

Stainless Steels

DATA SHEET

B-30

METRODE PRODUCTS LTD
 HANWORTH LANE, CHERTSEY
 SURREY, KT16 9LL
 Tel: +44(0)1932 566721
 Fax: +44(0)1932 565168 Sales
 Fax: +44(0)1932 569449 Technical
 Fax: +44(0)1932 566199 Export
 Email: info@metrode.com
 Internet: http://www.metrode.com

308L STAINLESS STEELS

Alloy type

308L austenitic stainless steels for joining 304L base materials.

Materials to be welded

ASTM	BS EN & DIN	UNS
304L	1.4306	S30403
304	1.4301	S30400
304LN	1.4311	S30453
CF3	1.4308	S32100
CF8	1.4541	S34700
321	1.4543/1.4561/1.4550	
347		
304S11		S30403
304S15/16/31		S30400
304S61		S30453
304C12		S32100
304C15		S34700
321S31		
347S31		

Applications

Used to weld 18/8 stainless steels including 301, 302, 303, nitrogen bearing 304LN and titanium stabilised 321. Service temperatures are typically -100°C to about 400°C.

Applications include **food, brewery, pharmaceutical equipment, architectural and general fabrication, and nuclear engineering.**

The 308L consumables covered here are not suitable for 304/304H in elevated temperature structural applications, see data sheets C-10 and C-12. For cryogenic applications (-196°C) see data sheet B-37.

Microstructure

Austenite with a controlled level of ferrite, normally in the range 3-10FN depending on the application.

Welding guidelines

No preheat, maximum interpass temperature 250°C; no PWHT required.

Additional information

There is a Technical Profile available on sub-arc welding with 308S92. There is also additional information available covering the Supercore flux cored wires.

Related alloy groups

308L stainless steel consumables for LNG, and other cryogenic applications, are in data sheet B-37. Stainless steel consumables for high temperature applications on 304H can be found in data sheets C-10 or C-12.

Products available

Process	Product	Specification
MMA	Supermet 308L	AWS E308L-17
	Ultramet 308L	AWS E308L-16
	Ultramet B308L	AWS E308L-15
	Ultramet 308LP	AWS E308L-16
TIG	308S92	AWS ER308L
MIG	Supermig 308LSi	AWS ER308LSi
SAW	308S92	AWS ER308L
	SS300	BS EN SA AF2
	SSB	BS EN SA AF2
	L2N	BS EN SF CS 2
FCW	Supercore 308L	AWS E308LT0-1/4
	Supercore 308LP	AWS E308LT1-1/4
	Supercore 308L	AWS R308LT1-5

General Data for all 308L MMA Electrodes

Storage	<p>3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin is satisfactory for longer than a working shift of 8h. Excessive exposure of electrodes to humid conditions will cause some moisture pick-up and increase the risk of porosity.</p> <p>For electrodes that have been exposed: Redry 200 – 300°C/1-2h to restore to as-packed condition. Maximum 400° C, 3 cycles, 10h total. Storage of redried electrodes at 50 – 200°C in holding oven or heated quiver: no limit, but maximum 6 weeks recommended. Recommended ambient storage conditions for opened tins (using plastic lid): < 60% RH, > 18°C.</p>																
Fume data	<p>Fume composition, wt % typical:</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px 10px;">Fe</td> <td style="padding: 2px 10px;">Mn</td> <td style="padding: 2px 10px;">Cr</td> <td style="padding: 2px 10px;">Ni</td> <td style="padding: 2px 10px;">Mo</td> <td style="padding: 2px 10px;">Cu</td> <td style="padding: 2px 10px;">F *</td> <td style="border-left: 1px solid black; padding: 2px 10px;">OES (mg/m³)</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center;">8</td> <td style="text-align: center;">5</td> <td style="text-align: center;">5</td> <td style="text-align: center;">0.8</td> <td style="text-align: center;">-</td> <td style="text-align: center;">< 0.2</td> <td style="text-align: center;">16</td> <td style="border-left: 1px solid black; text-align: center;">1</td> </tr> </table> <p>* F=28% for basic coated Ultramet B308L but this does not affect the OES.</p>	Fe	Mn	Cr	Ni	Mo	Cu	F *	OES (mg/m ³)	8	5	5	0.8	-	< 0.2	16	1
Fe	Mn	Cr	Ni	Mo	Cu	F *	OES (mg/m ³)										
8	5	5	0.8	-	< 0.2	16	1										


SUPERMET 308L

General purpose rutile 308L MMA electrode

Product description	<p>MMA electrode – rutile aluminosilicate flux on high purity 304L core wire giving very low typical carbon level. 'Low hydrogen' manufacturing technology ensures high resistance to weld metal porosity. 'Supermet Technology' gives acid rutile operability combined with controlled silicon content for maximum cracking/corrosion resistance. Designed for ease of use, exceptional weld bead appearance and high weld metal integrity, primarily in the downhand and HV positions; smaller sizes offer all-positional operability.</p> <p>Recovery is about 115% with respect to core wire, 65% with respect to whole electrode.</p>											
Specifications	AWS A5.4 E308L-17 BS EN 1600 E 19 9 LR 32 BS 2926 19.9.L.AR DIN 8556 E 19 9 LR 23											
ASME IX Qualification	QW432 F-No 5, QW442 A-No 8											
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN	
	min	--	0.5	--	--	--	18.0	9.0	--	--	3	
	max	0.04	2.0	0.90	0.025	0.030	21.0	11.0	0.5	0.5	10	
	typ	0.02	0.8	0.6	0.01	0.02	19.5	10	0.02	0.05	6	
All-weld mechanical properties	As-welded					min		typical				
	Tensile strength					MPa		520 590				
	0.2% Proof stress					MPa		320 450				
	Elongation on 4d					%		35 45				
	Elongation on 5d					%		30 40				
	Reduction of area					%		-- 45				
	Impact energy *					+ 20°C J		-- 80				
Operating parameters	DC +ve or AC (OCV: 50V min)											
	∅ mm	1.6		2.0		2.5		3.2		4.0		5.0
	min A	25		50		60		75		100		130
	max A	45		70		90		120		155		210
Packaging data	∅ mm	1.6		2.0		2.5		3.2		4.0		5.0
	length mm	250		300		300		350		450		450
	kg/carton	8.7		10.5		11.4		12.0		16.5		16.5
	pieces/carton	1350		846		609		333		243		156

ULTRAMET 308L

All-positional rutile MMA electrode for 304L

Product description	MMA electrode – rutile flux coated 308L electrode on high purity 304L core wire. Ultramet has all the benefits of an advanced rutile flux design – this includes optimum versatility for downhand welding with high cosmetic finish and weld metal integrity; and all-positional welding with the 2.5/3.2mm electrodes including fixed pipework. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.											
Specifications	AWS A5.4	E308L-16										
	BS EN 1600	E 19 9 L R 3 2										
	Approvals	TÜV										
ASME IX Qualification	QW432 F-No 5, QW442 A-No 8											
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN	
	min	--	0.5	--	--	--	18.0	9.0	--	--	3	
	max	0.04	2.0	0.90	0.025	0.030	21.0	11.0	0.50	0.5	10	
	typ	<0.03	1	0.6	0.01	0.02	19	9.5	0.1	0.1	6	
All-weld mechanical properties	As welded					min	typical	1050°C + WQ				
	Tensile strength					MPa	520	590	540			
	0.2% Proof stress					MPa	320	450	290			
	Elongation on 4d					%	35	45	50			
	Elongation on 5d					%	30	42	48			
	Reduction of area					%	--	50	64			
	Impact energy					J	--	35	--			
					J	-- *	--	> 60				
	* See Ultramet 308LCF (data sheet B-37) for as-welded cryogenic applications at -196°C.											
Operating parameters	DC +ve or AC (OCV: 50V min)											
	ø mm	2.5		3.2		4.0		5.0				
	min A	60		75		100		130				
	max A	90		120		155		210				
Packaging data	ø mm	2.5		3.2		4.0		5.0				
	length mm	300		350		350		450				
	kg/carton	11.4		13.5		13.5		16.8				
	pieces/carton	618		396		261		159				

ULTRAMET B308L

Basic coated MMA pipe-welding electrode for 304L

Product description	MMA electrode – designed and manufactured to give high moisture resistance using a basic flux system and high purity 304L core wire. Ultramet B308L is particularly suited to the most demanding vertical and overhead welding applications including fixed pipework in the ASME 5G/6G position. Under site conditions it is tolerant to adverse wind and drafts. Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.										
Specifications	AWS A5.4	E308L-15									
	BS EN 1600	E 19 9 L B 4 2									
	BS 2926	19.9.LB									
	DIN 8556	E 19 9 L B 20+									
ASME IX Qualification	QW432 F-No 5, QW442 A-No 8										
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN
	min	--	0.5	--	--	--	18.0	9.0	--	--	3
	max	0.04	2.0	0.90	0.025	0.030	21.0	11.0	0.50	0.5	10
	typ	0.03	1.2	0.3	0.01	0.015	19	10	0.05	<0.1	6

ULTRAMET B308L (continued)

All-weld mechanical properties	As welded		min	typical
	Tensile strength	MPa	520	600
	0.2% Proof stress	MPa	320	440
	Elongation on 4d	%	35	44
	Elongation on 5d	%	30	40
	Reduction of area	%	--	60
	Impact energy	+20°C -196°C	J	--
Operating parameters	DC +ve only.			
	∅ mm	2.5	3.2	4.0
	min A	60	75	100
	max A	90	120	155
	Packaging data	∅ mm	2.5	3.2
	length mm	300	350	350
	kg/carton	12.0	13.5	13.5
	pieces/carton	681	396	261

ULTRAMET 308LP

All-positional pipe welding and root welding electrode

Product description	<p>MMA electrode – rutile flux on high purity 304L core wire giving very low typical carbon level. Ultramet 308LP is a fully all-positional electrode capable of the most demanding fixed pipework applications including ASME 5G/6G. The Ultramet 308LP electrode has also been designed to deposit single-side root runs without the need for a gas purge. The electrode is also suitable for vertical-down welding on thin sheet material.</p> <p>Recovery is about 105% with respect to core wire, 65% with respect to whole electrode.</p>										
Specifications	AWS A5.4		E308L-16								
	BS EN 1600		E 19 9 L R 11								
ASME IX Qualification	QW432 F-No 5, QW442 A-No 8										
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN
	min	--	0.5	--	--	--	18.0	9.0	--	--	3
	max	0.04	2.5	0.90	0.025	0.030	21.0	11.0	0.5	0.5	10
	typ	0.02	0.8	0.8	0.01	0.02	19	10	0.01	0.1	6
All-weld mechanical properties	As welded		min	typical							
	Tensile strength	MPa	520	580							
	0.2% Proof stress	MPa	320	460							
	Elongation on 4d	%	35	37							
	Elongation on 5d	%	30	35							
	Reduction of area	%	--	35							
	Operating parameters	DC +ve or AC (OCV: 50V min)									
∅ mm		2.0	2.5	3.2							
min A		50	60	75							
max A		70	90	120							
Packaging data		∅ mm	2.0	2.5	3.2						
	length mm	300	300	350							
	kg/carton	11.7	12.0	14.1							
	pieces/carton	1086	702	447							

308S92 and SUPERMIG 308LSi

308L solid wire

Product description	Solid wires for TIG, MIG and sub-arc welding.										
Specifications		308S92 (TIG & Sub-arc)					Supermig 308LSi (MIG)				
	AWS A5.9 BS EN ISO 14343-A BS EN ISO 14343-B BS 2901: Pt2	ER308L 19 9 L SS308L 308S92					ER308L Si G 19 9 L Si SS308L Si 308S93				
ASME IX Qualification	QW432 F-No 6, QW442 A-No 8										
Composition (wire wt %)		C	Mn	Si *	S	P	Cr	Ni	Mo	Cu	FN
	min	--	1.0	0.30	--	--	19.5	9.0	--	--	3
	max	0.025	2.0	0.65	0.020	0.030	21.0	11.0	0.3	0.3	12
	typ	0.01	1.7	0.4	0.01	0.015	20	10	0.1	0.15	10
* Supermig 308LSi : Si range is 0.65 – 1.0%, typically 0.8%.											
All-weld mechanical properties	As welded							typical			
							TIG	MIG	SAW + SS300		
	Tensile strength				MPa		605	570	570		
	0.2% Proof stress				MPa		465	435	450		
	Elongation on 4d				%		35	42	41		
	Elongation on 5d				%		33	40	37		
	Impact energy			-130°C	J		110	70	50		
			-196°C *	J		80	30-60	30			
Hardness cap/mid				HV		200/220	200/220	195/215			
* For applications requiring cryogenic toughness see data sheet B-37.											
Typical operating parameters		TIG			MIG			SAW			
	Shielding	Argon			Ar+2%O ₂ *			SS300**			
	Current	DC-			DC+			DC+			
	Diameter	2.4mm			1.2mm			2.4mm			
	Parameters	100A, 12V			260A, 26V			350A, 28V			
* Also proprietary Ar and Ar-He gas mixtures with < 3%CO ₂ . **SSB, L2N and LA491 also suitable.											
Packaging data		TIG			MIG			SAW			
	ø mm	308S92			Supermig 308LSi			308S92			
	0.8	--			15kg reel			--			
	1.0	2.5kg tube			15kg reel			--			
	1.2	2.5kg tube			15kg reel			--			
	1.6	2.5kg tube			--			--			
	2.0	2.5kg tube			--			--			
	2.4	2.5kg tube			--			25kg coil			
	3.2	2.5kg tube			--			25kg coil			
4.0	--			--			25kg coil				
Fume data	MIG fume composition (wt %) (TIG and SAW fume negligible)										
		Fe	Mn	Cr ³	Ni	Mo	Cu	OES (mg/m ³)			
		32	12	16	8	< 0.5	< 0.5	3.1			

SUPERCORE 308L, 308LP

Rutile flux cored wires

Product description	<p>Flux cored wires – the wires are made with an austenitic stainless steel sheath and rutile flux system. Supercore 308L combines easy operability, high deposit quality and exceptional weld bead appearance for downhand and HV welding. Supercore 308LP is designed for all-positional welding including fixed pipework. Metal recovery is about 90% with respect to the wire.</p> <p>The Supercore 308L wire is not suitable for applications requiring PWHT or solution annealing – for these applications, it is recommended that Supercore 308LP is used.</p>																																																																																										
Specifications & Approvals	<table border="1"> <thead> <tr> <th></th> <th colspan="5">Supercore 308L</th> <th colspan="5">Supercore 308LP</th> </tr> </thead> <tbody> <tr> <td>AWS A5.22</td> <td colspan="5">E308LT0-1/4</td> <td colspan="5">E308LT1-1/4</td> </tr> <tr> <td>BS EN ISO 17633-A</td> <td colspan="5">T 19 9 L R C/M 3</td> <td colspan="5">T 19 9 L P C/M 2</td> </tr> <tr> <td>BS EN ISO 17633-B Approvals</td> <td colspan="5">TS308L-FB0 TÜV</td> <td colspan="5">TS308L-FB1 TÜV</td> </tr> </tbody> </table>												Supercore 308L					Supercore 308LP					AWS A5.22	E308LT0-1/4					E308LT1-1/4					BS EN ISO 17633-A	T 19 9 L R C/M 3					T 19 9 L P C/M 2					BS EN ISO 17633-B Approvals	TS308L-FB0 TÜV					TS308L-FB1 TÜV																																								
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Operating parameters	<p>Shielding gas: 80%Ar-20%CO₂ or 100% CO₂ at 20-25l/min. Proprietary gases may be used but argon should not exceed 85%.</p> <p>Current: DC+ve ranges as below for Ar-20%CO₂. Welding with 100%CO₂ requires approx 3V higher:</p> <table border="1"> <thead> <tr> <th>ø mm</th> <th>amp-volt range</th> <th>typical</th> <th>stickout</th> </tr> </thead> <tbody> <tr> <td>1.2</td> <td>120 – 280A, 22 – 34V</td> <td>180A, 29V</td> <td>15 – 20mm</td> </tr> <tr> <td>1.2P</td> <td>120 – 250A, 22 – 32V</td> <td>150A, 25V</td> <td>15 – 20mm</td> </tr> <tr> <td>1.6</td> <td>200 – 350A, 26 – 36V</td> <td>250A, 30V</td> <td>15 – 25mm</td> </tr> </tbody> </table>											ø mm	amp-volt range	typical	stickout	1.2	120 – 280A, 22 – 34V	180A, 29V	15 – 20mm	1.2P	120 – 250A, 22 – 32V	150A, 25V	15 – 20mm	1.6	200 – 350A, 26 – 36V	250A, 30V	15 – 25mm																																																																
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Packaging data	<p>Spools vacuum-sealed in barrier foil with cardboard carton: 15kg.</p> <p>The as-packed shelf life is virtually indefinite.</p> <p>Resistance to moisture absorption is high, but to maintain the high integrity of the wire surface and prevent any possibility of porosity, it is advised that part-used spools are returned to polythene wrappers.</p> <p>Where possible, preferred storage conditions are 60% RH max, 18°C min.</p>																																																																																										
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SUPEROOT 308L

Flux cored TIG wire for root welds without back purge

Product description	<p>Flux cored TIG wire Superoot 308L is made with a seamless austenitic stainless steel sheath, which results in a robust moisture resistant wire and rutile flux system. Superoot 308L is designed specifically for situations where it is impractical to apply back-purge for the TIG root run, or where there is an economic benefit in eliminating back-purge.</p> <p>Metal recovery is 90% with respect to the whole wire.</p>									
Specifications	AWS A5.22 BS EN ISO 17633-B		R308LT1-5 TS308L-RI1							
ASME IX Qualification	QW432 F-No 6, QW442 A-No 8									
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu
	min	--	0.5	--	--	--	18.0	9.0	--	--
	max	0.03	2.5	1.2	0.03	0.04	21.0	11.0	0.5	0.5
	typ	0.02	1.7	0.8	0.005	0.020	19.6	10.3	0.1	0.05
	Typically 8FN.									
All-weld mechanical properties	As welded					typical				
	Tensile strength					MPa	640			
	0.2% Proof stress					MPa	450			
	Elongation on 4d					%	47			
Note: In practice, mechanical properties of the root bead are assessed with the whole joint and subsequent filler.										
Typical operating parameters	TIG									
	Shielding Argon*									
	Current DC-									
	Diameter 2.2mm									
	Voltage 90A, 12V									
* No back-purge is required.										
Satisfactory application of Superoot 308L requires the use of a keyhole welding technique. Further details are available on request.										
Packaging data	ø mm	TIG								
	2.2	1kg tube								
Fume data	Fume composition (wt %)									
		Fe	Mn	Ni	Cr ³	Mo	Cu	F	OES (mg/m ³)	
		32	12	8	16	<0.5	< 0.5	--	3.1	