

Outershield® 81Ni1C-H

Low temperature rutile cored wire

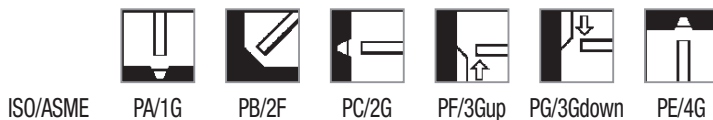
Classification

AWS A5.29/A5.29M : E81T1-Ni1C-JH4
EN ISO 17632-A : T 50 4 1Ni P C 2 H5

General description

All position 100% CO₂ gas shielded 1% Ni flux cored wire, offshore and similar applications
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -40°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meet NACE MR-0175 requirements

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
C1 : Active Gas 100% CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
C1	0.05	1.4	0.2	0.013	0.010	0.95	4

Mechanical properties, typical, all weld metal

Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J) -40°C
Required: AWS A5.29		min. 470	550-690	min. 19	min. 27
EN ISO 17632-A		min. 500	560-720	min. 18	min. 47
Typical values	C1 AW	530	600	24	80

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 81Ni1C-H: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 81Ni1C-H

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

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Outershield® 81Ni1-H

Low temperature rutile cored wire

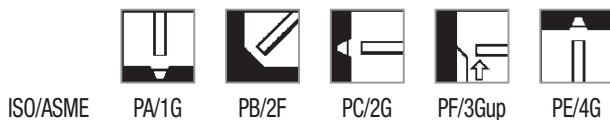
Classification

AWS A5.29/A5.29M : E81T1-Ni1M-JH4 (all diameters)
 EN ISO 17632-A : T 50 5 1Ni P M 2 H5 (only diameter 1.2 mm)

General description

All position gas shielded 1% Ni flux cored wire, offshore and similar applications
 Superior weldability, low spatter, good bead appearance
 Outstanding operator appeal
 Exceptional mechanical properties (CVN >47J at -50°C)
 Very low hydrogen (H_{DM} <5 ml/100g)
 Superior product consistency with optimal alloy control
 Excellent wire feeding
 Meet NACE MR-0175 requirements
 For PWHT, use Outershield 81Ni1-HSR

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
 M21 : Mixed gas Ar+ (>15-25%) CO₂
 Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR	RINA
M21	SA3,3YMH	IVYMSH5	4YH10S	4Y40SH5	4YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength	Tensile strength	Elongation	Impact ISO-V (J)	
			(N/mm ²)	(N/mm ²)	(%)	-40°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47	
Typical values	M21	AW	530	600	24	90	60

Packaging and available sizes

Unit type	Diameter (mm)			
	1.2	1.4	1.6	2.0
4.5kg plastic spool S200	X			
14 kg spool S300 (alu. Bag)	X			
15 kg spool B300	X	X	X	
15 kg spool BS300			X	X
25kg wire reel B435			X	

Outershield® 81Ni1-H: rev. EN 25

Outershield® 81Ni1-H

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

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Outershield® 81Ni1-HSR

Low temperature rutile cored wire

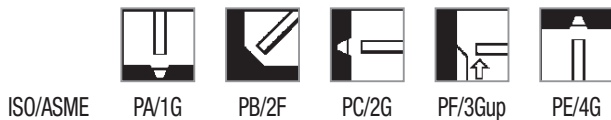
Classification

AWS A5.29/A5.29M : E81T1-Ni1M-JH4
EN ISO 17632-A : T 50 5 1Ni P M 2 H5 T

General description

All position gas shielded 1% Ni flux cored wire, offshore and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Exceptional mechanical properties (CVN >47J at -50°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Meet NACE MR-0175 requirements

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

Shielding gas	BV	DNV	GL	LR
M21	4YSDH5	IVYMSH5	4YH5S	4YSH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						-40°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 27	
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47	
Typical values	M21	SR	525	590	25	70	
		AW	530	600	24	20	60
SR 1h/600°C, 3G up - V45°							

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
14 kg spool S300 (alu. Bag)	X	X
15 kg spool S300	X	
15 kg spool B300	X	

Outershield® 81Ni1-HSR: rev. EN 24

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Outershield® 81Ni1-HSR

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

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Outershield® 81K2-H

Low temperature rutile cored wire

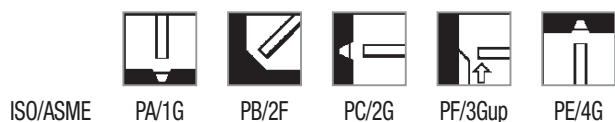
Classification

AWS A5.29/A5.29M : E81T1-K2M-JH4 (all diameters)
 EN ISO 17632-A : T 50 6 1.5Ni P M 2 H5 (only diameter 1.2 mm)

General description

All position gas shielded 1.5% Ni, Ti and B alloyed flux cored wire
 Used in off-shore and similar applications
 Superior weldability, low spatter, good bead appearance
 Outstanding operator appeal
 Exceptional mechanical properties (CVN >80J at -60°C)
 Very low hydrogen (H_{DM} <5 ml/100g)
 Superior product consistency with optimal alloy control
 Excellent wire feeding
 For PWHT, use Outershield 81K2-HSR

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
 M21 : Mixed gas Ar+ (>15-25%) CO₂
 Amount : 15-25 l/min

Approvals

Shielding gas	DNV	LR	RINA	RMRS
M21	IVY46MSH5	4Y40SH5	4YS	4Y50SH5

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
M21	0.04	1.4	0.2	0.012	0.010	1.4	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)		
						-40°C	-50°C	-60°C
Required: A5.29			min. 470	550-690	min.19	min. 27		
EN ISO 17632-A			min. 500	560-720	min.18	min. 47		
Typical values	M21	AW	590	630	23	130	100	80

Packaging and available sizes

Unit type	Diameter (mm)		
	1.2	1.6	2.0
4.5kg plastic spool S200	X		
14 kg spool S300	X		
15 kg spool B300	X		
25kg wire reel B435		X	X
200kg Accutrak® Drum	X		

Outershield® 81K2-H: rev. EN 24

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Outershield® 81K2-H

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL, S460QL1, S500S, S500QL, S500QL1

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-32V	24-32V	24-32V	24-28V	22-28V

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Outershield® 81K2-HSR

Low temperature rutile cored wire

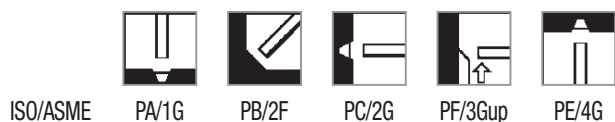
Classification

AWS A5.29 : E81T1-K2M-JH4
EN ISO 17632-A : T 50 6 1.5Ni P M 2 H5 T

General description

All position gas shielded 1.5% Ni alloyed flux cored wire for offshore and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties (CVN >80J at -60°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	H _{DM} ml/100g
M21	0.06	1.3	0.3	0.012	0.010	1.4	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)		
						-40°C	-50°C	-60°C
Required: A5.29			min. 470	550-690	min.19	min. 27		
EN ISO 17632-A			min. 500	560-720	min.18	min. 47		
Typical values	M21	SR	570	620	24	85		
		AW	590	630	23	140	100	80

SR 1h/600°C, 3G up - V45°

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 81K2-HSR: rev. EN 24

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Outershield® 81K2-HSR

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL, S460QL1, S500Q, S500QL, S500QL1

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 500CT-H

Weather resistant rutile cored wire

Classification

AWS A5.29/A5.29M : E81T1-9G-H4
EN ISO 17632-A : T 50 5 Z P M 2 H5

General description

All position gas shielded 0.8% Ni and 0.4% Cu flux cored wire, for welding weather resistant steel (CorTen)

For welding in all positions

Superior weldability, low spatter, good bead appearance

Outstanding operator appeal

Exceptional mechanical properties (CVN >47J at -50°C)

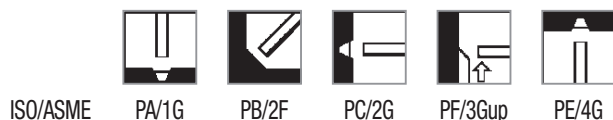
Very low hydrogen (H_{DM} <5 ml/100g)

Superior product consistency with optimal alloy control

Excellent wire feeding

For welding applications with higher service temperatures (i.e chimneys), Outershield 555CT-H is recommended.

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Cu	H _{DM} ml/100g
M21	0.04	1.3	0.2	0.014	0.010	0.84	0.39	4

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J) -50°C
Required: AWS A5.29			min. 470	550-690	min. 19	not required
EN ISO 17632-A			min. 500	560-720	min. 18	min. 47
Typical values	M21	AW	580	610	23	80

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 500CT-H: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 500CT-H

Materials to be welded

Steel grades/Standard	Type
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Weather resisting steels

EN 10025 part 5	S235 J0W, S235 J2W, S355 J0WP, S355 J2WP, S355 J0W, S355 J2W, S355 42W
ASTM A242	Type 1
ASTM A580	Grade A
ASTM A595	Grade C
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 355W1 & W2

Weather resistant steels like Cor-Ten®, Patinax®-F, Patinax®-37 and similar Ni- and Cu-alloyed steels

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 555CT-H

Weather resistant rutile cored wire

Classification

AWS A5.29/A5.29M : E81T1-W2M-JH4
EN ISO 17632-B : T555T1-1MA-NCC1-UH5

General description

All position gas shielded 0.6% Ni, 0.5Cr and 0.5% Cu alloyed flux cored wire, for welding weather resistant steel (CorTen)

For welding in all positions

Superior weldability, low spatter, good bead appearance

Outstanding operator appeal

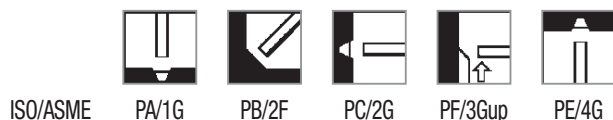
Exceptional mechanical properties (CVN >47J at -50°C)

Very low hydrogen (H_{DM} <5 ml/100g)

Superior product consistency with optimal alloy control

Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Cr	Ni	Cu	H _{DM} ml/100g
M21	0.03	1.1	0.4	0.015	0.010	0.55	0.60	0.55	4

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						-30°C	-50°C
Required: AWS A5.29			min. 470	550-690	min. 19	min. 47	
EN ISO 17632-B			min. 460	550-740	min. 17		min. 47
Typical values	M21	AW	600	660	20	140	100

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 555CT-H: rev. EN 01

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 555CT-H

Materials to be welded

Steel grades/Standard	Type
Weather resisting steels	
EN 10025 part 5	S235 J0W, S235 J2W, S355 J0WP, S355 J2WP, S355 J0W, S355 J2W, S355 42W
ASTM A242	Type 1
ASTM A580	Grade A
ASTM A595	Grade C
ASTM A709	Grade HPS 50W & HPS 70W
ISO 5952	HSA 355W1 & W2
ISO 5952	HSA 355W1 & W2

Weather resistant steels like Cor-Ten®, Patinax®-F, Patinax®-37 and similar Ni, Cr and Cu-alloyed steels

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91Ni1-HSR

Low temperature rutile cored wire

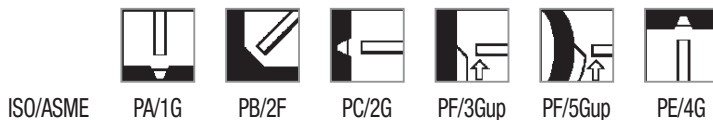
Classification

AWS A5.29 : E91T1-GM-H4
ISO 18276-A : T 55 4 1NiMo P M 2 H5

General description

All position gas shielded 1% Ni and 0.4%Mo alloyed flux cored wire for offshore, pipeline and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Very low hydrogen ($H_{DM} < 5 \text{ ml/100g}$)
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures
Meet NACE MR-0175 requirements

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	0.95	0.4	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						-20°C	-40°C
Required: AWS A5.29			min. 540	620-760	min. 17	min. 27	
ISO 18276-A			min. 550	640-820	min. 18	min. 47	
Typical values	M21	AW	640	700	19	60	

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 91Ni1-HSR: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91Ni1-HSR

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, C, D, AH32 to DH36
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70, X80
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91K2-HSR

Low temperature rutile cored wire

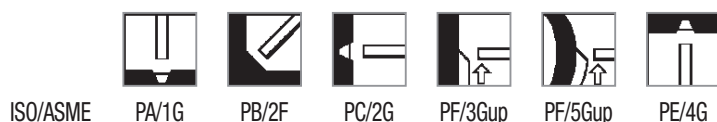
Classification

AWS A5.29 : E91T1-GM-H4
ISO 18276-A : T 55 4 1,5NiMo P M 2 H5

General description

All position gas shielded 1.5% Ni and 0.4%Mo alloyed flux cored wire for offshore, pipeline and similar applications
Specific design for stress relieved applications, guaranteed impact properties after PWHT
Superior weldability, low spatter, good bead appearance and outstanding operators appeal
Exceptional mechanical properties
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding
Specific design to withstand high heat input procedures

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.05	1.4	0.2	0.013	0.010	1.4	0.4	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						-20°C	-40°C
Required: AWS A5.29			min. 540	620-760	min. 17	min. 27	
ISO 18276-A			min. 550	640-820	min. 18	min. 47	
Typical values	M21	AW	640	700	19	60	

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 91K2-HSR: rev. EN 04

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 91K2-HSR

Materials to be welded

Steel grades/Standard	Type
General structural steel	
EN 10025 part 2	S185, S235, S275, S355
Ship plates	
ASTM A131	Grade A, B, D, AH32 to EH40
Cast steel	
EN 10213-2	G P 240R
Pipe material	
EN 10208-1	L210, L240, L290, L360
EN 10208-2	L240NB, L290NB, L360NB, L360QB, L240MB, L290MB, L360MB, L415MB, L415NB
API 5LX	X42, X46, X52, X60, X65, X70, X80
EN 10216-1/	P235T1, P235T2, P275T1
EN 10217-1	P275T2, P355N
Boiler & pressure vessel steel	
EN 10028-2	P235GH, P265GH, P295GH, P355GH, P420GH, P460GH
Fine grained steel	
EN 10025 part 3	S275N, S275NL, S355N, S355NL, S420N, S420NL, S460N, S460NL
EN 10025 part 4	S275M, S275ML, S355M, S355ML, S420M, S420ML, S460M, S460ML
EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 550-H

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E101T1-K3M-JH4
 ISO 18276-A : T 55 4 Z P M 1 H5

General description

All position gas shielded rutile flux cored wire, for high strength steel grades for welding pipes and plates
 Outstanding operator appeal
 Excellent mechanical properties (CVN >50J at -40°C)
 Very low hydrogen (H_{DM} <5 ml/100g)
 Superior product consistency with optimal alloy control
 Good wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
 M21 : Mixed gas Ar+ (>15-25%) CO₂
 Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.04	1.4	0.2	0.012	0.010	2.0	0.3	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J) -40°C
Required: AWS A5.29			min. 610	690-800	min.16	min. 27
ISO 18276-A			min. 550	640-820	min.18	min. 47
Typical values	M21	AW	700	730	19	60

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 550-H: rev. EN 23

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 550-H

Materials to be welded

Steel grades/Standard	Type
Pipe material API 5LX	X52, X60, X60, X65, X70, X80
Fine grained steel EN 10025 part 6	S460Q, S460QL1, S500Q, S500QL1, S550Q, S550QL1

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-H

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E111T1-K3M-JH4
 ISO 18276-A : T 69 4 Z P M 2 H5

General description

All position gas shielded rutile flux cored wire, for high strength steel grades like grade S690
 Specific design for stress relieved applications, guaranteed impact properties after PWHT
 Outstanding operator appeal
 Excellent mechanical properties (CVN >50J at -40°C)
 Very low hydrogen (H_{DM} <5 ml/100g)
 Superior product consistency with optimal alloy control
 Good wire feeding

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PF/3Gup PE/4G

Current type/Shielding gas (ISO 14175)

DC +
 M21 : Mixed gas Ar+ (>15-25%) CO₂
 Amount : 15-25 l/min

Approvals

Shielding gas ABS
 M21 AWS

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)		
						-29°C	-40°C	-46°C
Required: A5.29			min. 680	760-900	min.15	min. 27		
ISO 18276-A			min. 690	770-940	min.17	min. 47		
Typical values	M21	AW	800	830	17	75	60	50

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
14 kg spool S300	X	
15 kg spool B300	X	X
15 kg spool BS300	X	X

Outershield® 690-H: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-H

Materials to be welded

Steel grades/Standard	Type
Fine grained steel	
EN 10025 part 6	S500Q to S690QL1
API 5L	X100
MIL-S-162164	HY100
ASTM A514	Grade F
ASTM A517	Grade A, B, F, H, D
ASTM A709	Grade 690 type F, grade 100W type F

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-29V	24-29V	24-28V	24-26V	22-26V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-HSR

High strength rutile cored wire

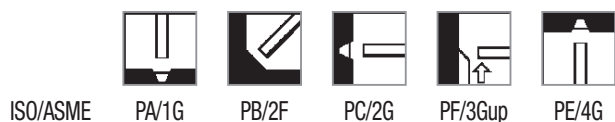
Classification

AWS A5.29/A5.29M : E111T1-K3M-JH4
ISO 18276-A : T 69 4 Z P M 2 H5 T

General description

All position gas shielded rutile flux cored wire, for high strength steel grades like grade S690
Specific design for stress relieved applications
Outstanding operator appeal
Excellent mechanical properties (CVN >50J at -40°C)
Very low hydrogen (H_{DM} <5 ml/100g)
Superior product consistency with optimal alloy control
Good wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.06	1.5	0.2	0.015	0.010	2.0	0.5	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)		
						-29°C	-30°C	-40°C
Required: AWS A5.29			min. 680	760-900	min.15	min.27		
ISO 18276-A			min. 690	770-970	min.17			min.47
Typical values	M21	SR	720	770	20			60
		AW	740	790	19		75	70

SR: 1h/580°C, 3G up - V60°

Packaging and available sizes

Unit type	Diameter (mm)	
	1.2	1.6
4.5kg plastic spool S200	X	
15 kg spool B300	X	X

Outershield® 690-HSR: rev. EN 24

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 690-HSR

Materials to be welded

Steel grades/Standard	Type
Fine grained steel	
EN 10025 part 6	S500Q to S690QL1
API 5L	X100
MIL-S-162164	HY100
ASTM A514	Grade F
ASTM A517	Grade A, B, F, H, D
ASTM A709	Grade 690 type F, grade 100W type F

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20
1.6	20	320	170	21-23	1.9	1.20
		510	235	22-24	3.1	1.20
		635	275	24-25	3.9	1.20
		760	310	25-27	4.7	1.20
		890	350	27-29	5.6	1.20
		1015	385	28-30	6.4	1.20
		1080	400	30-31	6.8	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V
1.6	250-350A	250-350A	230-280A	220-260A	170-240A
	24-29V	24-29V	24-28V	24-26V	22-26V

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 101Ni1-HSR

High strength rutile cored wire

Classification

AWS A5.29/A5.29M : E101T1-G

General description

Rutile micro alloyed flux-cored wire for welding in all positions, special of high carbon containing low alloy high strength steels such as SAE 4130

Specific design for stress relieved applications

Outstanding operator appeal

Excellent mechanical properties (CVN >50J at -40°C)

Very low hydrogen (H_{DM} <5 ml/100g)

Superior product consistency with optimal alloy control

Good wire feeding

Meet NACE MR-0175 requirements

Welding positions



Current type/Shielding gas (ISO 14175)

DC +

M21 : Mixed gas Ar+ (>15-25%) CO₂

Amount : 15-25 l/min

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Ni	Mo	H _{DM} ml/100g
M21	0.06	1.8	0.3	0.013	0.010	0.95	0.4	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J) -50°C
Required: AWS A5.29	M21	AW	610	690-830	16	27
Typical values	M21	AW	730	810	17	43
		SR	660	760	18	46

SR: 4h/645°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
4.5kg plastic spool S200	X
15 kg spool B300	X

Outershield® 101Ni1-HSR: rev. EN 02

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Outershield® 101Ni1-HSR

Materials to be welded

Steel grades/Standard	Type
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Fine grained steel

EN 10025 part 6	S500Q to S620QL1
AISI/SAE	4130-4140
ASTM A1031	Grade 4130
ASTM A519	Grade 4130

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-30V

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Outershield® 12-H

Creep resistant rutile cored wire

Classification

AWS A5.29/A5.29M : E81T1-A1M-H4
ISO 17634-A : T MoL P M 2 H5

General description

All position mix gas shielded 0.5% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Mo	H _{DM} ml/100g
M21	0.065	0.8	0.2	0.014	0.010	0.46	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						+20°C	-20°C
Required: AWS A5.29		SR ¹	min. 470	550-690	min. 19	not required	
EN 17634-A		SR ²	min. 355	min. 510	min. 22	47	
Typical values	M21	SR ³	540	600	27	160	79

Stress relieving: SR¹ = 620 ± 15°C/1h, SR² = 570-620°C/1h, SR³ = 1h/620°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 12-H: rev. EN 24

Outershield® 12-H

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	P295 G H, P355 G H, 16 Mo 3 & similar alloys
EN 10222-2	17 Mo 3, 14 Mo 6 & similar alloys
ASTM A335	Grade P1
ASTM A209	Grade T1
ASTM A250	Grade T1
ASTM A336	Grade F1
ASTM A204	Grade A, B, C
ASTM A217	Grade WC1
ASTM A352	Grade LC1
Fine grained steel	
EN 10025 part 3	S275, S355, S420
EN 10025 part 4	S275, S355, S420

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Remarks/ Application advice

Recommended tempering heat treatment range: 570-630°C
Time depends on material thickness

Outershield® 19-H

Creep resistant rutile cored wire

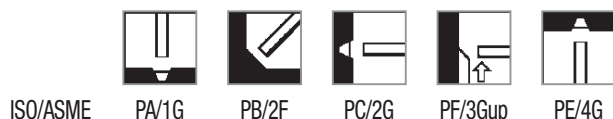
Classification

AWS A5.29/A5.29M : E 81T1-B2M-H4
ISO 17634-A : T CrMo1 P M 2 H5

General description

All position mix gas shielded 1.25% Cr 0.5% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Cr	Mo	H _{DM} ml/100g
M21	0.06	0.74	0.24	0.013	0.010	1.24	0.52	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						+20°C	-20°C
Required: AWS A5.29		SR ¹	min. 470	550-690	min. 19	not required	
EN 17634-A		SR ²	min. 355	min. 510	min.20	47	
Typical values	M21	SR ³	545	635	21	160	75

Stress relieving: SR¹ = 690 ± 15°C/1h, SR² = 660-700°C/1h, SR³ = 1h/690°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 19-H: rev. EN 23

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Outershield® 19-H

Materials to be welded

Steel grades/Standard	Type
Creep resistant steels	
EN 10028-2	13 CrMo 4-5 & similar alloys
EN 10083-1	25 CrMo 4 & similar alloys
EN 10222-2	14 CrMo 4-5 & similar alloys
ASTM A387	Grade 11 & 12
ASTM A182	Grade F1 & F12
ASTM A217	Grade WC6 & WC11
ASTM A234	Grade WP11 & WP12
ASTM A199	Grade T11
ASTM A200	Grade T11
ASTM A213	Grade T11 & T12
ASTM A335	Grade P11 & P12
Tool steel	
DIN 17210	16 MnCr 5 & similar alloys

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Remarks/ Application advice

Recommended preheat temperature: 200 - 250°C
 Recommended tempering heat treatment range: 660-700°C
 Time depends on material thickness

Outershield® 20-H

Creep resistant rutile cored wire

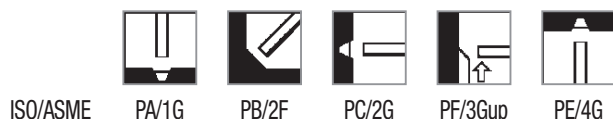
Classification

AWS A5.29/A5.29M : E 91T1-B3M-H4
ISO 17634-A : T CrMo2 P M 2 H5

General description

All position mix gas shielded 2.25% Cr 1% Mo-alloyed rutile cored wire
Superior weldability, low spatter, good bead appearance
Outstanding operator appeal
Very low hydrogen ($H_{DM} < 5$ ml/100g)
Superior product consistency with optimal alloy control
Excellent wire feeding

Welding positions



Current type/Shielding gas (ISO 14175)

DC +
M21 : Mixed gas Ar+ (>15-25%) CO₂
Amount : 15-25 l/min

Approvals

TÜV
+

Chemical composition (w%), typical, all weld metal

Shielding gas	C	Mn	Si	P	S	Cr	Mo	H _{DM} ml/100g
M21	0.06	0.75	0.21	0.013	0.008	2.23	1.09	3

Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V (J)	
						+20°C	-20°C
Required: AWS A5.29		SR ¹	min. 540	620-760	min. 17	not required	
EN 17634-A		SR ²	min. 400	min. 500	min. 18	47	
Typical values	M21	SR ³	570	680	19	160	60

Stress relieving: SR¹ = 690 ± 15°C/1h, SR² = 690-750°C/1h, SR³ = 1h/690°C

Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 20-H: rev. EN 23

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Outershield® 20-H

Materials to be welded

Steel grades/Standard Type

Creep and hydrogen resistant steels

EN 10028-2	10 CrMo 9-10 & similar alloys
EN 10222-2	12 CrMo 9-10 & similar alloys
ASTM A387	Grade 21 & 22
ASTM A182	Grade F22
ASTM A217	Grade WC9
ASTM A234	Grade WP22
ASTM A199/A200	Grade T21 & T22
ASTM A213	Grade T22
ASTM A335	Grade P22

Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg weld metal
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Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO₂

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

Remarks/ Application advice

Recommended preheat temperature: 200 - 250°C
 Recommended tempering heat treatment range: 690-750°C
 Time depends on material thickness

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