

# Nickel Base Alloys

DATA SHEET

D-20

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## ALLOY 625 CONSUMABLES

### Alloy type

Consumables matching the nickel base 625 alloy with typical composition of Ni-21%Cr-9%Mo-3.5%Nb.

### Materials to be welded

#### Matching Alloy 625

ASTM-ASME	DIN	BS
UNS N06625	2.4856	NA21
A494 CW-6MC (cast)		

#### Proprietary Alloys

Inconel 625 (Inco)  
 Nicrofer 6020hMo (VDM)  
 Nicrofer 6022hMo (VDM)

#### Other Alloys

High Nickel Alloys:	Superaustenitic alloys:
Inconel 601 (Inco)	UNS S31254
Incoloy 800H (Inco)	254SMO (Avesta)
Incoloy 825 (Inco)	904L
And equivalents	Similar alloys

Cryogenic:	Dissimilar:
9%Ni steels	Combinations of above

### Applications

These consumables are designed to match the composition and properties of alloy 625. Originally developed to give high temperature strength and structural stability, alloy 625 is also widely used for its resistance to general corrosion, pitting, crevice and stress corrosion cracking in severe chloride media. These properties are conferred by high levels of chromium, molybdenum and niobium, which also raise strength to the highest amongst standard nickel-base alloys. Useful properties from -269°C to above 1000°C are achieved.

In addition to matching alloy 625, suitable for welding **heat resisting** alloys including Inconel 601 (except severe sulphidising conditions), Incoloy 800/800H (preferred to

**Nimrod AKS** above about 900°C), or combinations of these with other alloys for **furnace equipment**, **petrochemical** and **power generation** plants. Some other applications include:

Overmatching corrosion-resistant welds in alloy 825, Hastelloys G and G3, alloy 28, 904L, 6%Mo super-austenitic stainless 254SMo, and also **overlays** on **pumps**, **valves** and **shafts**, often in **offshore** and **marine** environments where high pitting resistance (PRE = 50) and tolerance to weld metal dilution are essential.

Welds in **high strength** ferrous alloys including **cryogenic** 9% nickel steels and for reclamation of dies where rapid **work-hardening** and **toughness** are required.

### Microstructure

In the as-welded condition this nickel base weld metal consists of solid-solution strengthened austenite with carbides.

### Welding guidelines

No preheat required and maximum interpass of 250°C. When welding superaustenitic alloys the interpass temperature should be controlled to a maximum of 100°C.

### Related alloy groups

For welding superaustenitic stainless steels C276 (D-30), alloy 59 (D-31) and alloy C22 (D-32) are also suitable.

### Products available


Process	Product	Specification
MMA	<b>Nimrod 625</b>	AWS ENiCrMo-3
	<b>Nimrod 625KS</b>	AWS ENiCrMo-3
TIG/MIG	<b>62-50</b>	AWS ERNiCrMo-3
SAW	<b>62-50</b>	AWS ERNiCrMo-3
	<b>NiCr</b>	BS EN SA FB2

## General Data for all MMA Electrodes

<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> 200 – 250°C/1-2h to restore to as-packed condition. Maximum 350° 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>	<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>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>1</td> <td>4</td> <td>9</td> <td>6</td> <td>1</td> <td>0.1</td> <td>20</td> <td>0.8</td> </tr> </tbody> </table>	Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m <sup>3</sup> )	1	4	9	6	1	0.1	20	0.8
Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m <sup>3</sup> )										
1	4	9	6	1	0.1	20	0.8										


## NIMROD 625

Downhand MMA electrode for surfacing

<b>Product description</b>	<p>MMA electrode designed to combine easy operation with the deposition of high quality weld metal and a finished bead of good appearance. The electrode has a basic-rutile flux system and is made on a nickel core wire. <b>Nimrod 625</b> operates on AC or DC+ and is designed primarily for the downhand/flat or H-V positions. Optimised for surfacing and overlays, for joining Nimrod 625KS is preferred.</p> <p>Recovery is about 170% with respect to core wire, 65% with respect to whole electrode.</p>											
<b>Specifications</b>	<b>AWS A5.11</b> <b>BS EN 14172</b> <b>DIN 1736</b>			ENiCrMo-3 E Ni6625 (EL-NiCr 20 Mo 9 Nb (2.4621))								
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 43											
<b>Composition (weld metal wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Nb	Fe	Mo	Cu
	min	--	0.5	--	--	--	20.0	55	3.15	--	8.0	--
	max	0.10	1.0	0.75	0.015	0.020	23.0	--	4.15	2.5	10.0	0.50
	typ	0.04	0.8	0.7	0.005	0.008	21.5	64	3.4	< 1.5	9	0.05
<b>All-weld mechanical properties</b>	As welded						min *		typical			
	Tensile strength						MPa		760		800	
	0.2% Proof stress						MPa		420		480	
	Elongation on 4d						%		30		34	
	Elongation on 5d						%		27		32	
	Reduction of area						%		--		30	
	Impact energy						- 196°C J		--		> 28	
	Hardness (as welded)						HV		--		250	
	Hardness (work-hardened)						HV		--		450	
	* Cannot meet TS > 827MPa required by cold rolled ASTM N06625 Grade 1, but meets PS > 414MPa and properties of hot rolled grades. Cast CW-6MC solution annealed 1175°C + WQ requires TS > 485MPa.											
<b>Operating parameters</b>	DC +ve		AC (OCV: 70V)									
												
	ø mm		3.2			4.0			5.0			
	min A		90			130			160			
	max A		155			210			260			
<b>Packaging data</b>	ø mm		3.2			4.0			5.0			
	length mm		350			350			450			
	kg/carton		13.8			13.5			16.8			
	pieces/carton		243			156			93			

# NIMROD 625KS

Basic coated MMA pipe-welding electrode for 625

<b>Product description</b>	<p>MMA electrode with a basic flux system made on a 625 core wire. The electrode is designed to combine easy operation with the deposition of high quality, radiographically sound weld metal and a finished bead of good appearance. <b>Nimrod 625KS</b> is optimised for DC+ welding in all positions including pipework qualified in the ASME 6G position.</p> <p>Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.</p>															
<b>Specifications</b>	<b>AWS A5.11</b> <b>BS EN 14172</b> <b>DIN 1736</b>		E NiCrMo-3 ENi 6625 (EL-NiCr 20 Mo 9 Nb (2.4621))													
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 43															
<b>Composition (weld metal wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Nb	Fe	Mo	Cu				
	min	--	0.5	--	--	--	20.0	55	3.15	--	8.0	--				
	max	0.10	1.0	0.75	0.015	0.020	23.0	--	4.15	2.5	10.0	0.50				
	typ	0.04	0.7	0.4	0.005	0.005	22	63	3.2	< 1.5	9.3	0.01				
<b>All-weld mechanical properties</b>	As welded						min *		typical		+ 160°C					
	Tensile strength						MPa		760		800		725			
	0.2% Proof stress						MPa		420		500		440			
	Elongation on 4d						%		30		40		33			
	Elongation on 5d						%		27		38		31			
	Reduction of area						%		--		40		32			
	Impact energy						- 196°C		J		--		60		--	
	Hardness (as welded)						HV		--		250		--		--	
	Hardness (work-hardened)						HV		--		450		--		--	
	* Cannot meet TS > 827MPa required by cold rolled ASTM N06625 Grade 1, but meets PS > 414MPa and properties of hot rolled grades. Cast CW-6MC solution annealed 1175°C + WQ requires TS > 485MPa.															
<b>Operating parameters</b>	DC +ve															
																
	ø mm	2.5		3.2		4.0		5.0								
	min A	60		70		100		130								
	max A	80		110		155		210								
<b>Packaging data</b>	ø mm	2.5		3.2		4.0		5.0								
	length mm	260		300		350		350								
	kg/carton	11.1		13.5		15.0		15.0								
	pieces/carton	660		375		300		189								

# 62-50

Solid wire for TIG, MIG and SAW

<b>Product description</b>	Solid wire for TIG, MIG and SAW.													
<b>Specifications</b>	<b>AWS A5.14</b>		ERNiCrMo-3											
	<b>BS EN ISO 18274</b>		SNi6625											
	<b>BS 2901: Pt5</b>		Grade NA43											
	<b>DIN 1736</b>		SG-NiCr 21 Mo 9 Nb (2.4831)											
	<b>Approvals</b>		DNV and LRS (TIG)											
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 43													
<b>Composition (wire wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu	Al	Ti	Fe
	min	--	--	--	--	--	20.0	60.0	8.0	3.15	--	--	--	--
	max	0.05	0.50	0.50	0.015	0.015	23.0	bal	10.0	4.15	0.50	0.40	0.40	1.0
	typ	0.015	0.02	0.05	0.004	0.004	22	65	9	3.5	0.05	0.2	0.2	0.2
<b>All-weld mechanical properties</b>	Typical values as welded						TIG	SAW + NiCr	TIG +165°C					
	Tensile strength					MPa	780	715	710					
	0.2% Proof stress					MPa	520	430	440					
	Elongation on 4d					%	42	50	42					
	Elongation on 5d					%	40	47	40					
	Impact energy					J	100	--	--					
	- 100°C					J	80	100	--					
	Impact energy					J	80	100	--					
	- 196°C					J	80	100	--					
	Hardness cap/mid					HV	205/225	235/255	--					
Cannot meet TS > 827MPa required by cold rolled ASTM N06625 Grade 1, but meets PS > 414MPa and properties of hot rolled grades. Cast CW-6MC solution annealed 1175°C + WQ requires TS > 485MPa.														
<b>Typical operating parameters</b>		TIG *			MIG			SAW						
	Shielding	Ar			Ar or ArHe			NiCr flux						
	Current	DC-			Pulsed			DC+						
	Diameter	2.4mm			1.2mm			1.6mm						
	Parameters	100A, 12V			130A, 29V (mean)			260A, 26V						
* Also required as a purge for root runs.														
<b>Packaging data</b>	ø mm	TIG			MIG			SAW						
	0.8	--			15kg spool			--						
	1.0	--			To order			--						
	1.2	--			15kg spool			--						
	1.6	2.5kg tube			--			25kg coil						
	2.0	2.5kg tube			--			--						
	2.4	2.5kg tube			--			25kg coil						
	3.2	2.5kg tube			--			--						
<b>Fume data</b>	MIG fume composition (wt %) (TIG & SAW fume negligible)													
		Fe	Mn	Cr <sup>3</sup>	Ni	Mo	Cu	OES (mg/m <sup>3</sup> )						
		1	1	17	50	9	< 0.5	1						