

Heat-resistant alloys

Nicrofer 3220 H – alloy 800 H				Nicrofer 7216 – alloy 600			Nicrofer 3718 – alloy 330		
	Sheet/strip	Tube/pipe	Rod/bar	Sheet/strip	Tube/pipe	Rod/bar	Sheet/strip	Tube/pipe	Rod/bar

DESIGNATIONS AND SPECIFICATIONS

D	Designation	X 5 NiCrAlTi 31 20		NiCr15Fe		X 12 NiCrSi36 16			
	Material N.	1.4958 (1.4876 ¹⁾)		2.4816		1.4864			
	VdTUV	412/434	412/434	412/434	305	305	305	-	-
USA	UNS	N 08810		N 06600		N 08330			
	ASTM(B)ASME(SB)	409	163/407/514/515	408	168	163/167/516/517	166	-	-
GB	Designation BS	NA 15 (H)		NA14		-			
	BS	3072/3073	3074	3076	3072/3073	3074	3076	-	-
F	AFNOR	-		NC 15 Fe		Z 12 NCS 35.16			

CHEMICAL COMPOSITION (%)

Nickel	30 - 32		Min. 72		34 - 37
Chromium	19 - 22		14 - 17		15 - 17
Iron	Balance		6 - 10		Balance
Manganese	-		-		Max. 2
Silicon	0.2 - 0.6		Max. 0.5		1 - 2
Others	Al+Ti: Max. 0.7		Cu: Max. 0.5	Ti: Max. 0.2 - 0.6	-
Carbon	0.06 - 0.08		Al: Max. 0.3		Max. 0.15
			0.05 - 0.08		

MECHANICAL PROPERTIES (N/mm², %)

Temperature (°C)	Rp 0.2	Rp 1.0	Rm	A5	Rp 0.2	Rp 1.0	Rm	A5	Rp 0.2	Rp 1.0	Rm	A5
20	Min.170	Min.200	Min.450	-	Min.240	265	Min.550	Min. 3	Min.230	-	Min.550	Min. 30
100	Min.140	Min.160	425	-	Min.180	-	520	35	330	-	640	35
200	Min.115	Min.135	400	-	Min.165	-	500	35	300	-	620	35
300	Min. 95	Min.115	390	-	Min.155	-	485	35	290	-	610	35
400	Min. 85	Min.105	380	-	Min.150	-	480	35	280	-	600	35
500	Min. 80	Min.100	360	-	Min.140	-	470	-	265	-	560	35
600	Min. 75	Min. 95	300	-	-	-	-	-	250	-	490	40

CREEP PROPERTIES (N/mm²)

Temperature (°C)	Rp 1.0/10 ⁴	Rm/10 ⁴	Rp 1.0/10 ⁵	Rm/10 ⁵	Rp 1.0/10 ⁴	Rm/10 ⁴	Rp 1.0/10 ⁵	Rm/10 ⁵
600	-	152	-	114	80	125	40	75
700	-	75	-	53	35	45	14	25
800	-	37	-	24	15	20	4	7
900	-	17	-	10.5	5	8	1.5	3
950	-	11.5	-	7	-	-	-	-
1000	-	-	-	-	-	4	-	1.5

PHYSICAL PROPERTIES AT ROOM TEMPERATURE OR AS INDICATED

Density	g/cm ³	8.0	8.4	8.0
Specific heat	J/Kg K	472	455	472
Thermal conductivity	W/m K	11.5	14.8	11.4
Electrical resistivity	μΩ	101	103	104
Thermal expansion	10 ⁻⁶ /K	16.2	14.4	16.2
20-300°C				
Modulus of elasticity	kN/mm ²	194	214	194

FABRICATION CHARACTERISTICS

Formability	Good	Good	Good
Weldability	Satisfactory	Good	Good

WELDING PRODUCTS

Filler wire	Nicrofer S 7020-FM 82	S 6020 - FM 625	Nicrofer S 7020 - FM 82	Nicrofer S 7020 - FM 82
Covered electrode	2.4648	2.4621	2.4648	2.4648
	EL-NiCr19Nb	EL-NiCr20Mo9Nb	EL-NiCr19Nb	AWS ENiCrFe-3
				EL-NiCr19Nb
				AWS ENiCrFe-3

MATERIAL DESCRIPTION, MAIN CHARACTERISTICS

Grade of Nicrofer 3220 - alloy 800 with controlled carbon content and high-temperatures solution annealing for very high creep rupture strength. Excellent resistance to carburizing, oxidizing and nitriding atmospheres.

Nickel-chromium-iron alloy. For service temperature to about 700°C (1280°F). Extremely good resistance to nitriding atmospheres. Very good resistance to halogen atmospheres, up to about 600°C (1100°F). Very good carburization resistance.

Iron-nickel-chromium alloy with silicon and manganese additions. Good carburization resistance, even in alternating reducing-oxidizing atmospheres.

1) According VdTUV data sheet 412, edition 01.84, former material no. 1.4876