AFM ERTi-1 & 2

AWS/SFA A5.16

Description:

AFM ERTi-1 & 2 alloys commonly are referred to as commercially pure (C.P.) titanium with the level of impurities and mechanical properties increasing slightly from ERTi-1 to ERTi-4. C.P. Grade 2 (ERTi-2) is the most widely used titanium alloy for industrial applications because of its good balance of strength, formability, and weldability.

Applications:

AFM ERTi-1 & 2 are typically used in seawater and brackish water heat exchangers, chemical process heat exchangers, pressure vessels and piping systems, pulp bleaching systems, air pollution control scrubbers, and electrochemical and chemical storage tanks. These grades also have some uses in the aerospace industry.

Chemical Composition Requirements (%):

	ERTi-1	ERTi-2
C	0.03	0.03
O	0.10	0.10
H	0.005	0.008
N	0.015	0.020
Fe	0.10	0.20

All values are considered maximum, unless otherwise noted.

Standard Sizes:

.030 (0.8), .035 (0.9), .045 (1.2), 1/16 (1.6), 3/32 (2.4), 1/8 (3.2), 5/32 (4.0)

AFM ERTi-5

AWS/SFA A5.16

Description:

AFM ERTi-5 alloy is commonly referred to as “6-4” titanium and is probably the most widely used titanium alloy. Its high strength, ability to be heat treated, weldability, excellent fatigue strength, and hardness make this alloy excellent for industrial fans, pressure vessels, aircraft components, compressor blades, and automotive and jet engine parts.

Chemical Composition Requirements (%):

C	0.05
O	0.18
H	0.015
N	0.030
Al	5.5-6.7
V	3.5-4.5
Fe	0.30
Yt	0.005

All values are considered maximum, unless otherwise noted.

Standard Sizes:

.030 (0.8), .035 (0.9), .045 (1.2), 1/16 (1.6), 3/32 (2.4), 1/8 (3.2), 5/32 (4.0)

AFM ERTi-5ELI

AWS/SFA A5.16

Description:

AFM ERTi-5ELI alloy is a slightly purer version of ERTi-5 with ELI (Extra Low Interstitial) content, which, in practice, refers to primarily the oxygen content. With special processing, this alloy can develop high fracture toughness. Primary uses are in surgical implants, cryogenic vessels, and airframe components.

Chemical Composition Requirements (%):

C	0.03
O	0.10
H	0.005
N	0.012
Al	5.5-6.5
V	3.5-4.5
Fe	0.15
Yt	0.005

All values are considered maximum, unless otherwise noted.

Standard Sizes:

.030 (0.8), .035 (0.9), .045 (1.2), 1/16 (1.6), 3/32 (2.4), 1/8 (3.2), 5/32 (4.0)

AFM ERTi-7

AWS/SFA A5.16

Description:

AFM ERTi-7 is probably the most corrosion resistant titanium weld metal in industrial applications. Mechanical and physical properties are similar to those of ERTi-2. This alloy extends the use of titanium into mildly reducing media, to much higher chloride levels, or where the environment fluctuates between oxidizing and reducing.

Chemical Composition Requirements (%):

C	0.03
O	0.10
H	0.008
N	0.020
Fe	0.20
Pd	0.12-0.25

All values are considered maximum, unless otherwise noted.

Standard Sizes:

.030 (0.8), .035 (0.9), .045 (1.2), 1/16 (1.6), 3/32 (2.4), 1/8 (3.2), 5/32 (4.0)

WELDING CONSIDERATIONS

Titanium and titanium alloys can be welded by gas tungsten arc, gas metal arc, plasma arc and electron beam welding processes. Titanium is a reactive metal and is sensitive to embrittlement by oxygen, nitrogen, and hydrogen, at temperatures above 500°F (260°C). Consequently, the metal must be protected from atmospheric contamination. This can be provided by shielding the metal with high purity inert gas in air or in a chamber, or by a vacuum of at least 10^{-4} torr. During arc welding, the titanium should be shielded from the atmosphere until it has cooled below about 800°F (430°C). Adequate protection by auxiliary inert gas shielding can be provided when welding in air, but ventilation and exhaust at the arc should be carried out in such a manner that the protective atmosphere (arc shielding and backing) are not impaired. For critical applications, the welding should be done in a gas tight chamber thoroughly purged of air and filled with high purity inert gas.

The titanium metal should be free of thick oxide and chemically clean prior to welding, as contamination from oxide, water, grease, or dirt will also cause embrittlement.

Titanium welding rods should be chemically clean and free of heavy oxide, absorbed moisture, grease, and dirt. The welding rod should be kept in the inert gas during welding, and the oxide at the tip, formed upon cooling, should be removed before using the rod.

Titanium can be successfully fusion welded to zirconium, tantalum, niobium, and vanadium, although the weld metal will be stronger and less ductile than the parent metals. Titanium should not be fusion welded to other commonly welded metals such as copper, iron, nickel, and aluminum, as brittle titanium intermetallic alloys are formed which produce extremely brittle welds.