



Designation: B861 – 24

Standard Specification for Titanium and Titanium Alloy Seamless Pipe¹

This standard is issued under the fixed designation B861; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers the requirements for 34 grades of titanium and titanium alloy seamless pipe intended for general corrosion resisting and elevated temperature service as follows:

- 1.1.1 *Grade 1*—UNS R50250. Unalloyed titanium,
- 1.1.2 *Grade 2*—UNS R50400. Unalloyed titanium,
 - 1.1.2.1 *Grade 2H*—UNS R50400. Unalloyed titanium (Grade 2 with 58 ksi (400 MPa) minimum UTS),
- 1.1.3 *Grade 3*—UNS R50550. Unalloyed titanium,
- 1.1.4 *Grade 5*—UNS R56400. Titanium alloy (6 % aluminum, 4 % vanadium),
- 1.1.5 *Grade 7*—UNS R52400. Unalloyed titanium plus 0.12 % to 0.25 % palladium,
 - 1.1.5.1 *Grade 7H*—UNS R52400. Unalloyed titanium plus 0.12 % to 0.25 % palladium (Grade 7 with 58 ksi (400 MPa) minimum UTS),
- 1.1.6 *Grade 9*—UNS R56320. Titanium alloy (3 % aluminum, 2.5 % vanadium),
- 1.1.7 *Grade 11*—UNS R52250. Unalloyed titanium plus 0.12 % to 0.25 % palladium,
- 1.1.8 *Grade 12*—UNS R53400. Titanium alloy (0.3 % molybdenum, 0.8 % nickel),
- 1.1.9 *Grade 13*—UNS R53413. Titanium alloy (0.5 % nickel, 0.05 % ruthenium),
- 1.1.10 *Grade 14*—UNS R53414. Titanium alloy (0.5 % nickel, 0.05 % ruthenium),
- 1.1.11 *Grade 15*—UNS R53415. Titanium alloy (0.5 % nickel, 0.05 % ruthenium),
- 1.1.12 *Grade 16*—UNS R52402. Unalloyed titanium plus 0.04 % to 0.08 % palladium,
 - 1.1.12.1 *Grade 16H*—UNS R52402. Unalloyed titanium plus 0.04 % to 0.08 % palladium (Grade 16 with 58 ksi (400 MPa) minimum UTS),
- 1.1.13 *Grade 17*—UNS R52252. Unalloyed titanium plus 0.04 % to 0.08 % palladium,

¹ This specification is under the jurisdiction of ASTM Committee B10 on Reactive and Refractory Metals and Alloys and is the direct responsibility of Subcommittee B10.01 on Titanium.

Current edition approved April 1, 2024. Published April 2024. Originally approved in 1995. Last previous edition approved in 2019 as B861 – 19. DOI: 10.1520/B0861-24.

- 1.1.14 *Grade 18*—UNS R56322. Titanium alloy (3 % aluminum, 2.5 % vanadium plus 0.04 % to 0.08 % palladium),
- 1.1.15 *Grade 19*—UNS R58640. Titanium alloy (3 % aluminum, 8 % vanadium, 6 % chromium, 4 % zirconium, 4 % molybdenum),
- 1.1.16 *Grade 20*—UNS R58645. Titanium alloy (3 % aluminum, 8 % vanadium, 6 % chromium, 4 % zirconium, 4 % molybdenum) plus 0.04 % to 0.08 % palladium,
- 1.1.17 *Grade 21*—UNS R58210. Titanium alloy (15 % molybdenum, 3 % aluminum, 2.7 % niobium, 0.25 % silicon),
- 1.1.18 *Grade 23*—UNS R56407. Titanium alloy (6 % aluminum, 4 % vanadium, extra low interstitial, ELI),
- 1.1.19 *Grade 24*—UNS R56405. Titanium alloy (6 % aluminum, 4 % vanadium) plus 0.04 % to 0.08 % palladium,
- 1.1.20 *Grade 25*—UNS R56403. Titanium alloy (6 % aluminum, 4 % vanadium) plus 0.3 % to 0.8 % nickel and 0.04 % to 0.08 % palladium,
- 1.1.21 *Grade 26*—UNS R52404. Unalloyed titanium plus 0.08 % to 0.14 % ruthenium,
 - 1.1.21.1 *Grade 26H*—UNS R52404. Unalloyed titanium plus 0.08 % to 0.14 % ruthenium (Grade 26 with 58 ksi (400 MPa) minimum UTS),
- 1.1.22 *Grade 27*—UNS R52254. Unalloyed titanium plus 0.08 % to 0.14 % ruthenium,
- 1.1.23 *Grade 28*—UNS R56323. Titanium alloy (3 % aluminum, 2.5 % vanadium plus 0.08 % to 0.14 % ruthenium),
- 1.1.24 *Grade 29*—UNS R56404. Titanium alloy (6 % aluminum, 4 % vanadium, extra low interstitial, ELI plus 0.08 % to 0.14 % ruthenium),
- 1.1.25 *Grade 33*—UNS R53442. Titanium alloy (0.4 % nickel, 0.015 % palladium, 0.025 % ruthenium, 0.15 % chromium),
- 1.1.26 *Grade 34*—UNS R53445. Titanium alloy (0.4 % nickel, 0.015 % palladium, 0.025 % ruthenium, 0.15 % chromium),
- 1.1.27 *Grade 35*—UNS R56340. Titanium alloy (4.5 % aluminum, 2 % molybdenum, 1.6 % vanadium, 0.5 % iron, 0.3 % silicon),
- 1.1.28 *Grade 36*—UNS R58450. Titanium alloy (45 % niobium),
- 1.1.29 *Grade 37*—UNS R52815. Titanium alloy (1.5 % aluminum), and