



Hardide-A

Developed for the aerospace industry as a REACH-compliant replacement for hard chrome plating (HCP) and HVOF

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-A

Hardide-A has been developed specifically to meet the needs of the aerospace industry. It is an environmentally compliant and technically superior replacement for HCP and HVOF coatings, providing enhanced protection against corrosion and chemically aggressive media, wear, galling, fretting and fatigue. Hardide-A matches HCP in thickness and hardness and outperforms the material in several key properties including enhanced protection against corrosion, wear and chemically aggressive media. The transition from hard chrome to Hardide-A is facilitated for customers as no significant changes are necessary in part dimensions or drawings.

Hardide-LA is an ultra-low temperature variant of Hardide-A 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 internal and external surfaces and complex shapes uniformly
- Smooth, uniform as-coated surface finish 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 door pins, bushes, bearings, hooks, catches, landing gear, flap tracks and slats, sleeves, rods, valves, pistons, actuators, compressors, shafts, hydraulic and pneumatic cylinders

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-A

PARAMETER	HARDIDE-A
Microhardness [kgf/mm ²]	800 - 1200 Hv
Coating Thickness	Typically 50 - 100 microns (0.002 - 0.004")
Coating Toughness	Excellent. Good resistance to impact and thermal shock. High load capability.
Strain to Fracture	Higher than 0.3% (3000 microstrain)
Fatigue	Minimal change in fatigue debit, ranging from +10% to -10%
Adhesion Tensile Bond Strength	Better than 70 MPa or 10,000 psi Under standard bond test ASTM C633-01, the Hardide coating adhesion bond is 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 aggressive chemicals Passed 750 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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