

SPECIAL ALLOYS™

MORE



RE

CONSUMABLES

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GLOBAL LEADER FOR SUBMERGED ARC WELDING

120 YEARS YOUNG, KNOWN WORLDWIDE FOR QUALITY,
PERFORMANCE AND PRODUCTIVITY

120

YEARS OF EXPERIENCE



NUMBER ONE
IN WELDING

11 000

EMPLOYEES WORLDWIDE



CANADA

UNITED STATES

MEXICO

VENEZUELA

COLUMBIA

PERU

BRAZIL

CHILE

ARGENTINA

NETHERLANDS

UNITED KINGDOM

FRANCE

SPAIN

LOCATIONS



Global Headquarters



Solution Centers

325

**R&D ENGINEERS
WORLDWIDE**



42

**SOLUTION
CENTERS**

2.7

BILLION USD REVENUE

160

**ACTIVE IN 160
COUNTRIES
WORLDWIDE**

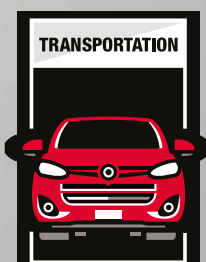
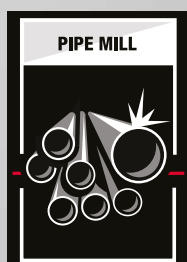
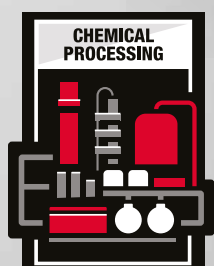
CONSUMABLES FOR HIGH-END APPLICATIONS

The new brand SPECIAL ALLOYS™ is part of our ongoing commitment in providing total welding solutions

LINCOLN ELECTRIC and METRODE have joined their forces and unified their metallurgy know-how and product range. SPECIAL ALLOYS™ is our new product portfolio for special consumables and solutions.



WE OFFER A GLOBAL SUPPORT TO THE HIGHEST DEMANDING INDUSTRIES





SPECIAL ALLOYS™



MORE SPECIAL SOLUTIONS FROM 1 HAND

Providing customers not only the adequate product but also the suitable solution.



APPLICATION SUPPORT

- IN-HOUSE DEMONSTRATION & TRAINING
- ON SITE QUALIFICATION SUPPORT
- TECHNICAL KNOW-HOW
- GLOBAL AVAILABILITY



SPECIAL ALLOYS™

EXPERIENCED TEAM

Today, LINCOLN ELECTRIC has a team of highly experienced welding scientists and engineers, not only in the welding process but also the metallurgy behind it. With SPECIAL ALLOYS™, Lincoln becomes even stronger.

TRAINING & DEMONSTRATION

With worldwide technical Solutions Centers LINCOLN ELECTRIC carries out training and demonstration on the technology, techniques and safety practices associated with welding, incorporating our SPECIAL ALLOYS™ consumables.

QUALIFICATION

LINCOLN ELECTRIC qualifies welding professionals for challenging industries with state of the art consumables and equipment. Additionally the SPECIAL ALLOYS™ product range provides solutions for key industries such as Power Generation, Oil & Gas, LNG as well as nuclear applications.

TECHNICAL DATA

SPECIAL ALLOYS™ consumables are manufactured according to the highest international quality standards and specifications. Additionally our welding consumables are extensively tested, so customers can have access to a broader database of test results, product data sheets and technical publications.

VRTEX360 WELDING SIMULATOR

FULL RANGE FOR DEMAND

Special Alloy consumables with a global distribution network.

SPECIAL ALLOY consumables for low alloy steels, stainless steels, nickel-based alloys, titanium and repair of Inconel. ALLOYS™ capabilities.



MORE

METALLURGICAL EXPERTISE

- LOW ALLOY
- STAINLESS
- HIGH TEMPERATURE
- NICKEL-BASE
- OTHER NON-FERROUS



SPECIAL ALLOYS™

LOW ALLOY

Consumables suitable for welding, engineering and structural steels, from high yield strength to specialized heat and creep-resistant CrMo types reaching the threshold of stainlessness at 12%Cr.

STAINLESS

Coverage of all stainless grades, including not only the ferritic, martensitic and austenitic steels, but also duplex grades. Additionally consumables for cryogenic applications and nuclear applications.

HIGH TEMPERATURE

300H, 800 and HP40 series designed with controlled carbon content and microstructure for service temperatures of 400-800°C and creep resistance as well as hot corrosion and oxidation like 800 and HP40 series.

NICKEL-BASE

Consumables indicated for highly corrosive environments as well as applications requiring superior mechanical properties. The group includes grades like 625, 600, Alloy 22, Alloy 276, Alloy 400 and EPRI P87.

OTHER NON-FERROUS

LINCOLN ELECTRIC offers not only Aluminum, Copper, Bronze and Cupronickel consumables, but also electrodes based on pure nickel and nickel-iron alloys required for maintenance and repair of cast iron products. Additionally we provide solutions to minimize surface wear found in different working environments. The product range includes martensitic, chromium carbides, Co base and Hadfield consumables.



LOW ALLOY APPLICATIONS// CR-MO CREEP RESISTANT CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
1/2 Mo	SMAW	MO.B (TECHTRODE A1)	A5.5: E7018-A1	BS EN ISO 3580-A: E Mo B 3 2 H5
	GMAW	CMO (TECHFIL A1)	A5.28: ER70S-A1	BS EN ISO 21952-A: G MoSi
	GTAW	CMO (TECHTIG A1)	A5.28: ER70S-A1	BS EN ISO 21952-A: W MoSi
11/4Cr1/2Mo	SMAW	CHROMET1 (TECHTRODE B2)	A5.5: E8018-B2	BS EN ISO 3580-A: E CrMo1 B 3 2 H5
		CHROMET1L (TECHTRODE B2L)	A5.5: E7015-B2L	BS EN ISO 3580-A: E CrMo1L B 3 2 H5
		CHROMET1X (TECHTRODE B2 SC)	A5.5: E8018-B2-H4	BS EN ISO 3580-A: E CrMo1 B 3 2 H5
	GMAW	1CRMO (TECHFIL CRM01)	A5.28: ER80S-G	BS EN ISO 21952-A: G CrMo1Si
		ER80S-B2 (TECHFIL B2 SC)	A5.28: ER80S-B2	BS EN ISO 21952-B: G 1CM
	GTAW	1CRMO (TECHTIG CRM01)	A5.28: ER80S-G	BS EN ISO 21952-A: W CrMo1Si
		ER80S-B2 (TECHTIG B2 SC)	A5.28: ER80S-B2	BS EN ISO 21952-B: W 1CM
	FCAW-G	CORMET1 (TECHCORE B2)	A5.29: E81T1-B2C/M-H4	BS EN ISO 17634-B: T 55T1-1C/M-1CM
	SAW (822)	1CRMO (TECHMERGE S B2 SC)	A5.23: EB2R	BS EN ISO 24598-A: S CrMo1
21/4Cr1Mo	SMAW	CHROMET2 (TECHTRODE B3)	A5.5: E9018-B3	BS EN ISO 3580-A: E CrMo2 B 3 2 H5
		CHROMET2L (TECHTRODE B3L)	A5.5: E8015-B3L	BS EN ISO 3580-A: E CrMo2L B 3 2 H5
		CHROMET2X (TECHTRODE B3 SC)	A5.5: E9018-B3-H4	BS EN ISO 3580-A: E CrMo2 B 3 2 H5
	GMAW	2CRMO (TECHFIL CRM02)	A5.28: ER90S-G	BS EN ISO 21952-A: G CrMo2Si
		ER90S-B3 (TECHFIL B3 SC)	A5.28: ER90S-B3	BS EN ISO 21952-B: G 2C1M
	GTAW	2CRMO (TECHTIG CRM02)	A5.28: ER90S-G	BS EN ISO 21952-A: W CrMo2Si
		ER90S-B3 (TECHTIG B3 SC)	A5.28: ER90S-B3	BS EN ISO 21952-B: W 2C1M
	FCAW-G	CORMET2 (TECHCORE B3)	A5.29: E91T1-B3C/M-H4	BS EN ISO 17634-B: T 62T1-1C/M-2C1M
	SAW (822)	2CRMO (TECHMERGE S B3 SC)	A5.23: EB3R	BS EN 12070: S CrMo2
CrMoV	SMAW	CHROMET1V (TECHTRODE 1V)	—	BS EN ISO 3580-A: E CrMoV1 B 3 2
	FCAW-G	CORMET 1V (TECHCORE 1V)	—	—
5CrMo	SMAW	SL502 (TECHTRODE B6R)	AWS A5.5: E8018-B6-H4R	BS EN ISO 3580-A: E CrMo5 B 3 2 H5
		CHROMET5 (TECHTRODE B6)	A5.5: E8015-B6	BS EN ISO 3580-A: E CrMo5 B 3 2 H5
	GMAW	5CRMO (TECHFIL B6)	A5.28: ER80S-B6	BS EN ISO 21952-A: G CrMo5Si
	GTAW	5CRMO (TECHTIG B6)	A5.28: ER80S-B6	BS EN ISO 21952-A: W CrMo5Si
	SAW	5CRMO (TECHMERGE S B6)	A5.23: EB6	—
9CrMo	SMAW	CHROMET9 (TECHTRODE B8)	A5.5: E8015-B8	BS EN ISO 3580-A: E CrMo9 B 3 2 H5
	GTAW	9CRMO (TECHTIG B8)	A5.28: ER80S-B8	BS EN ISO 21952-A: W CrMo9
	SAW	9CRMO (TECHMERGE S B8)	A5.23: EB8	BS EN ISO 24598-A: S CrMo9
E911	SMAW	CHROMET10MW (TECHTRODE 10MW)	—	—
12CrMoV	SMAW	CHROMET12MV (TECHTRODE 12MV)	—	BS EN ISO 3580-A: E CrMoWV12 B 3 2 H5
	GMAW	12CRMOV (TECHFIL 12MV)	—	BS EN ISO 21952-A: G CrMoWV12 Si

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	W	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.05	0.80	0.30	0.010	0.015	0.05	0.05	0.55	0.05	—	—	—	—	600-650°C/1h	580	490	30	-30	115
0.10	1.20	0.60	0.010	0.010	0.03	0.02	0.50	0.05	0.01	—	—	—	620°C/1h	620	505	25	-30	96
0.10	1.20	0.60	0.010	0.010	0.03	0.02	0.50	0.05	0.01	—	—	—	620°C/1h	640	520	25	-30	170
0.07	0.80	0.50	0.012	0.015	1.25	0.10	0.55	<0.10	—	—	0.01	—	690°C/1h	640	570	25	+20	160
0.04	0.80	0.40	0.012	0.015	1.25	—	0.55	<0.10	—	—	—	—	690°C/1h	600	500	26	+20	180
0.06	0.70	0.25	0.012	0.009	1.25	—	0.55	<0.05	—	—	—	X-f <15ppm	690°C/1h	610	525	25	+20	160
0.10	1.00	0.60	0.010	0.015	1.20	<0.10	0.50	0.10	—	—	—	—	690°C/1h	590	480	26	-10	>115
0.10	0.50	0.50	0.010	0.015	1.30	<0.10	0.50	0.10	—	—	—	—	620°C/1h	590	480	26	-10	>115
0.10	1.00	0.60	0.010	0.015	1.20	<0.10	0.50	0.10	—	—	—	—	690°C/1h	635	520	25	-10	>200
0.10	0.50	0.50	0.010	0.015	1.30	<0.10	0.50	0.10	—	—	—	X-f <15ppm	620°C/1h	635	520	25	-10	>200
0.06	1.00	0.30	0.010	0.010	1.30	—	0.55	0.05	—	—	—	—	690°C/1-2h	650	550	24	+20	30
0.07	1.00	0.25	0.005	0.010	1.00	—	0.50	0.07	—	—	—	X-f <15ppm	690°C/1h	610	550	22	-30	100
0.07	0.80	0.60	0.012	0.015	2.30	—	1.00	<0.10	—	—	0.01	—	690°C/1h	670	570	20	+20	140
0.04	0.80	0.40	0.012	0.015	2.25	—	1.05	<0.10	—	—	—	—	690°C/1h	630	540	24	+20	160
0.06	0.70	0.25	0.012	0.010	2.25	—	1.05	<0.05	—	—	—	X-f <15ppm	690°C/1h	670	570	22	+20	140
0.10	1.00	0.60	0.010	0.015	2.40	<0.10	1.00	0.15	—	—	—	—	690°C/1h	655	540	23	-10	>95
0.10	0.50	0.50	0.010	0.015	2.40	<0.10	1.00	0.10	—	—	—	—	690°C/1h	655	540	23	-10	>95
0.10	1.00	0.60	0.010	0.015	2.40	<0.10	1.00	0.15	—	—	—	—	690°C/1h	660	550	22	-10	>150
0.10	0.50	0.50	0.010	0.015	2.40	<0.10	1.00	0.10	—	—	—	X-f <15ppm	690°C/1h	660	550	22	-10	>150
0.06	1.00	0.30	0.010	0.010	2.30	—	1.00	0.05	—	—	—	—	690°C/1-2h	725	625	22	+20	45
0.07	0.80	0.20	0.005	0.010	2.25	—	0.90	0.07	—	—	—	X-f <15ppm	690°C/1h	680	570	22	-40	100
0.08	0.85	0.30	0.012	0.012	1.20	—	1.10	—	0.20	—	—	—	700°C/1h	800	745	20	+20	60
0.13	0.80	0.30	0.010	0.010	1.30	0.10	1.10	0.10	0.25	—	—	—	720°C/3h	650	550	20	+20	50
0.07	0.80	0.60	0.010	0.020	5.30	—	0.60	—	—	—	—	—	750°C/2h	680	580	22	+20	110
0.06	0.80	0.40	0.010	0.015	5.00	0.20	0.55	0.05	—	—	—	—	745°C/1h	610	500	25	+20	150
0.07	0.50	0.40	0.010	0.010	5.70	0.10	0.55	0.20	0.02	—	—	—	745°C/1h	590	470	17	+20	40
0.07	0.50	0.40	0.010	0.010	5.70	0.10	0.55	0.20	0.02	—	—	—	745°C/1h	640	530	28	+20	240
0.07	0.50	0.40	0.010	0.010	5.70	0.10	0.55	0.20	0.02	—	—	—	745°C/1h	640	530	28	+20	240
0.06	0.75	0.35	0.012	0.015	9.00	0.20	1.00	<0.05	—	—	—	—	740°C/2h	710	600	22	+20	90
0.07	0.50	0.40	0.010	0.015	9.00	0.10	0.90	0.10	—	—	—	—	745°C/1h	730	612	25	+20	80
0.07	0.50	0.40	0.010	0.015	9.00	0.10	0.90	0.10	—	—	—	—	745°C/1h	590	435	17	+20	34
0.11	0.80	0.25	0.008	0.010	9.50	0.50	1.00	<0.05	0.22	1.00	0.05	N:0.05; Al:0.01	730°C/12h	760	620	19	+20	60
0.20	0.80	0.25	0.010	0.017	11.00	0.50	1.00	—	0.30	0.50	—	—	760°C/3h	750	550	24	+20	40
0.20	0.60	0.40	0.005	0.010	11.00	0.60	1.00	—	0.30	0.50			760°C/2h	690	550	15	+20	34

LOW ALLOY APPLICATIONS// CRMO CREEP RESISTANT CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
P91	SMAW	CHROMET 9MV-N (TECHTRODE B91)	A5.5: E9015-B91-H4	BS EN ISO 3580-A: E CrMo91 B 3 2 H5
		CHROMET 9MVN+ (TECHTRODE B91+)	A5.5: E9015-B91-H4	BS EN ISO 3580-A: E CrMo91 B 3 2 H5
		CHROMET 9-B9 (TECHTRODE B91C)	A5.5: E9015-B91-H4	BS EN ISO 3580-B: E 6216-9C1MV
		CHROMET 91VNB (TECHTRODE B91RW)	A5.5: E9015-B91-H4	BS EN ISO 3580-A: E CrMo91 B 3 2 H5
	GMAW	9CRMOV-N (TECHFIL B91)	A5.28: ER90S-B9	BS EN ISO 21952-A: G CrMo91
	GTAW	9CRMOV-N (TECHTIG B91)	A5.28: ER90S-B9	BS EN ISO 21952-A: W CrMo91
		9CRMOV (TECHTIG B91C)	A5.28: ER90S-B9	—
	FCAW	SUPERCORE F91 (TECHCORE B91)	A5.29: E91T1-B9M	BS EN ISO 17634-B: T 69T1-1M-9C1MV
	MCAW	CORMET M91 (TECHCORE M B91)	A5.28: E90C-B9	BS EN ISO 17634-B: T 69T15-0M-9C1MV
	SAW	9CRMOV-N (TECHMERGE S B91)	A5.23: EB91	—
		9CRMOV (TECHMERGE S B91C)	A5.23: EB91	—
P92	SMAW	CHROMET 92 (TECHTRODE B92)	A5.5: E9015-B92-H4	—
	GMAW	9CRWV (TECHFIL B92)	A5.28: ER90S-G	—
	GTAW	9CRWV (TECHTIG B92)	A5.28: ER90S-G	—
	FCAW	SUPERCORE F92 (TECHCORE B92)	A5.29: E91T1-G	—
	SAW	9CRWV (TECHMERGE S B92)	A5.23: EG	—
CB2 / FB2	SMAW	CHROMET WB2 (TECHTRODE WB2)	A5.5: E9015-G	—
	FCAW-G	SUPERCORE F921 (TECHCORE WB2)	—	—

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis

LOW ALLOY APPLICATIONS// HIGH STRENGTH LOW ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
AISI4130	SMAW	E9018-D1 (TECHTRODE 9018D1)	A5.5: E9018-D1	—
		E10018-D2 (TECHTRODE 10018D2)	A5.5: E10018-D2	—
	GMAW	MNMO (TECHFIL 80D2)	A5.28: E80S-D2	—
	GTAW	MNMO (TECHTIG 80D2)	A5.28: E80S-D2	—
NiMo	GMAW	LNM NIMO1 (TECHFIL NIMO1)	—	BS EN ISO 16834-A : G Z Mn3Ni1Mo
	FCAW-G	OUTERSHIELD 91K2-HSR (TECHCORE 91K2)	A5.29 : E91T1-GM-H4	BS EN ISO 18276-A : T 55 41.5NiMo P M 2 H5
		OUTERSHIELD 91NI1-HSR (TECHCORE 91NI1SR)	A5.29 : E91T1-GM	BS EN ISO 18276-A : T 55 41NiMo P M 2 H5
		OUTERSHIELD 101NI1-HSR (TECHCORE 101NI1SR)	A5.29 : E101T1-G-H4	—
	SAW (LA436)	1NIMO (TECHMERGE S EF3)	A5.23: EF3	BS EN ISO 14171 : S3Ni1Mo
NiMoCr	SMAW	CONARC 80G (TECHTRODE 80G)	A5.5 : E11018-G-H4	BS EN ISO 18275-A : E 69 6 Z B 3 2 H5
		CONARC 85 (TECHTRODE 85)	A5.5 : E12018-G-H4R	BS EN ISO 18275-A : E 69 5 Mn2NiCrMo B 3 2 H5
	GMAW	LNM MONICR (TECHFIL MONICR)	A5.28 : E120S-G	BS EN ISO 16834-A : G Mn4Ni2CrMo
	FCAW-G	OUTERSHIELD 690-HSR (TECHCORE 690SR)	A5.29 : E111T1-K3MJ	BS EN ISO 18276-A : T 69 4 Z P M 2 H5 T
	SAW (P240)	LNS168 (TECHMERGE S 168)	—	BS EN ISO 26304-A : S 3Ni2.5CrMo
WB36/NiMo	SMAW	1NIMO.B (TECHTRODE 1NIMO)	A5.5: E9018-G-H4	—

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	W	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.10	0.60	0.25	0.008	0.010	9.00	0.70	1.00	0.05	0.20	—	0.05	N:0.05; Ni+Mn: 1.3	760°C/2h	770	640	22	+20	65
0.10	0.70	0.25	0.008	0.008	9.00	0.70	1.00	0.05	0.20	—	0.05	N:0.05; Ni+Mn: 1.4	760°C/2h	720	590	22	+20	90
0.10	0.55	0.25	0.008	0.008	9.00	0.30	1.00	0.05	0.20	—	0.04	N:0.05; Al:<0.01; Ni+Mn:<1.2	760°C/2h	710	590	23	+20	75
0.10	0.80	0.25	0.008	0.008	8.50	0.50	1.00	0.05	0.20	—	0.04	Al:0.01 N:0.05	760°C/2h	750	600	20	+20	55
0.10	0.50	0.25	0.005	0.008	9.00	0.60	1.00	0.03	0.20	—	0.05	N:0.05; Al:<0.01	750-760°C/2-3h	780	675	22	+20	220
0.10	0.50	0.25	0.005	0.008	9.00	0.60	1.00	0.03	0.20	—	0.05	N:0.05; Al:<0.01	750-760°C/2-3h	780	675	22	+20	220
0.10	0.50	0.25	0.005	0.008	8.70	0.30	1.00	0.03	0.20	—	0.05	N:0.05; Al:<0.01	750-760°C/2-3h	760	650	22	+20	220
0.10	0.80	0.30	0.010	0.016	9.00	0.50	1.00	0.05	0.20	—	0.04	Al:0.01; N:0.05; Ni+Mn:1.3	760°C/2h	790	660	20	+20	25
0.10	1.00	0.30	0.010	0.010	9.00	0.30	1.00	0.05	0.20	—	0.05	N:0.05; Al:0.03	760°C/2h	780	650	17	+20	30
0.10	0.50	0.25	0.006	0.008	8.70	0.60	1.00	0.03	0.20	—	0.05	N:0.05; Al:<0.01	750-760°C/2-3h	750	630	25	+20	45
0.10	0.50	0.25	0.005	0.008	8.70	0.30	1.00	0.03	0.20	—	0.05	N:0.05; Al:<0.01	750-760°C/2-3h	690	580	25	+20	220
0.11	0.60	0.25	0.010	0.010	9.00	0.60	0.45	<0.05	0.20	1.70	0.05	B:0.003; N:0.05; Al:<0.01	760°C/2-4h	740	630	22	+20	60
0.10	0.75	0.30	0.005	0.008	9.00	0.50	0.45	<0.05	0.20	1.70	0.06	B:0.003; N:0.05; Al:<0.01	760°C/2-4h	800	700	22	+20	220
0.10	0.75	0.30	0.005	0.008	9.00	0.50	0.45	<0.05	0.20	1.70	0.06	B:0.003; N:0.05; Al:<0.01	760°C/2-4h	800	700	22	+20	220
0.11	0.80	0.30	0.010	0.017	9.00	0.50	0.45	<0.05	0.20	1.70	0.04	B:0.003; N:0.04; Al:<0.01	760°C/4-6h	775	650	21	+20	25
0.10	0.75	0.30	0.005	0.008	9.00	0.50	0.45	<0.05	0.20	1.70	0.06	B:0.003; N:0.05; Al:<0.01	760°C/2-4h	800	700	22	+20	220
0.12	0.60	0.30	0.009	0.010	9.50	0.60	1.50	<0.05	0.25	—	0.05	B:0.008; N:0.02; Co:1.0	760°C/4h	735	600	23	+20	40
0.12	0.06	0.25	0.007	0.017	9.50	0.70	1.50	—	0.25	—	0.05	B:0.008; N:0.02; Co:1.0	760°C/4h	820	690	19	+20	22

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	W	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.07	1.50	0.40	0.010	0.015	0.15	0.15	0.35	0.05	—	—	—	—	620°C/1h	670	605	25	-30	90
0.10	1.80	0.40	0.025	0.015	0.30	0.60	0.35	0.05	—	—	—	—	620°C/1h	690	620	18	-40	>27
0.10	1.90	0.60	0.005	0.010	—	0.05	0.50	0.10	—	—	—	—	620°C/1h	630	530	32	-30	>200
0.10	1.90	0.60	0.005	0.010	—	0.05	0.50	0.10	—	—	—	—	620°C/1h	630	530	32	-30	>200
0.10	1.70	0.70	0.006	0.007	0.01	0.90	0.35	0.30	—	—	—	Ti: 0.20	As-welded	—	—	—	—	—
0.05	1.40	0.20	0.010	0.013	0.15	1.40	0.40	0.08	0.03	—	0.05	—	As-welded	700	640	19	-40	60
0.05	1.40	0.20	0.010	0.013	0.15	0.95	0.40	0.08	0.03	—	0.05	—	As-welded	700	640	19	-40	60
0.06	2.00	0.30	0.010	0.013	0.30	0.95	0.40	0.08	0.03	—	—	—	As-welded	810	750	17	-40	60
0.06	1.90	0.50	0.010	0.020	—	0.90	0.50	0.10	—	—	—	—	590°C/1h	680	560	28	+20	140
0.06	1.50	0.40	0.010	0.010	0.30	2.20	0.30	0.30	0.05	—	0.05	N: 0.010	As-welded	800	760	18	-60	90
0.06	1.50	0.30	0.010	0.010	0.40	2.00	0.40	0.30	0.05	—	0.05	—	620°C/1h	850	780	20	-40	70
0.09	1.80	0.80	—	—	0.03	2.20	0.55	0.30	0.03	—	—	Ti: 0.10; Al: 0.12; Zr: 0.10	As-welded	950	895	15	-40	70
0.06	1.50	0.20	0.010	0.015	—	2.00	0.50	0.08	0.03	—	0.05	—	600°C/1h	770	720	20	-40	60
0.08	1.60	0.40	< 0.015	< 0.015	0.30	2.40	0.40	0.30	—	—	—	—	As-welded	800	720	20	-50	55
0.07	1.20	0.30	0.010	0.010	0.10	1.00	0.40	0.05	0.01	—	—	—	590-620°C/1-2h	744	677	25	0	130

LOW ALLOY APPLICATIONS // RAIL STEEL CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Rail	SMAW	RAILROD (TECHTRODE RAIL)	–	–

STAINLESS STEEL APPLICATIONS // STANDARD STAINLESS STEEL CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
307	SMAW	19.9.6MN (TECHTRODE 307RP)	A5.4 : E307-16 *	BS EN ISO 3581-A: E 18 8 Mn R 3 2
		JUNGO 307 (TECHTRODE 307B)	A5.4 : E307-15 *	BS EN ISO 3581-A: E 18 8 Mn B 2 2
308L	SMAW	SUPERMET 308L (TECHTRODE 308LR)	A5.4 : E308L-17	BS EN ISO 3581-A: E 19 9 L R 3 2
		ULTRAMET 308L (TECHTRODE 308LRP)	A5.4: E308L-16	BS EN ISO 3581-A: E 19 9 L R 3 2
		JUNGO 304L (TECHTRODE 308LB)	A5.4: E308L-15	BS EN ISO 3581-A: E 19 9 L B 3 2
		VERTAROSTA 304L (TECHTRODE 308LVD)	A5.4: E308L-15	BS EN ISO 3581-A: E 19 9 L R 3 2
	GMAW	308S92 (TECHFIL 308L)	A5.9: ER308L	BS EN ISO 14343-A: G 19 9 L
		SUPERMIG 308LSi (TECHFIL 308LSi)	A5.9: ER308LSi	BS EN ISO 14343-A: G 19 9 L Si
	GTAW	308S92 (TECHTIG 308L)	A5.9: ER308L	BS EN ISO 14343-A: W 19 9 L
	FCAW	SUPERCORE 308L (TECHCORE 308L)	A5.22: E308LT0-1/4	BS EN ISO 17633-A: T 19 9 L R C/M 3
		SUPERCORE 308LP (TECHCORE 308LP)	A5.22: E308LT1-1/4	BS EN ISO 17633-A: T 19 9 L P C/M 2
	SAW (P2000)	308S92 (TECHMERGE S 308L)	A5.9: ER308L	BS EN ISO 14343-A: S 19 9 L
309L	SMAW	SUPERMET 309L (TECHTRODE 309LR)	A5.4: E309L-17	BS EN ISO 3581-A: E 23 12 L R 3 2
		ULTRAMET 309L (TECHTRODE 309LRP)	A5.4: E309L-16	BS EN ISO 3581-A: E 23 12 L R 3 2
		ULTRAMET 309LP (TECHTRODE 309LVD)	A5.4: E309L-16	BS EN ISO 3581-A: E 23 12 L R 1 1
	GMAW	309S92 (TECHFIL 309L)	A5.9: E309L	BS EN ISO 14343-A: G 23 12 L
	GTAW	309S92 (TECHTIG 309L)	A5.9: E309L	BS EN ISO 14343-A: W 23 12 L
	FCAW	SUPERCORE 309L (TECHCORE 309L)	A5.22: E309LT0-1/4	BS EN ISO 17633-A: T 23 12 L R C/M 3
		SUPERCORE 309LP (TECHCORE 309LP)	A5.22: E309LT1-1/4	BS EN ISO 17633-A: T 23 12 L P C/M 2
	SAW (P2000S)	309S92 (TECHMERGE S 309L)	A5.9: E309L	BS EN ISO 14343-A: S 23 12 L
316L	SMAW	SUPERMET 316L (TECHTRODE 316LR)	A5.4: E316L-17	BS EN ISO 3581-A: E 19 12 3 L R 3 2
		ULTRAMET 316L (TECHTRODE 316LRP)	A5.4: E316L-16	BS EN ISO 3581-A: E 19 12 3 L R 3 2
		JUNGO 316L (TECHTRODE 316LB)	A5.4: E316L-15	BS EN ISO 3581-A: E 19 12 3 L B 2 2
		LIMAROSTA 316L-130 (TECHTRODE 316LRHR)	A5.4: E316L-17	BS EN ISO 3581-A: E 19 12 3 L R 5 3
		VERTAROSTA 316L (TECHTRODE 316LVD)	A5.4: E316L-15	BS EN ISO 3581-A: E 19 12 3 L R 2 1
	GMAW	316S92 (TECHFIL 316L)	A5.9: ER316L	BS EN ISO 14343-A: G 19 12 3 L
		SUPERMIG 316LSi (TECHFIL 316LSi)	A5.9: ER316LSi	BS EN ISO 14343-A: G 19 12 3 L Si
	GTAW	316S92 (TECHTIG 316L)	A5.9: ER316L	BS EN ISO 14343-A: W 19 12 3 L
		SUPEROOT 316L (TECHTIG T 316L)	A5.22: R316LT1-5	BS EN ISO 17633-B: TS 316L-R11
	FCAW	SUPERCORE 316L (TECHCORE 316L)	A5.22: E316LT0-1/4	BS EN ISO 17633-A: T 19 12 3 L R C/M 3
		SUPERCORE 316LP (TECHCORE 316LP)	A5.22: E316LT1-1/4	BS EN ISO 17633-A: T 19 12 3 L P C/M 2
	SAW (P2000)	316S92 (TECHMERGE S 316L)	A5.9: ER316L	BS EN ISO 14343-A: S 19 12 3 L

Note:FN: Ferrite number

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	W	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.09	1.00	0.50	0.008	0.012	2.30	0.20	0.20	–	–	–	–	–	As Welded	900	700	17	+20	20

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.12	5.80	0.50	0.010	0.020	18.0	9.0	0.40	—	—	—	—	—	As-welded	680	480	35	+20	80
0.08	5.50	0.30	0.025	0.035	19.0	8.5	0.50	0.75	—	—	—	—	As-welded	650	500	35	+20	100
0.02	0.80	0.60	0.010	0.020	19.5	10.0	0.10	0.05	—	—	6	—	As-welded	590	450	45	+20	80
0.02	1.00	0.60	0.010	0.020	19.0	9.5	0.10	0.10	—	—	6	—	As-welded	590	450	45	-100	35
0.02	1.80	0.40	0.025	0.030	19.0	10.0	0.50	0.75	—	—	7	—	As-welded	600	450	40	+20	80
0.02	0.80	0.70	0.025	0.030	20.0	9.8	0.50	0.75	—	—	7	—	As-welded	600	440	40	+20	70
0.01	1.70	0.40	0.010	0.015	20.0	10.0	0.10	0.15	—	—	10	—	As-welded	570	435	42	-130	70
0.01	1.70	0.80	0.010	0.015	20.0	10.0	0.10	0.10	—	—	10	—	As-welded	570	435	42	-130	70
0.01	1.70	0.40	0.010	0.015	20.0	10.0	0.10	0.15	—	—	10	—	As-welded	605	465	35	-196	80
0.03	1.30	0.70	0.020	0.020	19.5	10.0	0.10	0.10	—	—	8	—	As-welded	560	400	43	-110	40
0.03	1.30	0.70	0.020	0.020	19.5	10.0	0.10	0.10	—	—	8	—	As-welded	560	400	43	-110	40
0.02	1.50	0.50	0.020	0.020	19.0	10.0	—	—	—	—	10	—	As-welded	550	380	35	-20	80
0.02	0.80	0.60	0.010	0.020	24.0	13.0	0.05	0.10	—	—	15	—	As-welded	620	500	40	+20	55
0.03	0.80	0.60	0.010	0.020	23.5	13.0	0.10	0.10	—	—	15	—	As-welded	595	495	41	-20	45
0.03	0.80	0.60	0.010	0.020	23.5	13.0	0.10	0.10	—	—	15	—	As-welded	635	525	41	+20	55
0.02	1.70	0.50	0.005	0.015	23.5	13.0	0.10	0.15	—	—	12	—	As-welded	560	430	42	-20	80
0.02	1.70	0.50	0.005	0.015	23.5	13.0	0.10	0.15	—	—	12	—	As-welded	590	450	43	-75	>150
0.03	1.30	0.60	0.020	0.020	24.0	12.5	0.10	0.10	—	—	15	—	As-welded	560	445	40	-20	40
0.03	1.30	0.60	0.020	0.020	24.0	12.5	0.10	0.10	—	—	15	—	As-welded	560	445	40	-110	55
0.02	1.50	0.50	0.020	0.020	25.0	13.0	—	—	—	—	15	—	As-welded	600	450	33	-40	80
0.02	0.80	0.60	0.010	0.020	19.0	12.0	2.70	0.10	—	—	6	—	As-welded	600	480	42	+20	70
<0.03	1.00	0.60	0.010	0.020	19.0	12.0	2.60	<0.10	—	—	6	—	As-welded	580	480	43	+20	70
0.03	1.60	0.40	0.025	0.025	18.5	11.0	2.70	0.75	—	—	6	—	As-welded	650	450	35	-196	35
0.02	0.65	1.00	0.030	0.025	18.0	11.5	2.80	0.75	—	—	6	—	As-welded	580	450	40	-105	40
0.02	0.70	0.85	0.025	0.025	18.0	11.5	2.80	0.75	—	—	6	—	As-welded	620	500	35	-60	35
0.01	1.40	0.50	0.010	0.015	18.5	12.8	2.60	0.15	—	—	6	—	As-welded	570	435	42	-130	>70
0.01	1.40	0.85	0.010	0.015	18.5	12.8	2.60	0.15	—	—	6	—	As-welded	570	435	42	-130	>70
0.01	1.40	0.50	0.010	0.015	18.5	12.8	2.60	0.15	—	—	6	—	As-welded	605	465	35	-130	>100
0.01	1.60	0.80	0.005	0.020	19.2	12.5	2.20	0.05	—	—	5	—	As-welded	605	450	38	—	—
0.03	1.30	0.50	0.020	0.020	18.0	12.5	2.70	0.10	—	—	6	—	As-welded	580	440	40	+20	70
0.03	1.30	0.50	0.020	0.020	18.0	12.5	2.70	0.10	—	—	6	—	As-welded	580	440	40	+20	70
0.02	1.50	0.50	0.020	0.020	18.0	12.0	2.50	—	—	—	10	—	As-welded	560	425	33	-130	50

STAINLESS STEEL APPLICATIONS // MARTENSITIC STAINLESS STEEL CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS/EN/ISO
410	SMAW	13.1.BMP (TECHTRODE 410B)	A5.4: E410-15 *	BS EN ISO 3581-A: E 13 B 5 2 *
410NiMo	GMAW	ER410NiMo (TECHFIL 410NIMO)	–	BS EN ISO 14343-A : G 13 4

STAINLESS STEEL APPLICATIONS // AUSTENITIC STAINLESS STEEL CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS/EN/ISO
347	SMAW	ULTRAMET 347 (TECHTRODE 347RP)	A5.4: E347-16	BS EN ISO 3581-A: E 19 9 Nb R 3 2
		ULTRAMET B347 (TECHTRODE 347B)	A5.4: E347-15	BS EN ISO 3581-A: E 19 9 Nb B 4 2
	GMAW	347S96 (TECHFIL 347)	A5.9: ER347	BS EN ISO 14343-A: G 19 9 Nb
		LNM347SI (TECHFIL 347SI)	A5.9: ER347Si	BS EN ISO 14343-A: G 19 9 Nb Si
	GTAW	347S96 (TECHTIG 347)	A5.9: ER347	BS EN ISO 14343-A: W 19 9 Nb
	FCAW	SUPERCORE 347 (TECHCORE 347)	A5.22: E347T0-1/4	BS EN ISO 17633-A: T 19 9 Nb R C/M 3
	SAW (P2007)	347S96 (TECHMERGE S 347)	A5.9: ER347	BS EN ISO 14343-A: S 19 9 Nb
318	SMAW	AROSTA 318 (TECHTRODE 318RP)	A5.4: E318-16	BS EN ISO 3581-A: E 19 12 3 Nb R 1 2
	GMAW	LNM318SI (TECHFIL 318SI)	A5.9: ER318 *	BS EN ISO 14343-A: G 19 12 3 Nb Si
	GTAW	318S96 (TECHTIG 318)	A5.9: ER318	BS EN ISO 14343-A: W 19 12 3 Nb
	SAW (P2007)	LNS318 (TECHMERGE S 318)	A5.9: ER318	BS EN ISO 14343-A: S 19 12 3 Nb
317L	SMAW	ULTRAMET 317L (TECHTRODE 317LR)	A5.4: E317L-16	BS EN ISO 3581-A: E 19 13 4 N L R 3 2
	GTAW	ER317L (TECHTIG 317L)	A5.9: ER317L	BS EN ISO 14343-A: W 19 13 4 L
Cryogenic 308	SMAW	ULTRAMET 308LCF (TECHTRODE 308LCF)	A5.4: E308L-16	BS EN ISO 3581-A: E 19 9 L R 3 2
		ULTRAMET B308LCF (TECHTRODE 308LBCF)	A5.4: E308L-15	BS EN ISO 3581-A: E 19 9 L B 4 2
	GTAW	ER308LCF (TECHTIG 308LCF)	A5.9: ER308L	BS EN ISO 14343-A: W 19 9 L
	FCAW	SUPERCORE 308LCF (TECHCORE 308LCF)	A5.22: E308LT1-1/4 J	BS EN ISO 17633-A: T 19 9 L P C/M 2
	SAW (P2007)	ER308LCF (TECHMERGE S 308LCF)	A5.9: ER308L	BS EN ISO 14343-A: S 19 9 L
Cryogenic 316	SMAW	ULTRAMET 316LCF (TECHTRODE 316LCF)	A5.4: E316L-16	–
		ULTRAMET B316LCF (TECHTRODE 316LBCF)	A5.4: E316L-15	–
	GTAW	ER316LCF (TECHTIG 316LCF)	A5.9: ER316L	BS EN ISO 14343-A: W 19 12 3 L
	FCAW	SUPERCORE 316LCF (TECHCORE 316LCF)	A5.22: E316LT1-1/4 J	BS EN ISO 17633-B: TS316L-FM1
	SAW (P2007)	ER316LCF (TECHMERGE S 316LCF)	A5.9: ER316L	BS EN ISO 14343-A: S 19 12 3 L

Note:FN: Ferrite number

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.04	0.70	0.25	0.010	0.020	13.0	1.5	0.30	0.05	–	–	–	–	790°C/5h + 700°C/5h	655	455	26	+20	105
0.02	0.80	0.40	0.005	0.015	12.3	4.5	0.50	0.10	–	–	–	–	610°C/1h	890	850	23	0	90

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.02	0.70	0.70	0.010	0.020	19.0	9.5	0.05	0.07	—	—	6	—	As-welded	650	500	40	-196	20
0.03	1.20	0.30	0.010	0.020	19.0	9.5	0.05	0.07	—	—	6	—	As-welded	650	500	40	-50	90
0.04	1.50	0.40	0.005	0.020	19.5	9.7	0.20	0.10	—	—	8	Nb: 0.6	As-welded	650	475	47	+20	100
0.04	1.30	0.90	—	—	19.0	10.0	0.30	0.30	—	—	6	Nb: 0.6	As-welded	650	460	35	+20	100
0.04	1.50	0.40	0.005	0.020	19.5	9.7	0.20	0.10	—	—	8	Nb: 0.6	As-welded	660	450	42	-196	35
0.03	1.20	0.40	0.010	0.020	19.0	10.5	0.10	0.10	—	—	8	Nb: 0.5	As-welded	600	435	47	+20	90
0.03	1.40	0.50	0.020	0.020	19.0	10.0	—	—	—	—	8	Nb: 0.6	As-welded	650	400	34	-50	65
0.03	0.80	0.85	0.030	0.025	18.0	11.5	2.70	0.50	—	—	10	Nb + Ta: 0.35	As-welded	630	500	38	-60	35
0.04	1.40	0.85	0.030	0.020	19.0	11.7	2.70	0.30	—	—	10	Nb: 0.5	As-welded	630	410	35	+20	100
0.04	1.80	0.45	0.010	0.020	19.5	11.5	2.50	0.20	—	—	10	Nb:0.6	As-welded	655	440	42	+20	90
0.04	1.50	0.50	0.020	0.020	19.0	11.0	2.50	—	—	—	10	Nb: 0.5	As-welded	655	440	35	—	—
0.02	1.20	0.60	0.010	0.020	19.0	13.0	3.80	0.10	—	—	5	N: 0.12	As-welded	620	470	38	-50	30
0.15	1.50	0.40	0.010	0.020	19.0	14.0	3.50	0.15	—	—	5		As-welded	630	450	35	+20	75
<0.025	1.00	0.60	0.010	0.020	18.5	10.0	0.10	<0.10	—	—	3	—	As-welded	600	445	50	-196	35
0.03	1.20	0.30	0.010	0.015	18.5	10.0	0.05	<0.10	—	—	3	—	As-welded	600	440	44	-196	43
0.01	1.70	0.40	0.010	0.015	20.0	10.0	0.10	0.15	—	—	7	—	As-welded	605	465	35	-196	80
0.03	1.40	0.60	0.010	0.020	18.6	10.5	0.10	0.10	—	—	3	—	As-welded	540	400	50	-196	36
0.02	1.40	0.60	0.010	0.020	19.7	10.0	—	0.10	—	—	—	—	As-welded	550	390	41	-196	45
<0.03	1.00	0.60	0.010	0.020	18.0	12.0	2.20	<0.10	—	—	3	—	As-welded	595	440	43	-196	30
<0.03	1.20	0.30	0.010	0.020	19.0	12.0	2.20	<0.10	—	—	3	—	As-welded	600	470	37	-196	50
0.01	1.40	0.50	0.010	0.015	18.5	12.8	2.60	0.15	—	—	6	—	As-welded	605	465	35	-196	>60
0.03	1.40	0.60	0.010	0.020	18.0	12.4	2.20	0.10	—	—	3	—	As-welded	550	410	40	-196	34
0.02	1.20	0.60	0.010	0.020	18.2	12.0	2.60	0.10	—	—	—	—	As-welded	560	400	41	-196	40

STAINLESS STEEL APPLICATIONS // DISSIMILAR WELDING CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
309LMo	SMAW	SUPERMET 309Mo (TECHTRODE 309LMOR)	A5.4: E309LMo-17	BS EN ISO 3581-A : E 23 12 2 L R 3 2
		AROSTA 309MO (TECHTRODE 309LMORP)	A5.4: E309LMo-16	BS EN ISO 3581-A : E 23 12 2 L R 3 2
		NICHROMA160 (TECHTRODE 309MORHR)	A5.4: E309Mo-26	BS EN ISO 3581-A : E 23 12 2 L R 5 3 *
	GMAW	ER309MO (TECHTIG 309MO)	A5.9: ER309LMo *	BS EN 12072: W 23 12 2 L
	FCAW	SUPERCORE 309MO (TECHCORE 309LMO)	A5.22: E309LMoT0-1/4	BS EN 17633-A: T 23 12 2 L R C/M 3
		SUPERCORE 309MOP (TECHCORE 309LMOP)	A5.22: E309LMoT1-1/4	BS EN 17633-A: T 23 12 2 L P C/M 2
	SAW	ER309MO (TECHMERGE S 309MO)	A5.9: ER309LMo *	BS EN ISO 14343-A: S 23 12 2 L

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis; FN: Ferrite number

STAINLESS STEEL APPLICATIONS // SUPERAUSTENITIC, DUPLEX, LEAN-DUPLEX

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
20	SMAW	E320LR-15 (TECHTRODE 320LRB)	A5.4: E320LR-15	BS 2926: 20.34.2.CuNb.B
825	SMAW	NICRO 31/27 (TECHTRODE 383RP)	A5.4: E383-16 *	BS EN ISO 3581-A: E 27 31 4 Cu L R 1 2
		E825L-15 (TECHTRODE 383B)	—	—
	GMAW	LNM NICRO31/27 (TECHFIL 383)	A5.9: ER383	BS EN ISO 14343-A: G 27 31 4 Cu L
	GTAW	LNT NICRO31/27 (TECHTIG 383)	A5.9: ER383	BS EN ISO 14343-A: W 27 31 4 Cu L
		82-50 (TECHTIG NIFECR1)	A5.14: ERNiFeCr-1	BS EN ISO 18274: S Ni8065
2507 Superduplex	SMAW	ULTRAMET 2507 (TECHTRODE 2594RP)	A5.4: E2594-16	BS EN ISO 3581-A: E 25 9 4 N L R 3 2
		2507XKS (TECHTRODE 2594B)	A5.4: E2594-15	BS EN ISO 3581-A: E 25 9 4 N L B 4 2
	GMAW	LNM 2507 (TECHFIL 2594)	A5.9: ER2594	BS EN ISO 14343-A: G 25 9 4 N L
	GTAW	2507 (TECHTIG 2594)	A5.9: ER2594	BS EN ISO 14343-A: W 25 9 4 N L
		SUPERCORE 2507 (TECHCORE 2594)	A5.22: E2594T0-4	—
	FCAW	SUPERCORE 2507P (TECHCORE 2594P)	A5.22: E2594T1-4	—
904L	SMAW	ULTRAMET 904L (TECHTRODE 385RP)	A5.4: E385-16	BS EN ISO 3581-A: E 20 25 5 Cu N L R 5 2
		JUNGO 4500 (TECHTRODE 385B)	A5.4: E385-16 *	BS EN ISO 3581-A: E 20 25 5 Cu N L R 1 2
	GMAW	20.25.4CU (TECHFIL 385)	A5.9: ER385	BS EN ISO 14343-A: G 20 25 5 Cu L
	GTAW	20.25.4CU (TECHTIG 385)	A5.9: ER385	BS EN ISO 14343-A: W 20 25 5 Cu L
Duplex	SMAW	SUPERMET 2205 (TECHTRODE 2205R)	—	—
		AROSTA 4462 (TECHTRODE 2209RP)	A5.4 : E2209-16 *	BS EN ISO 3581-A: E 22 9 3 N L R 3 2
		2205XKS (TECHTRODE 2209B)	A5.4: E2209-15	BS EN ISO 3581-A: E 22 9 3 N L B 4 2
	GMAW	ER329N (TECHFIL 2209)	A5.9: ER2209	BS EN ISO 14343-A: G 22 9 3 N L
	GTAW	ER329N (TECHTIG 2209)	A5.9: ER2209	BS EN ISO 14343-A: W 22 9 3 N L
	FCAW	SUPERCORE 2205 (TECHCORE 2209)	A5.22: E2209T0-1/4	BS EN ISO 17633-A: T 22 9 3 N L R C/M 3
		SUPERCORE 2205P (TECHCORE 2209P)	A5.22: E2209T1-1/4	BS EN ISO 17633-A: T 22 9 3 N L P C/M 2
	MCAW	SUPERCORE M2205 (TECHCORE M 2209)	A5.22: EC2209	—
	SAW [SSB]	ER329N (TECHMERGE S 2209)	A5.9: ER2209	BS EN ISO 14343-A: S 22 9 3 N L

Note: PREn (pitting resistance equivalent number)

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.02	0.80	0.60	0.010	0.020	23.5	12.5	2.50	0.05	–	–	25	–	As-welded	680	510	37	+20	50
0.02	0.80	0.80	0.030	0.020	23.0	12.5	2.70	0.75	0.10	–	20	V: 0.1	As-welded	700	580	30	-60	45
0.05	0.70	1.00	0.030	0.020	23.7	12.8	2.40	0.75	0.10	–	15	V: 0.1	As-welded	740	550	28	-20	27
0.015	1.70	0.50	0.005	0.015	22.0	14.5	2.70	0.20	–	–	10	–	As-welded	610	440	35	+20	>90
0.03	1.30	0.70	0.010	0.020	23.0	12.8	2.30	0.10	–	–	20	–	As-welded	700	550	32	+20	50
0.03	1.30	0.70	0.010	0.020	23.0	12.8	2.30	0.10	–	–	20	–	As-welded	700	550	32	+20	50
0.015	1.70	0.50	0.005	0.015	22.0	14.5	2.70	0.20	–	–	10	–	As-welded	610	440	35	+20	>90

AND SUPERDUPLEX STAINLESS STEEL CONSUMABLES

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	PREn	Other	°C/h	MPa	MPa	%	°C	J
0.02	2.00	0.20	0.005	0.010	20.0	34.0	2.50	3.50	—	—	—	Nb:0.3	As-welded	535	345	36	-196	98
0.02	0.80	0.90	0.020	0.020	27.1	31.0	3.50	0.90	—	—	—	—	As-welded	640	440	38	-196	32
0.02	2.00	0.30	0.010	0.010	28.0	38.0	3.50	2.00	—	—	—	Nb:0.3; Fe:27	As-welded	640	410	40	+20	120
0.01	1.50	0.20	0.020	0.030	27.0	31.0	3.50	1.00	—	—	—	—	As-welded	610	400	35	-196	50
0.01	1.50	0.20	0.020	0.030	27.0	31.0	3.50	1.00	—	—	—	—	As-welded	600	400	35	-196	80
0.02	0.50	0.30	0.005	0.015	22.0	40.0	3.00	2.00	—	—	—	Al:0.1; Ti:0.8; Fe:30	As-welded	580	350	39	-196	>60
0.03	1.00	0.80	0.010	0.020	25.0	9.5	4.00	0.10	0.23	—	42	—	As-welded	890	750	26	-50	>21
0.03	1.00	0.50	0.010	0.020	25.0	9.5	3.80	0.10	0.22	—	41	—	As-welded	870	700	28	-50	60
0.02	0.80	0.40	0.025	0.020	25.0	9.3	3.90	1.50	0.25	0.05	42	—	As-welded	850	650	23	-46	55
0.02	0.80	0.40	0.005	0.020	25.0	9.3	3.90	0.05	0.25	0.05	42	—	As-welded	870	695	36	-50	130
0.03	1.00	0.50	0.010	0.020	24.5	9.3	3.80	0.05	0.23	0.05	41	—	As-welded	870	660	30	-50	30
0.03	1.00	0.50	0.010	0.020	24.5	9.3	3.80	0.05	0.23	0.05	41	—	As-welded	870	660	30	-50	35
0.02	1.20	0.55	0.015	0.020	20.5	25.0	4.60	1.50	0.09	—	—	Nb:0.02	As-welded	620	420	38	-196	50
0.025	2.00	0.40	0.005	0.020	21.0	25.0	4.80	1.80	0.08	—	—	Nb:0.05	As-welded	620	440	41	-196	50
0.01	1.70	0.30	0.001	0.015	20.0	25.0	4.50	1.50	—	—	—	—	—	—	—	—	—	—
0.01	1.70	0.30	0.001	0.015	20.0	25.0	4.50	1.50	—	—	—	—	As-welded	650	490	35	+20	210
0.02	1.00	0.70	0.010	0.020	25.0	9.5	3.40	0.10	0.17	—	38	—	As-welded	850	650	30	-50	35
0.02	0.80	1.00	0.030	0.025	22.5	9.5	3.20	0.20	0.16	—	42	—	As-welded	800	650	27	-40	40
0.03	1.00	0.60	0.010	0.020	23.0	9.0	3.20	0.10	0.17	—	36	—	As-welded	750-870	630-700	28	-50	>60
0.015	1.60	0.50	0.001	0.015	23.0	8.2	3.20	0.10	0.17	—	38	—	As-welded	810	590	32	-50	>60
0.015	1.60	0.50	0.001	0.015	23.0	8.2	3.20	0.10	0.17	—	37	—	As-welded	790	620	36	-50	180
0.03	1.20	0.70	0.008	0.020	23.0	9.2	3.10	0.10	0.12	—	35	—	As-welded	800	630	32	-50	30
0.03	1.20	0.70	0.008	0.020	23.0	9.2	3.10	0.10	0.12	—	35	—	As-welded	800	630	32	-50	55
0.02	1.40	0.80	0.010	0.018	22.5	8.5	3.00	0.15	0.15	—	35	—	As-welded	820	680	30	-50	38
0.02	1.30	0.50	0.010	0.020	22.5	8.5	3.10	0.10	0.15	—	36	—	As-welded	790	630	30	-50	55

STAINLESS STEEL APPLICATIONS // SUPERAUSTENITIC, DUPLEX, LEAN-DUPLEX

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Lean Duplex	SMAW	ULTRAMET 2304 (TECHTRODE 2304)	—	—
	GMAW	LNM 4362 (TECHFIL 2304)	—	—
Superduplex with 2%Cu	SMAW	SUPERMET 2506CU (TECHTRODE 2553RP)	A5.4: E2553-16	BS EN ISO 3581-A: E 25 9 3 Cu N L R 5 2
		SUPERMET 2507CU (TECHTRODE 2507CU)	—	—
ZERON® 100 Superduplex	SMAW	ZERON® 100XKS (TECHTRODE ZERON100XB)	A5.4: E2595-15	BS EN ISO 3581-A: E 25 9 4 N L B 4 2
	GMAW	ZERON® 100X (TECHFIL ZERON 100X)	A5.9: ER2594	BS EN ISO 14343-A: G 25 9 4 N L
	GTAW	ZERON® 100X (TECHTIG ZERON 100X)	A5.9: ER2594	BS EN ISO 14343-A: W 25 9 4 N L
	FCAW	SUPERCORE Z100XP (TECHCORE Z100XP)	A5.22: E2594T1-4	—
	SAW (SSB)	ZERON® 100X (TECHMERGE S ZERON 100X)	A5.9: ER2594	BS EN ISO 14343-A: S 25 9 4 N L
310MoLN	SMAW	JUNGO 4465 (TECHTRODE 4465B)	A5.4: E310Mo-15 *	BS EN ISO 3581-A: E 25 22 2 N L B 2 2 *
	GTAW	LNT 4465 (TECHTIG 4465)	—	BS EN ISO 14343-A: W 25 22 2 N L

Note: PREn (pitting resistance equivalent number)

STAINLESS STEEL APPLICATIONS // NUCLEAR GRADE STAINLESS STEEL CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
308L (N)	SMAW	ULTRAMET 308L(N) (TECHTRODE 308LRPNUC)	A5.4: E308L-16	BS EN ISO 3581-A: E 19 9 L R 3 2
	GMAW	308S92(N) (TECHFIL 308LNUC)	A5.9: ER308L	BS EN ISO 14343-A: W 19 9 L
		NAG 19.9.L (TECHFIL 308LNAG)	A5.9: ER308L	BS EN ISO 14343-A: G 19 9 L
	GTAW	308S92(N) (TECHTIG 308LNUC)	A5.9: ER308L	BS EN ISO 14343-A: W 19 9 L
309L (N)	SMAW	ULTRAMET 309L(N) (TECHTRODE 309LRPNUC)	A5.4: E309L-16	BS EN ISO 3581-A: E 23 12 L R 3 2
	GTAW	309S92(N) (TECHTIG 309LNUC)	A5.9: ER309L	—
316L (N)	SMAW	ULTRAMET 316L(N) (TECHTRODE 316LRPNUC)	A5.4: E316L-16	BS EN ISO 3581-A: E 19 12 3 L R 3 2
	GMAW	316S92(N) (TECHFIL 316LNUC)	A5.9: ER316L	BS EN ISO 14343-A: W 19 12 3 L
	GTAW	316S92(N) (TECHTIG 316LNUC)	A5.9: ER316L	BS EN ISO 14343-A: W 19 12 3 L
Duplex (N)	FCAW	SUPERCORE 2205P(N) (TECHCORE 2209PNUC)	A5.22: E2209T1-4	BS EN ISO 17633-A: T 22 9 3 N L P M 2

Note: PREn (pitting resistance equivalent number)

HIGH TEMPERATURE APPLICATIONS // 300H STAINLESS STEELS CONSUMABLES FOR ELEVATED TEMPERATURE SERVICE

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
16.8.2	SMAW	SUPERMET 16.8.2 (TECHTRODE 1682R)	A5.4: E16-8-2-17	—
		E16.8.2-15 (TECHTRODE 1682B)	A5.4: E16-8-2-15	—
	GMAW	ER16.8.2 (TECHFIL 1682)	A5.9: ER16-8-2	BS EN ISO 14343-A: G 16 8 2
	GTAW	ER16.8.2 (TECHTIG 1682)	A5.9: ER16-8-2	BS EN ISO 14343-A: W 16 8 2
	FCAW	SUPERCORE 16.8.2 (TECHCORE 1682)	—	—
		SUPERCORE 16.8.2P (TECHCORE 1682P)	—	—
	SAW	ER16.8.2 (TECHMERGE S 1682)	A5.9: ER16-8-2	BS EN ISO 14343-A: S 16 8 2

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis; FN: ferrite number

AND SUPERDUPLEX STAINLESS STEEL CONSUMABLES

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp0.2%	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	PREn	Other	°C/h	MPa	MPa	%	°C	J
0.03	0.70	0.70	0.015	0.025	24.5	9.1	0.20	0.30	0.13	—	27	—	As-welded	790	640	31	-50	37
0.02	1.70	0.70	0.020	0.004	23.0	7.0	0.30	—	0.14	—	50	—	As-welded	710	525	25	-20	150
0.03	1.00	0.40	0.010	0.020	25.5	8.0	3.50	1.70	0.22	—	41	—	As-welded	925	780	17	-30	22
0.03	1.50	0.40	0.010	0.020	25.0	7.5	4.00	0.75	0.25	0.75	—	—	—	—	—	—	—	—
0.03	0.90	0.50	0.005	0.020	25.0	9.3	3.60	0.70	0.23	0.70	41	—	As-welded	900	700	30	-50	>40
0.015	0.70	0.40	0.002	0.020	25.0	9.3	3.70	0.70	0.23	0.60	41	—	As-welded	860	645	25	-50	60
0.015	0.70	0.40	0.002	0.020	25.0	9.3	3.70	0.70	0.23	0.60	41	—	As-welded	870	695	36	-50	130
0.03	1.00	0.50	0.005	0.020	24.5	9.1	3.70	0.60	0.22	0.60	41	—	As-welded	880	690	27	-50	32
0.02	0.60	0.40	0.010	0.020	24.5	9.3	3.60	0.70	0.21	0.70	41	—	As-welded	890	700	25	-50	40
0.03	4.50	0.40	0.020	0.020	25.0	22.0	2.20	0.75	0.13	—	—	—	As-welded	620	400	35	-196	50
0.02	5.00	0.40	0.030	0.020	25.0	22.0	2.00	0.30	0.15	—	—	—	As-welded	620	360	30	-10	80

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	PREn	Other	°C/h	MPa	MPa	%	°C	J
0.02	0.70	0.60	0.010	0.020	19.5	9.5	0.10	0.05	—	—	8	Co:0.04	As-welded	600	465	47	+20	65
0.01	1.70	0.40	0.010	0.015	20.0	10.0	0.10	0.15	—	—	8	Co:0.05; B:0.0010	As-welded	605	465	48	+20	160
0.01	1.70	0.40	0.004	0.015	20.0	10.0	0.10	0.30	—	—	—	B:0.0010	As-welded	—	—	—	—	—
0.01	1.70	0.40	0.010	0.020	20.0	10.0	0.10	0.15	—	—	8	Co:0.04	As-welded	605	465	48	+20	160
0.02	0.80	0.60	0.010	0.020	23.5	12.3	0.10	0.05	—	—	14	Co:0.04	As-welded	600	485	40	+20	55
0.01	0.80	0.60	0.010	0.020	23.5	13.0	0.10	0.05	—	—	13	Co:0.04	As-welded	590	450	43	+20	200
0.02	0.70	0.60	0.010	0.020	19.5	12.5	2.60	0.05	—	—	8	Co:0.04	As-welded	600	500	38	+20	65
0.01	1.70	0.40	0.010	0.020	19.0	12.5	2.60	0.15	—	—	10	Co:0.04	As-welded	605	465	48	+20	110
0.01	1.70	0.40	0.010	0.020	19.0	12.5	2.60	0.15	—	—	10	Co:0.04	As-welded	605	465	48	+20	110
0.03	1.20	0.70	0.010	0.020	23.0	9.2	3.10	0.30	0.12	—	40	Bi (ppm): 60	As-welded	800	630	32	-75	30

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp0.2%	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.05	1.00	0.45	0.010	0.020	15.5	8.5	1.20	0.10	—		3	—	As-welded	630	420	42	+20	<70
0.05	1.80	0.30	0.010	0.020	15.5	8.5	1.20	0.06	—	—	3	—	As-welded	630	420	40	-100	<50
0.06	1.40	0.40	0.010	0.010	15.5	8.5	1.30	0.10	—	—	3	—	As-welded	620	450	35	—	—
0.06	1.40	0.40	0.010	0.010	15.5	8.5	1.30	0.10	—	—	3	—	As-welded	620	450	35	—	—
0.05	1.20	0.50	0.010	0.020	16.2	9.2	1.10	0.10	—	—	4	—	As-welded	620	410	42	—	—
0.05	1.20	0.50	0.010	0.020	16.2	9.2	1.10	0.10	—	—	4	—	As-welded	620	410	42	—	—
0.06	1.40	0.40	0.010	0.010	15.5	8.5	1.30	0.10	—	—	3	—	As-welded	630	360	29	-196	30

HIGH TEMPERATURE APPLICATIONS // 300H STAINLESS STEELS CONSUMABLES FOR ELEVATED TEMPERATURE SERVICE

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
308H	SMAW	AROSTA304H (TECHTRODE 308HRP)	A5.4: E308H-16	BS EN ISO 3581-A: E 19 9 H R 12
		ULTRAMET B308H (TECHTRODE 308HB)	A5.4: E308H-15	BS EN ISO 3581-A: E 19 9 H B 4 2
	GMAW	308S96 (TECHFIL 308H)	A5.9: ER308H	BS EN ISO 14343-A: G 19 9 H
	GTAW	308S96 (TECHTIG 308H)	A5.9: ER308H	BS EN ISO 14343-A: W 19 9 H
	FCAW	SUPERCORE308H (TECHCORE 308H)	A5.22: E308HT0-4	BS EN ISO 17633-B: TS 308H-FM0
		SUPERCORE308HP (TECHCORE 308HP)	A5.22: E308HT1-4	BS EN ISO 17633-B: TS 308H-FM1
	SAW	308S96 (TECHMERGE S 308H)	A5.9: ER308H	BS EN ISO 14343-A: S 19 9 H
347H	SMAW	ULTRAMET347H (TECHTRODE 347HRP)	A5.4: E347-16	BS EN ISO 3581-A: E 19 9 Nb R 3 2
		ULTRAMET B347H (TECHTRODE 347HB)	A5.4: E347-15	BS EN ISO 3581-A: E 19 9 Nb B 4 2
	GTAW	ER347H (TECHTIG 347H)	A5.4: ER347	BS EN ISO 14343-A: W 19 9 Nb
	FCAW	SUPERCORE347HP (TECHCORE 347HP)	A5.22: E347HT1-1/4	BS EN ISO 17633-A: T 19 9 Nb P C/M 2
316H	SMAW	17.8.2.RCF (TECHTRODE 1782R)	—	BS ISO 2926: 17 8 2 R
		ULTRAMET316H (TECHTRODE 316HRP)	A5.4: E316H-16	BS EN ISO 3581-A: E 19 12 2 R 3 2
		ULTRAMET B316H (TECHTRODE 316HB)	A5.4: E316H-15	BS EN ISO 3581-A: E 19 12 2 B 4 2
	GTAW	316S96 (TECHTIG 316H)	A5.9: ER316H	BS EN ISO 14343-A: W 19 12 3 H

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis; FN: ferrite number

HIGH TEMPERATURE APPLICATIONS // 309 ALLOY CONSUMABLES FOR ELEVATED TEMPERATURE SERVICE

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
25-4	SMAW	AROSTA329 (TECHTRODE 254R)	—	BS EN ISO 3581-A: E 25 4 R 12 *
309H	SMAW	AROSTA309H (TECHTRODE 309HRP)	A5.4: E309H-16 *	BS EN ISO 3581-A: E 22 12 R 3 2 *
	GMAW	LNM309H (TECHFIL 309H)	A5.9: ER309	BS EN ISO 14343-A: G 22 12 H
	GTAW	309S94 (TECHTIG 309H)	A5.9: ER309	BS EN ISO 14343-A: W 22 12 H

Note: FN: Ferrite number

HIGH TEMPERATURE APPLICATIONS // AUSTENITIC STAINLESS STEEL CONSUMABLES FOR

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Super 304H	GMAW	MT304H (TECHFIL MT304H)	—	—
	GTAW	MT304H (TECHTIG MT304H)	—	—

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.05	0.75	0.85	0.020	0.020	18.5	9.5	0.50	0.75	—	—	5	—	As-welded	600	450	44	-20	50
0.05	1.00	0.40	0.010	0.020	18.5	9.5	0.10	0.05	—	—	3	—	As-welded	650	460	41	+20	100
0.05	1.80	0.40	0.002	0.015	19.9	9.5	0.10	0.10	—	—	5	—	As-welded	—	—	—	—	—
0.05	1.80	0.40	0.002	0.015	19.9	9.5	0.10	0.10	—	—	5	—	As-welded	630	450	43	+20	>100
0.05	1.30	0.50	0.010	0.020	18.8	9.5	0.10	0.10	—	—	5	—	As-welded	620	420	40	+20	100
0.05	1.30	0.50	0.010	0.020	18.8	9.5	0.10	0.10	—	—	5	—	As-welded	620	420	40	+20	100
0.05	1.80	0.40	0.002	0.015	19.9	9.5	0.10	0.10	—	—	5	—	As-welded	—	—	—	—	—
0.05	0.70	0.70	0.010	0.020	19.0	9.5	0.05	0.07	—	—	4	Nb:0.5	As-welded	650	500	40	+20	70
0.05	1.50	0.30	0.010	0.020	19.0	9.5	0.05	0.07	—	—	5	Nb:0.5	As-welded	650	500	40	+20	80
0.055	1.70	0.40	0.005	0.020	19.5	9.2	0.10	0.10	—	—	8	Nb:0.5	As-welded	660	450	42	+20	125
0.05	1.40	0.60	0.010	0.020	19.5	10.2	0.10	0.10	—	—	5	Nb:0.5	As-welded	630	470	43	+20	70
0.08	1.60	0.25	0.008	0.020	17.0	8.5	2.00	<0.10	—	—	5	—	As-welded	630	460	>30	-100	>50
0.05	1.00	0.60	0.010	0.020	18.0	12.0	2.20	0.10	—	—	5	—	As-welded	570	450	35	+20	>50
0.05	1.00	0.30	0.010	0.020	18.0	12.0	2.20	0.10	—	—	5	—	As-welded	620	450	35	+20	100
0.05	1.80	0.50	0.010	0.020	19.0	13.0	2.20	0.15	—	—	4	—	As-welded	650	460	35	+20	>100

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.08	0.70	1.20	0.020	0.020	25.0	4.5	0.75	0.75	—	—	—	—	As-welded	700	500	15	+20	30
0.10	0.80	1.60	0.020	0.020	22.0	11.0	0.75	0.75	—	—	5	—	As-welded	700	500	30	+2	50
0.05	1.80	0.50	0.020	0.020	24.0	13.5	0.20	0.75	—	—	6	—	As-welded	640	400	35	+2	110
0.07	1.70	0.50	0.010	0.020	23.5	13.0	0.10	0.10	—	—	6	—	As-welded	580	415	42	—	—

ELEVATED TEMPERATURE SERVICE

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.10	3.20	0.20	0.005	0.005	18.0	16.0	0.90	2.80	0.20	—	—	Nb:0.7	As-welded	720	570	30	+20	90
0.10	3.20	0.20	0.005	0.005	18.0	16.0	0.90	2.80	0.20	—	—	Nb:0.7	As-welded	720	570	30	+20	90

HIGH TEMPERATURE APPLICATIONS // 310 ALLOY CONSUMABLES FOR ELEVATED TEMPERATURE SERVICE

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
310	SMAW	INTHERMA 310 (TECHTRODE 310RP)	A5.4: E310-16	BS EN ISO 3581-A: E 25 20 R 12
		ULTRAMET B310MN (TECHTRODE 310B)	—	BS EN ISO 3581-A: E 25 20 B 4 2
	GMAW	LNM 310 (TECHFIL 310)	A5.9: ER310	BS EN ISO 14343-A: G 25 20
	GTAW	LNT 310 (TECHTIG 310)	A5.9: ER310	BS EN ISO 14343-A: W 25 20
310H	SMAW	THERMET 310H (TECHTRODE 310HB)	A5.4: E310H-15	BS EN ISO 3581-A: E 25 20 H B 4 2

HIGH TEMPERATURE APPLICATIONS // HIGH CARBON AUSTENITIC ALLOY CONSUMABLES (INCLUDING 330, 800, HP40)

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
330	SMAW	THERMET R17.38H (TECHTRODE R1738H)	—	BS 2926: 15 35 H R
800	SMAW	THERMET 800NB (TECHTRODE 800NB)	—	—
	GTAW	21.33.MNNB (TECHTIG 2133MNNB)	—	—
Alloy 22H	SMAW	THERMET 22H (TECHTRODE 22H)	—	—
25Cr-35Ni-0.6Nb	SMAW	THERMET 25.35.NB (TECHTRODE 2535NB)	—	—
25Cr-35Ni-WCo	SMAW	THERMET HP50WCO (TECHTRODE HP50WCO)	—	—
35Cr-45Ni-1Nb	SMAW	THERMET 35.45.NB (TECHTRODE 3545NB)	—	—
	GMAW	35.45.NB (TECHFIL 3545NB)	—	—
	GTAW	35.45.NB (TECHTIG 3545NB)	—	—
Alloy IN-657	SMAW	NIMROD 657 (TECHTRODE 657)	A5.11: ENiCr-4	—
HP40Nb	SMAW	THERMET HP40NB (TECHTRODE HP40NB)	—	BS 2926: 25 35 H Nb B
	GMAW	25.35.4CNB (TECHFIL 2534CNB)	—	—
	GTAW	25.35.4CNB (TECHTIG 2534CNB)	—	—

NICKEL BASE ALLOY APPLICATIONS // 182 ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
182	SMAW	NICRO 70/19 (TECHTRODE NI82)	A5.11: ENiCrFe-2 *	BS EN ISO 14172: E Ni6082
		NIMROD 182KS (TECHTRODE NI182KS)	A5.11: ENiCrFe-3	BS EN ISO 14172: E Ni6182
		NIMAX 182 (TECHTRODE NI182HR)	A5.11: ENiCrFe-3	BS EN ISO 14172: E Ni6182
	GMAW	20.70.NB (TECHFIL NI82)	A5.14: ERNiCr-3	BS EN ISO 18274: S Ni6082
	GTAW	20.70.NB (TECHTIG NI82)	A5.14: ERNiCr-3	BS EN ISO 18274: S Ni6082
AB	SMAW	NIMROD AKS (TECHTRODE NI133KS)	A5.11: ENiCrFe-2	BS EN ISO 14172: E Ni6133
		NICRO 70/15 (TECHTRODE NI7015)	A5.11: ENiCrFe-2 *	BS EN ISO 14172 : E Ni6182 *

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.12	2.50	0.50	0.030	0.025	26.0	20.5	0.75	0.75	—	—	—	—	As-welded	600	440	30	+20	80
0.10	3.80	0.40	0.008	0.018	26.0	21.0	0.20	0.10	—	—	—	—	As-welded	615	435	36	-196	75
0.10	1.80	0.45	0.030	0.020	26.0	21.0	0.20	0.30	—	—	—	—	As-welded	610	355	35	-196	70
0.10	1.70	0.50	0.030	0.020	26.0	21.0	0.30	0.30	—	—	—	—	As-welded	600	360	35	+20	100
0.41	1.70	0.50	0.010	0.020	26.0	21.0	0.10	0.03	—	—	—	—	As-welded	620	350	10	—	—

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	W	FN	Other	°C/h	MPa	MPa	%	°C	J
0.45	1.50	0.50	0.010	0.015	18.5	38.0	0.40	—	—	—	—	—	As-welded	780	520	16	—	—
0.10	2.50	0.30	0.007	0.015	21.0	32.0	0.40	0.15	—	—	—	Nb:1.3	As-welded	615	410	>33	+20	>55
0.15	4.30	0.50	0.008	0.012	21.0	33.0	0.30	0.10	—	—	—	Nb:1.0; Al:0.1; Ti:0.15	As-welded	670	500	18	+20	60
0.50	1.00	0.70	0.006	0.010	28.0	51.0	—	—	—	—	—	Fe:14	As-welded	780	590	7	—	—
0.12	3.50	0.50	0.010	0.010	26.0	36.0	0.20	0.05	—	—	—	Nb:0.8	As-welded	660	460	34	—	—
0.50	0.60	0.50	0.008	0.010	25.0	35.0	0.05	0.05	—	4.60	—	Fe:19; Co:14	As-welded	840	610	8.5	—	—
0.45	0.90	1.20	0.005	<0.01	35.0	47.0	0.05	—	—	—	—	Fe:13; Nb:0.8; Ti:0.07	As-welded	740	550	6	—	—
0.45	0.90	1.20	0.005	<0.01	35.0	47.0	0.05	—	—	—	—	Fe:13; Nb:0.8; Ti:0.07	As-welded	740	550	6	—	—
0.45	0.90	1.20	0.005	<0.01	35.0	47.0	0.05	—	—	—	—	Fe:13; Nb:0.8; Ti:0.07	As-welded	740	550	6	—	—
0.07	1.00	0.50	0.010	0.010	50.0	47.0	—	0.05	—	—	—	Fe:0.5; Nb:1.8; N:0.07	As-welded	830-985	570-725	2-4	—	—
0.43	1.70	0.90	0.010	0.010	25.0	35.0	0.10	—	—	—	—	Nb:1.10; Ti:0.08	As-welded	740	560	15	—	—
0.43	1.70	1.10	0.005	0.010	26.0	35.0	<0.30	0.10	—	—	—	Nb:1.1; Ti:0.1; Zr:0.03	—	—	—	—	—	—
0.43	1.70	1.10	0.005	0.010	26.0	35.0	<0.30	0.10	—	—	—	Nb:1.1; Ti:0.1; Zr:0.03	As-welded	809	593	9	—	—

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe	Ti	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.03	4.70	0.60	0.015	0.020	19.0	67.7	1.5	0.50	3.0	0.50	—	Nb+Ta:1.90	As-welded	650	400	40	-196	90
0.05	7.00	0.50	0.010	0.010	16.0	65.0	—	0.10	<8.0	0.10	1.50	—	As-welded	640	385	40	-196	100
0.06	6.00	0.40	0.008	0.010	15.0	69.0	—	0.05	7.0	0.07	1.50	—	As-welded	660	390	40	-196	> 80
0.02	3.00	0.10	0.005	0.010	20.0	73.0	—	0.01	1.0	0.40	2.50	—	As-welded	—	—	—	—	—
0.02	3.00	0.10	0.005	0.010	20.0	73.0	—	0.01	1.0	0.40	2.50	—	As-welded	640	360	40	-196	>100
0.05	2.80	0.50	0.010	0.010	16.0	69.0	1.5	0.05	8.0	—	2.00	—	As-welded	700	420	42	-196	110
0.02	4.40	0.45	0.015	0.020	18.0	Bal	1.1	0.50	6.0	0.50	—	Nb+Ta:1.90	As-welded	680	430	40	-196	130

NICKEL BASE ALLOY APPLICATIONS // 625 ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
625	SMAW	NIMROD 625 (TECHTRODE NI625)	A5.11: ENiCrMo-3	BS EN ISO 14172: E Ni6625
		NIMROD 625KS (TECHTRODE NI625KS)	A5.11: ENiCrMo-3	BS EN ISO 14172: E Ni6625
	GMAW	62-50 (TECHFIL NI625)	A5.14: ERNiCrMo-3	BS EN ISO 18274: S Ni6625
	GTAW	62-50 (TECHTIG NI625)	A5.14: ERNiCrMo-3	BS EN ISO 18274: S Ni6625
	FCAW	SUPERCORE 625P (TECHCORE NI625P)	A5.34: ENiCrMo3T1-4	BS EN ISO 12153: T Ni6625 P C/M 2
	SAW	62-50 (TECHMERGE S NI625)	A5.14: ERNiCrMo-3	BS EN ISO 18274: S Ni6625

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis

NICKEL BASE ALLOY APPLICATIONS // ALLOY C & B CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
59	SMAW	NIMROD 59KS (TECHTRODE NI59KS)	A5.11: ENiCrMo-13	BS EN ISO 14172: E Ni6059
	GMAW	HAS 59 (TECHFIL NI59)	A5.14: ERNiCrMo-13	BS EN ISO 18274: S Ni6059
	GTAW	HAS 59 (TECHTIG NI59)	A5.14: ERNiCrMo-13	BS EN ISO 18274: S Ni6059
B2	SMAW	NIMAX B2L (TECHTRODE NI665)	A5.11: ENiMo-7	BS EN ISO 14172: E Ni1066
C22	SMAW	NIMROD C22KS (TECHTRODE NI22KS)	A5.11: ENiCrMo-10	BS EN ISO 14172: E Ni6022
	GMAW	HAS C22 (TECHFIL NI22)	A5.14: ERNiCrMo-10	BS EN ISO 18274: S Ni6022
	GTAW	HAS C22 (TECHTIG NI22)	A5.14: ERNiCrMo-10	BS EN ISO 18274: S Ni6022
C276	SMAW	NIMROD C276KS (TECHTRODE NI276KS)	A5.11: ENiCrMo-4	BS EN ISO 14172: E Ni6276
	GMAW	HAS C276 (TECHFIL NI276)	A5.14: ERNiCrMo-4	BS EN ISO 18274: S Ni6276
	GTAW	HAS C276 (TECHTIG NI276)	A5.14: ERNiCrMo-4	BS EN ISO 18274: S Ni6276
	SAW (P2007)	HAS C276 (TECHMERGE S NI276)	A5.14: ERNiCrMo-4	BS EN ISO 18274: S Ni6276

NICKEL BASE ALLOY APPLICATIONS // SPECIALIST NICKEL BASE ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
617	SMAW	NIMROD 617KS (TECHTRODE NI117KS)	A5.11: ENiCrCoMo-1	BS EN ISO 14172: E Ni6117
	GMAW	61-70 (TECHFIL NI617)	A5.14: ERNiCrCoMo-1	BS EN ISO 18274: S Ni6617
	GTAW	61-70 (TECHTIG NI617)	A5.14: ERNiCrCoMo-1	BS EN ISO 18274: S Ni6617
690	SMAW	NIMROD 690KS (TECHTRODE NI152KS)	A5.11: ENiCrFe-7	BS EN ISO 14172: E Ni6152
	GTAW	ER690 TIG (TECHTIG NI52)	A5.14: ERNiCrFe-7	—
9% Ni	SMAW	NYLOID 2 (TECHTRODE NI620)	A5.11: ENiCrMo-6	BS EN ISO 14172 : E Ni 6620
		NYLOID 4 (TECHTRODE NI620A)	A5.11: ENiCrMo-6	BS EN ISO 14172 : E Ni 6620
EPRI P87	SMAW	EPRI P87 (TECHTRODE EPRI P87)	—	—
	GMAW	EPRI P87 (TECHFIL EPRI P87)	—	—
	GTAW	EPRI P87 (TECHTIG EPRI P87)	—	—
	SAW	EPRI P87 (TECHMERGE S EPRI P87)	—	—

Note: When flux for SAW wires is not specified, the chemical composition listed is type wire analysis

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe	Ti	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.04	0.80	0.70	0.005	0.008	21.5	64.0	9.0	0.05	<1.5	—	3.40	—	As-welded	800	480	34	-196	>28
0.04	0.70	0.40	0.005	0.005	22.0	63.0	9.3	0.01	<1.5	—	3.20	—	As-welded	800	500	40	-196	60
0.015	0.02	0.05	0.004	0.004	22.0	65.0	9.0	0.05	0.2	0.20	3.50	Al:0.2	As-welded	—	—	—	—	—
0.015	0.02	0.05	0.004	0.004	22.0	65.0	9.0	0.05	0.2	0.20	3.50	Al:0.2	As-welded	780	520	42	-196	80
0.02	0.30	0.20	0.005	0.005	21.0	66.0	8.5	0.02	1.0	0.20	3.40	—	As-welded	770	500	46	-196	80
0.015	0.02	0.05	0.004	0.004	22.0	65.0	9.0	0.05	0.2	0.20	3.50	Al:0.2	As-welded	715	430	50	-196	100

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe	Ti	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.010	0.50	0.15	0.006	0.010	23.0	60.0	15.5	0.01	1.0	—	—	—	As-welded	750	520	32	-50	50
0.003	0.20	0.03	0.003	0.003	23.0	60.0	15.6	0.01	0.4	—	—	—	As-welded	—	—	—	—	—
0.003	0.20	0.03	0.003	0.003	23.0	60.0	15.6	0.01	0.4	—	—	—	As-welded	730	510	34	+20	140
0.018	1.30	0.10	0.005	0.010	0.7	68.0	28.0	0.01	1.5	—	—	—	As-welded	775	525	31	—	—
0.010	0.50	0.15	0.008	0.008	21.0	58.0	14.0	0.05	4.0	—	—	W:3	As-welded	760	510	36	-196	45
0.003	0.20	0.03	0.002	0.010	21.0	56.0	13.5	0.10	4.0	—	—	W:3	As-welded	—	—	—	—	—
0.003	0.20	0.03	0.002	0.010	21.0	56.0	13.5	0.10	4.0	—	—	W:3	As-welded	740	500	44	-196	130
0.020	0.30	0.20	0.010	0.010	15.0	58.0	16.0	0.05	5.0	—	—	W:4; V:0.1	As-welded	780	520	30	-50	55
0.005	0.50	0.05	0.005	0.010	16.0	58.0	16.0	0.05	6.0	—	—	W:3.5; V:0.2	As-welded	—	—	—	—	—
0.005	0.50	0.05	0.005	0.010	16.0	58.0	16.0	0.05	6.0	—	—	W:3.5; V:0.2	As-welded	740	500	46	—	—
0.010	0.50	0.20	0.005	0.006	15.0	57.5	15.6	0.02	6.0	—	—	W:3.7; V:0.2	As-welded	730	470	43	-196	80

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp0.2%	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe	Ti	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.07	1.00	0.40	0.003	0.005	24.0	52.0	9.0	0.05	1.0	0.20	<0.50	Co:12	As-welded	760	520	43	+20	70
0.08	0.10	0.10	0.002	<0.010	22.0	55.0	9.0	<0.20	0.5	0.30	—	Co:12 Al:1	As-welded	750	500	43	+20	230
0.08	0.10	0.10	0.002	<0.010	22.0	55.0	9.0	<0.20	0.5	0.30	—	Co:12 Al:1	As-welded	750	500	43	+20	230
0.04	3.60	0.30	0.005	0.007	29.0	55.0	0.1	0.05	8.5	0.05	1.60	Co:0.02 Al:0.05	As-welded	660	430	40	-50	>50
0.03	0.70	0.20	0.005	0.010	29.0	60.0	0.05	0.05	8.5	0.60	0.03	Co:0.02 Al:0.6 Al+Ti:1.2	As-welded	720	430	43	-50	200
0.05	3.00	0.40	0.015	0.020	13.0	68.0	6.00	0.30	6.0	—	—	Nb+Ta:1.50 W:1.5	As-welded	725	475	40	-196	90
0.05	3.00	0.40	0.015	0.020	13.0	68.0	6.00	0.30	6.0	—	—	Nb+Ta:1.50 W:1.5	As-welded	770	490	33	-196	85
0.10	1.50	0.30	0.008	0.008	9.0	47.5	2.0	—	38.0	—	1.00	—	As-welded	560	360	34	+20	80
0.10	1.50	0.30	0.008	0.008	9.0	Bal	2.0	—	38.0	—	1.00	—	As-welded	560	360	32	+20	150
0.10	1.50	0.30	0.008	0.008	9.0	Bal	2.0	—	38.0	—	1.00	—	As-welded	560	360	32	+20	150
0.10	1.50	0.30	0.008	0.008	9.0	Bal	2.0	—	38.0	—	1.00	—	As-welded	560	360	32	+20	150

NICKEL BASE ALLOY APPLICATIONS // NICKEL BASED NON-FERROUS ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Monel	SMAW	NIMROD190 (TECHTRODE Ni190)	A5.11: ENiCu-7	BS EN ISO 14172: E Ni4060
	GTAW	65NICU (TECHTIG Ni60)	A5.14: ERNiCu-7	BS EN ISO 18274: S Ni4060
Nickel	GMAW	LNMNITI (TECHFIL Ni61)	A5.14: ERNi-1	BS EN ISO 18274: S Ni2061
	GTAW	NICKEL2TI (TECHTIG Ni61)	A5.14: ERNi-1	BS EN ISO 18274: S Ni2061

MAINTENANCE & REPAIR APPLICATIONS // CAST IRON CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Ni Cast Iron	SMAW	REPTECCAST1 (TECHTRODE CAST NI)	A5.15: ENi-CI	BS EN ISO 1071: EC Ni-CI
NiFe Cast Iron	SMAW	REPTECCAST3 (TECHTRODE CAST NIFE)	A5.15: ENiFe-CI	BS EN ISO 1071: EC NiFe-CI 1
		REPTECCAST31 (TECHTRODE CAST BM)	A5.15: ENiFe-CI	BS EN ISO 1071: EC NiFe-CI 1
	GMAW	55NIFE (TECHFIL CAST NIFE)	—	BS EN ISO 1071: S C NiFe-1

MAINTENANCE & REPAIR APPLICATIONS // DISSIMILAR WELDING CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
312	SMAW	LIMAROSTA312 (TECHTRODE 312R)	A5.4: E312-17 *	BS EN ISO 3581-A: E 29 9 R 12
	GMAW	312S94 (TECHFIL 312)	A5.9: ER312	BS EN ISO 14343-A: G 29 9
	GTAW	312S94 (TECHTIG 312)	A5.9: ER312	BS EN ISO 14343-A: W 29 9
	SAW	312S94 (TECHMERGE S 312)	A5.9: ER312	BS EN ISO 14343-A: S 29 9
Armour Plate	SMAW	NICHROMA (TECHTRODE 308LMORP)	A5.4: E308LMo-16	BS EN ISO 3581-A: E 20 10 3 R 3 2
	FCAW	SUPERCORE20.9.3 (TECHCORE 308MO)	A5.22: E308MoT0-4	BS EN ISO 17633-A: T 20 10 3 R M 3
		SUPERCORE20.9.3P (TECHCORE 308MOP)	A5.22: E308MoT1-4	BS EN ISO 17633-A: T 20 10 3 P M 2

Note: FN: Ferrite number * Hardness work-hardened

MAINTENANCE & REPAIR APPLICATIONS // COPPER ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
Al Bronze	GMAW	LNM CUAL8 (TECHFIL CUAL8)	A5.7: ERCuAl-A1	BS EN ISO 24373: S Cu6100
	GTAW	LNT CUAL8 (TECHTIG CUAL8)	A5.7: ERCuAl-A1	BS EN ISO 24373: S Cu6100
Bronze	GTAW	LNT CUSN6 (TECHTIG CUSN6)	A5.7: ERCuSn-A *	BS EN ISO 24373: S Cu5180
Copper	GMAW	LNM CUSN (TECHFIL CUSN1)	A5.7: ERCu	BS EN ISO 24373: S Cu1898
Copper Silicon	GMAW	LNM CUSI3 (TECHFIL CUSI3)	A5.7: ERCuSi-A	BS EN ISO 24373: S Cu6560
	GTAW	LNT CUSI3 (TECHTIG CUSI3)	A5.7: ERCuSi-A	BS EN ISO 24373: S Cu6560
Cupronickel Alloys	SMAW	CUPROMET N30 (TECHTRODE CUNI30)	A5.6: ECuNi	—
	GMAW	70CUNI (TECHFIL CUNI30)	A5.7: ERCuNi	BS EN ISO 24373: S Cu7158
		70CUNI (TECHTIG CUNI30)	A5.7: ERCuNi	BS EN ISO 24373: S Cu7158
	GTAW	90CUNI (TECHTIG CUNI10)	—	BS EN ISO 24373: S Cu7061

Typical Chemical Composition of Undiluted Weld Metal (wt%)													All Weld Metal Mechanical Properties					
													PHWT		Rm	Rp _{0.2%}	A4	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Fe	Ti	Nb	Other	°C/h	MPa	MPa	%	°C	J
0.08	3.50	1.20	0.005	0.010	–	63.0	–	30.0	1.0	0.90	–	–	As-welded	520	320	40	-30	110
0.03	3.20	0.20	0.005	0.005	–	64.0	–	29.0	<1.0	2.20	–	–	As-welded	525	280	41	-30	120
0.02	0.40	0.20	0.010	0.015	–	96.0	–	0.20	0.1	3.00	–	–	As-welded	460	250	30	+20	120
<0.02	0.40	<0.30	0.005	0.005	–	96.0	–	<0.20	0.1	3.00	–	–	As-welded	585	335	35	+20	120

Typical Chemical Composition of Undiluted Weld Metal (wt%)												All Weld Metal Mechanical Properties						
												PHWT		Rm	Rp _{0.2%}	A4	Hardness	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Fe	Other	°C/h	MPa	MPa	%	HV	°C	J
0.70	2.5	4	0.03	—	—	97	—	2.50	1.00	2.00	—	As-welded	445	270	8	—	—	—
0.60	2.5	4	0.03	—	—	Bal	—	2.50	1.00	40.00	—	As-welded	460	300	10	—	—	—
0.70	2.5	4	0.03	—	—	Bal	—	2.50	1.00	45.00	—	As-welded	460	300	15	—	—	—
0.05	0.7	0.2	<0.01	<0.01	—	58	—	0.01	—	40.00	—	As-welded	400	230	24	150	—	—

Typical Chemical Composition of Undiluted Weld Metal (wt%)												All Weld Metal Mechanical Properties						
												PHWT		Rm	Rp _{0.2%}	A4	Hardness	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	V	FN	Other	°C/h	MPa	MPa	%	HV	°C	J
0.11	0.9	1.1	0.025	0.035	29	9.0	0.75	0.75	—	—	—	As-welded	800	700	20	—	+20	50
0.10	1.8	0.4	0.005	0.020	30	9.3	0.10	0.10	—	—	—	As-welded	813	628	25	270	—	—
0.10	1.8	0.4	0.005	0.020	30	9.3	0.10	0.10	—	—	—	As-welded	790	640	20	275	+20	27
0.10	1.8	0.4	0.005	0.020	30	9.3	0.10	0.10	—	—	—	As-welded	790	640	21	275	+20	50
0.025	0.8	1.0	0.025	0.030	20	9.5	2.30	0.75	—	20	—	As-welded	720	500	30	—	-20	60
0.06	1.2	0.5	0.010	0.030	20	9.5	2.80	0.05	—	17	—	As-welded	720	520	35	225 [425*]	-50	50
0.06	1.2	0.5	0.010	0.030	20	9.5	2.80	0.05	—	17	—	As-welded	720	520	35	225 [425*]	-50	50

Typical Chemical Composition of Undiluted Weld Metal (wt%)												All Weld Metal Mechanical Properties						
												PHWT		Rm	Rp _{0.2%}	A4	Hardness	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Zn	Other	°C/h	MPa	MPa	%	HV	°C	J
—	0.3	0.1	—	—	—	—	—	Bal	8.00	0.20	Pb:0.02	As-welded	430	—	—	—	—	—
—	0.3	0.1	—	—	—	—	—	Bal	8.00	0.20	Pb:0.02	As-welded	430	—	—	—	—	—
—	—	—	—	0.200	—	—	—	Bal	0.01	0.01	Fe: 0.01; Sn:6; Pb:0.02	As-welded	260	150	20	—	+20	80
—	0.2	0.3	—	0.150	—	—	—	Bal	0.80	—	Sn:0.8	As-welded	220	100	60	—	—	—
—	1.0	3	—	0.050	—	—	—	Bal	0.01	—	Sn:0.1	As-welded	320	105	35	85	—	—
—	1.0	3	—	0.050	—	—	—	Bal	0.01	0.10	Sn:0.1	As-welded	320	105	35	85	—	—
0.03	1.8	0.2	0.005	0.010	—	30	—	67	—	—	Fe:0.6; Ti:0.15	As-welded	420	270	39	—	+20	115
0.03	0.8	0.01	0.005	0.003	—	31	—	67	—	—	Fe:0.5; Ti:0.3	As-welded	365	200	40	—	—	—
0.03	0.8	0.01	0.005	0.003	—	31	—	67	—	—	Fe:0.5; Ti:0.3	As-welded	365	200	40	—	—	—
0.01	0.8	0.02	0.001	0.002	—	10.5	—	86	—	—	Fe:1.2; Ti: 0.3	As-welded	365	200	40	—	—	—

MAINTENANCE & REPAIR APPLICATIONS // COPPER ALLOY CONSUMABLES

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
NiAl Bronze	GMAW	LNM CUAL8Ni2 (TECHFIL CUAL8Ni2)	—	BS EN ISO 24373: S Cu6327
		80CUNIAL (TECHFIL CUAL9Ni5)	A5.7: ERcUNiAl	BS EN ISO 24373: S Cu6328

MAINTENANCE & REPAIR APPLICATIONS // HARDFACING APPLICATIONS

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
13%Mn	SMAW	WEARSHIELD 15CRMN (TECHTRODE HFI 14MNCr)	—	BS EN 14700 : E Fe9
		WEARSHIELD MANGJET (TECHTRODE HFI 15MN)	—	BS EN 14700 : E Fe9
Abrasion	SMAW	WEARSHIELD ABR (TECHTRODE HFA ABR)	—	BS EN 14700 : E Fe6
		WEARSHIELD 420 (TECHTRODE HFA 420)	—	BS EN 14700 : E Fe8
		WEARSHIELD ME (E) (TECHTRODE HFA ME)	—	BS EN 14700 : E Fe14
		WEARSHIELD 60(E) (TECHTRODE HFA 60)	—	BS EN 14700 : E Fe15
		WEARSHIELD 70 (TECHTRODE HFA 70)	—	BS EN 14700 : E Fe16
		METHARD 1050 (TECHTRODE HFA 1050)	—	BS EN 14700 : E Fe16
Cobalt	SMAW	COBSTEL 6 (TECHTRODE HFC 6)	A5.13: ECoCr-A	—
		COBSTEL 8 (TECHTRODE HFC 8)	—	BS EN 14700 : E Co1
Metal to Metal & Build-up	SMAW	WEARSHIELD BU30 (TECHTRODE HFW BU30)	—	BS EN 14700 : E Fe1
		WEARSHIELD MM40 (TECHTRODE HFW MM40)	—	BS EN 14700 : E Fe1
		WEARSHIELD MM (TECHTRODE HFW MM)	—	BS EN 14700 : E Fe2
		WEARSHIELD T&D (TECHTRODE HFW TD)	A5.13 : EFe6 *	BS EN 14700 : E Fe4
		WEARSHIELD MI (E) (TECHTRODE HFW MI)	—	BS EN 14700 : E Fe6
	GMAW	LNM 4M (TECHFIL HFW 4M)	—	BS EN 14700 : S Fe2
		LNM 420FM (TECHFIL HFW 420FM)	—	BS EN 14700 : S Fe8
	MCAW	HARDCORE 650 (TECHCORE HFW 650)	—	BS EN 14700 : T Fe2

* Hardness work-hardened

STRIPS AND FLUXES FOR HIGH SPEED ELECTROSLAG CLADDING // 2D CLADFLUX E100

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
309L	ESW	CLADSTRIP 24.13L	A5.9: EQ309L	BS EN ISO 14343-A : B 23 12 L
308L		CLADSTRIP 19.9L	A5.9: EQ308L	BS EN ISO 14343-A : B 19 9 L
316L		CLADSTRIP 19.12.3L	A5.9: EQ316L	BS EN ISO 14343-A : B 19 12 3 L
347		CLADSTRIP 19.9LNb	A5.9: EQ347	BS EN ISO 14343-A : B 19 9 Nb
309LNb		CLADSTRIP 24.13LNb	—	BS EN ISO 14343-A : B 23 12 Nb

Typical Chemical Composition of Undiluted Weld Metal (wt%)												All Weld Metal Mechanical Properties						
												PHWT		Rm	Rp 0.2%	A4	Hardness	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Zn	Other	°C/h	MPa	MPa	%	HV	°C	J
–	1.5	0.07	–	–	–	2.1	–	Bal	8.70	0.00	Fe:2.2; Pb:0.02	As-welded	–	–	–	–	–	–
–	0.8	0.01	–	–	–	4.2	–	Bal	9.30	0.00	Fe:3.3	As-welded	700	350	15	–	–	–

Typical Chemical Composition of Undiluted Weld Metal [wt%]												All Weld Metal Mechanical Properties						
												PHWT		Rm	Rp0.2%	A4	Hardness	Impact Energy
C	Mn	Si	S	P	Cr	Ni	Mo	V	W	Nb	Other	°C/h	MPa	MPa	%	HV	°C	J
0.80	13.0	0.6	0.01	0.02	0.2	—	1	—	—	—	—	As-welded	—	—	—	220 [470*] HB	—	—
0.70	15.0	0.3	—	—	3.7	3	—	—	—	—	—	As-welded	—	—	—	210 [450*] HB	—	—
2.10	1.1	—	—	—	6.5	—	0.4	—	—	10.00	—	As-welded	—	—	—	50HRc	—	—
0.50	0.3	0.4	—	—	12.4	—	0.4	1.30	—	—	—	As-welded	—	—	—	55HRc	—	—
3.00	—	1.0	—	—	33.0	—	—	—	—	—	—	As-welded	—	—	—	60HRc	—	—
5.00	1.75	4.0	—	—	35.0	4	2.0	—	—	10.00	—	As-welded	—	—	—	60HRc	—	—
5.00	1.0	0.8	—	—	23.0	—	7.0	2.50	4.00	4.00	—	As-welded	—	—	—	65HRc	—	—
4.50	0.2	1.0	—	—	28.0	—	—	—	—	—	Mo + Nb + V + W = 12	As-welded	—	—	—	800HV	—	—
1.20	0.2	0.8	—	—	28.0	2	<0.5	—	4.50	—	Fe:3; Co:60	As-welded	—	—	—	400HV	—	—
0.30	0.2	0.6	—	—	26.0	2	5.5	—	—	—	Fe:3; Co:61	As-welded	—	—	—	320HV	—	—
0.20	0.8	1.0	—	—	1.5	—	0.5	—	—	—	Total+:5	As-welded	—	—	—	350HB	—	—
0.20	0.5	1.3	—	—	3.4	—	0.5	—	—	—	—	As-welded	—	—	—	400HB	—	—
0.55	0.5	1.5	—	—	4.5	—	0.5	—	0.50	—	—	As-welded	—	—	—	55HRc	—	—
0.60	0.4	0.5	0.02	0.03	4.0	—	6.5	—	—	—	—	As-welded	—	—	—	60HRc	—	—
0.50	0.4	1.8	—	—	9.0	—	—	—	—	—	—	As-welded	—	—	—	55HRc	—	—
0.70	1.9	0.45	—	—	1.0	—	—	—	—	—	—	As-welded	—	—	—	38HRc	—	—
0.50	0.4	3.0	—	—	9.0	—	4.5	—	—	—	—	As-welded	—	—	—	60HRc	—	—
0.80	2.0	0.80	—	—	2.5	1	0.2	1.00	1.00	—	Al:1.7	As-welded	—	—	—	650HV	—	—

Layer	Typical Chemical Composition of Undiluted Weld Metal (wt%)											Dimensions
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Width x Thickness. mm
1	0.040	1.40	0.50	–	–	19.6	11.0	0.10	0.02	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.020	1.40	0.50	–	–	19.9	10.4	0.10	0.02	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.020	1.40	0.50	–	–	18.6	12.1	2.27	0.04	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.030	1.40	0.50	–	–	19.5	10.5	0.10	0.05	0.32	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
1	0.040	1.30	0.40	–	–	19.1	10.3	0.10	0.09	0.50	–	30x0.5; 60x0.5; 90x0.5; 120x0.5

STRIPS AND FLUXES FOR NORMAL SPEED ELECTROSLAG CLADDING // 2D CLADFLUX E102

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
N05	ESW	CLADSTRIP 22.11L	—	—
308L		CLADSTRIP 19.9L	A5.9: EQ308L	BS EN ISO 14343-A : B 19 9 L
316L		CLADSTRIP 19.12.3L	A5.9: EQ316L	BS EN ISO 14343-A : B 19 12 3 L
347		CLADSTRIP 19.9LNb	A5.9: EQ347	BS EN ISO 14343-A : B 19 9 Nb
N05		CLADSTRIP 21.11LNb	—	—
-309LMo		CLADSTRIP 21.13.3L	—	—
317L		CLADSTRIP 19.13.4L	A5.9: EQ317L	BS EN ISO 14343-A : B 19 3 4 L

STRIPS AND FLUXES FOR NORMAL AND HIGH SPEED ELECTROSLAG CLADDING // 2D CLADFLUX E200

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
600	ESW	CLADSTRIP 600	A5.14: EQNiCr-3	BS EN ISO 18274 : B Ni6082
625		CLADSTRIP 625	A5.14: EQNiCrMo-3	BS EN ISO 18274 : B Ni6625
825		CLADSTRIP 825	A5.14: EQNiFeCr-1	BS EN ISO 18274 : B Ni8065

STRIPS, FLUXES AND CORED WIRES FOR ELECTRO SLAG H-ESC CLADDING // 3D CLADFLUX E100

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
308L	ESW	CLADSTRIP 300 + 3DCladCore 308L	—	-/BS EN ISO 17633-A : T Z
347		CLADSTRIP 300 + 3DCladCore 347	—	-/BS EN ISO 17633-A : T Z
316L		CLADSTRIP 300 + 3DCladCore 316L	—	-/BS EN ISO 17633-A : T Z

STRIPS, FLUXES AND CORED WIRES FOR ELECTROSLAG H-ESC CLADDING // 3D CLADFLUX E200

Alloy Type	Welding Process	Product Name and Specification		
		Product Name	AWS	BS / EN / ISO
625	ESW	CLADSTRIP 625 + 3DCladCore 625	A5.14: EQNiCrMo-3 / -	BS EN ISO 18274 : B Ni6082 / -
825		CLADSTRIP 825 + 3DCladCore 825	A5.14: EQNiFeCr-1 / -	BS EN ISO 18274 : B Ni8065 / -

Layer	Typical Chemical Composition of Undiluted Weld Metal (wt%)											Dimensions
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Width x Thickness. mm
1	0.040	1.30	0.50	–	–	19.5	9.9	0.10	0.02	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.020	1.30	0.50	–	–	19.8	10.3	0.10	0.02	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.020	1.30	0.50	–	–	18.5	11.8	2.70	0.04	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.030	1.30	0.50	–	–	20.2	10.4	0.10	0.05	0.42	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
1	0.040	1.20	0.40	–	–	18.6	9.6	0.10	0.09	0.50	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
1	0.040	1.20	0.50	–	–	19.1	12.2	2.50	0.02	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5
2	0.040	1.10	0.50	–	–	19.5	13.7	3.50	0.15	–	–	30x0.5; 60x0.5; 90x0.5; 120x0.5

Layer	Typical Chemical Composition of Undiluted Weld Metal (wt%)											Dimensions
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Width x Thickness. mm
2	0.015	2.90	0.50	–	–	20.5	Bal	–	0.10	2.70	2.80	30x0.5; 60x0.5; 90x0.5
2	0.015	0.10	0.30	–	–	21.1	Bal	8.80	0.10	3.40	2.50	30x0.5; 60x0.5; 90x0.5
2	0.015	0.60	0.50	–	–	22.8	Bal	3.00	2.10	–	29.10	30x0.5; 60x0.5; 90x0.5

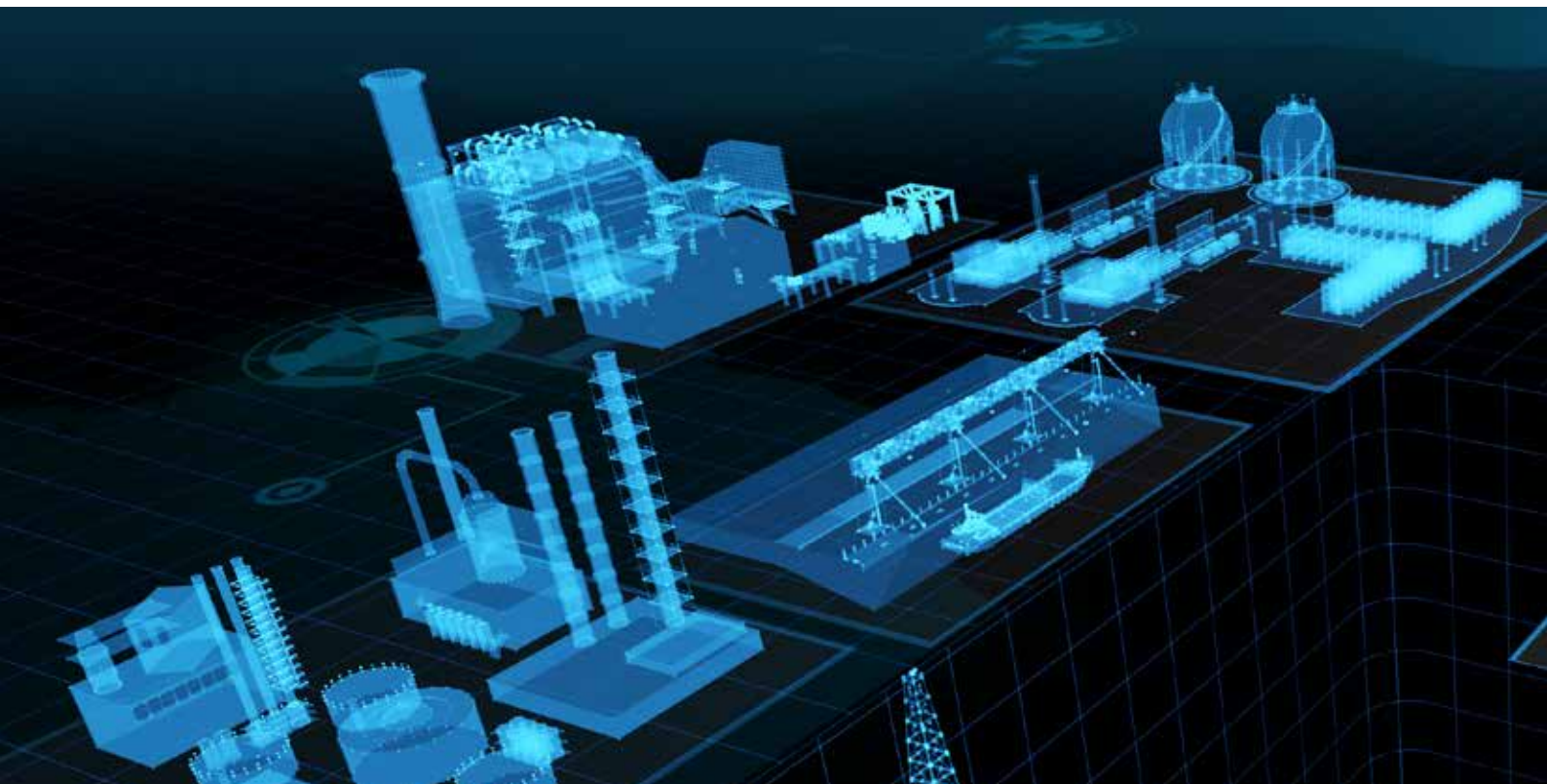
Layer	Typical Chemical Composition of Undiluted Weld Metal (wt%)											Dimensions
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Width x Thickness. mm
1	0.025	1.30	0.50	–	–	18.75	10.05	0.1	0.08	–	–	60x0.5; 90x0.5
1	0.030	1.30	0.50	–	–	18.85	10.10	0.1	0.08	0.60	–	60x0.5; 90x0.5
1	0.025	1.30	0.50	–	–	18.75	12.50	2.6	0.05	–	–	60x0.5; 90x0.5

Layer	Typical Chemical Composition of Undiluted Weld Metal (wt%)											Dimensions
	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe	Width x Thickness. mm
1	0.020	0.20	0.30	–	–	22.20	60.20	8.9	–	3.90	4.0	60x0.5; 90x0.5
1	0.018	0.60	0.40	–	–	19.70	41.20	2.9	2.300	–	29.8	60x0.5; 90x0.5

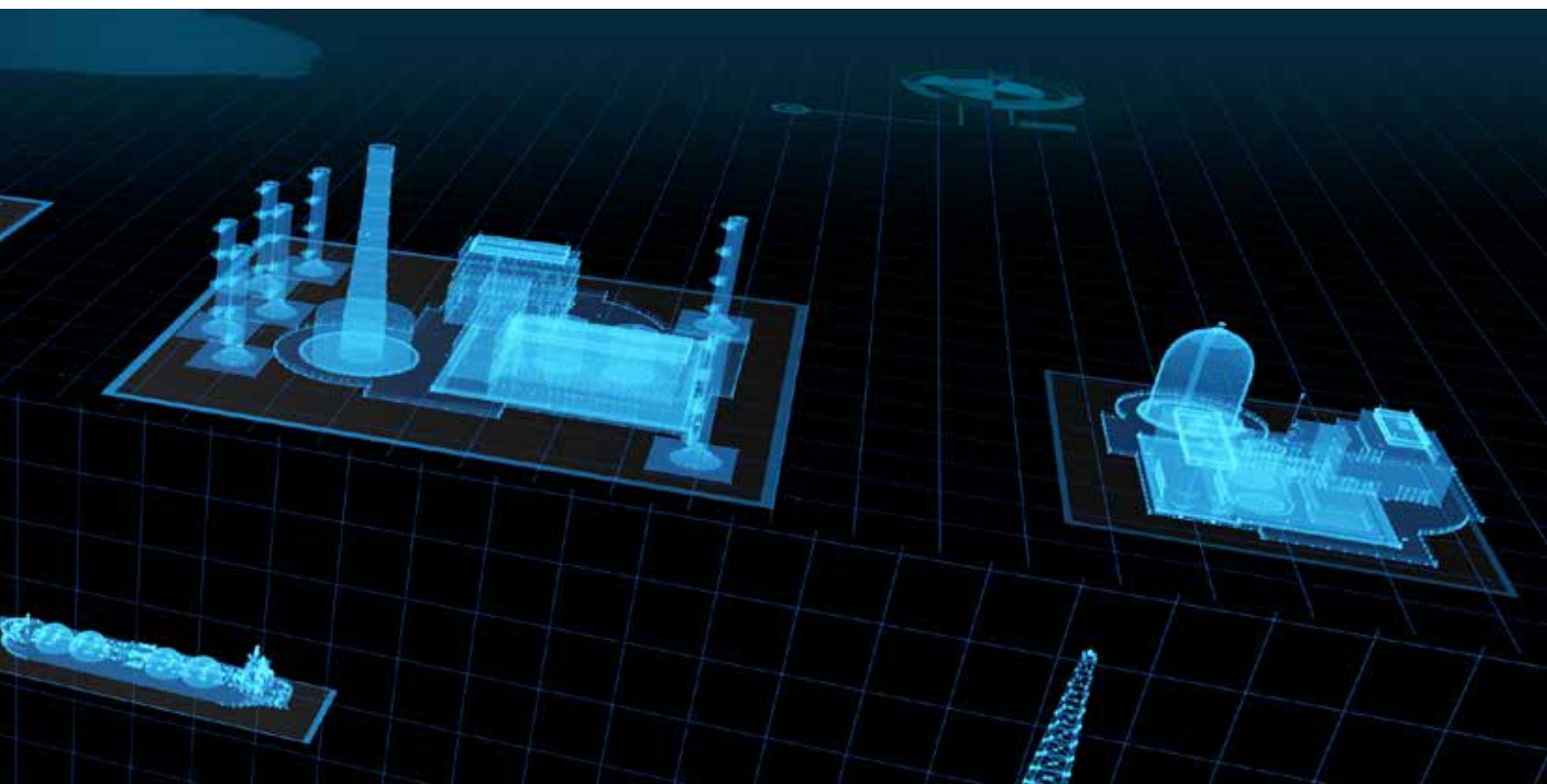
FLUX FOR SUBMERGED ARC WELDING

Product Name	SAW Consumable	Specification	Basicity Index
839 (TECHMERGE F 839)	-	BS EN ISO 14174: S A FB 1 66 AC H5	2.4
Lincolnweld 822	TECHMERGE S B2 SC, TECHMERGE S B3 SC, TECHMERGE S EF3	BS EN ISO 14174: S A FB 1	2.6
8500 (TECHMERGE F 8500)	TECHMERGE S 168, TECHMERGE S B6	BS EN ISO 14174: S A FB 1 54 AC H5	2.8
888 (TECHMERGE F 888)	TECHMERGE S 168, TECHMERGE S B6	BS EN ISO 14174: S A FB 1 66 AC H5	2.3
P240 (TECHMERGE F P240)	TECHMERGE S 168	BS EN ISO 14174: S A FB 1 55 AC H5	3.0
LA436 (TECHMERGE F LA436)	TECHMERGE S EF3, TECHMERGE S B6, TECHMERGE S B8, TECHMERGE S B2 SC, TECHMERGE S B3 SC	BS EN ISO 14174: S A AB 1 67 AC H5	1.6
LA490 (TECHMERGE F LA490)	TECHMERGE S B91, TECHMERGE S B91C, TECHMERGE S B92, TECHMERGE S B8	BS EN ISO 14174: S A FB 1 55 AC H5	3.0
P2000 (TECHMERGE F P2000)	TECHMERGE S 308L, TECHMERGE S 316L, TECHMERGE S 347, TECHMERGE S 318	BS EN ISO 14174: S A AF 2 64 DC H5	1.6
P2000S (TECHMERGE F P2000S)	TECHMERGE S 309L, TECHMERGE S 309MO	BS EN ISO 14174: S A AF 2 64Cr DC H5	1.6
P2007 (TECHMERGE F P2007)	TECHMERGE S 308L, TECHMERGE S 316L, TECHMERGE S 309L, TECHMERGE S 347, TECHMERGE S 318, TECHMERGE S 308 LCF, TECHMERGE S 316 LCF, TECHMERGE S 308H, TECHMERGE S Ni625, TECHMERGE S Ni276, TECHMERGE S 312	BS EN ISO 14174: S A AF 2 64 AC H5	1.6
SSB (TECHMERGE F SSB)	TECHMERGE S 2209, TECHMERGE S ZERON 100X, TECHMERGE S 1682	BS EN ISO 14174: S A AF 2 DC	2.2
NiCr (TECHMERGE F NICR)	TECHMERGE S EPRI P87	BS EN ISO 14174: A FB 2	3.0
NiCu (TECHMERGE F NICU)	MONEL wire	BS EN ISO 14174: S A CS 2	0.6
802 (TECHMERGE F 802)	LINCORE wires	BS EN ISO 14174: S A CS 1 55 DC H5	-

*SRB=Sahara ReadyBag™: no need for re-baking the flux prior to use

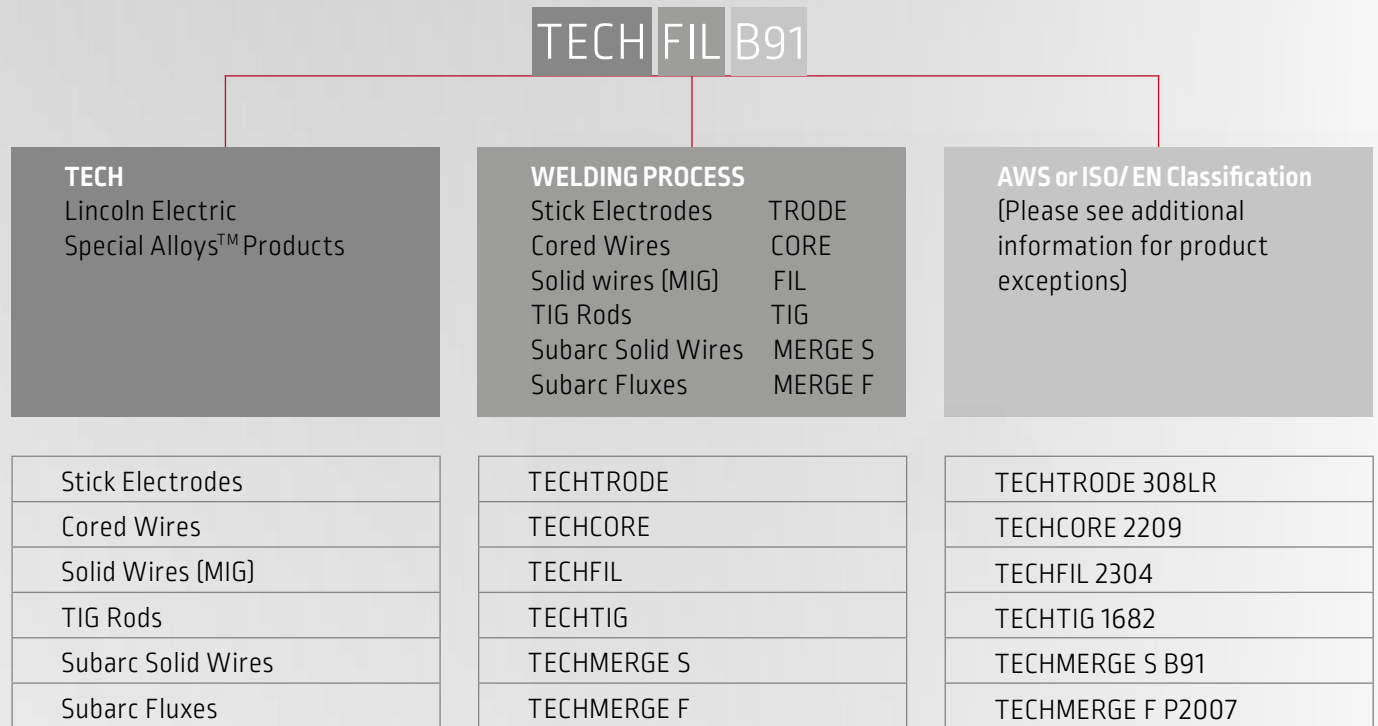


Description	Polarity	Re-baking	Packaging
Basic flux designed for combination of mild steel or low alloy grades for multirun application	DC/AC	300-375°C/1-2h	25Kg/Bag
Neutral flux designed for Chrome-Moly applications	DC+/AC	300-375°C/1-2h	22.7Kg/Bag
Basic flux designed for carbon and low alloy steels	DC/AC	300-375°C/1-2h	25Kg/Bag 25Kg/SRB* 225Kg/Drum 1000Kg/Big Bag
Basic flux designed for carbon and low alloy steels Easy slag removal in deep groove	DC/AC	300-375°C/1-2h	25Kg/SRB*
Highly basic fluoride agglomerated flux suitable for offshore constructions	DC/AC	300-375°C/1-2h	25Kg/SRB*
Neutral flux, designed for welding low alloy and creep resisting CrMo steels	DC/AC	300-375°C/1-2h	25Kg/SRB*
Agglomerated fluoride basic flux for 9% Cr creep resisting steels	DC+/AC	300-375°C/1-2h	25Kg/SRB*
Stainless steel welding flux	DC	300-375°C/1-2h	25Kg/SRB*
Welding stainless steel to carbon steel Compensates Cr-burn off and increases the Cr-content in the weldmetal	DC +/-	300-375°C/1-2h	25Kg/SRB*
Stainless steel welding flux	DC +/-	300-375°C/1-2h	25Kg/SRB*
Basic, Non-Alloying Agglomerated flux	DC+	300-375°C/1-2h	20kg/Drum
Highly Basic Agglomerated flux	DC+	300-375°C/1-2h	25kg/Drum
Basic Agglomerated flux	DC/AC	300-375°C/1-2h	20kg/Drum
Neutral flux for hardfacing applications	DC	300-375°C/1-2h	25Kg/Bag



SPECIAL ALLOYS™ PACKAGING

Packaging & Double Naming on labels



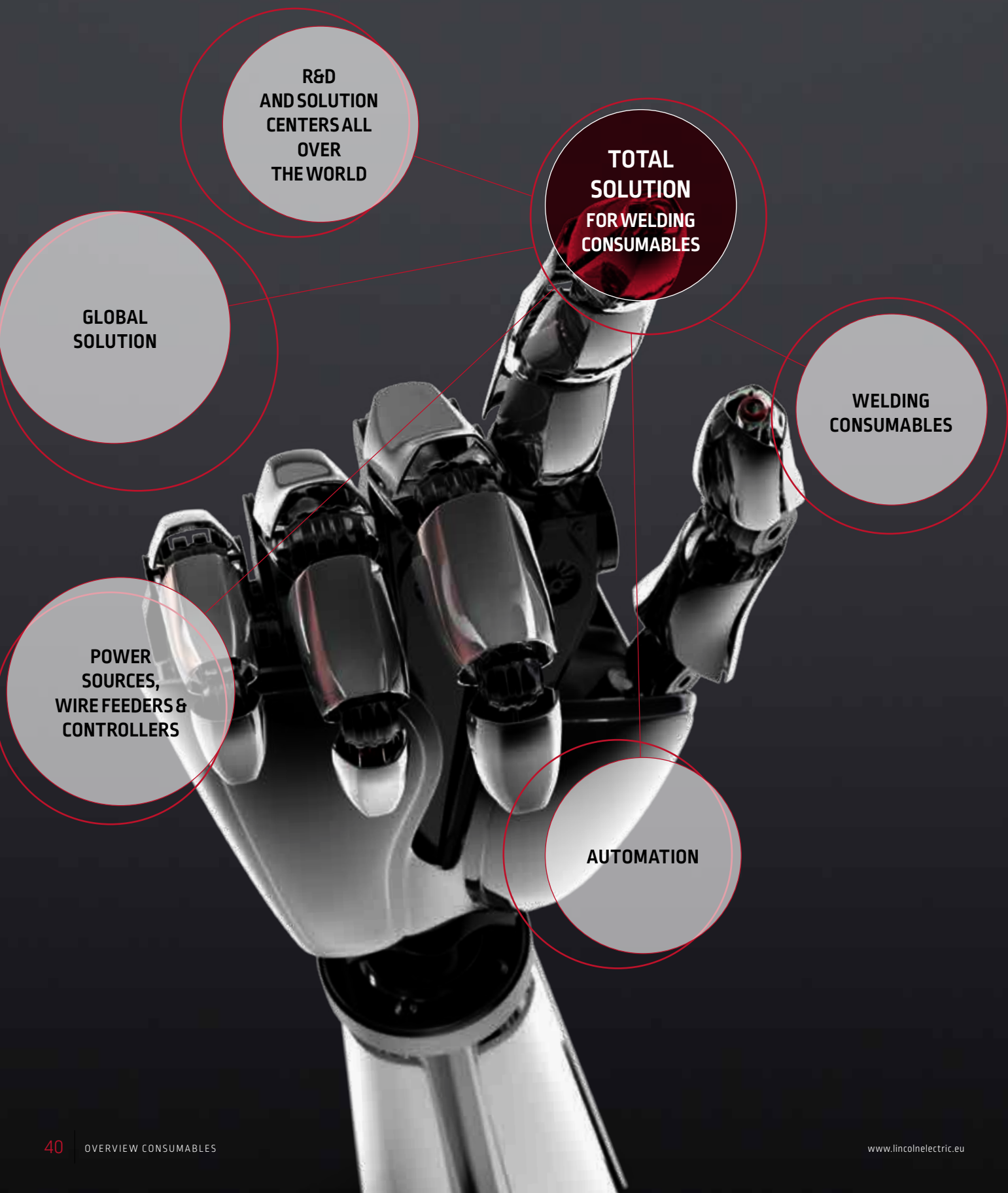
ADDITIONAL INFORMATION

- **Nickel Alloys:**
UNS number identifies the product preceded of "NI"
- **Hardfacing:**
 - Impact (13%Mn) = HFI
 - Abrasion = HFA
 - Cobalt = HFC
 - Metal to Metal & Build-up = HFW
- **Copper Alloys:**
Chemical composition of ISO-EN classification identifies the product
- **Cast-Iron:**
Chemical composition identifies the product preceded of "CAST"



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