CARPENTER TECHNOLOGY

DATASHEET

CUSTOM 630 (17-4)

Applicable specifications: AMS 5643; ASME SA564; ASTM A564, A693 (Strip), A705
Associated identifiers: AISI 630, UNS S17400

Type analysis

Single figures are nominal except where noted.

Iron	Balance	**Chromium**	15.00–17.50 %	**Copper**	3.00–5.00 %
Nickel	3.00–5.00 %	**Manganese**	Max 1.00 %	**Silicon**	Max 1.00 %
Columbium + Tantalum	0.15–0.45 %	**Carbon**	Max 0.070 %	**Phosphorus**	Max 0.040 %
Sulfur	Max 0.030%				

Forms manufactured

Bar-Flats	**Bar-Hexagons**	**Bar-Rounds**	**Bar-Squares**	**Billet**	**Strip**	**Wire**

Description

Custom 630 (17Cr-4Ni) is a martensitic precipitation/age-hardening stainless steel offering high strength and hardness along with excellent corrosion resistance. It has good fabricating characteristics and can be age hardened by a single-step, low-temperature treatment.

When an application calls for extensive machining, consider specifying a modified version, Custom 630 **Project 70®+**, for improved machinability.

Custom 630 shows excellent resistance to oxidation up to approximately 1100°F (539°C). Long-term exposure to elevated temperatures can result in reduced toughness in precipitation hardenable stainless steels. The reduction in toughness can be minimized in some cases by using higher aging temperatures. Short exposures to elevated temperatures can be considered, provided the maximum temperature is at least 50°F (28°C) less than the aging temperature.

Key Properties:

- High strength and hardness
- Excellent corrosion resistance
- Good fabricating characteristics

Markets:

- Aerospace
- Defense
- Energy
- Industrial
- Medical
- Transportation

Applications:

- Oil field valve and nuclear reactor components
- Chemical process equipment, fasteners, shafts, and gears
- Aircraft and missile fittings
- Medical instrumentation and surgical tooling

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Corrosion resistance

Custom 630 has withstood corrosive attack better than any of the 400 series hardenable stainless steels, and, in most corrodents, its corrosion resistance closely approaches that of stainless Types 302 and 304.

Good resistance to stress-corrosion cracking is gained by hardening at temperatures of 1025°F (552°C) and higher. Custom 630 also withstands erosion-corrosion well due to the combination of good corrosion resistance and high hardness.

The alloy has acceptable resistance to sulfide stress cracking at Rockwell C 33 maximum hardness per NACE MR-01-75, "Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment." Refer to the current document for details on acceptable conditions.

For optimum corrosion resistance, surfaces must be free of scale, lubricants, foreign particles, and coatings applied for drawing and heading. After fabrication of parts, cleaning and/or passivation should be considered.

IMPORTANT NOTE:
The following 4-level rating scale (Excellent, Good, Moderate, Restricted) is intended for comparative purposes only. Corrosion testing is recommended. Factors that affect corrosion resistance include temperature, concentration, pH, impurities, aeration, velocity, crevices, deposits, metallurgical condition, stress, surface finish, and dissimilar metal contact.

Nitric Acid	Good	**Sulfuric Acid**	Restricted
Phosphoric Acid	Restricted	**Acetic Acid**	Moderate
Sodium Hydroxide	Moderate	**Salt Spray (NaCl)**	Good
Sea Water	Restricted	**Sour Oil/Gas**	Restricted
Humidity	Excellent		

COMPARATIVE CORROSION RATES – MILS PER YEAR

CORRODENTS	TYPE 410		TYPE 431		CUSTOM 630		
	HARDENED AND TEMPERED 300°F (150°C)	HARDENED AND TEMPERED 1100°F (590°C)	HARDENED AND TEMPERED 500°F (260°C)	HARDENED AND TEMPERED 1200°F (650°C)	H 900	H 1025	H 1150
5 w/o H_2SO_4 at 75°F (24°C)	1732[1]	1218	1402[1]	2325[1]	2	3	14[1]
20 w/o HNO_3 at 200°F (93°C)	8	59[2]	3	3	2	2	2
50 w/o Acetic Acid Boiling	266[1]	1627	43[1]	54	3	3	4

Corrosion rates for one 48-hour period.
[1] Several or all of subsequent 48-hour test periods showed nil rates.
[2] Rates increased to 200 mpy by 3rd 48 hour test period.

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Physical properties

PROPERTY	Condition / At or From	English Units	Metric Units
SPECIFIC GRAVITY	Condition A	7.75	7.75
	Condition H 900	7.80	7.80
	Condition H 1075	7.81	7.81
	Condition H 1150	7.82	7.82
DENSITY	Condition A	0.2800 lb/in^3	7750 kg/m^3
	Condition H 900	0.2820 lb/in^3	7800 kg/m^3
	Condition H 1075	0.2820 lb/in^3	7810 kg/m^3
	Condition H 1150	0.2830 lb/in^3	7820 kg/m^3
MEAN SPECIFIC HEAT	32 to 212°F (0 to 100°C) Condition A	0.1100 Btu/lb/°F	460 J/kg·K
	32 to 212°F (0 to 100°C) Condition H 900	0.1000 Btu/lb/°F	419 J/kg·K
MEAN COEFFICIENT OF THERMAL EXPANSION (CTE)	70 to 200°F (21 to 93°C) Condition A	6.00 x 10^{-6} in/in/°F	10.8 x 10^{-6} length/length/K
	70 to 400°F (21 to 204°C) Condition A	6.00 x 10^{-6} in/in/°F	10.8 x 10^{-6} length/length/K
	70 to 600°F (21 to 316°C) Condition A	6.20 x 10^{-6} in/in/°F	11.2 x 10^{-6} length/length/K
	70 to 800°F (21 to 427°C) Condition A	6.30 x 10^{-6} in/in/°F	11.3 x 10^{-6} length/length/K
	-100 to 70°F (-73 to 21°C) Condition H 900	5.80 x 10^{-6} in/in/°F	10.4 x 10^{-6} length/length/K
	70 to 200°F (21 to 93°C) Condition H 900	6.00 x 10^{-6} in/in/°F	10.8 x 10^{-6} length/length/K
	70 to 400°F (21 to 204°C) Condition H 900	6.10 x 10^{-6} in/in/°F	11.0 x 10^{-6} length/length/K
	70 to 600°F (21 to 316°C) Condition H 900	6.30 x 10^{-6} in/in/°F	11.3 x 10^{-6} length/length/K
	70 to 800°F (21 to 427°C) Condition H 900	6.50 x 10^{-6} in/in/°F	11.7 x 10^{-6} length/length/K
	70 to 200°F (21 to 93°C) Condition H 1075	6.30 x 10^{-6} in/in/°F	11.3 x 10^{-6} length/length/K
	70 to 400°F (21 to 204°C) Condition H 1075	6.50 x 10^{-6} in/in/°F	11.7 x 10^{-6} length/length/K
	70 to 600°F (21 to 316°C) Condition H 1075	6.60 x 10^{-6} in/in/°F	11.9 x 10^{-6} length/length/K
	70 to 800°F (21 to 427°C) Condition H 1075	6.80 x 10^{-6} in/in/°F	12.2 x 10^{-6} length/length/K

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Physical properties

PROPERTY	At or From	English Units	Metric Units
MEAN COEFFICIENT OF THERMAL EXPANSION (CTE)	-100 to 70°F (-73 to 21°C) Condition H 1150	6.10×10^{-6} in/in/°F	11.0×10^{-6} length/length/K
	70 to 200°F (21 to 93°C) Condition H 1150	6.60×10^{-6} in/in/°F	11.9×10^{-6} length/length/K
	70 to 400°F (21 to 204°C) Condition H 1150	6.90×10^{-6} in/in/°F	12.4×10^{-6} length/length/K
	70 to 600°F (21 to 316°C) Condition H 1150	7.10×10^{-6} in/in/°F	12.8×10^{-6} length/length/K
	70 to 800°F (21 to 427°C) Condition H 1150	7.20×10^{-6} in/in/°F	13.0×10^{-6} length/length/K
THERMAL CONDUCTIVITY	300°F (149°C) Condition H 900	124.0 Btu-in/hr/ft^2/°F	17.9 W/m·K
	500°F (260°C) Condition H 900	135.0 Btu-in/hr/ft^2/°F	19.5 W/m·K
	860°F (460°C) Condition H 900	156.0 Btu-in/hr/ft^2/°F	22.5 W/m·K
	900°F (482°C) Condition H 900	157.0 Btu-in/hr/ft^2/°F	22.6 W/m·K
POISSON'S RATIO	Condition H 900	0.272	0.272
	Condition H 1075	0.272	0.272
	Condition H 1150	0.272	0.272
MODULUS OF ELASTICITY (E)	Condition H 900	28.5×10^3 ksi	—
ELECTRICAL RESISTIVITY (RT)	70°F, Condition A	589 ohm-cir-mil/ft	980 microhm·mm
	70°F, Condition H 900	463 ohm-cir-mil/ft	770 microhm·mm
MODULUS OF RIGIDITY (G)	Condition H 900	11.2 x 103 ksi	—
	Condition H 1075	10.0 x 103 ksi	—
	Condition H 1150	10.0 x 103 ksi	—

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Typical mechanical properties

TYPICAL CREEP STRENGTH — CONDITION H 900

TEMP		STRESS FOR CREEP OF			
		0.1% IN 1000 HRS		0.01% IN 1000 HRS	
°F	°C	ksi	MPa	ksi	MPa
600	316	135	931	125	862
700	371	105	724	100	689
800	427	60	414	43	296
900	482	23	159	—	—

TYPICAL CRYOGENIC CHARPY V-NOTCH IMPACT STRENGTH

TEMP		IMPACT STRENGTH									
		H 925		H 1025		H 1150		H 1150M			
°F	°C	FT-LB[1]	J	FT-LB[1]	J	FT-LB[1]	J	FT-LB[2]	J	FT-LB[2]	J
75	24	30	41	75	102	95	129	105	142	95	129
10	-12	16	22	58	79	93	126	—	—	85	115
-40	-40	9	12	40	54	76	103	—	—	75	102
-110	-79	5	7	15	20	48	65	—	—	65	88
-175	-115	—	—	—	—	—	—	—	—	35	47
-250	-157	—	—	—	—	—	—	—	—	18	24
-320	-196	3	4	4	6	6	8	28	38	5	7

[1] *Test samples from 1 in (25.4 mm) round bar—longitudinal direction.*
[2] *Test samples from 4 in (102 mm) round bar—longitudinal direction.*

TYPICAL CRYOGENIC TENSILE PROPERTIES — CONDITION H 1100

TEMP		0.2% YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION IN 2 IN (50.8 MM)
°F	°C	ksi	MPa	ksi	MPa	%
75	24	135	931	150	1034	17
32	0	183	1262	193	1331	16
-40	-40	189	1303	203	1440	16
-80	-62	196	1351	209	1441	15
-320	-196	243	1675	248	1710	8

TYPICAL ELEVATED TEMPERATURE TENSILE PROPERTIES — CONDITION H 900

TEMP		0.2% YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION IN 2 IN (50.8 MM)	REDUCTION OF AREA
°F	°C	ksi	MPa	ksi	MPa	%	%
RT	RT	183	1262	198	1365	15	52
600	316	145	1000	172	1186	13	46
800	427	132	910	160	1103	13	51
900	482	118	814	138	952	13	55
1000	538	94	643	115	793	17	64

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TYPICAL ROOM TEMPERATURE MECHANICAL PROPERTIES

CONDITION	0.2% YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION IN 2 IN (50.8 MM)	REDUCTION OF AREA
	ksi	MPa	ksi	MPa	%	%
A	—	—	—	—	—	—
H 900	183	1262	198	1365	15	52
H 1025	162	1117	168	1158	16	58
H 1075	148	1020	164	1131	17	59
H 1150	126	869	144	993	20	60
H 1150M	87	600	123	848	22	66

TYPICAL ROOM TEMPERATURE MECHANICAL PROPERTIES

CONDITION	HARDNESS		CHARPY V-NOTCH IMPACT STRENGTH		MODULUS OF ELASTICITY (E)		MODULUS OF RIGIDITY (G)	
	HRC	BRINELL	FT-LB	J	ksi	MPa	ksi	MPa
A	36	352	—	—	—	—	—	—
H 900	44	420	16	21	28.5×10^3	197×10^3	11.2×10^3	77×10^3
H 1025	38	352	40	54	—	—	—	—
H 1075	36	341	45	61	—	—	10×10^3	69×10^3
H 1150	33	311	55	75	—	—	10×10^3	69×10^3
H 1150M	29	293	100	136	—	—	—	—

TYPICAL STRESS RUPTURE STRENGTH

CONDITION	TEMP		100 HOURS		1000 HOURS	
	°F	°C	ksi	MPa	ksi	MPa
H 900	625	329	162	1117	157	1082
H 1075			137	945	134	924
H 900	700	371	156	1076	150	1034
H 1075			126	869	123	848
H 900	800	427	140	965	128	883
H 1075			108	745	103	710

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Heat treatment

Custom 630 is hardened by heating solution-treated (Condition A) material to a temperature between 900°F (482°C) and 1150°F (621°C) for 1 to 4 hours, depending on the temperature, then air cooling. The specific aging temperature chosen depends on the desired properties.

Solution treatment	Heat at 1900°F (1038°C) ±25°F (±14°C) for ½ hour, cool to below 90°F (32°C) so that the material is completely transformed to martensite. Sections under 3 in. (76.2 mm) can be quenched in a suitable liquid quenchant and sections over 3 in. (76.2 mm) should be rapidly air cooled. **Do not use this condition without age hardening due to susceptibility to stress-corrosion cracking.**
Deformation (size change) in hardening	The precipitation hardening of Custom 630 is accomplished with a slight dimensional change. • The amount of contraction in hardening solution-treated (Condition A) material to Condition H 900 is about 0.0004 to 0.0006 in./in. (m/m). • Condition A material when hardened to Condition H 1150 will contract approximately 0.0009 to 0.0012 in./in. (m/m).
Age	Condition H 900: Heat solution-treated material at 900°F (482°C) for 1 hour and air cool. Condition H 925, H 1025, H 1075, H 1100, and H 1150: Heat solution-treated material at specified temperature ±15°F (±8°C) for 4 hours and air cool. Condition H 1150M: Heat solution-treated material at 1400°F(760°C) ±15°F (±8°C) for 2 hours, air cool; then treat at 1150°F (621°C) ±15°F (±8°C) for 4 hours and air cool.

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Workability

Hot working	Custom 630 can be readily forged, hot headed and upset. Material that is hot worked must be solution treated prior to hardening if the material is to respond properly to hardening.
Forging	Heat uniformly to 2150/2200°F (1177/1204°C) and hold one hour at temperature before forging. Do not forge below 1850°F (1010°C). To obtain optimum grain size and mechanical properties, forgings should be cooled in air to below 90°F (32°C) before further processing. Forgings must be solution-treated prior to hardening.
Cold working	Custom 630 can be cold worked to a limited degree. Due to the proximity of its initial yield strength to its ultimate tensile strength, satisfactory cold working requires precise knowledge of material condition and process parameters. Cold working capability is maximized in the H1150M and H1150D conditions.
Machinability	Custom 630 is readily machined in both the solution-treated and various age-hardened conditions. In the solution-treated condition, it machines similarly to stainless Types 302 and 304. The machinability will improve as the hardening temperature is increased. Condition H 1150M provides optimum machinability. Additional "drop-in" machinability enhancements can be obtained by evaluating the use of this alloy's Project 70+ enhanced machinability variant. Having procured Condition H 1150M for best machinability, higher mechanical properties can only be developed by solution treating and heat treating at standard hardening temperatures.

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Typical feeds and speeds

The feeds and speeds in the following charts are conservative recommendations for initial setup. Optimized feeds and speeds may be attainable depending on machining environment.

TURNING — SINGLE-POINT AND BOX TOOLS

CONDITION	DEPTH OF CUT, IN	HIGH-SPEED TOOLS			CARBIDE TOOLS (INSERTS)				
		SPEED, FPM	FEED, IPR	TOOL MATERIAL	SPEED, FPM			FEED, IPR	TOOL MATERIAL
					BRAZED	THROW AWAY	COATED		
Solution Treated	.150	80	.015	M-2, T-5, T-15	300	350	450	.015	C-6
	.025	95	.007		350	400	525	.007	C-7
Double-Aged H 1150M	.150	80	.015	M-2, T-5, T-15	300	350	450	.015	C-6
	.025	95	.007		350	400	525	.007	C-7
Aged H 1075, H 1100, H 1150	.150	60	.015	M-41, M-42, M-43, M-44, T-15	250	300	400	.015	C-6
	.025	75	.007		300	350	450	.007	C-7
Aged H 1025	.150	55	.015	M-41, M-42, M-43, M-44, T-15	245	275	350	.010	C-6
	.025	70	.007		290	325	400	.005	C-7
Aged H 900, H 925	.150	30	.010	M-41, M-42, M-43, M-44, T-15	160	190	250	.010	C-6
	.025	45	.005		190	225	285	.005	C-7

TURNING — CUT-OFF AND FORM TOOLS

CONDITION	SPEED, FPM	FEED, IPR							TOOL MATERIAL	
		CUT-OFF TOOL WIDTH, IN				FORM TOOL WIDTH, IN			HIGH-SPEED TOOLS	CARBIDE TOOLS
		1/16	*1/8*	*1/4*	*1/2*	*1*	*1-1/2*	*2*		
Solution Treated	70	.001	.0015	.002	.0015	.001	.001	.0005	M-2, T-15	—
	210	.003	.003	.004	.003	.002	.002	.002	—	C-6
Double-Aged H 1150M	100	.0015	.002	.0025	.002	.0015	.001	.001	M-2, T-15	—
	250	.003	.003	.0045	.003	.002	.002	.002	—	C-6
Aged H 1075, H 1100, H 1150	80	.001	.0015	.002	.0015	.001	.001	.0005	M-2, T-15	—
	210	.003	.003	.0045	.003	.002	.002	.002	—	C-6
Aged H 1025	65	.001	.001	.0015	.0015	.001	.001	.0005	M-42, T-15	—
	160	.003	.003	.0045	.003	.002	.002	.002	—	C-6
Aged H 900, H 925	35	.001	.001	.0015	.0015	.001	.001	.0005	M-42, T-15	—
	115	.0025	.0025	.004	.0025	.0015	.0015	.0015	—	C-6

ROUGH REAMING

CONDITION	HIGH-SPEED TOOLS		CARBIDE TOOLS		FEED, IPR, REAMER DIAMETER, IN					
	SPEED, FPM	TOOL MATERIAL	SPEED, FPM	TOOL MATERIAL	*1/8*	*1/4*	*1/2*	*1*	*1-1/2*	*2*
Solution Treated	60	M-7	190	C-7	.003	.005	.008	.011	.015	.018
Double-Aged H 1150M	65	M-7	200	C-2	.003	.005	.008	.011	.015	.018
Aged H 1075, H 1100, H 1150	45	T-15	150	C-2	.003	.005	.008	.011	.015	.018
Aged H 1025	35	T-15	125	C-2	.003	.004	.006	.010	.013	.016
Aged H 900, H 925	30	T-15	100	C-2	.001	.001	.001	.001	.001	.001

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DRILLING — HIGH-SPEED TOOLS

CONDITION	SPEED, FPM	FEED, IPR — NOMINAL HOLE DIAMETER, IN								TOOL MATERIAL
		1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
Solution Treated	50	.001	.002	.004	.007	.008	.010	.012	.015	M-1, M-10
Double-Aged H 1150M	60	.001	.002	.004	.007	.009	.011	.013	.016	M-1, M-10
Aged H 1075, H 1100, H 1150	45	—	.002	.004	.007	.008	.010	.012	.015	M-42, T-15
Aged H 1025	35	—	.002	.004	.006	.008	.009	.011	.012	M-42, T-15
Aged H 900, H 925	25	—	.001	.002	.003	.004	.004	.004	.004	M-42, T-15

BROACHING — HIGH-SPEED TOOLS

CONDITION	SPEED, FPM	CHIP LOAD, IN PER TOOTH	TOOL MATERIAL
Solution Treated	10	.002	M-42, T-15
Double-Aged H 1150M	15	.002	M-42, T-15
Aged H 1075, H 1100, H 1150	8	.002	M-42, T-15
Aged H 1025	8	.002	M-42, T-15
Aged H 900, H 925	8	.002	M-42, T-15

TAPPING — HIGH-SPEED TOOLS

CONDITION	SPEED, FPM	TOOL MATERIAL
Solution Treated	12–25	M-1, M-7, M-10
Double-Aged H 1150M	17–28	M-1, M-7, M-10
Aged H 1075, H 1100, H 1150	15–25	M-1, M-7, M-10
Aged H 1025	10–20	M-1, M-7, M-10
Aged H 900, H 925	5–15	M-1, M-7, M-10 Nitrided

DIE THREADING — HIGH-SPEED TOOLS

CONDITION	SPEED, FPM				TOOL MATERIAL
	7 OR LESS, TPI	8 TO 15, TPI	16 TO 24, TPI	25 AND UP, TPI	
Solution Treated	5–12	8–15	10–20	15–25	M-1, M-2, M-7, M-10
Aged	4–8	6–10	8–12	10–15	M-42, T-15

MILLING — END PERIPHERAL

CONDITION	DEPTH OF CUT, IN	HIGH-SPEED TOOLS: SPEED, FPM	FEED, IN PER TOOTH — CUTTER DIAMETER, IN				TOOL MATERIAL	CARBIDE TOOLS: SPEED, FPM	FEED, IPT — CUTTER DIAMETER, IN PER TOOTH				TOOL MATERIAL
			1/4	1/2	3/4	1-2			1/4	1/2	3/4	1-2	
Solution Treated	.050	85	.001	.002	.003	.004	M-2, M-7	270	.001	.002	.004	.006	C-2
Double-Aged H 1150M	.050	90	.001	.002	.003	.004	M-2, M-7	275	.001	.002	.004	.006	C-2
Aged H 1075, H 1100, H 1150	.050	80	.001	.002	.003	.004	M-2, M-7	265	.001	.002	.004	.006	C-2
Aged H 1025	.050	65	.0005	.001	.002	.003	M-2, M-7	190	.001	.002	.003	.004	C-2
Aged H 900, H 925	.050	60	.0005	.001	.002	.003	T-15	90	.001	.002	.003	.004	C-2

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Additional machinability notes

When using carbide tools, surface speed feet/minute (sfpm) can be increased between 2 and 3 times over the high-speed suggestions. Feeds can be increased between 50 and 100%.

Figures used for all metal removal operations covered are average. On certain work, the nature of the part may require adjustment of speeds and feeds. Each job has to be developed for best production results with optimum tool life. Speeds or feeds should be increased or decreased in small steps.

Weldability	Custom 630 can be satisfactorily welded by the shielded fusion and resistance welding processes. Oxyacetylene welding is not recommended, since carbon pickup in the weld may occur. When a filler metal is required, AWS E/ER630 welding consumables should be considered to provide welds with properties matching those of the base metal. When designing the weld joint, care should be exercised to avoid stress concentrators, such as sharp corners, threads, and partial-penetration welds. When high weld strength is not needed, a standard austenitic stainless filler, such as E/ER308L, should be considered. Normally, welding in the solution-treated condition has been satisfactory; however, where high welding stresses are anticipated, it may be advantageous to weld in the overaged (H 1150) condition. Usually, preheating is not required to prevent cracking. If welded in the solution-treated condition, the alloy can be directly aged to the desired strength level after welding. However, the optimum combination of strength, ductility, and corrosion resistance is obtained by solution treating the welded part before aging. If welded in the overaged condition, the part must be solution treated and then aged.

Other information

Descaling (cleaning)	Descaling following forging and annealing can be accomplished by acid cleaning or grit blasting. The acid treatment consists of 2 minutes in 50% by volume muriatic acid at 180°F (82°C), followed by 4 minutes in a mixture 15% by volume nitric acid, plus 3% by volume hydrofluoric acid at room temperature. Water rinse and desmut in 20% by volume nitric acid at room temperature. Repeat cleaning procedure as necessary but decrease the times by 50% (i.e., 1 and 2 minutes, respectively). The heat tint from aging can be removed by polishing, vapor blasting, or pickling 4 to 6 minutes in a mixture of 15% by volume nitric acid, plus 3% by volume hydrofluoric acid, followed by a water rinse. Repeat the acid cleaning procedure if necessary, but decrease the time by 2 to 3 minutes. Desmut in 20% by volume nitric acid at room temperature. After acid cleaning, back 1 to 3 hours at 300/350°F (149/177°C) to remove hydrogen.

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For additional information, please contact your nearest sales office:

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