



Hardide-T

Tough, ductile and impact resistant coating for use in extremely abrasive and erosive environments

Hardide Coatings

Hardide® is a family of low temperature CVD (chemical vapour deposition) tungsten carbide/tungsten metal matrix composite coatings that extend the life of critical metal components. The coatings have a unique combination of abrasion, erosion and chemical resistant properties while being tough, ductile and impact resistant.

Hardide-T

Hardide-T has enhanced toughness and is suitable for heavy duty applications in extremely abrasive and erosive environments where a thicker coating (typically 50 microns) is required or in applications involving shock loads where impact resistance is required.

Hardide-LT is an ultra-low temperature variant of Hardide-T which is suitable for coating grades of steel and alloys sensitive to the 500°C / 932°F process temperature. It is produced at the significantly reduced temperature of 350°C / 662°F

- Can be applied to both internal and external surfaces, including complex shapes uniformly
- Smooth, uniform as-coated surface minimises expensive grinding and finishing operations
- Easily applied to a wide range of metallic substrates including ferrous and nickel-based alloys, and most grades of stainless and carbon steels
- Applications include downhole tools, valves, flow control components, pumps, sealing and bearing surfaces, heavy duty earth-moving equipment, hydraulics, powder compaction and tool & die
- Industries served include oil and gas, aerospace, petrochemical, valves, pumps, material processing, power generation, steam and industrial gas turbines, industrial production tooling, pulp and paper processing, food manufacturing and motorsport

Hardide Coatings' UK and USA manufacturing sites are approved to ISO 9001 and aerospace AS 9100 certification. The UK site is also accredited to Nadcap and ISO 14001.

The specification is intended to illustrate typical properties. Engineering data is representative. Property values vary somewhat with method of manufacture, size, and shape of part. Any suggested applications are not made as a representation or warranty that the material will ultimately be suitable for such applications. The customer is ultimately responsible for all design and material suitability decisions. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which Hardide Coatings assumes legal responsibility. Any warranty or representation for which Hardide Coatings is responsible shall be subject to a separately negotiated agreement.

Hardide Coatings Limited

11 Wedgwood Road, Bicester, Oxfordshire OX26 4UL, UK
Tel: +44 (0)1869 353 830

Email: info@hardide.com

Hardide Coatings, Inc.

444 Hollie Drive, Martinsville, VA 24112, USA
Tel: +1 (713) 677-3504

www.hardide.com

Key Properties for Hardide-T

PARAMETER	HARDIDE-T
Microhardness [kgf/mm ²]	1100 - 1600 Hv ₁₀₀
Coating Thickness	Typically 50 microns (0.002") Thicker coatings can be produced, ask for details
Coating Toughness	Excellent. Good resistance to thermal shock
Strain to Fracture	Higher than 0.3% (3000 microstrain)
Adhesion Tensile Bond Strength	Better than 70 MPa or 10,000 psi Under standard bond test ASTM C633-01, the Hardide coating adhesion bond has been proven to be higher than the adhesive ultimate strength of 70 MPa (10,000 psi)
Coating Composition	Tungsten with nano-structured Tungsten Carbide Does not contain Cobalt or other metal binder materials used in Cemented Carbides and thermal spray coatings
Coating Porosity	< 0.5% as measured in accordance with ASTM E2109
Appearance	Coating as applied is light grey Finishes to a high metallic lustre when polished
Finishing Operations	Grinding, Honing, Lapping, Polishing, Super-finishing
Surface finish	As coated 0.4 - 0.6 microns Ra / 16-24 µin Can be polished to 0.2 - 0.3 microns Ra / 8 - 12 µin Can be super-finished to 0.02 microns Ra / 0.8 µin
Corrosion Resistance	Resistant to acids, H ₂ S and some aggressive chemicals Passed NACE 30 day Sulphide Stress Cracking (SSC) test to NACE TM0177-2005/ASTM G39-Method B (1 bar H ₂ S) Passed 480 hours neutral salt spray corrosion test ASTM B117
Coating Temperature	Typically up to 500°C / 932°F max Hardide-LT – ultra-low temperature option - 350°C / 662°F max for temperature sensitive substrates
Electrical Resistivity @ 20°C	5.5 microhm-cm
Linear Coefficient of Expansion	4.3 x 10 ⁻⁶ per °C
Density @ 20°C	19.3 (gm/cc)
Thermal Conductivity @ 20°C	174 W/m·K
Specific Heat Capacity @ 20°C	0.132 J/g·K

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