

Stainless Steels

DATA SHEET

B-30

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308L STAINLESS STEELS

Alloy type

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

Materials to be welded

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

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 border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Fe</th> <th>Mn</th> <th>Cr</th> <th>Ni</th> <th>Mo</th> <th>Cu</th> <th>F *</th> <th>OES (mg/m³)</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>5</td> <td>5</td> <td>0.8</td> <td>-</td> <td>< 0.2</td> <td>16</td> <td>1</td> </tr> </tbody> </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										
	BS 2926	19.9.LR										
	DIN 8556	E 19 9 L R 2 3										
	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	-100°C				J	--	35	--			
	-196°C				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)											
	∅ mm	2.5		3.2		4.0		5.0				
	min A	60		75		100		130				
	max A	90		120		155		210				
Packaging data	∅ 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 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 DIN 8556	ER308L 19 9 L SS308L 308S92 SG X2CrNi 19 9 (1.4316)				ER308L Si G 19 9 L Si SS308L Si 308S93 SG X2CrNi 19 9 (1.4316)					
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	AWS A5.22 BS EN ISO 17633-A BS EN ISO 17633-B Approvals			Supercore 308L E308LT0-1/4 T 19 9 L R C/M 3 TS308L-FB0 TÜV				Supercore 308LP E308LT1-1/4 T 19 9 L P C/M 2 TS308L-FB1 TÜV																			
ASME IX Qualification	QW432 F-No 6, QW442 A-No 8																										
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	FN																
	min	--	0.5	0.2	--	--	18.5	9.0	--	--	3																
	max	0.04	2.0	1.0	0.025	0.030	20.5	11.0	0.3	0.3	12																
	typ	0.03	1.3	0.7	0.02	0.02	19.5	10	0.1	0.1	8																
All-weld mechanical properties	As welded						min	typical																			
	Tensile strength						MPa	520	560																		
	0.2% Proof stress						MPa	320	400																		
	Elongation on 4d						%	35	43																		
	Elongation on 5d						%	30	42																		
	Reduction of area						%	--	60																		
	Impact energy						J	--	80																		
							J	--	40																		
	Hardness						HV	--	200																		
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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1.2P	120 – 250A, 22 – 32V	150A, 25V	15 – 20mm																								
1.6	200 – 350A, 26 – 36V	250A, 30V	15 – 25mm																								
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>																										
Fume data	<p>Fume composition (wt %)</p> <table border="1"> <thead> <tr> <th>Fe</th> <th>Mn</th> <th>Ni</th> <th>Cr³</th> <th>Cr⁶</th> <th>Cu</th> <th>F</th> <th>OES (mg/m³)</th> </tr> </thead> <tbody> <tr> <td>17</td> <td>10</td> <td>1.5</td> <td>3</td> <td>5</td> <td>< 1</td> <td>5</td> <td>1</td> </tr> </tbody> </table>											Fe	Mn	Ni	Cr ³	Cr ⁶	Cu	F	OES (mg/m ³)	17	10	1.5	3	5	< 1	5	1
Fe	Mn	Ni	Cr ³	Cr ⁶	Cu	F	OES (mg/m ³)																				
17	10	1.5	3	5	< 1	5	1																				