



DATA SHEET No 17

Cold Worked High Strength Commercially Pure Titanium

(March 2006)

Titanium offers many advantages to the designer and engineer, including excellent corrosion resistance, high strength-weight ratio and good formability.

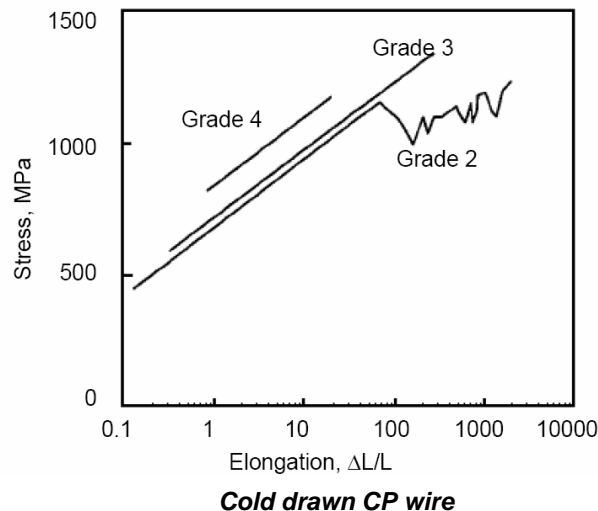
Many titanium alloys are in use, although the Commercially Pure (CP) grades 1 to 4 and Ti 6Al-4V (grade 5) are the most common grades. CP grades have excellent corrosion resistance and medium strength and come at a lower cost to grade 5, which has higher strength

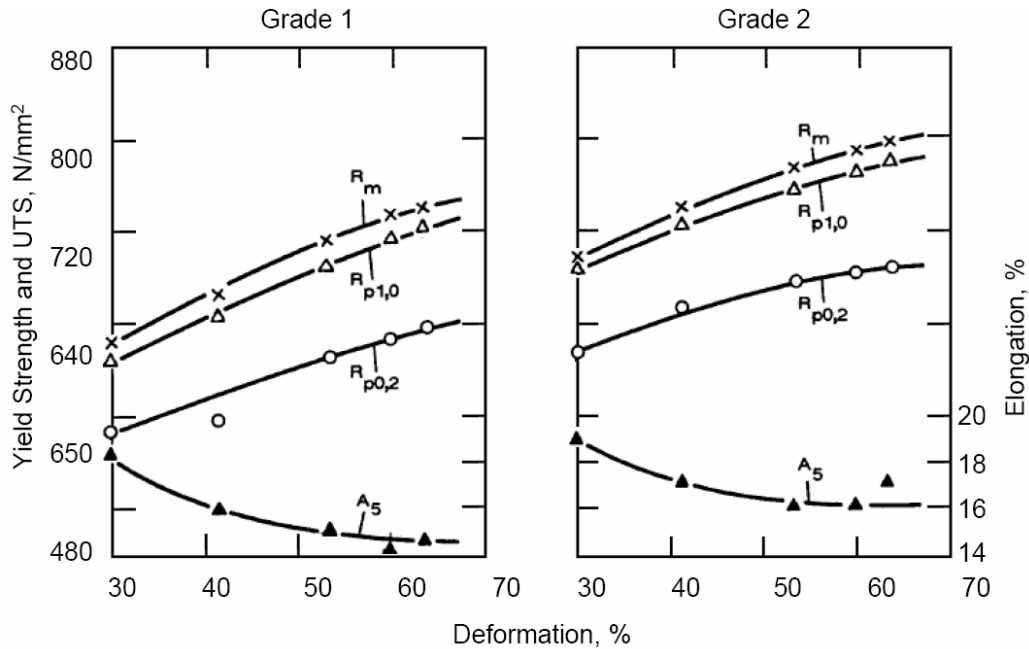
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
UTS, MPa	241	345	448	552	896

Min UTS values for titanium grades

Unlike Ti 6Al-4V, the CP grades cannot be heat treated to higher strength. Standards will only list minimum mechanical properties usually in the annealed condition (Ti 6Al-4V will also have properties listed in the Solution Treated and Aged condition), but this ignores the fact that metals, including titanium, can be cold worked to higher strength.

Cold working the CP grades, for example by drawing into wire, allows much higher strengths to be achieved than listed in the specifications. The graphs below show the increase in strength that can be achieved.





Cold rolled CP sheet

It is clear from the above that higher strengths than listed in the specifications can be achieved without a severe impact on ductility. Cold drawn commercially pure titanium has been used as an orthopaedic implant material without suffering from stress corrosion cracking. Collaboration between end users and cold drawers could therefore ensure the delivery of high strength material at lower cost than usual.

FOR FURTHER INFORMATION

TIG, tel. +44 (0) 1709 722 463
 Fax. +44 (0) 1709 724 999, enquiries@titaniuminfogroup.co.uk
 www.titaniuminfogroup.com

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