

## Ti-6Al-4V-ELI Small-diameter Pipe

### 1. Introduction of Ti-6Al-4V

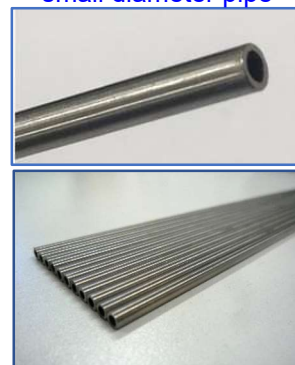
Ti-6Al-4V-ELI (Extra Low Interstitial material) containing 6% of aluminum and 4% of vanadium has **biocompatibility**, corrosion resistance, and the **twice toughness of that of pure titanium**. This alloy is widely used for artificial bones and joints in medical use, and parts for an aircraft, chemical plant, and car in industrial use, accounting for about 70% of the market.

### 2. Characteristics of Ti-6Al-4V-ELI

Unlike  $\beta$ -titanium, Ti-6Al-4V has been a difficult material to be formed in a small -diameter pipe because of its difficulty in cool rolling processing. FUTA-Q has finally succeeded in producing the small-size pipe of Ti-6Al-4V ELI (Extra Low Interstitial material).

This pipe must have a wide variety of possible applications including medical apparatus having better corrosion resistance, reduced weight instruments, and pipe components taking advantage of the strength properties, and should be able to replace components made of SUS316L.

Ti-6Al-4V-ELI  
small diameter pipe



Properties (* by universal tester)	TI-6Al-4V ELI	SUS316L (hard-drawn)	Pure titanium (2nd grade)
Tensile strength*	1058 Mpa	1064 Mpa	483 Mpa
0.2% proof stress*	879 Mpa	803 Mpa	333 Mpa
Vickers hardness	390 HV	365 HV	144 HV
Density	4.42 g/cm <sup>3</sup>	7.9 g/cm <sup>3</sup>	4.51 g/cm <sup>3</sup>

### 3. New heat treatment equipment

We have introduced a vacuum heat treatment furnace to process a long size pipe at a superhigh temperature of **1200°C**. This process can prevent the pipe surface from being oxidized under a high vacuum.

Maximum treatment temperature: 1200°C

Reachable vacuum degree: 10<sup>-4</sup> Pa

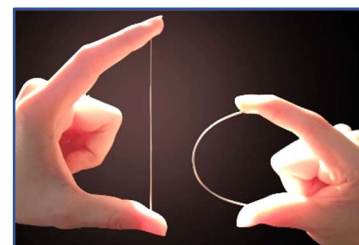
Length of the core treatment tube: 2.8 m

Vacuum heat-treatment furnace



### 4. Heat treatments for $\beta$ -titanium alloys

Unlike SUS316L,  $\beta$ -titanium can be conducted with aging treatment. Various kinds of  $\beta$ -titanium alloys having different properties can be obtained with different parameters in heat treatment in which heated to a high temperature followed by cooled slowly or quickly. Hard-to-break  $\beta$ -titanium pipes having a different tensile strength or an improved surface hardness are also available .



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