

High Temperature Alloys

CONSUMABLES TO MATCH HP40Nb

DATA SHEET C-50

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Alloy type

Consumables to match 0.4% C-25% Cr-35% Ni-Nb heat resistant cast alloys.

Materials to be welded

Matching alloys

ASTM-ASME DIN

A297 'HP40Cb' 1.4852 (G-X40NiCrNb 35 25)

1.4853 (wrought)

Proprietary alloys

Paralloy H39W (Doncasters Paralloy)

Lloyds T64 (LBA)

MORE 10 & 10-MA (Duraloy)

Thermalloy 64 (Duraloy)

Manaurite 36X & 36XM (Manoir)

Pyrotherm G25/35Nb & NbTZ (Pose Marre)

Centralloy 4852 & 4852 Micro (Schmidt + Clemens -

Centracero)

E2535Nb & E2535Nb-MA (Engemasa)

Nb-free alloys

ASTM-ASME DIN

A297 HP or HP40 1.4857 (G-X40NiCrSi 35 25)

1.4853 (wrought)

Proprietary alloys

Paralloy H39 (Doncasters Paralloy) Lloyds T63 (LBA) HR33 (Cronite)

Also suitable for high carbon 18%Cr-37%Ni-Nb alloys eg. DIN 1.4849.

Applications

These consumables are designed to match heat resistant cast alloys with 0.4%C-25%Cr-35%Ni-Nb, including those micro-alloyed with Ti to increase creep resistance.

They are also suitable for the Nb free alloys and leaner high carbon Cr-Ni alloys such as HK40, HT40 and IN519 where overmatching weld metal will normally be acceptable.

Alloy HP40Nb is not prone to sigma phase embrittlement and the presence of eutectic and secondary carbides provide excellent hot strength and creep resistance in the typical service temperature range 900-1100°C. High levels of Cr and Ni provide good resistance to oxidation and carburisation.

The principal applications are **pyrolysis coils** and **reformer tubes** for **ethylene production** in the **petrochemical industry**.

Microstructure

In the as-welded condition the weld metal consists of austenite with eutectic and secondary carbide.

Welding guidelines

Generally preheat is not required.

Related alloy groups

There are a number of related high carbon Cr-Ni alloys which are used in the same type of applications, see other alloys in the Hot Zone. There is also a lower carbon version of the 25% Cr-35% Ni alloy (data sheet C-40) which provides better thermal shock and fatigue, with some reduction in creep strength.

Products available

Process	Product	Specification
MMA	Thermet HP40Nb	BS 25.35.H.Nb.B
TIG/MIG	25.35.4CNb	

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THERMET HP	40Nb)					Ba	sic ele	ectrode	e mato	ching	HP40	Nb alloys		
Product description					A electroc arge mult			purity a	alloy co	re wire,	giving	g high r	resistance to		
	Recover	y is abou	ut 120%	6 with r	espect to o	core wire	, 65% with	respec	t to who	le electr	ode.				
Specifications	BS 292	6		25.3	35.H.Nb.E	3									
ASME IX Qualification	QW432 F-No -														
Composition	C		Mn	Si	S	Р	Cr	Ni	Мо	Nb	Ti				
(weld metal wt %)	min	0.35	0.5	0.2			23.0	32.0		0.75	0.02				
	max	0.50	2.0	1.3	0.030	0.040	27.0	36.0	0.5	1.50	0.20				
	typ	0.43	1.7	0.9	0.010	0.010	25	35	0.1	1.1	0.08				
All-weld mechanical	As welde	ed					min *		typical						
properties	Tensile s			N	IPa	600 (450))	740							
	0.2% Pro				M	IPa	(250)		560						
	Elongatio					%	(5)		15						
	Elongation Reduction					%			15 17						
	Hardnes		a		1	HV			240						
	 * Minimum tensile strength of 600MPa is from BS2926; the values in brackets are minimum values for base material static castings. Room temperature elongation has little significance for weld metal designed for high temperature service and creep resistance. Values down to 4.5% (on 4d) are allowed in ASTM HP40 castings and the ductility of multipass welds may approach this value due to carbide precipitation in successive runs. 														
	welds m										na me o	auctiffty	ormunipass		
	Stress re	ay appro upture/c	ach thi	s value						18.	ife		longation		
		ay appro upture/o Temp	ach thi	s value			cipitation i			ns. Li			10100010000100001000100010000		
	Stress re	ay approupture/c Temp	ach thi	ata: °F 1600		MPa 48.2	cipitation i	n succe		Li Ho	ife urs		longation % 6		
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	Stress re	ay approupture/c Temp C 1	ach thi	ata: °F 1600		MPa 48.2	cipitation i	n succe		Li Ho 14 23	ife urs		longation % 6		
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	Stress ro 87 92 98 DC +ve ø mm min A max A	ay appro upture/o Temp C 11 17 122	ach thi	ata: F 1600 1700 1800 2.5 60 90		MPa 48.2 27.6 17.3 3.2 75 120	cipitation i	ksi 7 4 2.5 4.0 100 155		Li Ho 14 23 24 5.0 130 210	ife urs 31 998 14 0 0 0		longation % 6 3		
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														40Nb a	
Product description	Solid	Solid wire for TIG, auto-TIG and MIG.													
Specifications	There	are no r	nationa	l speci	fications	for this	wire								
ASME IX Qualification Composition (wire wt %)	QW432 F-No -														
		С	Mn	Si	S	Р	Cr	Ni	Мо	Nb	Ti	Zr	Cu	Sn	Pb
	min	0.40	1.0	0.5			23.0	32.0		0.75	0.05	0.01			
	max	0.50	2.5	1.6	0.02	0.02	27.0	36.0	0.50	1.50	0.25	0.15	0.5		
	typ	0.43	1.7	1.1	0.005	0.01	26	35	< 0.3	1.1	0.1	0.03	0.1	< 0.01	< 0.01
All-weld mechanical	Typica	Typical values as welded							TI	G					
properties	Tensil	e streng	th			MPa	4	450	76	50					
	0.2%	Proof str	ess			MPa	1	250	51	15					
	_	ation on			%		5	1	2						
	Elong	ation on	5d			%			1	3					
		ction of a		% HV			1								
	Hardn	Hardness cap/mid							211/	263					
		tempera	ature el	ongatio	on has lit		icance	for welc						ervice an	
Typical operating	resista may a	tempera ance. Va pproach	ature el lues do	ongatio	on has lit 4.5% (on	tle signif	icance allowed	for weld	гм нр4	0 castir				ervice an multipas	
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	Shield Currer Diame Param	i tempera ance. Va pproach ling nt	ature el lues do	ongatio wn to 4 alue du	on has lit 4.5% (on e to carb TIG Argon DC- 2.4mm 0A,12V TIG	tle signif 4d) are a ide preci	Spoole used for	for welcd in AST on in succeed wire in succeed wire in succeed wire in succeed wire in succeed with the succeeding the succeed	rm HP4 ecessive	0 castir runs.					
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