

comparative characteristics/application

TABLE 3.3 Comparative Characteristics and Applications

ALLOY AND TEMPER	RESISTANCE TO CORROSION		Workability (Cold) ⑤	Machinability ⑤	Brazability ⑥	WELDABILITY ⑥			SOME APPLICATIONS OF ALLOYS
	General ①	Stress-Corrosion Cracking ②				Gas	Arc	Resistance Spot and Seam	
1060-O H12 H14 H16 H18	A A A A	A A A A	A A B B	E E D D	A A A A	A A A A	A A A A	B A A A	Chemical equipment, railroad tank cars
1100-O H12 H14 H16 H18	A A A A	A A A A	A A B C	E E D D	A A A A	A A A A	A A A A	B A A A	Sheet metal work, spun hollowware, fin stock
1350-O H12, H111 H14, H24 H16, H26 H18	A A A A	A A A A	A A B B	E E D D	A A A A	A A A A	A A A A	B A A A	Electrical conductors
2011-T3 T4, T451 T8	D ③ D ③ D	D D B	C B D	A A A	D D D	D D D	D D D	D D D	Screw machine products
2014-O T3, T4, T451 T6, T651, T6510, T6511	.. D ③ D	.. C C	.. C D	D B B	D D D	D D D	D B B	B B B	Truck frames, aircraft structures
2017-T4, T451	D ③	C	C	B	D	D	B	B	Screw machine products, fittings
2018-T61	..	..	..	B	D	D	C	B	Aircraft engine cylinders, heads and pistons
2024-O T4, T3, T351, T3510, T3511 T361 T6 T861, T81, T851, T8510, T8511 T72	.. D ③ D ③ D D ..	.. C C B B ..	.. C D C D ..	D B B B B	D D D D D	D C D D D	D B C C C	D B B B B	Truck wheels, screw machine products, aircraft structures
2025-T6	D	C	..	B	D	D	B	B	Forgings, aircraft propellers
2036-T4	C	..	B	C	D	C	B	B	Auto body panel sheet
2117-T4	C	A	B	C	D	D	B	B	Rivets
2124-T851	D	B	D	B	D	D	C	B	Aircraft structures
2218-T61 T72	D D	C C	.. ..	.. B	D D	D D	C C	B B	Jet engine impellers and rings
2219-O T31, T351, T3510, T3511 T37 T81, T851, T8510, T8511 T87	.. D ③ D ③ D D	.. C C B B	.. C D D D	.. B B B B	D D D D D	D A A A A	A A A A A	B A A A A	Structural uses at high temperatures (to 600°F) High strength weldments
2618-T61	D	C	..	B	D	D	C	B	Aircraft engines
3003-O H12 H14 H16 H18 H25	A A A A A	A A A A A	A B C C B	E E D D D	A A A A A	A A A A A	A A A A A	B A A A A	Cooking utensils, chemical equipment, pressure vessels, sheet metal work, builder's hardware, storage tanks
3004-O H32 H34 H36 H38	A A A A	A A A A	A B C C	D D C C	B B B B	A A A A	A A A A	B A A A	Sheet metal work, storage tanks
3105-O H12 H14 H16 H18 H25	A A A A A	A A A A A	A B B C B	E E D D D	A A A A A	A A A A A	A A A A A	B A A A A	Residential siding, mobile homes, rain carrying goods, sheet metal work

For all numbered footnotes, see page 3-11.

TABLE 3.3 Comparative Characteristics and Applications (continued)

ALLOY AND TEMPER	RESISTANCE TO CORROSION		Workability (Cold) ⑤	Machinability ⑤	Brazability ⑥	WELDABILITY ⑥			SOME APPLICATIONS OF ALLOYS
	General ①	Stress-Corrosion Cracking ②				Gas	Arc	Resistance Spot and Seam	
4032-T6	C	B	..	B	D	D	B	C	Pistons
5005-O	A	A	A	E	B	A	A	B	Appliances, utensils, architectural, electrical conductor
H12	A	A	A	E	B	A	A	A	
H14	A	A	B	D	B	A	A	A	
H16	A	A	C	D	B	A	A	A	
H18	A	A	C	D	B	A	A	A	
H32	A	A	A	E	B	A	A	A	
H34	A	A	B	D	B	A	A	A	
H36	A	A	C	D	B	A	A	A	
H38	A	A	C	D	B	A	A	A	
5050-O	A	A	A	E	B	A	A	B	Builder's hardware, refrigerator trim, coiled tubes
H32	A	A	A	D	B	A	A	A	
H34	A	A	B	D	B	A	A	A	
H36	A	A	C	C	B	A	A	A	
H38	A	A	C	C	B	A	A	A	
5052-O	A	A	A	D	C	A	A	B	Sheet metal work, hydraulic tube, appliances
H32	A	A	B	D	C	A	A	A	
H34	A	A	B	C	C	A	A	A	
H36	A	A	C	C	C	A	A	A	
H38	A	A	C	C	C	A	A	A	
5056-O	A ④	B ④	A	D	D	C	A	B	Cable sheathing, rivets for magnesium, screen wire, zipper
H111	A ④	B ④	A	D	D	C	A	A	
H12, H32	A ④	B ④	B	D	D	C	A	A	
H14, H34	A ④	B ④	B	C	D	C	A	A	
H18, H38	A ④	C ④	C	C	D	C	A	A	
H192	B ④	D ④	D	B	D	C	A	A	
H392	B ④	D ④	D	B	D	C	A	A	
5083-O	A ④	A ④	B	D	D	C	A	B		Unfired, welded pressure vessels, marine, auto aircraft cryogenics, TV towers, drilling rigs, transportation equipment, missile components
H32 ⑧	A ④	A ④	C	D	D	C	A	A	
H321 ⑧	A ④	A ④	C	D	D	C	A	A	
H111	A ④	B ④	C	D	D	C	A	A	
H116 ⑧	A ④	A ④	C	D	D	C	A	A	
5086-O	A ④	A ④	A	D	D	C	A	B	
H32 ⑧	A ④	A ④	B	D	D	C	A	A	
H34	A ④	B ④	B	C	D	C	A	A	
H36	A ④	B ④	C	C	D	C	A	A	
H111	A ④	A ④	B	D	D	C	A	A	
H116 ⑧	A ④	A ④	B	D	D	C	A	A	
5154-O	A ④	A ④	A	D	D	C	A	B	Welded structures, storage tanks, pressure vessels, salt water service
H32	A ④	A ④	B	D	D	C	A	A	
H34	A ④	A ④	B	C	D	C	A	A	
H36	A ④	A ④	C	C	D	C	A	A	
H38	A ④	A ④	C	C	D	C	A	A	
5252-H24	A	A	B	D	C	A	A	A	Automotive and appliance trim
H25	A	A	B	C	C	A	A	A	
H28	A	A	C	C	C	A	A	A	
5254-O	A ④	A ④	A	D	D	C	A	B	Hydrogen peroxide and chemical storage vessels
H32	A ④	A ④	B	D	D	C	A	A	
H34	A ④	A ④	B	C	D	C	A	A	
H36	A ④	A ④	C	C	D	C	A	A	
H38	A ④	A ④	C	C	D	C	A	A	
5454-O	A	A	A	D	D	C	A	B	Welded structures, pressure vessels, marine service
H32	A	A	B	D	D	C	A	A	
H34	A	A	B	C	D	C	A	A	
H111	A	A	B	D	D	C	A	A	
5456-O	A ④	B ④	B	D	D	C	A	B	High strength welded structures, pressure vessels, marine applications, storage tanks
H32 ⑧	A ④	B ④	C	D	D	C	A	A	
H321 ⑧	A ④	B ④	C	D	D	C	A	A	
H116 ⑧	A ④	B ④	C	D	D	C	A	A	
5457-O	A	A	A	E	B	A	A	B	
5652-O	A	A	A	D	C	A	A	B	Hydrogen peroxide and chemical storage vessels
H32	A	A	B	D	C	A	A	A	
H34	A	A	B	C	C	A	A	A	
H36	A	A	C	C	C	A	A	A	
H38	A	A	C	C	C	A	A	A	

For all numbered footnotes, see page 3-11.

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TABLE 3.3 Comparative Characteristics and Applications (concluded)

ALLOY AND TEMPER	RESISTANCE TO CORROSION		Workability (Cold) ⑤	Machinability ⑤	Brazability ⑥	WELDABILITY ⑥			SOME APPLICATIONS OF ALLOYS
	General ①	Stress-Corrosion Cracking ②				Gas	Arc	Resistance Spot and Seam	
5657-H241 H25 H26 H28	A A A A	A A A A	A B B C	D D D D	B B B B	A A A A	A A A A	A A A A	Anodized auto and appliance trim
6005-T1, T5 6005A-T1, T5 6005A-T61	B B B	A A A	.. .. C	.. C C	A A A	A A A	A A A	A A A	Truck, marine, railroad car Extruded profiles, structures, ladders, construction
6053-O T6, T61	.. A	.. A	.. ..	E C	B B	A A	A A	B A	Wire and rod for rivets
6061-O T4, T451, T4510, T4511 T6, T651, T652, T6510, T6511	B B B	A B A	A B C	D C C	A A A	A A A	A A A	B A A	Heavy-duty structures requiring good corrosion resistance, truck and marine, railroad cars, furniture, pipelines
6063-T1 T4 T5, T52 T6 T83, T831, T832	A A A A A	A A A A A	B B B C C	D D C C C	A A A A A	A A A A A	A A A A A	A A A A A	Pipe railing, furniture, architectural extrusions
6066-O T4, T4510, T4511 T6, T6510, T6511	C C C	A B B	B C C	D C B	D D D	D D D	B B B	B B B	Forgings and extrusion for welded structures
6070-T4, T4511 T6	B B	B B	B C	C C	D D	A A	A A	A A	Heavy duty welded structures, pipelines
6082-T6, T6511	B	A	C	C	A	A	A	A	Heavy-duty structures requiring good corrosion resistance, truck and marine, railroad cars, furniture, pipelines
6101-T6, T63 T61, T64	A A	A A	C B	C D	A A	A A	A A	A A	High strength bus conductors
6151-T6, T652	..	..	..	..	B	..	..	..	Moderate strength, intricate forgings for machine and auto parts
6201-T81	A	A	..	C	A	A	A	A	High strength electric conductor wire
6262-T6, T651, T6510, T6511 T9	B B	A A	C D	B B	B B	B B	B B	A A	Screw machine products
6351-T1 T4 T5 T6	.. A A A	.. .. .. ..	C C C C	C C C C	C C C C	B B B B	A A A A	B B A A	Extruded profiles, structurals, pipe and tube
6463-T1 T5 T6	A A A	A A A	B B C	D C C	A A A	A A A	A A A	A A A	Extruded architectural and trim sections
6951-T42, T62	..	..	..	..	A	A	A	A	
7005-T53	..	..	..	..	B	C	A	A	
7049-T73, T7352	C	B	D	B	D	D	D	B	Aircraft forgings
7050-T73510, T73511 T74 ⑦, T7451 ⑦, T74510 ⑦, T74511 ⑦, T7452 ⑦, T7651, T76510, T76511	C	B	D	B	D	D	D	B	Aircraft and other structures
7075-O T6, T651, T652, T6510, T6511 T73, T7351	.. C ③ C	.. C B	.. D D	D B B	D D D	D D D	D D D	B B B	Aircraft and other structures
7175-T74, T7452, T7454	C	B	D	B	D	D	C	B	
7178-O T6, T651, T6510, T6511	.. C ③	.. C	.. D	.. B	D D	D D	D D	B B	Aircraft and other structures
7475-O 7475-T61, -T651 7475-T761, T7351	.. C C	.. C B	.. D D	.. B B	D D D	D D D	D B D	B B B	Shell Casings Aircraft & Other Structures
8017-H12, H22, H221	A	A	A	D	A	A	A	A	Electrical conductors
8030-H12, H221	A	A	A	E	A	A	A	A	Electrical conductors
8176-H14, H24	A	A	A	D	A	A	A	A	Electrical conductors

For all numbered footnotes, see page 3-11.

Notes for Table 3.3

① Ratings A through E are relative ratings in decreasing order of merit, based on exposures to sodium chloride solution by intermittent spraying or immersion. Alloys with A and B ratings can be used in industrial and seacoast atmospheres without protection. Alloys with C, D and E ratings generally should be protected at least on faying surfaces.

② Stress-corrosion cracking ratings are based on service experience and on laboratory tests of specimens exposed to the 3.5% sodium chloride alternate immersion test.

A = No known instance of failure in service or in laboratory tests.

B = No known instance of failure in service; limited failures in laboratory tests of short transverse specimens.

C = Service failures with sustained tension stress acting in short transverse direction relative to grain structure; limited failures in laboratory tests of long transverse specimens.

D = Limited service failures with sustained longitudinal or long transverse areas.

These ratings are neither product specific nor test direction specific and therefore indicate only the general level of stress-corrosion cracking resistance. For more specific information on certain alloys, see ASTM G64.

③ In relatively thick sections the rating would be E.

④ This rating may be different for material held at elevated temperature for long periods.

⑤ Ratings A through D for Workability (cold), and A through E for Machinability, are relative ratings in decreasing order of merit.

⑥ Ratings A through D for Weldability and Brazeability are relative ratings defined as follows:

A = Generally weldable by all commercial procedures and methods.

B = Weldable with special techniques or for specific applications that justify preliminary trials or testing to develop welding procedure and weld performance.

C = Limited weldability because of crack sensitivity or loss in resistance to corrosion and mechanical properties.

D = No commonly used welding methods have been developed.

⑦ T74 type tempers, although not previously registered, have appeared in various literature and specifications as T736 type tempers.

⑧ 5xxx products in the -H116 and H32X tempers have similar properties and have the same testing requirements, but are produced by different practices. The -H116 and -H321 tempers are typically used in marine and other applications requiring demonstrations of intergranular and exfoliation corrosion resistance. Products in the -H32 temper have similar tensile properties and while production methods may be similar, corrosion testing requirements are different, therefore, -H32 temper products shall not be substituted for -H116 or -H321 products.