass welding
- Earthmoving equipment

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded basic flux-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 - 1.6 mm (0.039 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel ≤ 890 MPa	up to S890QL1
TM pipesteels	Rel ≤ 890 MPa	to X120
Pipe steels	Rel ≤ 890 MPa	S890 - S1100QL1
Fine grain structural steels	Rel ≤ 890 MPa	A517
Steels to API-standard	Rel ≤ 890 MPa	

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	1.8
Manganese (Mn)	1.6	Molybdenum (Mo)	0.6
Silicon (Si)	0.4	Chromium (Cr)	0.5
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	1050 (152) (with due regard of the 8/5 time)	940 - 1180 (136 - 171)
Yield strength Rp0.2	1000 (145) (with due regard of the 8/5 time)	> 890 (129)
Expansion A5	17%	15%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	80 (59)	> 47 (35)
-40° C	70 (52)	> 47 (35)

MEGAFIL® 807 M



AWS A5.28: E110C-G H4 / ~E120C-G H4

AWS A5.36: E111T15-M21P0-G-H4 / E131T15-M21A0-G-H4

EN ISO 18276-A: T 69 0 Z M M21 1 H5 / T 89 0 Z M M21 1 H5

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none"> Extremely low diffusible hydrogen weld deposit Good reignition characteristics Ideal for use of short arc and spray arc Excellent gap bridging for root welding High deposition rate and efficiencies Virtually no slag coverage Smooth arc characteristic 	<ul style="list-style-type: none"> Heat treatable weld metal Minimizes risk of hydrogen-induced cracking No re-drying Suitable for robot applications Reduces clean-up time, improves productivity Root welding without any backing Automatic root welding automatically possible 	<ul style="list-style-type: none"> Automatic and mechanized welding Steel structures Offshore structures Pipelines Non-alloy and fine grain steels Vessels General fabrication Heavy equipment Single and multi-pass welding

WIRE TYPE	Gas shielded metal-cored wire
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂)
	Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.2 mm (0.045")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤ 890 MPa	up to S890QL1
TM pipesteels	Rel ≤ 890 MPa	up to X120
Pipe steels	Rel ≤ 890 MPa	S890 - S1100QL1
Fine grain structural steels	Rel ≤ 890 MPa	A517
Steels to API-standard	Rel ≤ 890 MPa	25CrMo4; 34CrMo4; 28NiCrMo5-5; 42 CrMo4 typical ASTM A 829 M
High strength fine grain structural steels (tempered)		
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Carbon (C)	Nickel (Ni)	2.3
Manganese (Mn)	0.05	Molybdenum (Mo)	0.6
Silicon (Si)	1.7	Chromium (Cr)	0.6
Sulphur (S)	0.6		
Phosphorus (P)	0.015		
	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi) as welded / heat treated 680°C (1256°F) / 120 min		ISO Specification MPa (ksi) as welded / heat treated 680°C (1256°F) / 120 min	
Tensile Strength Rm	980 (142)	900 (130)	940 - 1180 (136 - 171)	800 - 950 (116 - 138)
Yield strength Rp0.2	930 (135)	740 (107)	> 890 (129)	> 700 (102)
Expansion A5	17%	20%	15%	15%

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
0° C	80 (59)	> 47 (35)
-20° C	60 (44)	> 27 (20)

MEGAFIL® 235 M



AWS A5.28: E80C-G H4

AWS A5.36: E81T15-M21P4-A1-HA

EN ISO 17634-A: T Mo M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Suitable for robot applications
- Automatic root welding possible
- Root welding without any backing
- Improved efficiency
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Pipelines
- Non-alloy and fine grain steels
- Vessels (Mo steels up to 500° C (932° F))
- General fabrication
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.0 - 1.6 mm (0.039 - 1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Shipbuilding steels		A, B, D, AH 32 - EH 36
Unalloyed structural steels	Rel ≤ 355 MPa	S185 - S355, A 106 Gr.B, A 333 Gr.6
Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH, 16Mo3
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S235 - S460QL1
Steels to API-standard	Rel ≤ 460 MPa	X42 - X70
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.1	Molybdenum (Mo)	0.5
Silicon (Si)	0.7	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 690 (80 - 100)
Yield strength Rp0.2	520 (75)	>470 (68)
Expansion A5	26%	22%
The specified values apply to the stress-relieved condition (600° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	120 (89)	> 47 (35)
-40° C	100 (74)	> 47 (35)
The specified values apply to the stress-relieved condition (600° C / 60 min)		

APPROVALS: TÜV, DB

MEGAFIL® P36 M



AWS A5.36: E91T15-M21P4-K1-H4

EN ISO 17634-A: T Z M M21 1 H5

EN ISO 18276-A: T 55 4 1NiMo M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Suitable for robot applications
- Automatic root welding possible
- Root welding without any backing
- Improved efficiency
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Pipelines
- High-grade structural steels
- Vessels (Mo steels up to 500° C (932° F))
- General fabrication
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

High-grade structural steels	Rel ≤ 540 MPa	15NiCuMoNb5, 20MnMoNi4-5, 11NiMoV53, 17MnMoV6-4
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	1.0
Manganese (Mn)	1.3	Molybdenum (Mo)	0.5
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.012		
Phosphorus (P)	0.010		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	650 (94)	640 - 760 (93 - 110)
Yield strength Rp0.2	580 (84)	> 550 (80)
Expansion A5	23%	18%
The specified values apply to the stress-relieved condition (620° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	120 (89)	> 47 (35)
-40° C	80 (59)	> 47 (35)
The specified values apply to the stress-relieved condition (620° C / 60 min)		

MEGAFIL® 236 M



AWS A5.28: E80C-B2 H4

AWS A5.36: E81T15-M21P4-B2-H4

EN ISO 17634-A: T CrMo1 M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Suitable for robot applications
- Automatic root welding possible
- Root-welding without any backing
- Improved efficiency
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Automatic and mechanized welding
- Steel structures
- Pipelines
- Cast steels
- Steam boilers and turbines (Mo steels up to 550° C (1022° F))
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.0 - 1.2 mm (0.039 - 0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Boiler steels	ReI ≤ 460 MPa	13CrMo4-5
Cast steels	ReI ≤ 460 MPa	G17CrMo5-5, G22CrMo5-4
Similar alloyed heat treatable steels and similar alloyed cementation and nitrited steels.		
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	0.5
Silicon (Si)	0.3	Chromium (Cr)	1.1
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 740 (80 - 107)
Yield strength Rp0.2	540 (78)	> 470 (68)
Expansion A5	24%	20%
The specified values apply to the stress-relieved condition (690° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	150 (110)	> 47 (35)
-40° C	55 (41)	> 47 (35)
The specified values apply to the stress-relieved condition (690° C / 60min)		

APPROVALS: TÜV

MEGAFIL® 237 M



AWS A5.28: E90C-B3 H4

AWS A5.36: E91T15-M21P0-B3-H4

EN ISO 17634-A: T CrMo2 M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Suitable for robot applications
- Automatic root welding possible
- Root-welding without any backing
- Improved efficiency
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Automatic and mechanized welding
- Construction of containers
- Pipelines
- Steam boilers and turbines (2 ¼ Cr1Mo steels)
- Machine-building
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded metal-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

boiler steels	Rel ≤ 540 MPa	10CrMo9-10, 12CrMo9-10
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	1.1
Silicon (Si)	0.3	Chromium (Cr)	2.3
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	650 (94)	620 - 760 (90 - 110)
Yield strength Rp0.2	560 (81)	> 540 (78)
Expansion A5	22%	18%
The specified values apply to the stress-relieved condition (690° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	130 (96)	> 47 (35)
-20° C	90 (66)	> 47 (35)
The specified values apply to the stress-relieved condition (690° C / 60 min)		

APPROVALS: TÜV

MEGAFIL® P5 M



AWS A5.28: E80C-B6 H4

AWS A5.36: E81T15-M21P0-B6-H4

EN ISO 17634-A: T CrMo5 M M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Good reignition characteristics
- Ideal for use of short arc and spray arc
- Excellent gap bridging for root welding
- High deposition rate
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Suitable for robot applications
- Automatic root-welding possible
- Root-welding without any backing
- Improved efficiency
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Automatic and mechanized welding
- Vessels
- Pumps and fittings
- Creep & scale resistant steels up to 600° C (1112° F)
- Steam turbines
- Hydropower stations
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.6 mm (1/16")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Boiler steels	ReI ≤ 460 MPa	X12CrMo5
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	0.6
Silicon (Si)	0.4	Chromium (Cr)	5.2
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	610 (88)	590 - 690 (86 - 100)
Yield strength Rp0.2	500 (73)	> 470 (68)
Expansion A5	23%	20%
The specified values apply to the stress-relieved condition (745° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	100 (74)	> 47 (35)
The specified values apply to the stress-relieved condition (745° C / 60 min)		

MEGAFIL® 825 R



AWS A5.29: E81T1-A1M H4

AWS A5.36: E81T1-M21PY-A1-H4

EN ISO 17634-A: T MoL P M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Excellent weld puddle manipulation
- Particularly suited for mechanized MAG welding
- Ideal for all-position welding on ceramic backing
- Low spatter loss
- Easy slag removal
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Efficient out-of-position welding
- Economic production
- High flexibility
- No additives needed
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Mechanized welding
- Steel construction
- Vessels (Mo steels up to 500° C (932° F))
- Pipelines
- Single and multi-pass welding
- Mechanical engineering

WIRE TYPE

SHIELDING GAS

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfm)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Boiler steels	Rel ≤ 355 MPa	P235GH - P355GH, 16Mo3
Pipe steels	Rel ≤ 460 MPa	P235T1/T2 - P460NL2, L210 - L445MB
Fine grain structural steels	Rel ≤ 460 MPa	S255 - S460
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.1	Molybdenum (Mo)	0.5
Silicon (Si)	0.5	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 680 (80 - 99)
Yield strength Rp0.2	520 (75)	> 470 (68)
Expansion A5	23%	22%
The specified values apply to the stress-relieved condition (600° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	80 (59)	> 47 (35)
The specified values apply to the stress-relieved condition (600° C / 60 min)		

APPROVALS: TÜV

MEGAFIL® 836 R



AWS A5.29: E81T1-B2M H4

AWS A5.36: E81T1-M21PY-B2-H4

EN ISO 17634-A: T CrMo1 P M21 1 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Excellent weld puddle manipulation
- Particularly suited for mechanized MAG welding
- Ideal for all-position welding on ceramic backing
- Low spatter loss
- Easy slag removal
- Smooth arc characteristic

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- Efficient out-of-position welding
- Economic production
- High flexibility
- No additives needed
- Reduced cleaning time
- Easy handling

APPLICATIONS

- Mechanized welding
- Construction of containers
- Steam boilers and turbines (CrMo steels up to 550° C (1022° F))
- Pipelines
- Single and multi-pass welding
- Mechanical engineering

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded rutile flux-cored wire with rapidly solidifying slag

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Material	Rel \leq 460 MPa	Material
Boiler steels		13CrMo4-5
Cast steels		G17CrMo5-5, G22CrMo5-4

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Value (%)	Element	Value (%)
Carbon (C)	0.05	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	0.5
Silicon (Si)	0.3	Chromium (Cr)	1.1
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 680 (80 - 99)
Yield strength Rp0.2	540 (78)	> 470 (68)
Expansion A5	21%	20%

The specified values apply to the stress-relieved condition (690° C / 60 min)

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	70 (52)	> 47 (35)

The specified values apply to the stress-relieved condition (690° C / 60 min)

MEGAFIL® 735 B



AWS A5.29: E80T5-G H4

AWS A5.36: E80T5-M21P4-A1-H4

EN ISO 17634-A: T Mo B M21 3 H5

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none">Extremely low diffusible hydrogen weld depositExtremely clean weld puddleIdeal for repair weldingLow spatter lossEasy slag removal	<ul style="list-style-type: none">Minimizes risk of hydrogen-induced crackingHigh reserve of toughness and crack resistanceHigh flexibilityNo additives neededReduced cleaning time	<ul style="list-style-type: none">Steel constructionMechanical engineeringVessels (Mo steels up to 500° C (932° F))PipelinesSingle and multi-pass welding

WIRE TYPE	Gas shielded basic flux-cored wire
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂) Gas Flow 12-18 l/min (25-38 cfh)
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.2 - 1.6 mm (0.045 - 1/16")
TYPICAL DIFFUSIBLE HYDROGEN*	< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

*Measurement technique is the carrier gas method according to AWS and ISO

MATERIALS TO BE WELDED *)

Material	Rel ≤	Welding Position
Boiler steels	355 MPa	P235GH - P355GH, 16Mo3
Pipe steels	460 MPa	P235T1/T2 - P460NL2; L210 - L445MB
Fine grain structural steels	460 MPa	S255 - S460QL1

*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Element	Typical Value (%)	Element	Typical Value (%)
Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.1	Molybdenum (Mo)	0.5
Silicon (Si)	0.3	Chromium (Cr)	-
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	600 (87)	550 - 680 (80 - 99)
Yield strength Rp0.2	520 (75)	> 470 (68)
Expansion A5	26%	22%

The specified values apply to the stress-relieved condition (600° C / 60min)

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	140 (103)	> 47 (35)
-40° C	120 (89)	> 47 (35)

The specified values apply to the stress-relieved condition (600° C / 60 min)

APPROVALS: TÜV

MEGAFIL® P36 B



AWS A5.36: E90T5-M21P4-K1-H4

EN ISO 17634-A: T Z B M21 3 H5

EN ISO 18276-A: T 55 4 1NiMo B M21 3 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Extremely clean weld puddle
- Ideal for repair welding
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- High reserve of toughness and crack resistance
- High flexibility
- No additives needed
- Reduced cleaning time

APPLICATIONS

- Mechanical engineering
- Steel construction
- Vessels (Mo steels up to 500° C (932° F))
- Pipelines
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded basic flux-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfh)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

High-grade structural steels	ReI ≤ 540 MPa	15NiCuMoNb5, 20MnMoNi4-5, 11NiMoV53, 17MnMoV6-4
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	1.0
Manganese (Mn)	1.3	Molybdenum (Mo)	0.5
Silicon (Si)	0.3	Chromium (Cr)	-
Sulphur (S)	0.012		
Phosphorus (P)	0.010		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	SO Specification MPa (ksi)
Tensile Strength Rm	650 (94)	620 - 760 (90 - 110)
Yield strength Rp0.2	580 (84)	> 550 (80)
Expansion A5	24%	18%
The specified values apply to the stress-relieved condition (620° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
-20° C	120 (89)	> 47 (35)
-40° C	80 (59)	> 47 (35)
The specified values apply to the stress-relieved condition (620° C / 60 min)		

MEGAFIL® 736 B



AWS A5.29: E80T5-B2M H4

AWS A5.36: E80T5-M21P4-B2-H4

EN ISO 17634-A: T CrMo1 B M21 3 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Extremely clean weld puddle
- Ideal for repair welding
- Low spatter loss
- Easy slag removal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- High reserve of toughness and crack resistance
- High flexibility
- No additives needed
- Reduced cleaning time

APPLICATIONS

- Construction of containers
- Boiler & machinery parts
- Steam boiler and turbines (CrMo steels up to 550° C (1022° F))
- Pipelines
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

Gas shielded basic flux-cored wire
75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)
Gas Flow 12-18 l/min (25-38 cfh)

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 - 1.6 mm (0.045 - 1/16")

TYPICAL DIFFUSIBLE HYDROGEN*

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Boiler steels	Rel ≤ 460 MPa	13CrMo4-5
Pipe steels	Rel ≤ 460 MPa	G17CrMo5-5, G22CrMo5-4
Similar alloyed heat treatable steels and similar alloyed cementation and nitrited steels.		
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.05	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	0.5
Silicon (Si)	0.3	Chromium (Cr)	1.1
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	620 (90)	550 - 690 (80 - 100)
Yield strength Rp0.2	540 (78)	> 470 (68)
Expansion A5	25%	20%
The specified values apply to the stress-relieved condition (690° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	160 (118)	> 47 (35)
-40° C	70 (52)	> 47 (35)
The specified values apply to the stress-relieved condition (690° C / 60 min)		

APPROVALS: TÜV

MEGAFIL® 737 B



AWS A5.29: E90T5-B3M H4

AWS A5.36: E90T5-M21P0-B3-H4

EN ISO 17634-A: T CrMo2 B M21 3 H5

WELDING POSITIONS:



FEATURES

- Extremely low diffusible hydrogen weld deposit
- Extremely clean weld puddle
- Ideal for repair welding
- Low spatter loss
- Easy slag removal
- Heat treatable weld metal

BENEFITS

- Minimizes risk of hydrogen-induced cracking
- High reserve of toughness and crack resistance
- High flexibility
- No additives needed
- Reduced cleaning time
- Step cooling possible

APPLICATIONS

- Construction of containers
- Boiler & machinery parts
- Steam boiler and turbines (2 ¼ Cr1Mo steels)
- Pipelines
- Single and multi-pass welding

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

TYPICAL DIFFUSIBLE HYDROGEN*

RE-DRYING

STORAGE

Gas shielded basic flux-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂)

Gas Flow 12-18 l/min (25-38 cfm)

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

< 3.0 ml / 100 g; Guaranteed for the total processing time < 4.0 ml / 100 g maximum (AWS Spec)

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

**Measurement technique is the carrier gas method according to AWS and ISO*

MATERIALS TO BE WELDED *)

Boiler steels	Rel ≤ 540 MPa	10CrMo9-10, 12CrMo9-10
*) The specified base materials are not complete and should only be seen as examples. The selection of the appropriate combination of steel and welding consumable should follow the specific mechanical strength and toughness requirements.		

ALL WELD METAL CHEMISTRY (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.07	Nickel (Ni)	-
Manganese (Mn)	1.0	Molybdenum (Mo)	1.1
Silicon (Si)	0.3	Chromium (Cr)	2.3
Sulphur (S)	0.015		
Phosphorus (P)	0.015		

ALL WELD METAL MECHANICAL PROPERTIES (for mixed gas 82% Ar / 18% CO₂)

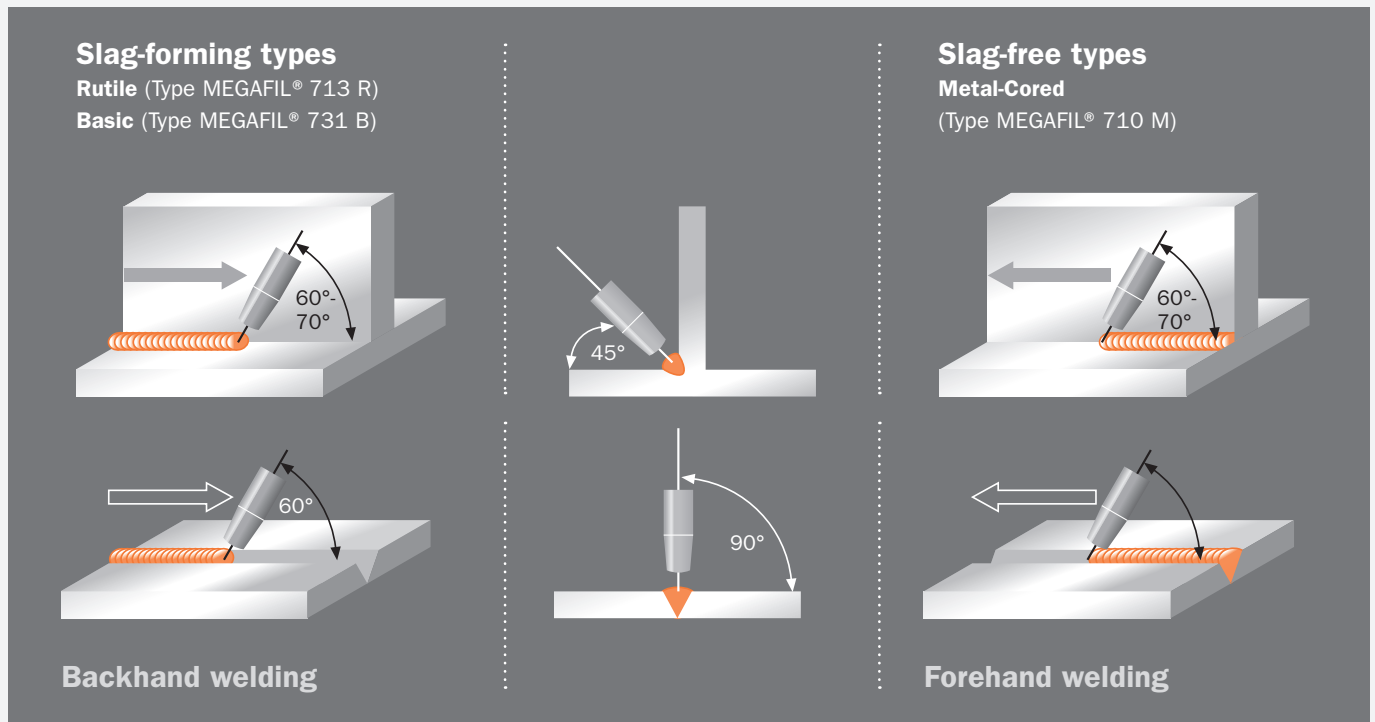
Mechanical tests	Typical values MPa (ksi)	ISO Specification MPa (ksi)
Tensile Strength Rm	650 (94)	620 - 760 (90 - 110)
Yield strength Rp0.2	560 (81)	> 540 (78)
Expansion A5	22%	18%
The specified values apply to the stress-relieved condition (690° C / 60 min)		

CHARPY V-NOTCH IMPACT VALUES (for mixed gas 82% Ar / 18% CO₂)

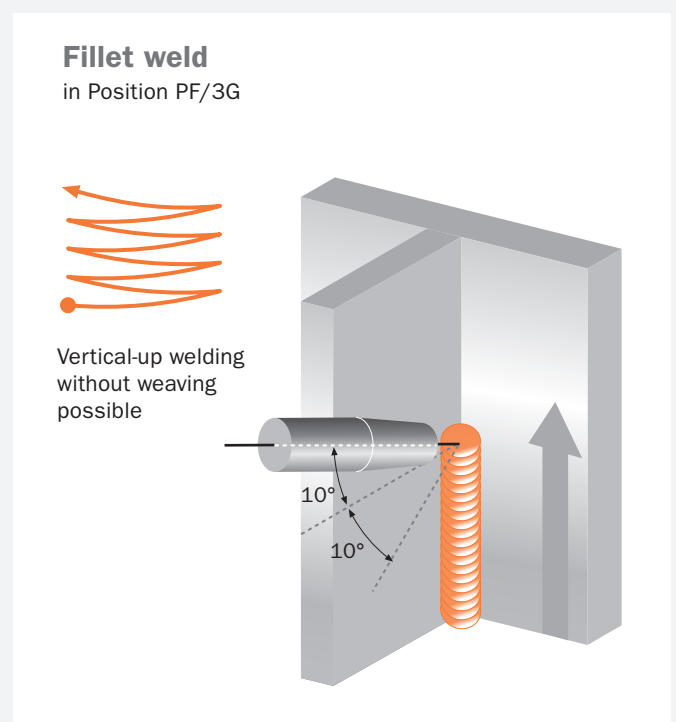
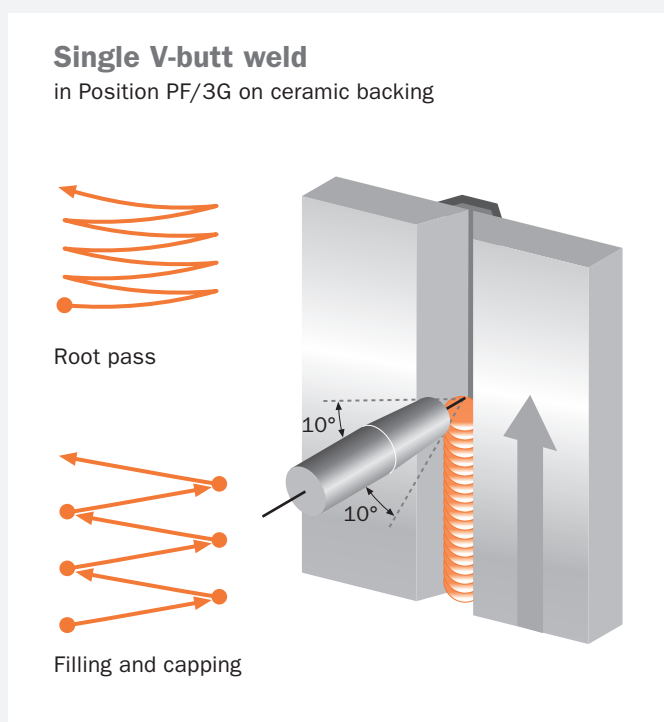
Mechanical Tests	Typical values [J] (ft.lbf)	ISO Specification [J] (ft.lbf)
RT	130 (96)	> 47 (35)
-20° C	90 (66)	> 47 (35)
The specified values apply to the stress-relieved condition (690° C / 60 min)		

APPROVALS: TÜV

Torch Angle and Handling



Positional Welding with MEGAFIL® Rutile Flux-Cored Wires



Use of Ceramic Backing Material

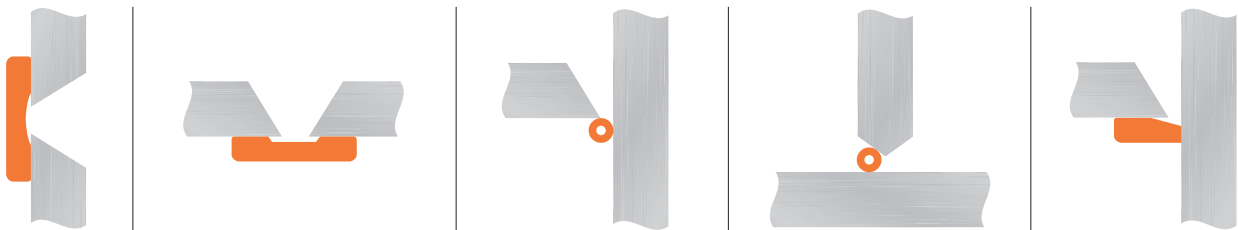
Ceramic backing is used to provide weld metal support when welding from one side only. It is an extremely effective way to rationalise welding procedures, improve root pass quality and reduce production costs.

Reduced production costs

- Eliminates the need for back-gouging, grinding and weld sealing operations at the reverse side of the joint.
- No turning of heavy sections.
- Increased productivity when welding root runs in PA/1G, PC/2G and PF/3G positions.
- Simpler joint preparation and reduced set-up time, due to greater root gap tolerances.

Improved quality

- Smooth, even root bead with slightly convex profile and excellent blend-in with base material.
- Ceramic material does not contain any moisture and produces no fumes. Ideal for low-hydrogen applications.
- No pollution of working environment with noise and fume from gouging, grinding and weld sealing operations.



Typical examples of ceramic backing applications

Two-sided welding means additional time needed for:

1. Back-gouging
2. Grinding
3. Rewelding on the reverse side, depending on the construction

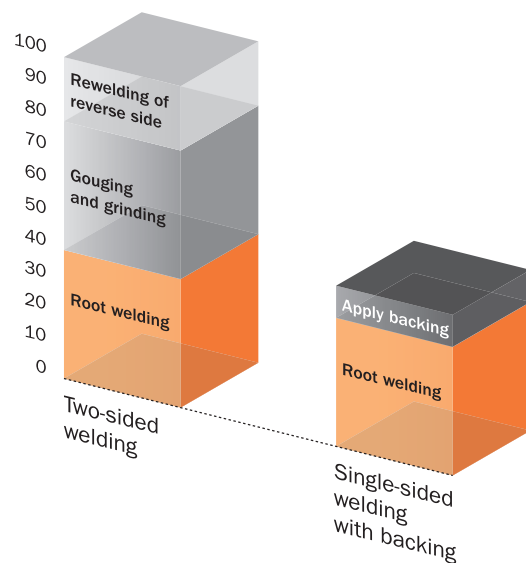


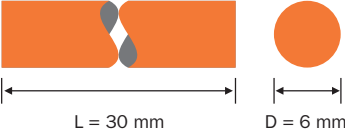
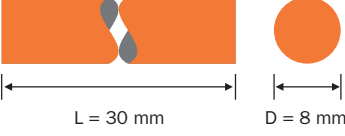
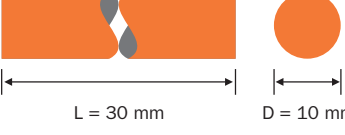
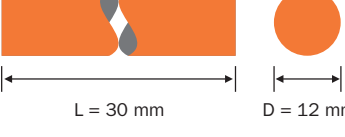
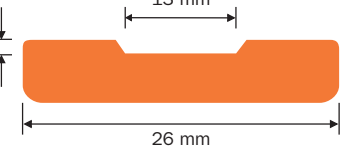
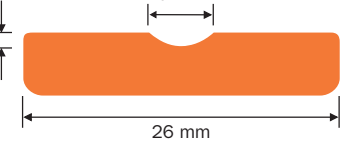
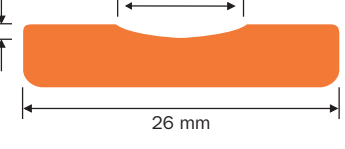
Single-sided welding with flux cored wire and backing:

Substantially higher productivity since all “extra work” has been eliminated. ✓



Total time comparison %

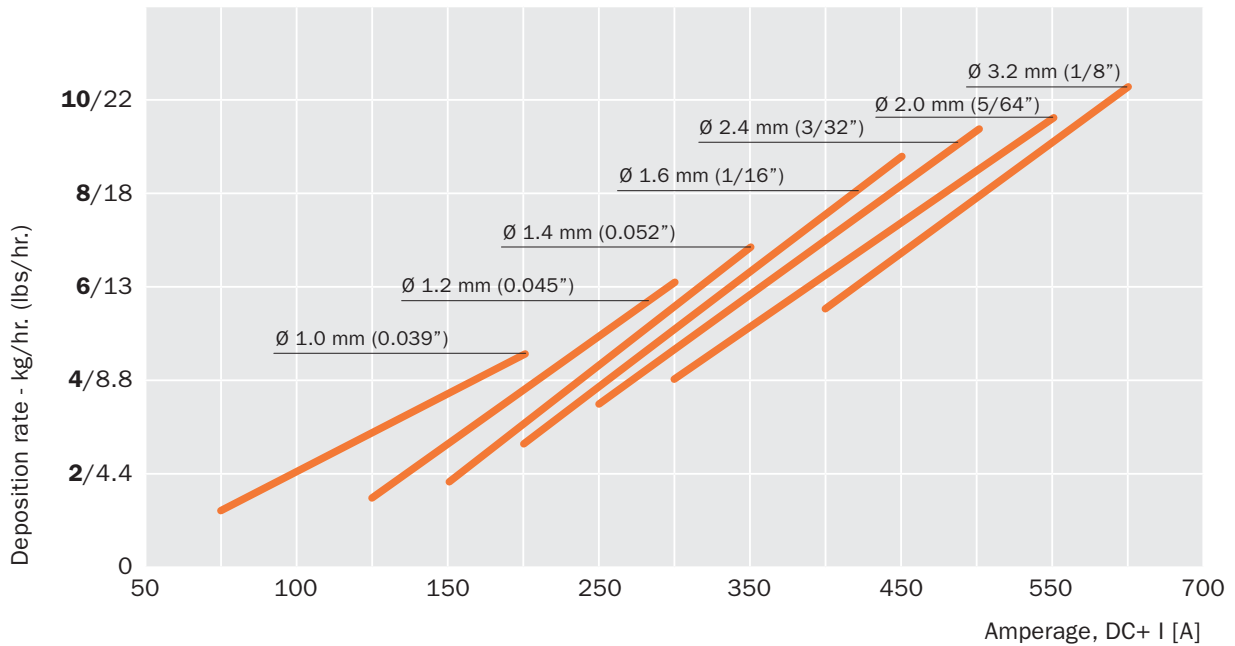


 <p>L = 30 mm D = 6 mm</p>	X- and K-joints MEGAFIL® rutile and metal-cored wires Root gap: 3-5 mm Length of tile: 30 mm Art. Nr.. 86640600	Contents Pieces per box: 40 Pieces per pallet: 4480
 <p>L = 30 mm D = 8 mm</p>	X- and K-joints MEGAFIL® rutile and metal-cored wires Root gap: 4-6 mm Length of tile: 30 mm Art. Nr.. 86650600	Contents Pieces per box: 40 Pieces per pallet: 4480
 <p>L = 30 mm D = 10 mm</p>	X- and K-joints MEGAFIL® rutile and metal-cored wires Root gap: 5-7 mm Length of tile: 30 mm Art. Nr.. 86660600	Contents Pieces per box: 40 Pieces per pallet: 4480
 <p>L = 30 mm D = 12 mm</p>	X- and K-joints MEGAFIL® rutile and metal-cored wires Root gap: 7-10 mm Length of tile: 30 mm Art. Nr.. 86670600	Contents Pieces per box: 30 Pieces per pallet: 3360
 <p>13 mm 8.5 mm 26 mm 1.3 mm</p>	V-joints MEGAFIL® rutile flux-cored wires Root gap: 3-8 mm Length of tile: 25 mm Art. Nr.. 86800600	Contents Pieces per box: 30 Pieces per pallet: 3360
 <p>6 mm 8 mm 26 mm 1.3 mm</p>	V-joints MEGAFIL® metal-cored wires and solid wires Root gap: 3-5 mm Length of tile: 25 mm Art. Nr.. 86980600	Contents Pieces per box: 30 Pieces per pallet: 3360
 <p>12.5 mm 8 mm 26 mm 1.3 mm</p>	V-joints MEGAFIL® rutile flux-cored wires Root gap: 3-7 mm Length of tile: 25 mm Art. Nr.. 86990600	Contents Pieces per box: 30 Pieces per pallet: 3360

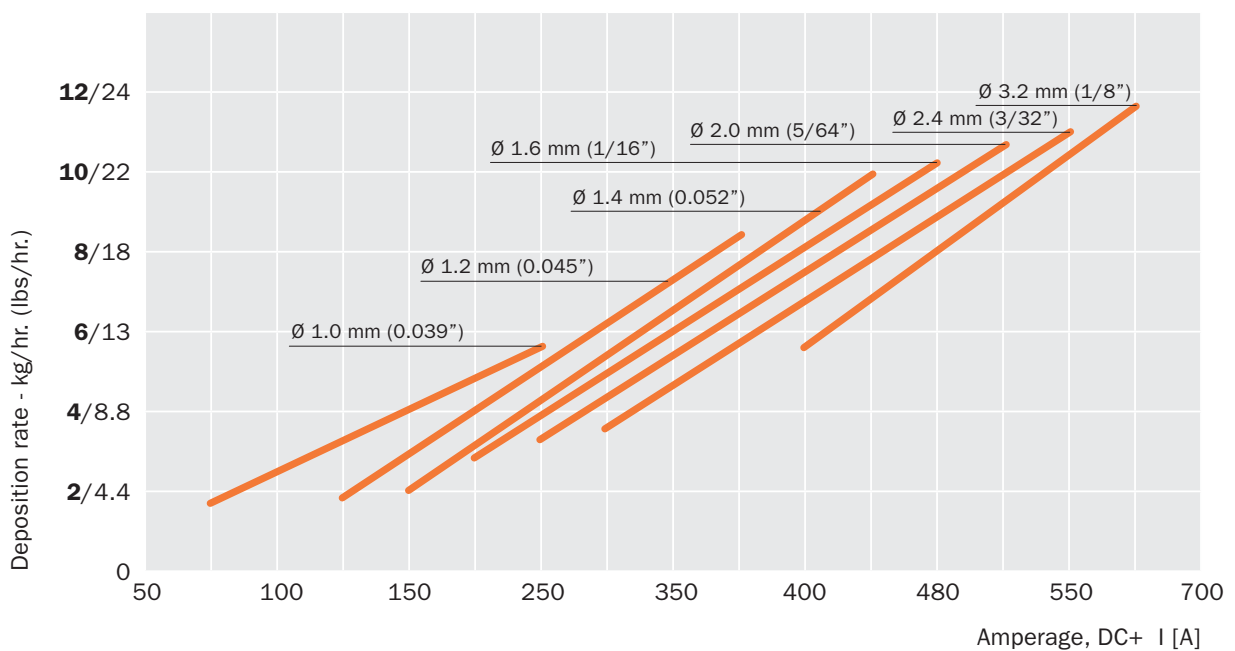
Overview of ITW Welding ceramic backing materials. All are grey ceramic backing on aluminium adhesive tape. Length per piece is 600 mm. Used for non- and low-alloyed steels and stainless steels.

Deposition Rate Flux- and Metal-Cored Wires

Deposition rate of MEGAFIL® flux-cored wires



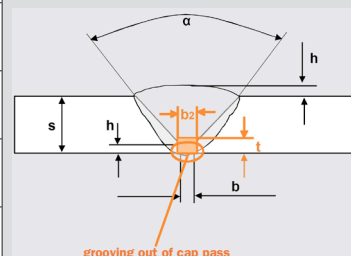
Deposition rate of MEGAFIL® metal-cored wires



Welding Parameters / Welding Costs

Comparison of welding economy of V weld in PF / 3G position

		MEGAFIL® 713 R		SG2 / G3Si1	
wire diameter	Ø	1.2	mm	1.2	mm
labour and overhead costs	L	40	€/h	40	€/h
amperage	I	260	A	170	A
deposition rate	A	5.5	kg/h	2.8	kg/h
welding duty cycle	ED	70	%	70	%
price of welding consumable	Zp	3	€/kg *)	1	€/kg *)
weld metal recovery	E	85	%	95	%
price of gas	Gp	0.006	€/l	0.006	€/l
gas volumetric flow rate	Gs	12	l/min	15	l/min
gas consumption = 60 x GS / Ax ED	Gv	187.01	L/kgSG	459.184	L/kgSG
gas costs = Gp x Gv	Gk	1.12	€/kgSG	2.76	€/kgSG
welding costs = Zp / E x 100	Zk	3.53	€/kgSG	1.05	€/kgSG
production costs = L / A x ED	Fk	10.39	€/kgSG	20.41	€/kgSG
total costs = Fk + Zk + Gk		15.04	€/kgSG	24.22	€/kgSG
sheet thickness s [mm]	20.0	weight of weld [kg/m]	production costs per meter weld [kg/mSN]		
weld preparation angle α	50				
gap width b [mm]	3.0				
root height h [mm]	1.0	1.987	29.75	47.90	
weld reinforcement [mm]	2	required wire quantity [kg/mSN]			
cap oass (if necessary)	1.0	solid or metal-cored wire*			2.06
depth t [mm]	1	rutile or basic flux-cored wire*			2.25
width b2 [mm]		*for flux-cored wire with slag 86%, for solid and metal-cored wire 96% recovery are considered			

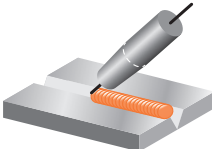
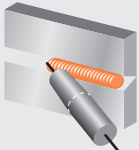
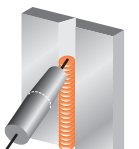
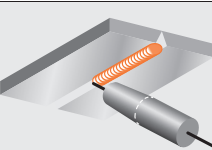

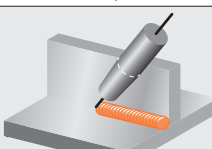
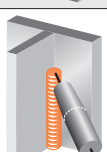
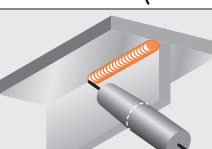


Remarks:

*) Price of welding consumable depending on supplied volume

MEGAFIL® Welding parameters - guidance values: metal-cored wires

MEGAFIL® - metal-cored wire - Ø 1.0 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1 (Root)	90 ± 10	14.5 ± 1	2.3	4	
			2-n	220 ± 20	26 ± 1	10.7		
PC 2G			1 (Root)	90 ± 10	14.5 ± 1	2.3	3	
			2-n	220 ± 10	25 ± 1	10.7		
PF 3G			1 (Root)	90 ± 10	14.5 ± 1	2.3	4	
			2	120 ± 10	14.5 ± 1	3.8		
			3-n	140 ± 20	15.5 ± 1	5.1		
PE 4G			1 (Root)	100 ± 10	14.5 ± 1	2.9	2 (3)	
			weaving 2-n	120 ± 10	15 ± 1	3.8		
			stringer beads 2-n	200 ± 10	24 ± 1	9.5		
PA 1F	min 1.5 mm	< 5 mm		100 ± 20	14.5 ± 1	2.9		
		< 10 mm		220 ± 10	25 ± 1	10.7		
		> 10 mm		220 ± 20	26 ± 1	10.7		
PB 2F	min 1.5 mm	< 5 mm		120 ± 20	15.5 ± 1	3.8		
		< 10 mm		220 ± 10	26 ± 1	10.7		
		> 10 mm		220 ± 20	26 ± 1	10.7		
PF 3F	single layer			100 ± 20	15.5 ± 1	2.9		
	multi layer			120 ± 20	15.5 ± 1	3.8		
PD 4F		< 5 mm		120 ± 20	15.5 ± 1	3.8		
		> 5 mm		220 ± 10	25 ± 1	10.7		

MEGAFIL® Welding parameters - guidance values: metal-cored wires

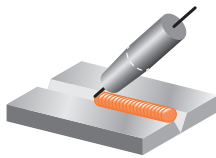
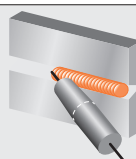
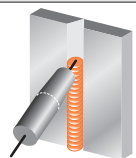


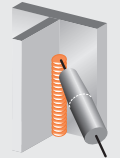
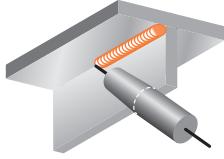


MEGAFIL® - metal-cored wire - Ø 1.2 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1 (Root)	90 ± 10	14.5 ± 1	1.8	4	
			2-n	240 ± 20	26 ± 1	7.1		
PC 2G			1 (Root)	90 ± 10	14.5 ± 1	1.8	3	
			2-n	230 ± 10	25 ± 1	6.7		
PF 3G			1 (Root)	90 ± 10	14.5 ± 1	1.8	4	
			2	110 ± 10	14.5 ± 1	2.2		
			3-n	120 ± 20	15.5 ± 1	2.6		
PE 4G			1 (Root)	100 ± 10	14.5 ± 1	2	2 (3)	
			weaver	2-n	130 ± 10	15 ± 1	3	
			stringer beads	2-n	220 ± 10	25 ± 1	6.6	
PA 1F	min 1.5 mm	< 5 mm		120 ± 20	14.5 ± 1	2.6		
		< 10 mm		220 ± 10	26 ± 1	6.6		
		< 15 mm		240 ± 20	27 ± 1	7.1		
		> 15 mm		300 ± 20	30 ± 1	9.5		
PB 2F	min 1.5 mm	< 5 mm		120 ± 10	15.5 ± 1	2.6		
		< 10 mm		220 ± 10	26 ± 1	6.6		
		< 15 mm		240 ± 20	27 ± 1	7.1		
		> 15 mm		300 ± 20	30 ± 1	9.5		
PF 3F	single layer			140 ± 20	15.5 ± 1	3.2		
	multi layer			160 ± 20	16.5 ± 1	3.8		
PD 4F		< 5 mm		160 ± 20	16.5 ± 1	3.8		
		> 5 mm		220 ± 10	25 ± 1	6.6		

MEGAFIL® Welding parameters - guidance values: metal-cored wires

MEGAFIL® - metal-cored wire - Ø 1.6 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1 (Root)	100 ± 10	14.5 ± 1	1.1	4 (3)	
			2-n	250 ± 20	26 ± 1	3.5		
PC 2G			1 (Root)	100 ± 10	14.5 ± 1	1.1	3 (4)	
			2-n	220 ± 10	25 ± 1	2.9		
PF 3G			1 (Root)	100 ± 10	14.5 ± 1	1.1	4	
			2	120 ± 10	14.5 ± 1	1.4		
			3-n	140 ± 20	15.5 ± 1	1.6		
PA 1F	min 1.5 mm	< 5 mm		120 ± 20	14.5 ± 1	1.4		
		< 10 mm		220 ± 10	26 ± 1	2.9		
		< 15 mm		240 ± 20	27 ± 1	3.3		
		> 15 mm		300 ± 20	28 ± 1	4.2		
PB 2F	min 1.5 mm	< 5 mm		120 ± 10	15.5 ± 1	1.4		
		< 10 mm		220 ± 10	26 ± 1	2.9		
		< 15 mm		240 ± 20	27 ± 1	3.3		
		> 15 mm		300 ± 20	28 ± 1	4.2		
PF 3F	single layer			120 ± 20	15.5 ± 1	1.4		
	multi layer			140 ± 20	15.5 ± 1	1.6		
PD 4F		< 5 mm		140 ± 20	15.5 ± 1	1.6		
		> 5 mm		220 ± 10	25 ± 1	2.9		

MEGAFIL® Welding parameters - guidance values: rutile flux-cored wires



MEGAFIL® - rutile flux-cored wire - Ø 1.0 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	180 ± 10	23 ± 1	8.6	5	
			2-n	220 ± 20	26 ± 1	11.5		
PC 2G			1	160 ± 10	22 ± 1	7.1	4	
			2-n	220 ± 20	24 ± 1	11.5		
PF 3G		t < 12 mm	1	160 ± 10	22 ± 1	7.1	5	
		t < 12 mm	2-n	200 ± 20	25 ± 1	10.4		
		t > 12 mm	1	180 ± 10	23 ± 1	8.6	6	
		t > 12 mm	2-n	220 ± 20	26 ± 1	11.5		
PE 4G			1	160 ± 10	22 ± 1	7.1	4	
			2-n	220 ± 20	25 ± 1	11.5		
PA 1F			1	220 ± 20	26 ± 2	11.5		
PB 2F	single layer	t < 12 mm		200 ± 20	25 ± 1	10.4		
		t > 12 mm	1	240 ± 20	26 ± 2	12.8		
	multi layer		1	240 ± 20	27 ± 2	12.8		
			2-n	220 ± 20	25 ± 2	11.5		
PF 3F	single layer	t < 12 mm		160 ± 10	22 ± 1	7.1		
		t > 12 mm	1	220 ± 20	25 ± 2	11.5		
	multi layer		1	180 ± 10	24 ± 1	8.6		
			2-n	220 ± 10	25 ± 1	11.5		
PD 4F	single layer	t < 12 mm		160 ± 10	22 ± 1	7.1		
		t > 12 mm	1	220 ± 20	25 ± 1	11.5		
	multi layer		1	160 ± 10	22 ± 1	7.1		
			2-n	200 ± 20	24 ± 1	10.4		

MEGAFIL® Welding parameters - guidance values: rutile flux-cored wires



MEGAFIL® - rutile flux-cored wire - Ø 1.2 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	180 ± 10	23 ± 1	5.4	6	
			2-n	250 ± 20	27 ± 1	9.6		
PC 2G			1	160 ± 10	22 ± 1	5	5	
			2-n	210 ± 20	24 ± 1	6.3		
PF 3G		t < 12 mm	1	160 ± 10	22 ± 1	5	5	
			2-n	200 ± 20	25 ± 1	6.1		
		t > 12 mm	1	180 ± 10	23 ± 1	5.4	6	
			2-n	240 ± 20	26 ± 1	9.3		
PE 4G			1	160 ± 10	22 ± 1	5	4	
			2-n	220 ± 10	25 ± 1	6.4		
PA 1F			1	260 ± 20	27 ± 2	10.5		
PB 2F	single layer	t < 12 mm		180 ± 20	24 ± 1	5.4		
		t > 12 mm	1	260 ± 20	27 ± 2	10.5		
	multi layer		1	260 ± 20	27 ± 2	10.5		
			2-n	240 ± 20	26 ± 2	9.3		
PF 3F	single layer	t < 12 mm		160 ± 10	22 ± 1	5		
		t > 12 mm	1	200 ± 20	23 ± 2	6.1		
	multi layer		1	160 ± 10	22 ± 1	5		
			2-n	230 ± 10	26 ± 1	8.5		
PD 4F	single layer	t < 12 mm		160 ± 10	22 ± 1	5		
		t > 12 mm	1	200 ± 20	24 ± 1	6.1		
	multi layer		1	160 ± 10	22 ± 1	5		
			2-n	200 ± 20	24 ± 1	6.1		

MEGAFIL® Welding parameters - guidance values: rutile flux-cored wires



MEGAFIL® - rutile flux-cored wire - Ø 1.6 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	180 ± 10	24 ± 1	2.7	5	
			2-n	250 ± 20	26 ± 1	4		
PC 2G			1	160 ± 10	22 ± 1	2.4	5	
			2-n	220 ± 10	24 ± 1	3.2		
PF 3G	t < 20 mm		1	160 ± 10	22 ± 1	2.4	5	
			2-n	220 ± 10	25 ± 1	3.2		
	t > 20 mm		1	180 ± 10	23 ± 1	2.7	5	
			2-n	240 ± 20	26 ± 1	3.8		
PA 1F		t > 20 mm	1	300 ± 20	27 ± 2	5.3		
PB 2F	single layer	t < 20 mm		240 ± 20	26 ± 1	3.8		
		t > 20 mm	1	280 ± 20	27 ± 2	4.9		
	multi layer		1	260 ± 20	27 ± 1	4.2		
			2-n	240 ± 20	26 ± 2	3.8		
PF 3F	single layer	t < 20 mm		180 ± 10	22 ± 1	2.7		
		t > 20 mm	1	240 ± 20	24 ± 2	3.8		
	multi layer		1	160 ± 10	22 ± 1	2.4		
			2-n	220 ± 20	24 ± 1	3.2		
PD 4F	single layer	t < 20 mm		180 ± 10	22 ± 1	2.7		
		t > 20 mm	1	220 ± 20	25 ± 1	3.2		
	multi layer		1	160 ± 10	22 ± 1	2.4		
			2-n	200 ± 20	23 ± 1	3		

MEGAFIL® Welding parameters - guidance values: basic flux-cored wires



MEGAFIL® - basic flux-cored wire - Ø 1.0 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	200 ± 10	23 ± 1	11.5	4	
			2-n	220 ± 20	26 ± 1	13		
PC 2G			1	180 ± 10	23 ± 1	10.3	3	
			2-n	220 ± 20	25 ± 1	13		
PA 1F	single layer	> 10 mm	1	240 ± 20	26 ± 2	14.1		
	multi layer		2-n	220 ± 20	25 ± 2	13		
PB 2F	single layer	> 10 mm	1	240 ± 20	26 ± 2	14.1		
	multi layer		2-n	220 ± 20	25 ± 2	13		

MEGAFIL® - basic flux-cored wire - Ø 1.2 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	200 ± 10	23 ± 1	8.5	4	
			2-n	220 ± 20	26 ± 2	9.8		
PC 2G			1	180 ± 10	23 ± 1	7.3	3	
			2-n	220 ± 20	25 ± 1	9		
PA 1F	single layer	> 10 mm	1	250 ± 20	26 ± 2	10.5		
	multi layer		2-n	240 ± 20	25 ± 2	9.8		
PB 2F	single layer	> 10 mm	1	240 ± 20	26 ± 2	9.8		
	multi layer		2-n	220 ± 20	25 ± 2	9		

MEGAFIL® Welding parameters - guidance values: basic flux-cored wires



MEGAFIL® - basic flux-cored wire - Ø 1.6 mm; gas flow 12-18 l/min (25-38 cfh)

Position		Plate thickness	Layer	Amperage [A]	Voltage [V]	W.- Speed [m/ min]	Gap max (mm)	Symbol
PA 1G			1	200 ± 10	23 ± 1	3.9	4	
			2-n	250 ± 20	26 ± 1	5		
PA 1F	single layer	> 10 mm	1	300 ± 20	26 ± 2	6.2		
	multi layer		2-n	240 ± 20	25 ± 2	4.7		
PB 2F	single layer	> 10 mm	1	250 ± 20	26 ± 1	5		
	multi layer		2-n	220 ± 20	25 ± 2	4.2		

Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels (extract)

Example:



T - Tubular cored wire

Tensile properties (multi-run welds)

Symbol	Rel/Rp 0.2 min. MPa	Rm MPa	A 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

Tensile properties (single-run welds)

Symbol	Rel/Rp 0.2 min. Paren metal MPa	Rm Weld MPa
3T	355	470
4T	420	520
5T	500	500

Impact properties

Symbol	Min. 47 J at °C
Z	No requirements
A	20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
7	-70
8	-80
9	-90
10	-100

Welding positions

Symbol	Positions
1	PA, PB, PC, PD, PE, PF & PG
2	PA, PB, PC, PD, PE & PF
3	PA & PB
4	PA
5	PA, PB & PG

Diffusible hydrogen in weld metal

Symbol	ml / 100 g weld metal, max.
H5	5
H10	10
H15	15

All weld metal chemical composition (%) ^{1,2}

Symbol	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	Al ²	Cu
No symbol	—	2.0	—	—	—	0.2	0.5	0.2	0.08	0.05	2.0	0.3
Mo	—	1.4	—	—	—	0.2	0.5	0.3-0.6	0.08	0.05	2.0	0.3
MnMo	—	1.4-2.0	—	—	—	0.2	0.5	0.3-0.6	0.08	0.05	2.0	0.3
1Ni	—	1.4	0.80	—	—	0.2	0.6-1.2	0.2	0.08	0.05	2.0	0.3
1.5Ni	—	1.6	—	—	—	0.2	1.2-1.8	0.2	0.08	0.05	2.0	0.3
2Ni	—	1.4	—	—	—	0.2	1.8-2.6	0.2	0.08	0.05	2.0	0.3
3Ni	—	1.4	—	—	—	0.2	2.6-3.8	0.2	0.08	0.05	2.0	0.3
Mn1Ni	—	1.4-2.0	—	—	—	0.2	0.6-1.2	0.2	0.08	0.05	2.0	0.3
1NiMo	—	1.4	—	—	—	0.2	0.6-1.2	0.3-0.6	0.08	0.05	2.0	0.3
Z	Any other agreed analysis											
¹	Single values are maximum											
²	Non-gas shielded electrodes only											

Type of filling

Symbol	Properties	Type of weld	Shielding gas
R	Rutile, slowly solidifying slag	Single- and multi-run	Required
P	Rutile, quickly solidifying slag	Single- and multi-run	Required
B	Basic	Single- and multi-run	Required
M	Metal-cored	Single- and multi-run	Required
V	Rutile or fluoride-basic	Single-run	Not required
W	Basic-fluoride, slowly solidifying slag	Single- and multi-run	Not required
Y	Basic-fluoride, quickly solidifying slag	Single- and multi-run	Not required
Z	Other types		

Shielding gas

C	Shielding gas according EN ISO 14175 - C1 (100% CO ₂)
M	Shielding gas compositions according to EN ISO 14175 - M2

Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of high strength steels (extract)

Example:

MEGAFIL® 742 B

T 69 6 Mn2NiCrMo B M21 3 H5

T - Tubular cored wire

Tensile properties (multi-run welds)

Symbol	Rel/Rp 0.2 min. MPa	Rm MPa	A min. %
55	550	640-820	18
62	620	700-890	18
69	690	770-940	17
62	790	880-1080	16
6	890	940-1180	15

Impact properties

Symbol	Min. 47 J at °C
Z	No requirements
A	20
0	0
2	-20
3	-30
4	-40
5	-50
6	-60
7	-70
8	-80
9	-90
10	-100

Welding positions

Symbol	Positions
1	PA, PB, PC, PD, PE, PF & PG
2	PA, PB, PC, PD, PE & PF
3	PA & PB
4	PA
5	PA, PB & PG

Diffusible hydrogen in weld metal

Symbol	ml / 100 g weld metal, max.
H5	5
H10	10
H15	15

All weld metal chemical composition (%) ^{1, 2}

Symbol	C	Mn	Si	P	S	Ni	Cr	Mo	V
MnMo	0.03-0.10	1.4-2.0	0.90	0.020	0.020	0.3	0.2	0.3-0.6	0.05
Mn1Ni	0.03-0.10	1.4-2.0	0.90	0.020	0.020	0.6-1.2	0.2	0.2	0.05
Mn1.5Ni	0.03-0.10	1.1-1.8	0.90	0.020	0.020	1.3-1.8	0.2	0.2	0.05
Mn2.5Ni	0.03-0.10	1.1-2.0	0.90	0.020	0.020	2.1-3.0	0.2	0.2	0.05
1NiMo	0.03-0.10	1.4	0.90	0.020	0.020	0.6-1.2	0.2	0.3-0.6	0.05
1.5NiMo	0.03-0.10	1.4	0.90	0.020	0.020	1.2-1.8	0.2	0.3-0.7	0.05
2NiMo	0.03-0.10	1.4	0.90	0.020	0.020	1.8-2.6	0.2	0.3-0.7	0.05
Mn1NiMo	0.03-0.10	1.4-2.0	0.90	0.020	0.020	0.6-1.2	0.2	0.3-0.7	0.05
Mn2NiMo	0.03-0.10	1.4-2.0	0.90	0.020	0.020	1.8-2.6	0.2	0.3-0.7	0.05
Mn2NiCrMo	0.03-0.10	1.4-2.0	0.90	0.020	0.020	1.8-2.6	0.3-0.6	0.3-0.6	0.05
Mn2Ni1CrMo	0.03-0.10	1.4-2.0	0.90	0.020	0.020	1.8-2.6	0.6-1.0	0.3-0.6	0.05

Z Any other agreed analysis

¹ Single values are maximum

² Cu < 0.3 Nb < 0.05

Type of filling

Symbol	Properties
R	Rutile, slowly solidifying slag
P	Rutile, quickly solidifying slag
B	Basic
M	Metal-cored
Z	Other types

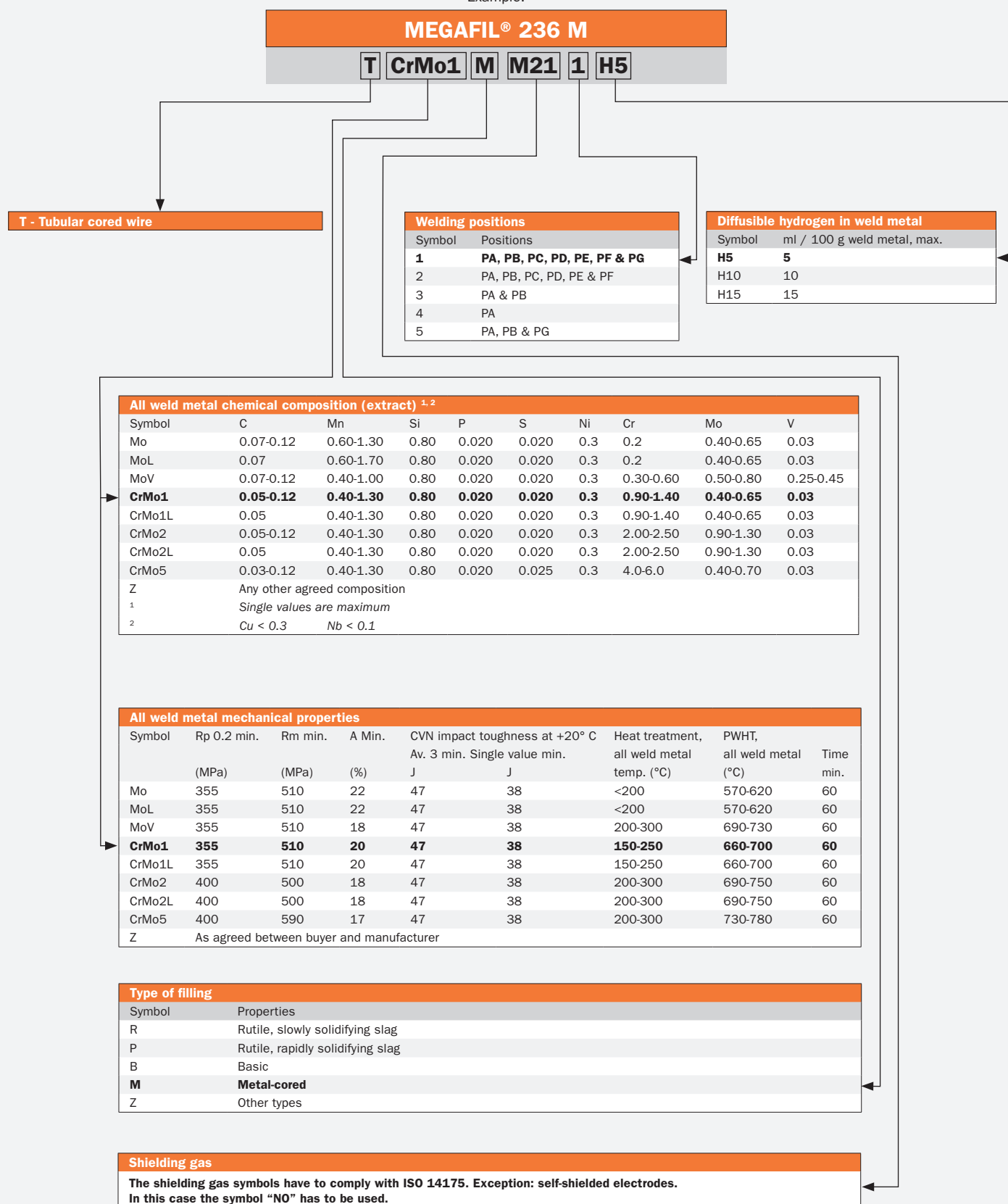
Shielding gas

The shielding gas symbol has to comply with EN ISO 14175: 2008, e.g.:

- The symbol **M21** for mixed gases has to be used if the shielding gas is classified ISO 14175-M21 without helium.

Tubular cored electrodes for gas shielded metal arc welding of creep resisting steels (extract)

Example:



Specification for carbon steel electrodes and rods for gas shielded arc welding (extract)

Example:

MEGAFIL® 710 M

E70C-6 M H4

Designates use as either an electrode or rod (ER) or use only as an electrode (E)

Indicates whether the filler metal is solid (S) or composite (C)

Shielding gas

C	CO ₂
M	75-80% Ar/Rest CO₂

Diffusible hydrogen in weld metal

Symbol	ml / 100 g weld metal, max.
H16	16
H8	8
H4	4

Chemical composition requirements for weld metal from composite electrodes, as welded, as welded (%)¹

Multiple pass	Shielding gas	C	Mn	Si	S	P	Ni ²	Cr ²	Mo ²	V ²	Cu
E70C-3X	75-80% Ar/Balance CO ₂ or CO ₂	0.12	1.75	0.90	0.03	0.03	0.50	0.20	0.30	0.08	0.50
E70C-6X	75-80% Ar/Balance CO₂ or CO₂	0.12	1.75	0.90	0.03	0.03	0.50	0.20	0.30	0.08	0.50
E70C-G(X)	³	Not specified ⁴									
Single pass											
E70C-GS(X)	³	Not specified									

¹ Single values are maximum

² Sum of Ni, Cr, Mo + V shall not exceed 0.50%

³ Shielding gas agreed between purchaser and supplier, unless designated by the C or M suffix

⁴ Composition as agreed between purchaser and supplier

Tension test requirements, as welded

	Shielding gas	Tensile strength (min.)		Yield strength (min)		Elongation (min)
		psi	MPa	psi	MPa	
E70C-3X	75-80% Ar/Balance CO ₂ or CO ₂	70000	480	58000	400	22
E70C-6X	75-80% Ar/Balance CO₂ or CO₂	70000	480	58000	400	22
E70C-G(X)	As agreed	70000	480	58000	400	22
E70C-GS(X)	As agreed	70000	480	Not specified		

AWS classification Impact test requirements, as welded

E70C-3X	20 ft.lbf at 0° F
E70C-6X	20 ft.lbf at -20° F
E70C-G(X)	As agreed between supplier and purchaser
E70C-GS(X)	Not required

Specification for carbon steel electrodes for flux-cored arc welding (extract)

Example:



Designates use as either an electrode or rod (ER) or use only as an electrode (E)

Designator for Tubular flux-cored wire (T)

Mechanical property requirements, all weld metal, as welded

Classification	Tensile strength (ksi)	Min. Yield strength (ksi)	Min. Elongation (%)	Min. Elongation
E6XT-G	60-80	48	22	Not specified
E7XT-G	70-95	58	22	Not specified
E7XT-1C, -1M	70-95	58	22	20 ft.lbf at 0° F
E7XT-5C, -5M	70-95	58	22	20 ft.lbf at -20° F

Shielding gas

C	100% CO₂
M	75-80% Ar/CO₂

Electrode usability requirements

Designator	Classification	Welding position	Shielding gas	Polarity	Application
1	E70T-1C	H, F	CO ₂	DCEP	M
	E70T-1M	H, F	75-80% Ar/CO ₂	DCEP	M
	E71T-1C	H, F, VU, OH	CO₂	DCEP	M
	E71T-1M	H, F, VU, OH	75-80% Ar/CO₂	DCEP	M
5	E70T-5C	H, F	CO ₂	DCEP	M
	E70T-5M	H, F	75-80% Ar/CO ₂	DCEP	M
	E71T-5C	H, F, VU, OH	CO ₂	DCEP or DCEN	M
	E71T-5M	H, F, VU, OH	75-80% Ar/CO ₂	DCEP or DCEN	M
G	E60T-G	H, F	Not specified	Not specified	M
	E70T-G	H, F	Not specified	Not specified	M
	E61T-G	H, F, VD or VU, OH	Not specified	Not specified	S
	E71T-G	H, F, VD or VU, OH	Not specified	Not specified	S

H=horizontal F=flat VU=vertical up VD=vertical down OH=overhead

DCEP=direct current electrode positive DCEN=direct current negative

M=single or multiple pass S=single pass

J Designator for improved toughness of min. 20 ft.lbf at -40° F (27 J at -40° C)

Diffusible hydrogen in weld metal

Symbol	ml / 100g weld metal, max.
H16	16
H8	8
H4	4

Specification for low-alloy steel electrodes and rods for gas shielded arc welding (extract)

Example:

MEGAFIL® 742 M

E110C - K4 H4

Designates use as either an electrode or rod (ER) or use only as an electrode (E)

Indicates whether the filler metal is solid (S) or metal-cored (C)

Chemical composition requirements for weld metal from composite electrodes, all weld metal, as welded¹

Classification	C	Mn	Si	P	S	Ni	Cr	Mo	V	Ti	Zr	Al	Cu	Others total
Chromium molybdenum weld metal														
E80C-B2	0.05-0.12	0.40-1.00	0.25-0.60	0.025	0.030	0.20	1.00-1.50	0.40-0.65	0.03	-	-	-	-	0.50
E90C-B3	0.05-0.12	0.40-1.00	0.25-0.60	0.025	0.030	0.20	2.00-2.50	0.90-1.20	0.03	-	-	-	0.35	0.50
E80C-B6	0.10	0.40-1.00	0.25-0.60	0.025	0.025	0.60	4.50-6.00	0.45-0.65	0.03	-	-	-	0.35	0.50
Nickel steel electrodes and rods														
E80C-Ni1	0.12	1.50	0.90	0.025	0.030	0.80-1.10	-	0.30	0.03	-	-	-	0.35	0.50
E70C-Ni2	0.08	1.25	0.90	0.025	0.030	1.75-2.75	-	-	0.03	-	-	-	0.35	0.50
E80C-Ni2	0.12	1.50	0.90	0.025	0.030	1.75-2.75	-	-	0.03	-	-	-	0.35	0.50
E80C-Ni3	0.12	1.50	0.90	0.025	0.030	2.75-3.75	-	-	0.03	-	-	-	0.35	0.50
Other low-alloy steel electrodes and rods														
E90C-K3	0.15	0.75-2.25	0.80	0.025	0.025	0.50-2.50	0.15	0.25-0.65	0.03	-	-	-	0.35	0.50
E100C-K3	0.15	0.75-2.25	0.80	0.025	0.025	0.50-2.50	0.15	0.25-0.65	0.03	-	-	-	0.35	0.50
E110C-K3	0.15	0.75-2.25	0.80	0.025	0.025	0.50-2.50	0.15	0.25-0.65	0.03	-	-	-	0.35	0.50
E110C-K4	0.15	0.75-2.25	0.80	0.025	0.025	0.50-2.50	0.15-0.65	0.25-0.65	0.03	-	-	-	0.35	0.50
E120C-K4	0.15	0.75-2.25	0.80	0.025	0.025	0.50-2.50	0.15-0.65	0.25-0.65	0.03	-	-	-	0.35	0.50
E80C-W2	0.12	0.50-1.30	0.35-0.80	0.025	0.030	0.40-0.80	0.45-0.70	-	0.03	-	-	-	0.30-0.75	0.50
EXXC-G	Not specified													
1	Single values are maximum													

Tension test requirements, all weld metal

Classification	Shielding gas	Tensile strength (min.)		Yield strength (min.)		Elongation	Testing condition
		MPa	MPa	psi	MPa		
E80C-B2		80000	550	68000	470	19	PWHT
E90C-B3		90000	620	78000	540	17	PWHT
E80C-B6		80000	550	68000	470	17	PWHT
E80C-Ni1	Ar/1-5%O ₂	80000	550	68000	470	24	As welded
E70C-Ni2	Ar/1-5%O ₂	70000	490	58000	400	24	PWHT
E80C-Ni2	Ar/1-5%O ₂	80000	550	68000	470	24	PWHT
E90C-K3	Ar/5-25%O ₂	90000	620	78000	540	18	As welded
E100C-K3	Ar/5-25%O ₂	100000	690	88000	610	16	As welded
E110C-K3	Ar/5-25%O ₂	110000	760	98000	680	15	As welded
E110C-K4	Ar/5-25%O₂	110000	760	98000	680	15	As welded
E120C-K4	Ar/5-25%O ₂	120000	830	108000	750	15	As welded
E80C-W2	Ar/5-25%O ₂	80000	550	68000	470	22	As welded

Diffusible hydrogen in weld metal

Symbol	ml / 100 g weld metal, max.
H16	16
H8	8
H4	4

AWS A5.29: Welding consumables

Specification for low alloy steel electrodes for flux cored arc welding (extract)

Example:

MEGAFIL® 742 B
E110T5 - K4 M H4

Designates use as either an electrode or rod (ER) or use only as an electrode (E)

Designator for Tubular flux-cored wire (T)

Welding positions

0 flat & horizontal
1 All positions

Shielding gas

C 100% CO₂
M 75-80% Ar/CO₂

Mechanical property requirements, all weld metal, as welded

Classification	Condition	Tensile strength (ksi)	Min. Yield strength (ksi)	Min. Elongation (%)	Min. CVN impact energy
E8XT1-A1C, -A1M	PWHT	80-100	68	19	Not specified
E8XT1-B2C, -B2M	PWHT	80-100	68	19	Not specified
E8XT5-B2C, -B2M	PWHT	80-100	68	19	Not specified
E9XT5-B3C, -B3M	PWHT	90-110	78	17	Not specified
E9XT1-K2C, -K2M	AW	90-110	78	17	20 ft.lbf at 0°F
E9XT5-K2C, -K2M	AW	90-110	78	17	20 ft.lbf at -60°F
E10XT1-K3C, -K3M	AW	100-120	88	16	20 ft.lbf at 0°F
E11XT1-K3C, -K3M	AW	110-130	98	15	20 ft.lbf at 0°F
E11XT5-K4C, -K4M	AW	110-130	98	15	20 ft.lbf at 0°F
E12XT5-K4C, -K4M	AW	120-140	108	14	20 ft.lbf at -60°F
EXXTX-G, -GC, -GM	Chemical composition, test condition and mechanical properties as agreed between supplier and purchaser.				

Electrode usability requirements

Designator	Classification	Welding position	Shielding gas	Polarity	Application
1	EX0T1-XC	H, F	CO ₂	DCEP	M
	EX0T1-XM	H, F	75-80% Ar/CO ₂	DCEP	M
	EX1T1-XC	H, F, VU, OH	CO ₂	DCEP	M
	EX1T1-XM	H, F, VU, OH	75-80% Ar/CO ₂	DCEP	M
5	EX0T5-XC	H, F	CO ₂	DCEP	M
	EX0T5-XM	H, F	75-80% Ar/CO₂	DCEP	M
	EX1T5-XC	H, F, VU, OH	CO ₂	DCEP or DCEN	M
	EX1T5-XM	H, F, VU, OH	75-80% Ar/CO ₂	DCEP	M
G	EX0TX-G	H, F	None	g	M
	EX0TX-GC	H, F	CO ₂	g	M
	EX0TX-GM	H, F	75-80% Ar/CO ₂	g	M

H=horizontal F=flat VU=vertical up VD=vertical down OH=overhead

DCEP=direct current electrode positive DCEN=direct current negative

M=single or multiple pass S=single pass

Diffusible hydrogen in weld metal

Symbol	ml / 100 g weld metal, max.
H16	16
H8	8
H4	4

AWS A5.36: Welding consumables



Specification for carbon and low-alloy steel flux cored electrodes for flux cored arc welding and metal cored electrodes for gas metal arc welding (extract)

Example:

MEGAFIL® 1100 M

E 13 1 T15 M21 A 4 K4 H4

Designates use as an electrode (E)

Welding positions

0 flat & horizontal
1 All positions

Designator of the heat treatment condition, in which the tests were conducted

A as welded
P heat treated

Shielding gas

Symbol	Oxidizing Components %CO ₂	%O ₂
C1	100	—
M12	0.5≤CO ₂ ≤5	—
M13	—	0.5≤CO ₂ ≤3
M14	0.5≤CO ₂ ≤5	0.5≤CO ₂ ≤3
M20	5≤CO ₂ ≤15	—
M21	15≤CO₂≤25	—
M22	—	3≤CO ₂ ≤10
M23	0.5≤CO ₂ ≤5	3≤CO ₂ ≤10

Charpy Impact Test Requirements

Impact Designator	Max. test Temperature (°F)	Max. test Temperature (°C)	Minimum Average Energy Level [J] (ftlbf)
Y	+68	+20	
0	0	-18	
2	-20	-29	
4	-40	-40	27 (20)
5	-50	-46	
6	-60	-51	
8	-80	-40	

Diffusible hydrogen in weld metal

Hydrogen Designator	Average Diffusible Hydrogen; Maximum mL/100g Deposited Metal
H16	16
H8	8
H4	4
H2	2

Tension Test Requirements

Designator	Tensile Strength ksi	Minimum Yield Strength ksi	Minimum Percent Elongation %	Tensile Strength Mpa	Minimum Yield Strength Mpa	Minimum Percent Elongation %
6	60-80	48	22	430-550	330	22
7	70-95	58	22	490-660	400	22
8	80-100	68	19	550-690	470	19
9	90-110	78	17	620-760	540	17
10	100-120	88	16	690-830	610	16
11	110-130	98	15	760-900	680	15
12	120-140	108	14	830-970	740	14
13	130-150	118	14	900-1040	810	14

Weld Metal Chemical Composition Requirements

Weld Metal Designation	C	Mn	Si	S	P	Ni	Cr	Mo	V	Al	Cu	Other
K1	0.15	0.80-1.40	0.80	0.030	0.030	0.80-1.10	0.15	0.20-0.65	0.05	—	—	—
K2	0.15	0.50-1.75	0.80	0.030	0.030	1.00-2.00	0.15	0.35	0.05	1.8 ^h	—	—
K3	0.15	0.75-2.25	0.80	0.030	0.030	1.25-2.60	0.15	0.25-0.65	0.05	—	—	—
K4	0.15	1.20-2.25	0.80	0.030	0.030	1.75-2.60	0.20-0.60	0.20-0.65	0.03	—	—	—
K5	0.10-0.25	0.60-1.60	0.80	0.030	0.030	0.75-2.00	0.20-0.70	0.15-0.55	0.05	—	—	—
K6	0.15	0.50-1.50	0.80	0.030	0.030	0.40-1.00	0.20	0.15	0.05	1.8 ^h	—	—
K7	0.15	1.00-1.75	0.80	0.030	0.030	2.00-2.75	—	—	—	—	—	—
K8	0.15	1.00-2.00	0.40	0.030	0.030	0.50-1.50	0.20	0.20	0.05	1.8 ^h	—	—
K9	0.07	0.50-1.50	0.60	0.015	0.015	1.30-3.75	0.20	0.50	0.05	—	0.06	—

Single values are maximums

^hApplicable to self-shielded electrodes only

Electrode Usability Characteristics

Electrode Usability Designator	Process	General Description of Electrode Type	Typical Positions of Welding	Polarity
T1	FCAW-G	Flux cored electrodes of this type are gas shielded and have a rutile base slag. They are characterized by a spray transfer, low spatter loss, and a moderate volume of slag which completely covers the weld bead.	H, F, VU & OH	DCEP
T5	FCAW-G	Flux cored electrodes of this type are gas shielded and are characterized by a globular transfer, slightly convex bead contour, and a thin slag that may not completely cover the weld bead. They have a lime-fluoride slag system and develop improved impact properties and better cold cracking resistance than typically exhibited by the 'T1' type electrodes.	H, F, VU & OH	DCEP od. DCEN
T15	FCAW-G	Electrodes of this type are gas shielded composite stranded or metal cored electrodes. The core ingredients are primarily metallic. The nonmetallic components in the core typically total less than 1% of the total electrode weight. These electrodes are characterized by a spray arc and excellent bead wash capabilities. Applications are similar in many ways to solid GMAW electrodes.	H, F, VU & OH	DCEP od. DCEN

Hardfacing



MEGAFIL® A 220 M



EN ISO 14700: T Fe9

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to impact and shock
- The weld metal characteristics are similar to manganese hard alloy
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Railroad frogs
- Transport rollers and wheels
- Rope pulleys
- Wear parts of track vehicles

WIRE TYPE

Gas shielded metal-cored wire

SHIELDING GAS

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Gas flow 12-18 l/min

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.6 mm (1/16")

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.6	Nickel (Ni)	0.2
Manganese (Mn)	14.5		
Silicon (Si)	0.6		
Chromium (Cr)	3.8		
Molybdenum (Mo)	-		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	20 - 30	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

MEGAFIL® A 730 M



EN ISO 14700: T Fe1

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to impact
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Railroad frogs
- Transport rollers and wheels
- Rope pulleys
- Wear parts of track vehicles

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Gas flow 12-18 l/min

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.22	Nickel (Ni)	-
Manganese (Mn)	1.5		
Silicon (Si)	0.6		
Chromium (Cr)	1.3		
Molybdenum (Mo)	-		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	25 - 35	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component

MEGAFIL® A 740 M



EN ISO 14700: T Z Fe2

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to heavy impact
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- No buffer layer except on materials considered critical
- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Conveyors and transport surfaces
- Tires
- Construction equipment

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Gas flow 12-18 l/min

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.15	Nickel (Ni)	-
Manganese (Mn)	1.3		
Silicon (Si)	0.4		
Chromium (Cr)	5.0		
Molybdenum (Mo)	0.5		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	35 - 45	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

MEGAFIL[®] A 750 M



EN ISO 14700: T Z Fe2

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to heavy impact
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- No buffer layer except on materials considered critical
- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Conveyors and transport surfaces
- Tires
- Construction equipment

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Gas flow 12-18 l/min

Direct Current Electrode Positive (DCEP)

Ø 1.2 mm (0.045")

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.3	Nickel (Ni)	-
Manganese (Mn)	1.5		
Silicon (Si)	0.4		
Chromium (Cr)	5.5		
Molybdenum (Mo)	0.5		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	45 - 55	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

MEGAFIL® A 760 M



EN ISO 14700: T Fe2

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to heavy impact
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- No buffer layer except on materials considered critical
- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Bucket and loader teeth
- Conveyors
- Crusher jaws and cones

WIRE TYPE

Gas shielded metal-cored wire

SHIELDING GAS

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Gas flow 12-18 l/min

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 - 1.6 mm (0.045 - 1/16")

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.5	Nickel (Ni)	-
Manganese (Mn)	1.5		
Silicon (Si)	0.6		
Chromium (Cr)	6.0		
Molybdenum (Mo)	0.5		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	55 - 65	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.
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MEGAFIL® A 760 B

EN ISO 14700: T Fe2

WELDING POSITIONS:



FEATURES

- Well suited for wear resisting parts subject to heavy impact
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic

BENEFITS

- Shielding Gas C1 (100% CO₂) possible
- No buffer layer except on materials considered critical
- Machinable weld metal
- Hardening possible
- No re-drying
- Suitable for robot applications

APPLICATIONS

- Automatic and mechanized welding
- Bucket and loader teeth
- Conveyors
- Crusher jaws and cones

WIRE TYPE

Gas shielded basic flux-cored wire

SHIELDING GAS

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); 100% CO₂ possible; Gas flow 12-18 l/min

TYPE OF CURRENT

Direct Current Electrode Positive (DCEP)

STANDARD DIAMETERS

Ø 1.2 mm (0.045")

RE-DRYING

Not required due to seamless wire design

STORAGE

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.5	Nickel (Ni)	-
Manganese (Mn)	1.5		
Silicon (Si)	0.6		
Chromium (Cr)	6.0		
Molybdenum (Mo)	0.5		

HARDNESS OF PURE WELD METAL FROM THE 3rd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	55 - 65	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

MEGAFIL® A 861 M



EN ISO 14700: T Fe8

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none">• Superior hardness as a result of special carbides• Good reignition characteristics• Virtually no slag coverage• Smooth arc characteristic• Weld metal machinable only by grinding• A buffer layer is recommended for critical materials or multi-layer build up	<ul style="list-style-type: none">• Well suited for wear resisting parts subject to heavy impact and shock, as well as abrasion• Surface remains free of cracks• No re-drying• Suitable for robot applications• Welding without shielding gas possible	<ul style="list-style-type: none">• Automatic and mechanized welding• Bucket and loader teeth• Conveyors• Crusher jaws and cones

WIRE TYPE	Gas shielded metal-cored wire
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂); Welding without shielding gas possible Gas flow 12-18 l/min
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.6 mm (1/16")
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	1.3	Nickel (Ni)	-
Manganese (Mn)	0.8	Molybdenum (Mo)	-
Silicon (Si)	1.4		
Chromium (Cr)	6.5		
Niobium (Nb)	6.5		

HARDNESS OF PURE WELD METAL FROM THE 2nd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	56 - 64	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.
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MEGAFIL® A 863 M

EN ISO 14700: T Z Fe14

WELDING POSITIONS:



FEATURES

- The weld metal characteristic and structure is similar to hard chrome alloys
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic
- Weld metal machinable only by grinding
- Sporadic cracks on the surface do not affect wear resistance

BENEFITS

- Excellent resistance to abrasion from sand and minerals
- No re-drying
- Suitable for robot applications
- Welding without shielding gas possible

APPLICATIONS

- Automatic and mechanized welding
- Repair of mining and steel mill equipment
- Parts subject to wear in heavy engineering and agricultural industry
- Conveyors
- Cement and concrete pumps

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Welding without shielding gas possible

Gas flow 12-18 l/min

Direct Current Electrode Positive (DCEP)

Ø 1.6 mm (1/16")

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	2.6	Nickel (Ni)	-
Manganese (Mn)	0.9	Molybdenum (Mo)	-
Silicon (Si)	0.6		
Chromium (Cr)	17		
Boron (B)	0.9		

HARDNESS OF PURE WELD METAL FROM THE 2nd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	58 - 66	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

MEGAFIL® A 864 M



EN ISO 14700: T Fe13

WELDING POSITIONS:



FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none">• Special boron based carbides• Good reignition characteristics• Virtually no slag coverage• Smooth arc characteristic• Weld metal machinable only by grinding• Sporadic cracks on the surface do not affect wear resistance	<ul style="list-style-type: none">• Excellent resistance to abrasion from sand and minerals• No re-drying• Suitable for robot applications• Welding without shielding gas possible	<ul style="list-style-type: none">• Automatic and mechanized welding• Repair of mining and steel mill equipment• Parts subject to wear in agricultural industry,• Conveyors• Cement and concrete pumps

WIRE TYPE	Gas shielded metal-cored wire
SHIELDING GAS	75-85% Argon (Ar)/Balance Carbon Dioxide (CO ₂); Welding without shielding gas possible Gas flow 12-18 l/min
TYPE OF CURRENT	Direct Current Electrode Positive (DCEP)
STANDARD DIAMETERS	Ø 1.2 and 1.6 mm (0.045 and 1/16")
RE-DRYING	Not required due to seamless wire design
STORAGE	The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	0.5	Nickel (Ni)	1.5
Manganese (Mn)	1.1	Molybdenum (Mo)	-
Silicon (Si)	0.3		
Chromium (Cr)	0.3		
Boron (B)	4.8		

HARDNESS OF PURE WELD METAL FROM THE 2nd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	60 - 68	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.
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MEGAFIL® A 867 M



EN ISO 14700: T Z Fe13

WELDING POSITIONS:



FEATURES

- Microstructure consisting of special boron based carbides in combination with Chromium carbides
- Good reignition characteristics
- Virtually no slag coverage
- Smooth arc characteristic
- Weld metal machinable only by grinding
- Sporadic cracks on the surface do not affect wear resistance

BENEFITS

- Excellent resistance to abrasion from sand and minerals
- No re-drying
- Suitable for robot applications
- Welding without shielding gas possible

APPLICATIONS

- Automatic and mechanized welding
- Repair of mining and steel mill equipment
- Parts subject to wear in agricultural industry, Conveyors
- Cement and concrete pumps

WIRE TYPE

SHIELDING GAS

TYPE OF CURRENT

STANDARD DIAMETERS

RE-DRYING

STORAGE

Gas shielded metal-cored wire

75-85% Argon (Ar)/Balance Carbon Dioxide (CO₂); Welding without shielding gas possible

Gas flow 12-18 l/min

Direct Current Electrode Positive (DCEP)

Ø 1.6 mm (1/16")

Not required due to seamless wire design

The same conditions as for solid wire. Product should be stored in a dry, enclosed environment, in its original undamaged packaging

WELD METAL ANALYSIS (%) (typical values for mixed gas 82% Ar / 18% CO₂)

Carbon (C)	1.8	Nickel (Ni)	-
Manganese (Mn)	0.8	Molybdenum (Mo)	-
Silicon (Si)	0.6		
Chromium (Cr)	8.1		
Boron (B)	4.2		

HARDNESS OF PURE WELD METAL FROM THE 2nd LAYER (typical values for mixed gas 82% Ar / 18% CO₂)

Hardness Rockwell (HRC)	62 - 70	The achieved hardness as well as the structure of the hardfacing depends on (among others): Base material, welding parameters, working and interpass temperature, heating up, cooling down, number of layers, hardfacing methods and shape of component.

1. What is meant by the term “Build-up Welding“?

Build up welding is used when the surface of vulnerable engine parts is damaged by abrasion wear, corrosion or heat.

Distinction according to standard:

<u>Build up:</u>	Is the addition of new material or the replacement of the original worn material. The build up material is chosen in accordance to the application demands. The characteristics are usually similar to the base material.
<u>Cladding:</u>	As a result of cladding it is possible to modify the surface properties to enhance the corrosion resistance and or to prevent water.

2. Surfacing when and where?

New Construction

Economics
Quality
Alloy Properties

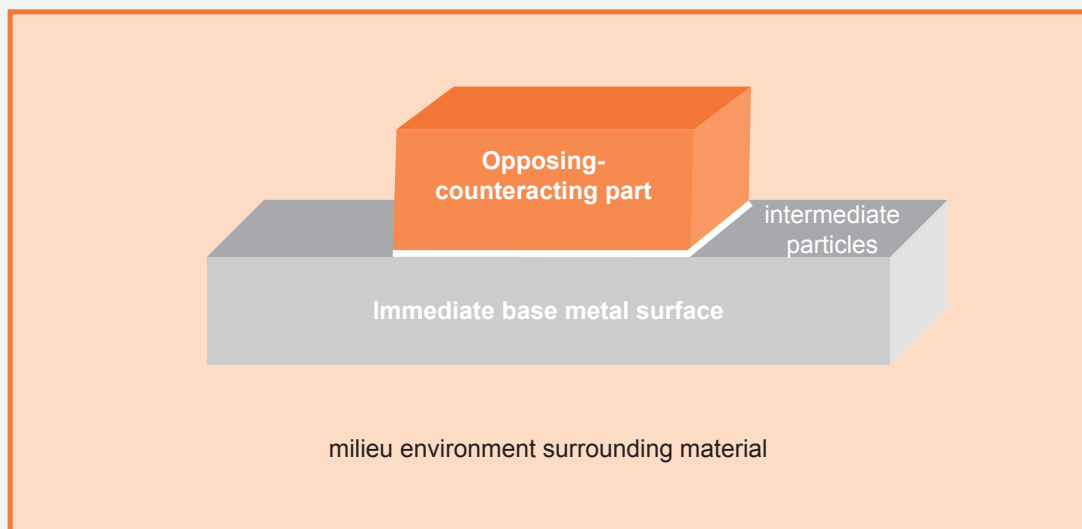
Repair

Economics
Schedule
Serviceability

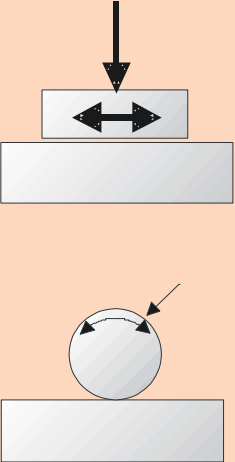
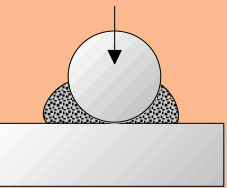
3. What does “wear“ mean?

<u>Definition:</u>	Wear is the accelerated loss of surface material due to one or more of the following:
<u>Galling:</u>	Adhesion or cohesion of localized areas of two bearing surfaces of metal, followed by tearing out of small fragments from one or the other or the surfaces when they are separated.
<u>Abrasion:</u>	Material loss due to frictional stress such as abrasive solids sliding, rolling or rubbing again a surface.
<u>Cracking:</u>	Wear resulting from fatigue caused by strain and stress.
<u>TRIBO mechanical reaction:</u>	Result of corrosion.

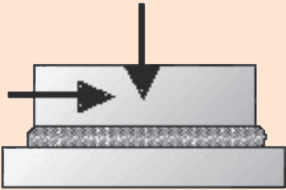


Components of the TRIBO - System wear process



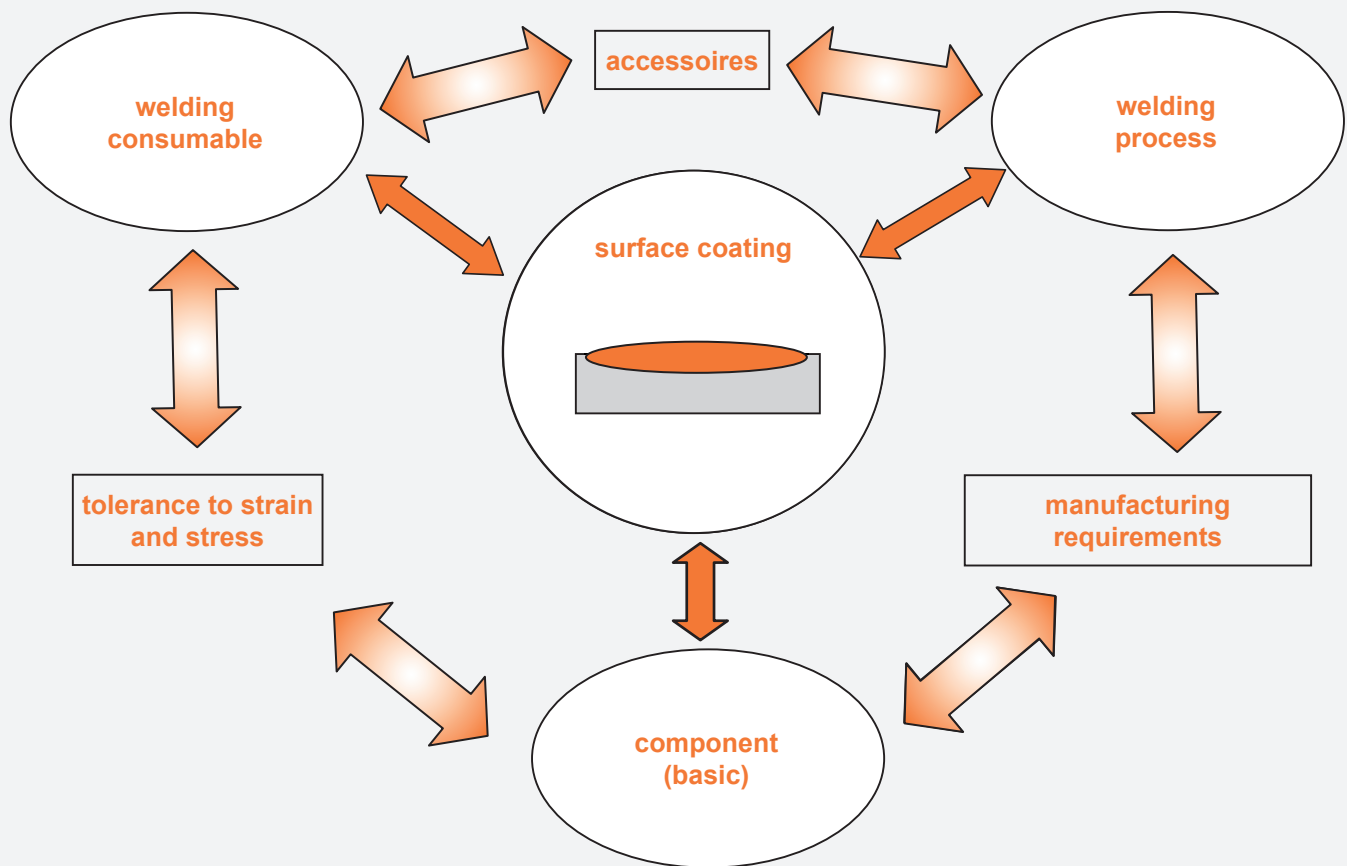
4. Practical Examples of TRIBO - Systems:

System structure	Type of wear	Application	Symbol EN 14700
<p>Metal to metal wear Rigid to friction Edge wear Mixing wear</p> 	Abrasion	Rails, chutes	Fe1, Fe2, Fe3, Cu1
	Impact	Forging hammers	Fe9, F10, Al1, Ni2, Ni4
		Dumper handle, cam shaft	Fe1, Fe2, Fe3
	Rotational Rolling	Rail car wheels, frogs	Fe9, Fe10
		Drive wheels	Fe1, Fe2, Fe3, Fe9
		Train tracks	Fe1, Fe9, Fe10
	Roll-compressional High - temp	Continuous cat roller	Fe7
		Mill roller	Fe3, Fe6, Fe7, Fe8
		Cable rolls	Fe3
		Forging dies	Fe3, Fe4, Fe6, Fe8, Co1, Co2, Co3, Ni2, Ni4
<p>Metal to metal with particulate</p> 	Impact, friction cold	Knives, shearers edges	Fe4, Fe5, Fe8, Co1, Co2, Co3
	Impact, friction hot	Hot cutting knives	Fe4, Fe3, Co2, Ni2, Ni4
		Hole punchers	Fe4, Fe3, Co2, Ni2, Ni4
	Impact - abrasion	Stone crusher	Fe6, Fe8, Fe9, Fe14
		Hammer mills	Fe6, Fe8, Fe9
		Hammer rails	Fe6, Fe8, Fe9, Fe13, Fe14, Fe15
		Coal & Ore grinders	Fe6, Fe8
		Grateing & grills	Fe6, Fe8, Fe13, Fe14, Fe15, Fe16
		Coal crushers	Fe13, Fe14, Fe15
		Wear plate	Fe8, Fe13, Fe14, Fe15
		strike plate	Fe13, Fe14, Fe15
<p>Metal to particle with pressure and impact</p>	Impact - abrasion	Plough share	Fe15, Fe20, Ni20
		Discharging table, chute	Fe14, Fe15, Fe20, Ni20
		Wearing sheet	Fe14, Fe15, Ni1, Ni2, Ni3, Ni4, Ni20

5. Practical Examples of TRIBO - Systems:

System structure	Type of wear	Application	Symbol EN 14700
<p>Metal to metal wear Particulates and Surface pressure</p> 	Abrasion	Extruders	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20, Co2, Co3, Cr1
		Transport screws	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20, Co2, Cr1
		Mixing plates	Fe15, Fe20, Ni20
		Shredder	Fe6, Fe2, Fe8
		Plow blades	Fe2, Fe6, Fe8, Fe20, Ni20
		Mixing paddles, Mixer walls	Fe6, Fe8, Fe14, Fe20, Ni1, Ni3, Ni20
		Grinders & components	Fe6, Fe8, Fe14, Ni1, Ni3
		Mill roller, Compression molds	Fe14
<p>Metal to particulate with gas</p> 	Particle abrasion $T \geq 500^\circ\text{C}$	Blast furnace vents	Fe6, Fe7, Fe8
		Charging furnace vents	Fe6, Fe3, Fe8, (Fe16)
		Coal & Ore grinders	Fe15, Fe16
		Grate and grills	Fe7, Co1, Co2
		Coal crushers	Fe10, Fe15, Fe16, Fe20, Ni1, Ni2, Ni3, Ni4, Ni20
		Wear plate	Fe15, Fe16
		Fan, strike plate	Fe14, Fe15, Fe20, Ni1, Ni3, Ni20
<p>Metal to particulate Pressure and impact</p> 	Fluid wear Fluid erosion	Jet- pipe. wearing sheet	Fe14, Fe15
		Marine dredger sliding, slag	Fe6, Fe8
		Hydraulic pump	Fe6, Fe7, Fe8, Ni1, Ni3
		Mixer	Fe6, Fe7, Fe8
	Corrosion with erosion	Screw propeller	Cu1
		Hydraulic turbine	Fe7, Cu1
Metal to fluidity	Corrosion, cavitation	Chemical apparatus	Fe7, Fe11, Fe12
		Sealing surface	Fe7, Co1, Co2, Co3

6. Selection criteria



7. The following 5 basic questions are helpful to choose:

- Weldment Composition:** It is a solid form (a metal for example), determined by physical form method, dimension surface characteristics, hardness, microstructure, working temperature?
- Opposite medium:** Is it a solid, fluid or a gas? Is it a solid form such as metal, mineral, wood or plastic, can be determined by physical appearance?
- Intermediate medium:** Possibly hard particles (wear particles) fluid (abrasive) or gaseous?
Note: Minerals can be either an opposite or intermediate.
- Movement:** The effect can be determined by the type of wear (flow, rolling or impact) and the duration (constant or movement) and the length of service (constant, variation, slow or fast).
- Stress:** Determined by the type of stress (stationary, rotational, impact, length of stress).

MEGAFIL® Welding parameters - guidance values: metal-cored wires



MEGAFIL® A 220 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	170	17	2.5	globular transfer
PA		190	21	2.8	globular transfer
PA		210	23	3.6	globular transfer
PA		230	22-28	3.8	globular / spray
PA		250	25-28	4.5	globular / spray
PA		280	26-30	5	globular / spray
PA		300	31-33	5.6	globular / spray

MEGAFIL® A 730 M, A 740 M, A 750 M, A 760 M - metal-cored wires - Ø 1.2 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA/PC/PF	20	80	14	1.7	short arc
PA/PC/PF		100	15.1	2.2	short arc
PA/PC/PF		120	15.4	2.9	short arc
PA/PC/PF		140	16	3.5	globular transfer
PA/PC/PF		160	18.3	4.4	globular transfer
PA		180	20.1	5.3	globular transfer
PA		200	21.4	6.1	globular transfer
PA		220	23-29	6.9	globular / spray
PA		240	25-30	8.4	globular / spray
PA		260	30	9.6	spray arc
PA		280	31	10.4	spray arc
PA		300	32	10.9	spray arc

MEGAFIL® A 760 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA/PC/PF	20	100	15.8	1.1	short arc
PA/PC/PF		120	16	1.3	short arc
PA/PC/PF		140	16.2	1.6	short arc
PA/PC/PF		160	16.5	1.9	short arc
PA		180	16.7	2.3	short arc
PA		200	17	2.6	globular transfer
PA		220	18-24	3	globular transfer
PA		240	24-27.5	3.4	globular / spray
PA		260	27.6	3.8	spray arc
PA		280	28	4.1	spray arc
PA		300	28.5	4.8	spray arc
PA		330	29	5.3	spray arc
PA		360	31	6.2	spray arc
PA		390	33	7	spray arc
PA		420	34	7.6	spray arc

MEGAFIL® Welding parameters - guidance values: basic flux-cored wires



MEGAFIL® A 760 B - basic flux-cored wire - Ø 1.2 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	130	20	4.2	globular transfer
PA		150	22	6	globular transfer
PA		190	23	8	globular transfer
PA		230	26	10	globular transfer
PA		250	26-29	12	globular / spray
PA		280	28-30	14	globular / spray
PA		300	28-31	16	globular / spray

MEGAFIL® Welding parameters - guidance values: 8 series – metal-cored



MEGAFIL® A 861 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	160	18	2.3	globular transfer
PA		180	18.5	2.6	globular transfer
PA		200	22	3	globular transfer
PA		220	22-23	3.4	globular transfer
PA		240	24	3.9	globular transfer
PA		260	29	4.2	spray arc
PA		280	31	4.6	spray arc
PA		300	31-32	5	spray arc
PA		350	33	6.5	spray arc

MEGAFIL® A 863 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	160	16.5	2.5	globular transfer
PA		190	18.5	3.2	globular transfer
PA		220	22	4.1	globular transfer
PA		240	24.5	4.5	globular transfer
PA		260	27	4.9	globular transfer
PA		300	28	5.7	globular transfer
PA		350	31	7.8	spray arc
PA		350	35	7.8	globular transfer

MEGAFIL® Welding parameters - guidance values: 8 series – metal-cored



MEGAFIL® A 864 M - metal-cored wire - Ø 1.2 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	18-20	140	20	5.4	globular transfer
PA		160	22	6.2	globular transfer
PA		180	23-24	7.2	globular transfer
PA		200	24	8.1	globular transfer
PA		220	25-26	9.7	globular transfer
PA		240	26	10.5	globular transfer
PA		240	34	10.5	spray arc
PA		260	27	12	globular transfer
PA		260	36	12	spray arc

MEGAFIL® A 864 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	160	18.5	2.6	short arc
PA		190	21	3.4	globular transfer
PA		220	23	4.1	globular transfer
PA		240	25	4.7	globular transfer
PA		260	27	5.4	globular transfer
PA		260	31	5.4	spray arc
PA		300	28	6.3	globular transfer
PA		300	32	6.3	spray arc

MEGAFIL® A 867 M - metal-cored wire - Ø 1.6 mm; shielding gas 82% Ar - 18% CO₂

Position	Stickout mm	Amperage [A]	Voltage [V]	Wire feeding [m/ min]	Arc type / transfer mode
PA	20	140	18.2	2.4	short arc
PA		160	18.8	3	short arc
PA		180	20-21	3.6	globular transfer
PA		200	23-24	4.3	globular transfer
PA		240	26-33	5.6	globular / spray
PA		280	33	6.5	spray arc
PA		350	30-35	9.4	globular / spray
PA		400	34-37	11.5	globular / spray

Welding consumables for hardfacing

Example:

MEGAFIL® A 730 B

T Fe1

Kurzzeichen	Produktform
E	Covered electrodes
S	Solid wires and rods
T	Tubular cored wires and rods
R	Cast rods
B	Solid bars
C	Caked rods, cored and caked bars
P	Metal powder

Alloy type	Application	Chemical composition (%) ° (m/m)												
		C	Cr	Ni	Mn	Mo	W	V	Nb	Fe	Co	Cu	Al	Others
Fe1	p	≤ 0.4	≤ 3.5	≤ 3	≤ 4.5	≤ 1	≤ 1	≤ 1	—	Rest	—	—	—	Si, Ti
Fe2	p (g) (s)	0.4 - 1.5	≤ 7	≤ 1	≤ 3	≤ 4	≤ 1	≤ 1	—	Rest	≤ 1	≤ 1	—	Si, Ti
Fe3	s t	0.1 - 0.5	1 - 15	≤ 5	≤ 3	≤ 5	≤ 10	≤ 1.5	≤ 3	Rest	≤ 13	—	—	Si, Ti
Fe4	s t (p)	0.2 - 1.5	2 - 10	≤ 4	≤ 3	≤ 10	≤ 20	≤ 4	—	Rest	≤ 5	—	—	Si, Ti
Fe5	c p s t w	≤ 0.5	≤ 0.1	17 - 22	≤ 1	3 - 5	—	—	—	Rest	10 - 15	—	≤ 1	Si, Ti
Fe6	g p s	≤ 2.5	≤ 10	—	≤ 3	≤ 3	—	—	≤ 10	Rest	—	—	—	Si, Ti
Fe7	c p t	≤ 0.2	11 - 30	≤ 6	≤ 3	≤ 2	—	≤ 1	≤ 1	Rest	—	—	—	Si, N
Fe8	g p t	0.2 - 2	5 - 20	—	≤ 3	≤ 5	≤ 2	≤ 2	≤ 10	Rest	—	—	—	Si, Ti
Fe9	k p (n)	≤ 1.2	≤ 20	≤ 5	9 - 20	≤ 2	—	≤ 1	—	Rest	—	—	—	Si, Ti
Fe10	c k p z (n)	≤ 0.25	17 - 22	7 - 11	3 - 8	≤ 1.5	—	—	≤ 1.5	Rest	—	—	—	Si
Fe11	c n z	≤ 0.3	17 - 32	8 - 20	≤ 3	≤ 4	—	—	≤ 1.5	Rest	—	—	—	Si, Cu
Fe12	c n (z)	≤ 0.12	17 - 27	9 - 26	≤ 3	≤ 4	—	—	≤ 1.5	Rest	—	—	—	Si
Fe13	g	≤ 1.5	≤ 7	≤ 4	≤ 3	≤ 4	—	—	—	Rest	—	—	—	Si, B, Ti
Fe14	g (c)	1.5 - 4.5	25 - 40	≤ 4	≤ 3	≤ 4	—	—	—	Rest	—	—	—	Si
Fe15	g	3 - 7	20 - 40	≤ 4	≤ 3	≤ 2	—	—	≤ 10	Rest	—	—	—	Si, B
Fe16	g z	4 - 8	10 - 40	—	≤ 3	≤ 10	≤ 10	≤ 10	≤ 10	Rest	—	—	—	Si, B
Fe17	c k p v	≤ 0.3	≤ 20	≤ 5	8 - 20	≤ 2	≤ 0.3	—	—	Rest	10 - 15	—	—	Si
Fe20	c g t z	—	—	—	—	—	—	—	—	Rest	—	—	—	hard filler ^b
Ni1	c p t	≤ 1	15 - 30	Rest	≤ 1	≤ 6	≤ 2	≤ 1	—	≤ 5	—	—	—	Si, B
Ni2	c k p t z	≤ 0.1	14 - 30	Rest	≤ 1.5	10 - 30	≤ 8	≤ 1	≤ 5	≤ 10	≤ 5	—	—	Si, Ti
Ni3	c p t	≤ 1	≤ 15	Rest	≤ 1	≤ 6	≤ 2	≤ 1	—	≤ 5	—	—	—	Si, B
Ni4	c k p t z	≤ 0.1	1 - 20	Rest	≤ 1.5	≤ 30	≤ 8	≤ 1	≤ 5	≤ 3	≤ 15	—	≤ 3	Si, Ti
Ni20	c g t z	—	—	Rest	—	—	—	—	—	—	—	—	—	hard filler ^b
Co1	c k t z	≤ 0.6	20 - 35	≤ 10	0.1 - 2	≤ 10	≤ 15	—	≤ 1	≤ 5	—	—	—	Si
Co2	t z (c) (s)	0.6 - 3	20 - 35	≤ 4	0.1 - 2	—	4 - 10	—	—	≤ 5	—	—	—	Si
Co3	t z (c) (s)	1 - 3	20 - 35	≤ 4	≤ 2	≤ 1	6 - 15	—	—	≤ 5	—	—	—	Si
Cr1	g n	1 - 5	Rest	—	≤ 1	—	—	15 - 30	—	≤ 5	—	—	—	Si, B, Zr
Cu1	c (n)	—	—	≤ 6	≤ 2	—	—	—	—	≤ 5	—	Rest	7 - 15	Sn
Cu2	c (n)	—	—	≤ 6	≤ 15	—	—	—	—	≤ 5	—	Rest	≤ 9	Sn
Al1	c n	—	—	10 - 35	≤ 0.5	—	—	—	—	—	—	≤ 6	Rest	Si
Z	—	any other agreed analysis ^a												

c: non-corrosive
g: non-abrasive
k: likely to strain hardening
n: non-magnetizable
p: impact resistant
s: cuttable
v: cavitation resistant
t: creep resistant
z: scale resistant
w: temperhardened
() evt. not applicable for all listed alloys

^a alloys that are not listed in this table should be characterized similarly by putting the prefix "Z" in front

^b crushed or spheric fused tungsten carbides or sintered tungsten carbides

^c the listed single values are maximum values

Approval Certificates

DNV GL
Certificate No: TAW0000026

TYPE APPROVAL CERTIFICATE

This is to certify:
That the Flux Cored Wire/Gas combination
with trade name
Megafil 550R / M21
Manufacturer
ITW Welding GmbH
Alteneingen, Germany
is found to comply with
DNV GL rules for classification – Ships
with this approval
Grade **V Y5MS H5**
Current **DC +**
Approved diameter **1,2 + 1,4mm**
Positions **All, including vertical-down**
Remarks **---**
Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

DB Mobility Networks Logistics

Zertifizierungsstelle DB Systemtechnik
für Schweißzusätze
32423 Minden

Zulassungszertifikat für Schweißzusätze und Schweißhilfsstoffe

Hersteller: ITW Welding GmbH
Spechtal 1a
67317 Alteneingen

Schweißzusatz: SG-Fülldrahtelektrode
Markenbezeichnung: MEGAFIL 821 R
Normbezeichnung: DIN EN ISO 17632-A-T 50 6 INI P M 1 H5

DB-Zulassungs-Nr.: 42.027.09
Geltungsdauer: 30.11.2018

Geltungsbereich aufgrund der nach VA 918 490 durchgeführten Eignungsprüfung:
Werkstoffgruppe nach CEN ISO/TR 15608 1):
Schweißprozess nach DIN EN ISO 4063: 136
Schweißpositionen nach DIN EN ISO 6947: PA, PB, PC, PE, PF
Start und Polung: = (+)
Nesserbereich: 1,2 mm
ngen/Schweißbedingungen:

LR Welding Consumables Annual Re-Approval Certificate

Date: 06 November 2015
This certificate is issued to
ITW Welding GmbH Spechtal 1a, 67317 Alteneingen, Germany

Office
Dortmund

Certificate no:
Page 1 of 1

The undermentioned welding consumables supplied by the company named above have been approved 31.12.2016 with the grading shown.

Trade Name	Section	Grade
TOPCORE 731 B / ST55	4	D
TOPCORE 735 B1D/ST 55	4	D
TOPCORE 735 B1D/ST 65	4	D
TOPCORE 735 B2D/SDA 52/ST 55	4	D
TOPCORE 735 B2D/SDA 52/ST 65	4	D
TOPCORE 742 B / ST 55	4	D
SDA 52/ ST65	4	D
SDA D3/ ST55	4	D
MEGAFIL 822 R / CO2	5	S
MEGAFIL 822 R / 82%Ar-18% CO2	5	S

Valid Until: 25 October 2018
Date of issue: 16 August 2016

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective members of the Lloyd's Register group collectively, referred to in this clause as "Lloyd's Register", is not responsible for the accuracy or completeness of the information or data provided by the company named above and in that case any responsibility or liability is exclusively on the company named above.

Form 6227 (2014.01)



Certificate No: MNDE/MD00-05/1037/2016/AS

ITW WELDING GMBH
Spechtal 1a D-67317, Alteneingen
Germany

This certificate is issued to the manufacturer named above, w/ System has been approved in accordance with the requireme for the:

Maintenance of Approval of Welding C

The approval is subject to compliance with the Rules classification of Ships:

Rules for the Manufacturer, Testing and Certificat
Qualification Procedures for Ships, Book J, Proce

Lloyd's Register is to be informed of any change certificate.

This certificate is issued to the above compa

Valid Until: 25 October 2018
Date of issue: 16 August 2016

Remark

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements of Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units.

At Neuilly, on 29 Jan 2016
For BUREAU VERITAS
By order of the Secretary

L. COURENDELONGUE



BUREAU VERITAS

Marine & Offshore Division
6771 Boulevard du Château
92200 Neuilly-sur-Seine France
Tel: 33 1 55 24 70 00
Fax: 33 1 55 24 70 45
www.veritas.com

TYPE APPROVAL CERTIFICATE

as per Bureau Veritas Classification Rules

This certificate is issued to
ITW Welding GmbH
Alteneingen - GERMANY
for the product
Flux-Cored Wire for Semi-Automatic or Automatic Welding with Shielding Gas

Certificate number : WM 4085/2
File number : 4085 N 2009

Designation: MEGAFIL 821 R / M21
Grade: A-SA 4Y69M HS
Description: rutile flux-cored wire
Diameter: 1,0 - 1,2 mm
Welding current: DC+
Welding position: 1,0mm: Flat butt weld (PA bw), Horizontal vertical fillet weld (PB fw), Vertical upwards butt weld (PF bw) and Vertical upwards fillet weld (PF fw)
1,2mm: All positions for butt and fillet welding including vertical downwards (PA, PF, PG, PB, PC, PE, PD)
Semi-automatic or automatic multipass welding process.

Valid Until: 25 October 2018
Date of issue: 16 August 2016

This certificate will expire on: 29 Jan 2017

Local office: BV MANNHEIM
Surveyor: H. Koenen

Approval Certificates

ABS
FOUNDED 1862

CERTIFICATE OF
QUALITY ASSURANCE SYSTEM
APPROVAL

This is to certify that a representative of ABS did, at the request of
ITW Welding GmbH, Altleiningen, Germany
attend its facilities as indicated in the ABS Haan port office survey report number HN2688027 dated
19 August 2014, in order to carry out an audit of the quality system procedures and that the system is
considered in compliance with the ABS Quality Assurance Program. This Certificate covers
ABS Approved Welding Consumables
and is valid subject to adherence to relevant ABS Rules and survey requirements and annual for
quality audits by an ABS representative.

CERTIFICATE NUMBER
QA 2688027

PORT OFFICE
ABS MATERIALS HOUSTON

ISSUE DATE 19 Aug 14 EXPIRATION DATE 18

SIGNATURE **V. BALASUBRAMANIAM**
PRINCIPAL ENGINEER
ABS MATERIALS HOUSTON

1 TÜV and TÜV are registered trademarks. Utilization and application require prior approval.



VdTÜV-Kennblatt für Schweißzusätze

1 Hersteller/Lieferer:
ITW Welding GmbH
DEU 67317 Altleiningen

2 Kennblatt-Nummer:
67685-97
11-2013

3 Schweißzusatz:
Fülldrahtelektrode

4 Marke:
MEGAFIL 718 M

5 Durchmesserbereich:
EN ISO 17632 - A - T 46 6 M M 1 H5

6 Typ:
1,0 - 1,6 mm

7 Hilfsstoffe:
EN ISO 14175 - H2

8 Die weitere Gültigkeit wird durch Erscheinen des Kennblattes im Schweißzusatzverzeichnis bescheinigt.

9 Wärmebehandlung (Wb) nach dem Schweißen und Werkstoffe

10 Pos. Wb Gruppe 1.1

11 Pos. Wb Gruppe 1.2

12 Pos. Wb Gruppe 1.3 (Reif max. 428 MPa)

13 Pos. Wb Gruppe 1.3 (Reif max. 428 MPa)

14 Pos. Wb Gruppe 1.3 (Reif max. 428 MPa)

15 Pos. Wb Gruppe 1.3 (Reif max. 428 MPa)

16 Die Werkstoffteilbarkeit:
nachgewiesen

17 Die Tiefstschweißbarkeit:
unbegrenzt

18 Die Verwendbarkeit nach DIN ISO 6947:
PA, PB, PC, PD, PE, PF, PG

19 Die Stromart und -polung:
--- °C

20 Die Schweißposition nach DIN ISO 6947:
--- °C

21 Die höchste Betriebstemperatur im Kurzzeitbereich max.:
--- °C

22 Die höchste Betriebstemperatur im Langzeitbereich max.:
--- °C

23 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
--- °C

24 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
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25 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
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26 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
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27 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
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28 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
--- °C

29 Die höchste Betriebstemperatur wie Grundwerkstoff, jedoch nicht tiefer als:
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30 Bei Einsatz im Langzeitbereich:
--- °C

31 Korrosionsbeständigkeit nachgewiesen nach:
--- °C

32 Bemerkungen:
--- °C

33 Die Eintragung erfolgte auf der Grundlage des VdTÜV-Merkblattes 1153 Sowohl in R:
--- °C

34 Bei Einsatz im Langzeitbereich:
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35 Bei Einsatz im Langzeitbereich:
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100 Bei Einsatz im Langzeitbereich:
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CERTIFICATE

Approval of a manufacturer of Welding Consumables pursuant to
VdTÜV-Merkblatt Schweißtechnik 1153:2012
Approval Testing of Welding Consumables

on the
ITW Welding GmbH
Spechtal 1a
Altleiningen, Germany

have furnished conclusive evidence of the proper application of their in-
shop quality assurance procedures to approved welding consumables.
An audit covering the manufacturer's quality assurance system has been
conducted by the undersigned Inspector of TÜV Rheinland Industrie
Service GmbH proves that the requirements of the VdTÜV-Merkblatt are
satisfied.

With this, the requirements for registration of your welding consumables
in VdTÜV-Kennblatt 1000 is fulfilled.

This certificate is valid till April 30, 2018

The validity of the certificate may be extended by a new renewal of the
approval acc. to VdTÜV Merkblatt Schweißtechnik 1153:2012.

Cologne, July 2, 2015
Revision 00

TÜV Rheinland Industrie Service GmbH
Bereich Energiesysteme
Am Grauen Stein
D-51105 Köln

Tel. +49-(0) 221 806 - 3010
Fax +49-(0) 221 806 - 3474
e-mail sandra.skrodel@de.tuv.com

Certification Body for Welding Consumables
Head of Certification Body

TÜV Rheinland
Certification Body
Dipl.-Ing. A. Makowska



WELDING CONSUMABLE CERTIFICATE

Certificate No: AG 2682367-BX, Page 1 of 3
Report No: AG 2637648
Port of: Augsburg/Germany
Date: 29.09.2015

THIS IS TO CERTIFY

THAT THE UNDERSIGNED SURVEYOR TO THIS BUREAU DID, AT THE REQUEST OF ITW WELDING GMBH, ATTEND
THEIR PLANT AT D-67317 ALTLEININGEN / GERMANY, ON THE 17TH DAY OF JULY, 2015 AND ON SUBSEQUENT DATES, IN
ORDER TO CARRY OUT A PLANT SURVEY OF FACILITIES AND ASSOCIATED QUALITY ASSURANCE AND QUALITY CONTROL
PROCEDURES AND TO WITNESS AND REPORT ON THE ANNUAL APPROVAL TESTING OF WELDING CONSUMABLES, AND;
THAT THE FACILITY IS CONSIDERED CAPABLE OF PROVIDING AN ACCEPTABLE UNIFORM PRODUCT, AND THAT
EACH WELDING CONSUMABLE LISTED BELOW WAS FOUND IN COMPLIANCE WITH THE SPECIFICATION INDICATED AND IS
ELIGIBLE TO BE PLACED ON THIS BUREAU'S APPROVED WELDING CONSUMABLES LIST IN THE
GAS METAL ARC WELDING AND FLUX CORED ARC WELDING SECTION:

TRADE NAME	SPECIFICATION	GRADE OR CLASS	SHIELDING GAS	POSITION	CURRENT/ POLARITY	SIZE
Megafil 620 R	ABS	4YQ620SA H5	82%Ar, 18%CO ₂	All, Fillet	Deep	1,2-1,6 mm
Megafil 680 R	ABS	4YQ680SA H5	82%Ar, 18%CO ₂	F, Fillet, V, H	Deep	1,2 mm
Megafil 710 M	ABS	3Y400SA H5	82%Ar, 18%CO ₂	All, V-down	Deep	1,2 mm
Megafil 710 M	ABS	3Y400SA H5	82%Ar, 18%CO ₂	All, V-down	Deep	1,2 mm
Megafil 710 M	ABS	3Y400SA H5	82%Ar, 18%CO ₂	All, V-down	Deep	1,2 mm
Megafil 713 R	ABS	4YSA	82%Ar, 18%CO ₂	F, Fillet, V, H	Deep	1,2 mm
Megafil 713 R	ABS	4Y400SA H5	82%Ar, 18%CO ₂	All, V-down	Deep	1,2-1,6 mm
Megafil 713 R	ABS	3YSA	CO ₂	All, V-down	Deep	1,2-1,6 mm
Megafil 713 R	ABS	3Y400SA* H5	CO ₂	All, V-down	Deep	1,2-1,6 mm

*Jone side welding with ceramic backing material subject to satisfactory test at user's plant

F. Fritzing / SURVEYOR

ABS
HAAN

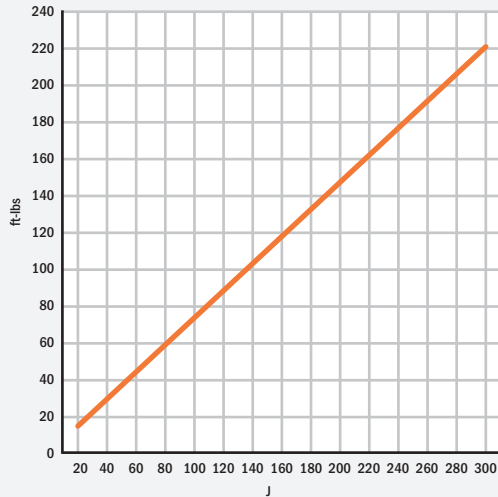
Conversion Charts

Toughness

Formulas	
ft-lbs	J
1	1.356
0.738	1

ft-lbs	J
15	20
22	30
27	37
30	40
35	47
37	50
44	60
52	70
59	80
66	90
74	100
89	120
103	140
118	160
133	180
148	200
162	220
177	240
192	260
207	280
221	300

Conversion J – ft-lbs

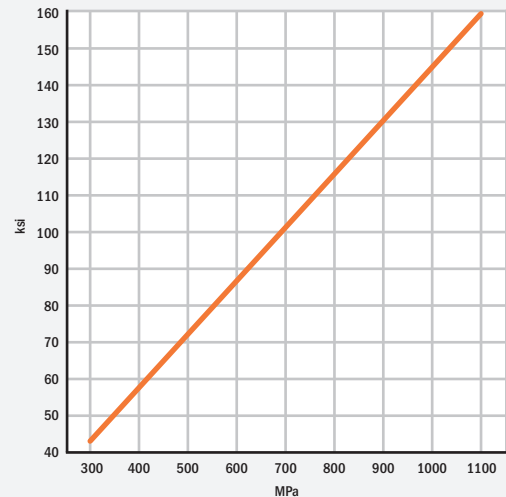


Strength

Formulas	
ksi	MPa
1	6.895
0.145	1

ksi	MPa
44	300
51	355
58	400
61	420
65	448
67	460
70	483
73	500
75	517
80	552
85	586
90	620
100	690
110	758
115	790
120	827
129	890
145	1000
160	1100

Conversion MPa – ksi

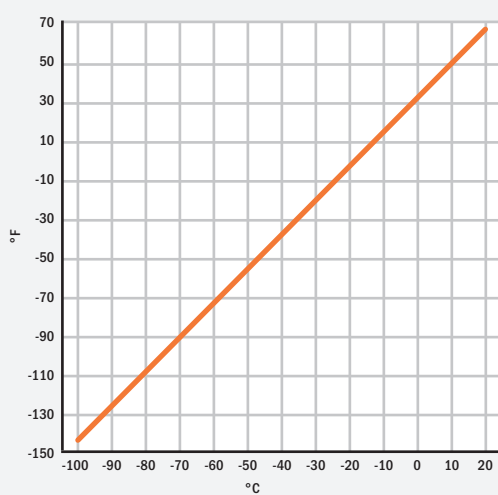


Temperature (Low)

Formulas	
$^{\circ}\text{F} = ^{\circ}\text{C} \times 9/5 + 32$	
$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$	

$^{\circ}\text{F}$	$^{\circ}\text{C}$
-321	-196
-148	-100
-120	-84
-112	-80
-100	-73
-80	-62
-76	-60
-60	-51
-58	-50
-50	-46
-40	-40
-20	-29
-4	-20
0	-18
32	0
50	10
68	20

Conversion $^{\circ}\text{C} - ^{\circ}\text{F}$

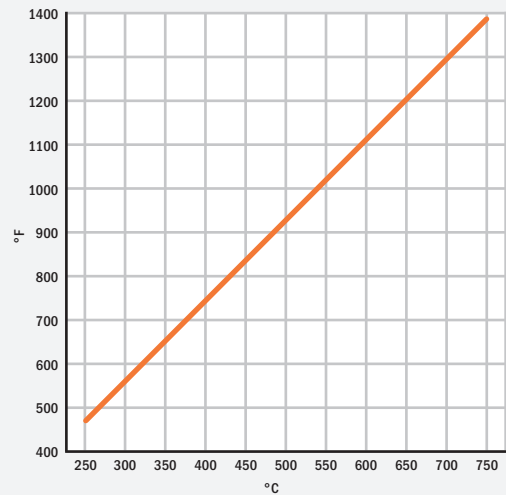


Temperature (High)

Formulas	
$^{\circ}\text{F} = ^{\circ}\text{C} \times 9/5 + 32$	
$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$	

$^{\circ}\text{F}$	$^{\circ}\text{C}$
572	300
662	350
700	371
752	400
800	427
842	450
900	482
932	500
1000	538
1022	550
1100	593
1112	600
1150	621
1202	650
1250	677
1292	700
1382	750

Conversion $^{\circ}\text{C} - ^{\circ}\text{F}$





ITW Welding GmbH
Spechttal 1a
DE - 67317 Altleiningen
Germany

www.itw-welding.de

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