

Stainless Steels

DATA SHEET

B-40

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CONSUMABLES FOR 904L

Alloy type

904L is a nominally 20%Cr-25%Ni-5%Mo-2%Cu fully austenitic alloy with good corrosion resistance.

Materials to be welded

ASTM-ASME	DIN	BS
N08904	1.4505	1449: 904S13
	1.4506	1504: 364C11 (cast)
	1.4536	
	1.4539	
	1.4585	
	1.4500 (cast)	

Proprietary alloys

Uddelholm 904L
 2RK65 (Sandvik)
 Cronifer 1925LC (VDM)
 254SLX (Avesta Polarit)
 Uranus B6 & B6M (Creusot Loire)

Suitable for copper-free variants of the above alloys and also to overmatch leaner alloys such as 317L, 317LN, 317LM, 317LMN, 1.4439, 1.4440 and S31726.

Applications

These consumables give a fully austenitic, low carbon weld metal with molybdenum and copper, with good resistance to corrosion in sulphuric, phosphoric and other inorganic and organic acids.

They are not normally chosen for resistance to corrosion in concentrated nitric acid. For service in severe chloride

pitting media, overmatching nickel-base weld metal is recommended, see alloy 625 (data sheet D-20).

It is the preferred weld metal for some lower alloy austenitics such as Creusot UHB 34L and UHB 734L for wet process phosphoric acid service.

Applications include **tanks and process vessels, piping systems, agitators and rotors and cast pumps and valves** for use in the **fertiliser, phosphoric, sulphuric and acetic acid** plants, and in **salt and seawater** environments. It is also used in some **offshore** applications, including **overlays** on mild and low alloy steels.

Microstructure

In the as-welded condition the weld metal microstructure is fully austenitic.

Welding guidelines

No preheat or PWHT is required, interpass should be controlled to 150°C maximum and heat input should also be controlled particularly with larger diameter MMA electrodes.

Products available


Process	Product	Specification
MMA	Ultramet 904L	E385-16
	Ultramet B904L	E385-15
TIG/MIG	20.25.4Cu	ER385

General Data for all 904L 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 150 – 250°C/1-2h to restore to as-packed condition. Maximum 250° 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="width: 100%; text-align: center;"> <thead> <tr> <th>Fe</th> <th>Mn</th> <th>Ni</th> <th>Cr</th> <th>Mo</th> <th>Cu</th> <th>F *</th> <th>OES (mg/m³)</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>8</td> <td>2</td> <td>7</td> <td>1.5</td> <td>0.5</td> <td>18</td> <td>0.7</td> </tr> </tbody> </table> <p>* F=28% for basic coated Ultramet B904L but this does not affect OES.</p>	Fe	Mn	Ni	Cr	Mo	Cu	F *	OES (mg/m ³)	8	8	2	7	1.5	0.5	18	0.7
Fe	Mn	Ni	Cr	Mo	Cu	F *	OES (mg/m ³)										
8	8	2	7	1.5	0.5	18	0.7										

ULTRAMET 904L

Rutile MMA electrode for welding 904L






Product description	MMA electrode (formerly 21.26.5.CuNb.R) with a special rutile flux on low carbon, high purity austenitic stainless steel core wire. Careful control of carbon, silicon, manganese and molybdenum contents to give resistance to microfissuring. Recovery is about 130% with respect to core wire, 65% with respect to whole electrode.												
Specifications	AWS A5.4	E385-16											
	BS EN 1600	E 20 25 5 Cu NL R 52											
	BS 2926	(Nearest 20.25.5.LCuNb.R)											
	DIN 8556	E 20 25 5 L Cu R26											
ASME IX Qualification	QW432 F-No 5												
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	N	
	min	--	1.0	--	--	--	19.5	24.0	4.2	1.2	--	--	
	max	0.03	2.5	0.90	0.02	0.030	21.5	26.0	5.2	2.0	0.5	0.25	
	typ	0.02	1.2	0.55	0.015	0.02	20.5	25	4.6	1.5	0.02	0.09	
All-weld mechanical properties	As welded						min	typical					
	Tensile strength						MPa	560	620				
	0.2% Proof stress						MPa	320	420				
	Elongation on 4d						%	30	38				
	Elongation on 5d						%	25	35				
	Reduction of area						%	--	50				
	Impact energy	- 196°C					J	--	50				
Hardness cap/mid						HV	--	185/200					
Operating parameters	DC +ve or AC (OCV: 70V min)												
													
	ø mm						2.5	3.2	4.0				
	min A						60	75	100				
	max A						90	120	155				
Packaging data	ø mm						2.5	3.2	4.0				
	length mm						300	350	350				
	kg/carton						12.0	13.5	14.1				
	pieces/carton						525	306	213				

ULTRAMET B904L

Basic all-positional MMA pipe-welding electrode for alloy 904L

Product description	Special basic flux on low carbon, high purity austenitic stainless steel core wire. Careful control of carbon, silicon, manganese and molybdenum contents to give resistance to microfissuring. Recovery is about 130% with respect to core wire, 65% with respect to whole electrode.											
Specifications	AWS A5.4	E385-15										
	BS EN 1600	E 20 25 5 Cu NL B 62										
	BS 2926	(Nearest 20.25.5.LCuNb.B)										
	DIN 8556	E 20 25 5 L Cu B 20+										
ASME IX Qualification	QW432 F-No 5											
Composition (weld metal wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	N
	min	--	1.0	--	--	--	19.5	24.0	4.2	1.2	--	--
	max	0.03	2.5	0.90	0.02	0.030	21.5	26.0	5.2	2.0	0.5	0.25
	typ	0.025	2	0.4	0.005	0.02	21	25	4.8	1.8	0.05	0.08

ULTRAMET B904L (continued)

All-weld mechanical properties	As welded		min	typical
	Tensile strength	MPa	560	620
	0.2% Proof stress	MPa	320	440
	Elongation on 4d	%	30	41
	Elongation on 5d	%	25	38
	Reduction of area	%	--	60
	Impact energy	- 196°C	J	--
Hardness cap/mid		HV	--	190/215
Operating parameters	DC +ve     			
	∅ mm	2.5	3.2	4.0
	min A	60	75	100
	max A	90	120	155
Packaging data	∅ mm	2.5	3.2	4.0
	length mm	300	350	350

20.25.4.Cu

Solid TIG and MIG wire matching alloy 904L

Product description	Solid wire for TIG and MIG.										
Specifications	AWS A5.9	ER385									
	BS EN ISO 14343-A	20 25 5 Cu L									
	BS EN ISO 14343-B	SS385									
	BS 2901: Pt2	904S92									
	DIN 8556	(Nearest SG-X2CrNiMoCu 20 25 / 1.4519)									
ASME IX Qualification	QW432 F-No 6										
Composition (wire wt %)		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	
	min	--	1.0	0.25	--	--	19.5	24.0	4.2	1.2	
	max	0.025	2.5	0.50	0.015	0.020	21.5	26.0	5.2	2.0	
	typ	0.01	1.7	0.3	0.001	0.015	20	25	4.5	1.5	
All-weld mechanical properties	Typical values as welded					TIG					
	Tensile strength					MPa	650				
	0.2% Proof stress					MPa	490				
	Elongation on 4d					%	35				
	Elongation on 5d					%	32				
	Impact energy	+ 20°C				J	210				
	Hardness cap/mid					HV	175/195				
Typical operating parameters		TIG				MIG					
	Shielding	Argon *				Ar+2%O ₂ **					
	Current	DC-				DC+					
	Diameter	2.4mm				1.2mm					
	Parameters	100A, 12V				230A, 30V					
	* Also required as a purge for root runs.										
	** Ar-He-CO ₂ proprietary mixtures also suitable.										
Packaging data	∅ mm	TIG				MIG					
	1.2	--				15kg spool					
	1.6	2.5kg tube				--					
	2.4	2.5kg tube				--					
Fume data	MIG fume composition (wt %) (TIG fume negligible)										
		Fe	Mn	Cr ³	Ni	Mo	Cu	OES (mg/m ³)			
		28	13	16	20	3	2.5	2.5			