

# Stainless Steels

## DATA SHEET

## B-42

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## CONSUMABLES FOR ALLOY 825

### Alloy type

Cr-Ni-Mo-Cu alloy of the generic 825 type.

### Materials to be welded

Matching 825 materials:

<b>ASTM/UNS</b>	N08825
<b>DIN</b>	2.4858
<b>BS</b>	1501 & 3072 Grade NA16
<b>Proprietary</b>	Incoloy 825 (Special Metals) Incoloy 825CP, cast (Special Metals) Nicrofer 4221 (Krupp VDM)

The E825L-15 MMA electrode is also suitable for the 28%Cr alloy 28 materials:

<b>ASTM UNS</b>	N08028
<b>DIN</b>	1.4563
<b>Proprietary</b>	Nicrofer 3127LC (Krupp VDM) Sanicro 28 (Sandvik)

Also suitable for lower nickel materials of the alloy 20 type.

### Applications

The consumables deposit Cr-Ni-Mo-Cu weld metal with a high corrosion resistance to organic acids and hot sulphuric acid. The high nickel content gives good resistance to stress corrosion cracking in chloride and H<sub>2</sub>S environments.

Applications include **tanks** and **process vessels**, **pipework systems**, **heat exchangers**, **agitators** and **rotors**, and **cast pumps** and **valves** for use in the **chemical processing** and increasingly **offshore oil** and **gas industries**. Also suitable for corrosion resistant **overlays** and for welding **dissimilar** materials.

### Microstructure

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

### Welding guidelines

No preheat required, interpass should be restricted to 150°C maximum and the heat input should be controlled particularly with 4mm and 5mm diameter electrodes.

### Additional information

Some authorities accept or prefer overmatching type 625 weld metal (data sheet D-20) but 825 is the conventional type for welding alloy 825. Both the E825L-15 electrode and 82-50 wire are also suitable for welding the leaner alloy 20 type materials. The MMA electrode E825L-15 (but not the 82-50 wire) can also be used for welding the 28%Cr, alloy 28 type, materials.

### Related alloy groups

The 625 alloy (data sheet D-20) is sometimes used for welding 825 and alloy 28 materials.

### Products available

Process	Product	Specification
MMA	<b>E825L-15</b>	DIN EL-NiCr28Mo
TIG/MIG	<b>82-50</b>	AWS ERNiFeCr-1

# E825L-15

## MMA electrode for austenitic alloy 825

<b>Product description</b>	<p>MMA electrode for welding 825, alloy 28 and alloy 20 type materials. Specially balanced basic-fluoride-rutile flux on high purity 825 core wire. The electrodes are designed for fixed pipework welds including the demanding ASME 5G/6G positions. Careful control of carbon, manganese, silicon and nitrogen to maximise corrosion resistance in the as-welded condition and to ensure high resistance to solidification cracking and microfissuring in multipass welds. The composition is controlled to give a Pitting Resistance Equivalent (PRE) of about 40, where <math>PRE = \%Cr + 3.3\%Mo</math>.</p> <p>Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.</p>																											
<b>Specifications</b>	<b>AWS A5.4</b> (E383-15) <b>DIN 1736</b> EL-NiCr28Mo (2.4653)			Does not strictly conform; Ni & Cu are higher in E825L-15 compared to the E383-15 classification.																								
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 5 (This is nearest because the electrode does not strictly conform to AWS)																											
<b>Composition (weld metal wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb	Fe																
	min	--	1.0	--	--	--	27.0	35.0	3.2	1.5	--	--																
	max	0.03	3.0	0.5	0.015	0.030	31.0	40.0	4.5	3.0	1.0	30																
	typ	0.02	2	0.3	0.01	0.01	28	38	3.5	2	0.3	27																
<b>All-weld mechanical properties</b>	As welded					min		typical																				
	Tensile strength					MPa		550 640																				
	0.2% Proof stress					MPa		240 410																				
	Elongation on 4d					%		30 40																				
	Elongation on 5d					%		25 39																				
	Reduction of area					%		-- 43																				
	Impact energy + 20°C					J		-- 120																				
	Impact energy - 196°C					J		-- 65																				
	Hardness					HV		-- 220																				
<b>Operating parameters</b>	DC +ve																											
	∅ mm	2.5		3.2		4.0		5.0																				
	min A	60		70		90		120																				
	max A	80		110		150		190																				
<b>Packaging data</b>	∅ mm	2.5		3.2		4.0		5.0																				
	length mm	275		325		325		325																				
	kg/carton	10.8		13.8		14.1		14.1																				
	pieces/carton	612		387		261		168																				
<b>Storage</b>	<p><b>3 hermetically sealed ring-pull metal tins</b> 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:  <b>Redry</b> 150 – 250°C/1-2h to restore to as-packed condition. Maximum 300° C, 3 cycles, 10h total.  <b>Storage</b> 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): &lt; 60% RH, &gt; 18°C.</p>																											
<b>Fume data</b>	Fume composition, wt % typical: <table border="1" style="margin-left: auto; margin-right: auto;"> <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/m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>5</td> <td>3</td> <td>7</td> <td>1</td> <td>1</td> <td>20</td> <td>0.7</td> </tr> </tbody> </table>												Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m <sup>3</sup> )	4	5	3	7	1	1	20	0.7
Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m <sup>3</sup> )																					
4	5	3	7	1	1	20	0.7																					

## 82-50

### Solid TIG and MIG wire for welding high alloy austenitic 825 material

<b>Product description</b>	Solid wire for TIG and MIG welding of 825 and alloy 20 type materials. The 82-50 wire only has a nominal 21%Cr and so is not suitable for alloy 28. Note MIG wire is to order only.												
<b>Specifications</b>	<b>AWS A5.14</b> ERNiFeCr-1 <b>BS 2901: Pt5</b> NA41 <b>BS EN ISO 18274</b> SNi8065 <b>DIN 1736</b> (SG-NiCr27Mo / 2.4655) nearest Also known generically as filler metal 65 (FM65)												
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 45												
<b>Composition (wire wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Ti	Fe
	min	--	--	--	--	--	19.5	38.0	2.5	1.5	--	0.60	22.0
	max	0.05	1.0	0.50	0.015	0.020	23.5	46.0	3.5	3.0	0.20	1.2	bal
	typ	0.02	0.5	0.3	0.005	0.015	22	40	3	2	0.1	0.8	30
<b>All-weld mechanical properties</b>	Typical values as welded						TIG (Ar)		TIG (Ar+2%H <sub>2</sub> )				
	Tensile strength				MPa		475		580				
	0.2% Proof stress				MPa		350		350				
	Elongation on 4d				%		18		39				
	Elongation on 5d				%		16		35				
	Reduction of area				%		35		35				
	Hardness cap/mid				HV		165/180		190/205				
<b>Typical operating parameters</b>		TIG					MIG						
	Shielding	Argon *					Argon						
	Current	DC-					DC+ **						
	Diameter	2.4					1.2mm						
	Parameters	100A, 12V					220A, 30V						
	* Also required as a purge for root runs. Ar+1-5%H <sub>2</sub> can prove beneficial see mechanical properties.												
	** Pulsed current may provide better arc transfer characteristics.												
<b>Packaging data</b>	ø mm	TIG					MIG (to order)						
	1.2	--					15kg spool						
	1.6	2.5kg tube					--						
	2.4	2.5kg tube					--						
<b>Fume data</b>	MIG fume composition (wt %) (TIG fume negligible)												
		Fe	Mn	Cr <sup>3</sup>	Ni	Mo	Cu	OES (mg/m <sup>3</sup> )					
		23	2	19	29	2	3	1.7					