

CHROMESHIELD® 29 Mo

STAINLESS STEEL



Chimney Liners

Condenser Tubing

Furnace Vents

Heat Exchangers



CLEVELAND-CLIFFS CHROMESHIELD® 29 Mo STAINLESS STEEL is a superferritic grade that has outstanding resistance to chloride-induced pitting, crevice corrosion and stress corrosion cracking (SCC). High chromium (Cr) superferritic stainless steel alloys have become the industry standard in thin-walled, small-diameter tubing used in residential secondary heat exchangers. These steels are often used in industrial power plant condenser tubing, especially in brackish water environments. Furnace vents and chimney liners employ this high chromium alloy grade when condensate corrosion is a concern. CHROMESHIELD 29 Mo Stainless Steel can be an alternative to titanium (Ti) and high nickel (Ni) grades.

Product Description

CHROMESHIELD® 29 Mo Stainless Steel provides excellent resistance to chloride pitting and crevice corrosion in the most aggressive environments. This grade is dual stabilized with both titanium and niobium (Nb) to improve weld performance. CHROMESHIELD 29 Mo Stainless Steel meets all requirements for UNS S44735.

| Composition | | (wt %) |
|------------------------------|------|--------------------------|
| Carbon | (C) | 0.03 max. |
| Manganese | (Mn) | 1.00 max. |
| Phosphorus | (P) | 0.04 max. |
| Sulfur | (S) | 0.03 max. |
| Silicon | (Si) | 1.00 max. |
| Chromium | (Cr) | 28.0 – 30.0 |
| Nickel | (Ni) | 1.0 max. |
| Nitrogen | (N) | 0.045 max. |
| Molybdenum | (Mo) | 3.60 – 4.20 |
| Titanium + Niobium (Ti + Nb) | | 0.20 – 1.00; 6(C+N) min. |

AVAILABLE FORMS

CHROMESHIELD 29 Mo Stainless Steel is available in gauges from 0.012 – 0.050 in. (0.30 – 1.30 mm) and in widths potentially up to 36 in. (914.4 mm) wide. Contact your Cleveland-Cliffs representative for additional information.

Properties

TABLE 1 – ROOM TEMPERATURE MECHANICAL PROPERTIES

| | UTS, ksi. (MPa) | YS, ksi. (MPa) | Elongation % in 2 in. (50.8 mm) | Rockwell Hardness |
|------------------------|--------------------|-------------------|------------------------------------|----------------------|
| UNS S444735 | 80 (550) min. | 60 (415) min. | 18 min. | C25 max. |
| CHROMESHIELD® 29 Mo SS | 99.4 (685) | 76.7 (530) | 26 | B88 |

*Property standards required by ASTM A240..

CORROSION RESISTANCE

CHROMESHIELD 29 Mo Stainless Steel is highly resistant to pitting and crevice corrosion. Corrosion testing to various industry standards has shown CHROMESHIELD 29 Mo Stainless Steel to perform in accordance to published data on competitive superferritic alloys. Standard corrosion tests are based on immersion in several ferric chloride solutions at various temperatures and durations.

TABLE 2 – PITTING AND CREVICE CORROSION TESTING

| Corrosion Test | Duration | Result |
|----------------------------------------------------------------------|----------|----------------------------------------------------------|
| ASTM G48 Method A Pitting | 72 hours | Pass 71° F (22° C), Pass 122° F (50° C) |
| ASTM G48 Method B Crevice | 72 hours | Pass 71° F (22° C), Pass 122° F (50° C) |
| ASTM G48 Method E Critical Pitting Temperature | 24 hours | Critical Pitting Temperature = 176° F (80° C) |
| Modified ASTM G48 Method B (solution pH = 0.75, 100.5° F (38° C)) | 24 hours | Pass with no mass loss and no signs of crevice corrosion |

WELDABILITY

CHROMESHIELD 29 Mo Stainless Steel can be welded by gas tungsten arc welding (GTAW) or Laser Beam Welding (LBW) techniques. The weld Heat Affected Zone (HAZX) should be shielded with an inert gas to limit oxidation. Any heat tint should be removed after welding to restore corrosion resistance. Minimize heat input during welding to prevent coarsening of the grain structure in the HAZ. Contact Cleveland-Cliffs for additional welding information.



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About Cleveland-Cliffs Inc.

Cleveland-Cliffs is the largest flat-rolled steel producer in North America. Founded in 1847 as a mine operator, Cliffs also is the largest manufacturer of iron ore pellets in North America. The Company is vertically integrated from mined raw materials and direct reduced iron to primary steelmaking and downstream finishing, stamping, tooling, and tubing. The Company serves a diverse range of markets due to its comprehensive offering of flat-rolled steel products and is the largest steel supplier to the automotive industry in North America. Headquartered in Cleveland, Ohio, Cleveland-Cliffs employs approximately 25,000 people across its mining, steel and downstream manufacturing operations in the United States and Canada.



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