

# Nickel Base Alloys

**DATA SHEET**

**D-31**

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## ALLOY 690

### Alloy type

Ni-30%Cr-10%Fe alloy commonly known as alloy 690.

### Materials to be welded

<b>ASTM</b>	B163, B166-8
<b>DIN</b>	2.4642 (NiCr29Fe)
<b>UNS</b>	N06690
<b>Proprietary</b>	Inconel 690 (Special Metals) Nicrofer 6030 (Krupp VDM)

### Applications

The consumables are designed to match alloy 690, which is finding increasing use in place of alloy 600 for high temperature corrosion applications, especially in the nuclear industry. The high chromium content provides good elevated temperature corrosion resistance in oxidising and sulphidising atmospheres.

In addition to joining matching base materials, the consumables can also be used for **surfacing** applications on CMn and low alloy steels.

Applications include **nuclear engineering; sulphuric, nitric and hydrofluoric acid processing equipment.**

### Microstructure

High alloy nickel base austenite.

### Welding guidelines

Preheat and PWHT is not generally required.

### Related alloy groups


There are no directly related alloys.

### Products available

Process	Product	Specification
MMA	<b>Nimrod 690KS</b>	AWS ENiCrFe-7
TIG/MIG	<b>ER690</b>	AWS ERNiCrFe-7

# NIMROD 690KS

Basic all-positional pipe-welding electrode for alloy 690

<b>Product description</b>	Nickel base MMA electrode designed for welding matching base materials, and for surfacing CMn and low alloy steels. Special basic flux coating on a nickel alloy core wire optimised for DC+ welding in all positions including pipework in the ASME 5G/6G positions. Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.														
<b>Specifications</b>	<b>AWS A5.11</b> <b>BS EN 14172</b>		ENiCrFe-7 E Ni6152												
<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	Ti	Al	Cu	Co
	min	--	3.0	--	--	--	28.0	50.0	1.2	8.0	--	--	--	--	--
	max	0.045	5.0	0.65	0.008	0.02	31.5	bal	2.2	12.0	0.5	0.5	0.5	0.5	0.10
	typ	0.04	3.6	0.3	0.005	0.007	29	55	1.6	8.5	0.1	0.05	0.05	0.05	0.02
<b>All-weld mechanical properties</b>							As welded		PWHT 610°C/40h						
							min	typical	RT		+360°C				
Tensile strength							MPa	552	660	661	532				
0.2% Proof stress							MPa	360	430	414	325				
Elongation on 4d							%	30	40	42	45				
Elongation on 5d							%	27	38	38	42				
Reduction of area							%	--	45	60	46				
Impact energy, KCV					- 50°C	J	--	>50	--	--					
Impact energy, KCU					+ 20°C	J/cm <sup>2</sup>	--	--	84	--					
<b>Operating parameters</b>	DC +ve 														
	ø mm	2.5		3.2		4.0									
	min A	60		70		100									
	max A	80		110		155									
<b>Packaging data</b>	ø mm	2.5		3.2		4.0									
	length mm	280		300		350									
	kg/carton	11.7		12.9		15.0									
	pieces/carton	672		408		294									
<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>	Fume composition, wt % typical:														
		Fe	Mn	Ni	Cr	Cu	Mo	F	OES (mg/m <sup>3</sup> )						
		2	13	10	8	0.2	0.1	16	0.6						

# ER690

Solid wire for TIG welding of alloy 690

<b>Product description</b>	Solid wire for TIG.																
<b>Specifications</b>	<b>AWS A5.14</b>		ERNiCrFe-7														
	<b>BS EN ISO 18274</b>		S Ni6052														
<b>ASME IX Qualification</b>	<b>QW432</b> F-No 43																
<b>Composition (wire wt %)</b>		C	Mn	Si	S	P	Cr	Ni	Nb	Fe	Mo	Ti	Al	Cu	Al+Ti		
	min	--	--	--	--	--	28.0	54.0	--	7.0	--	--	--	--	--		
	max	0.04	1.0	0.50	0.015	0.020	31.5	--	0.10	11.0	0.50	1.0	1.10	0.30	1.5		
	typ	0.03	0.7	0.2	0.005	0.010	29	60	0.03	8.5	0.05	0.6	0.6	0.05	1.2		
<b>All-weld mechanical properties</b>							As welded		As welded			PWHT 610°C/40h					
							typical, RT		typical, +360°C			typical					
	Tensile strength						MPa		720			520					
	0.2% Proof stress						MPa		430			320			--		
	Elongation on 4d						%		43			40			--		
	Elongation on 5d						%		40			--			--		
	Reduction of area						%		60			50			--		
Impact energy, KCV					- 50°C	J		200			--			145			
Impact energy, KCU					+ 20°C	J/cm <sup>2</sup>		160			--			130			
<b>Typical operating parameters</b>	TIG																
	Shielding	Argon *															
	Current	DC-															
	Diameter	2.4mm															
Parameters	100A, 12V																
	* Also required as a purge for root runs.																
<b>Packaging data</b>	ø mm	TIG															
	0.9	0.7 or 5kg spool															
	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> )									
		10	3	20	50	<1	<1	0.9									