

ZERON 100 is a 25% chromium super duplex stainless steel. Duplex stainless steels are a family of stainless steels with dual phase structure. Roughly 50 percent of the structure is ferrite (like 400 series stainless) and 50 percent is austenite (structure of 300 series stainless). ZERON 100 is a more highly alloyed and higher performance grade of stainless steel than 316L or the common duplex grade, 2205. 2205 contains 22 Cr, 5.5 Ni, and 3.1 Mo. By comparison, ZERON 100 contains 25 Cr, 7 Ni, 3.5 Mo with nitrogen, tungsten, and copper additions. For this reason ZERON 100 is termed a super duplex stainless steel.

Questions

Answers

1. What are some typical applications where ZERON 100 is successfully used?

ZERON 100 has found its most significant usage in seawater applications, sour gas applications, and in sulfuric acid service. As a result, it has been utilized extensively in seawater reverse osmosis desalination systems, offshore oil & gas exploration, downhole oil wells, and in mining and flue gas desulfurization applications.

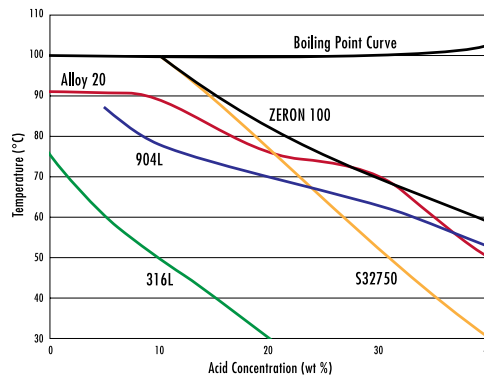
2. What alloys would I consider ZERON 100 to potentially replace?

ZERON 100 is commonly used as an upgrade to 2205 and 316L stainless. It is an alternate to other superduplex stainless steels such as 2507 or alloy 255. It is also considered to replace higher nickel alloys such as 904L, 6% molybdenum stainless steels (AL-6XN® and 254 SMO®), and in some cases alloy 625 and C-276.

3. How does ZERON 100 compare to other superduplex grades?

ZERON 100 (S32760) differs from 2507 (S32750) because of its additions of copper and tungsten. Both are added at about 0.6% to ZERON 100. These elements provide additional resistance in acid service such as sulfuric or hydrochloric acid. Both superduplex grades have very high strength and have similar resistance to seawater. ZERON 100 is available in all product forms from stock, whereas 2507 is available in limited product forms. Additional comparative information is available upon request.

Iso-Corrosion curves (0.1 mm/y) for some stainless steels in dilute sulfuric acid



4. What is the relative cost of ZERON 100 to some common corrosion alloys?

Generally, ZERON 100 will be more expensive than 316L or 2205. It is less expensive than 6% molybdenum stainless and nickel alloys. Pricing ratios can fluctuate significantly with the cost of raw materials such as nickel and molybdenum and also by product form. Current price information to other grades in the appropriate size, quantity, and product form can be found at www.rolledalloys.com or contact our sales department.

5. What materials specifications cover ZERON 100?

UNS	S32760 (J93380 Castings)	W.Nr./EN	1.4501 (1.4508 Castings)
ASME	B16.5, B16.34, B16.47, B31.3, Section VIII Division 1 Case 2244-2, 2245-1, Section III Division 1 Case N-564-2		
ASTM	A 182 (Grade F55), A 240, A 276, A 314, A 473, A 479, A 789, A 790, A 815, A 890, A 928, A 988, A 995,		
EUROPEAN	EN 10028-7, EN 10088-2, EN 10088-3, EN 10272, EN 10216-5, EN 10217-7		
NACE	ISO 15156 / MR0175 Part 3		
API	5LC		
BSI	PD 5500 - Enquiry Case 5500/87		

6. Is ZERON 100 included in the ASME Code?

ZERON 100 (UNS S32760) is covered for ASME Section VIII, Division 1 construction by code case 2245 and in Section III, Division 1 by Case N-564-2. It is also included in B16.5 (Pipe Flanges and Flanged Fittings), B16.34 (Valves - Flanged, Threaded, and Welding End), 16.47 (Large Diameter Steel Flanges: NPS 26 through NPS 60), B31.3 (Process Piping).

Temp, °F	100	200	300	400	500	600
ZERON 100 ¹	31.1 ksi	31.0 ksi	29.4 ksi	29.0 ksi	29.0 ksi	29.0 ksi
2205 ¹	25.7 ksi	25.7 ksi	24.8 ksi	23.9 ksi	23.3 ksi	23.1 ksi
AL-6XN®	27.1 ksi	27.1 ksi	25.7 ksi	24.6 ksi	23.8 ksi	23.3 ksi
ZERON 100 ²	36.3 ksi	35.9 ksi	34.4 ksi	34.0 ksi	34.0 ksi	34.0 ksi

¹ASME Section VIII, Division 1; ²ASME B31.3

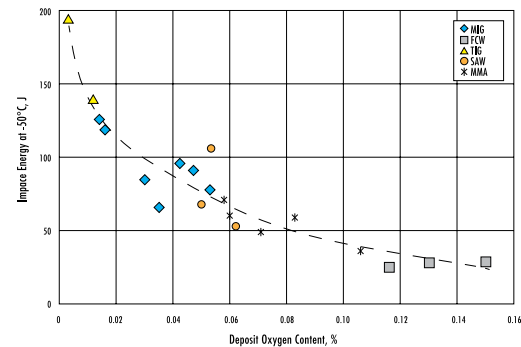
7. What is the useful temperature range for ZERON 100?

Because of its duplex structure, ZERON 100 is suggested to be used between -100°F and 600°F. Long term exposure to temperatures above 600°F can lead to the precipitation of intermetallic phases in duplex stainless steels. These phases can reduce toughness and corrosion resistance.

8. How easy is ZERON 100 to fabricate?

ZERON 100 is fabricated using methods consistent with other stainless steels. Welding can be performed using ZERON 100X overmatching fillers and GMAW, GTAW, SAW or SMAW processes typically. Flux cored wires are available however the FCAW process typically results in welds with high oxygen contents and low toughness levels. As a result, poor Charpy impact test results could be expected.

Forming ZERON 100 products does require more force and greater springback can be expected due to its much higher minimum yield strength than standard stainless steels. For comparison ZERON 100 has a minimum yield strength at room temperature of 85,000 psi, whereas 316L stainless is 30,000 psi minimum. ZERON 100 cannot be bent to as tight a radius as 316L stainless. A 2T internal bend radius is suggested. By comparison in ASTM A240, ZERON 100 plate is 25% minimum elongation, whereas, 316L plate requires 40% minimum elongation. Additional information can be found in Bulletin 105 (Welding Guidelines for ZERON 100)



9. If I have experience welding other duplexes do I need to requalify to weld ZERON 100 products and what AWS Classifications cover ZERON 100X weld products?

No. ZERON 100 (S32760) is assigned to the same P group in the ASME Section IX as 2205 and other duplex stainless steels. This is P group 10H Group 1. ZERON 100X filler is made to AWS Classifications. ER2594 (AWS A5.9) covers GMAW and GTAW bare wires. Bare wire fillers are assigned to F number 6 in ASME Section IX. Covered electrodes are to E2595-15 (AWS A5.4). The F number for all A5.4 electrodes is 5 according to ASME Section IX.

10. What product forms are available?

Plate, sheet, round bar, pipe, fittings, forgings, and weld wires are carried by Rolled Alloys® in both the USA and U.K. Additionally, round bar in the strain hardened condition or fastener grade (ZERON 100 FG) is available in diameters from 1/2 to 2-1/2 inch. This product provides higher strength than standard annealed ZERON 100 round bar.

Welded and seamless tubing is produced in ZERON 100, but not carried in Rolled Alloys inventory. Recent product developments include ZERON 100 high strength wire line for down hole use and long seam welded tube for heat exchanger, instrumentation tube, subsea umbilical and flying lead applications.

11. If I mix ZERON 100 with other superduplexes, is there a potential for galvanic corrosion?

ZERON 100 is galvanically compatible with other superduplex stainless steels, 6% molybdenum stainless steels and also C-276 in seawater solutions. It is possible to mix them in an assembly if necessary provided the proper welding consumable is used.

12. Where can I get more information on ZERON 100?

Our website www.rolledalloys.com provide downloadable brochures in PDF format that include our ZERON 100 alloy data sheet (Rolled Alloys Bulletin 104), ZERON 100 Welding Guidelines (Rolled Alloys Bulletin 105), and case histories. You may also contact a Rolled Alloys sales representative and request further information.



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