

Data Sheet

HIP Vitox™ (Mac-A999R Bio)

Description

A very high purity alumina ceramic of 99.9% Al₂O₃ content, produced specifically for surgical implant devices.

Prime Features:

- Clinical use since 1985
- Highest levels of QA and traceability
- Excellent wear resistance — far superior to polyethylene/metal joint systems
- Very high density and non-porous alumina
- Ultra fine grain
- Resistant to extreme chemical environments
- High mechanical strength
- Highly cost effective

Specifications

- FDA Master Files since 1990
- Exceeds requirements of ASTM F603-83
- Exceeds requirements of ISO 6474 revision 2
- Manufacturing systems approved to ISO 9001, EN46001 and CE Mark

Typical Applications:

- Joint replacement components
- Femoral heads to match cup liners of same material or UHMWPE
- Cup liners

Production Capabilities

- 28mm or 32mm diameter for -4 to +4 neck lengths
- Femoral heads and cup liners for surgeons' preferred hip systems

Physical Properties

Radiochemical analysis		Recommended ICRP Dose
U-238 content	<0.4 ppm	
Th-232 content	<0.4 ppm	
Tissue dose	0.32 mSv.y ⁻¹	200
Effective dose	0.008 mSv.y ⁻¹	<5
Comparative wear data	HIP Vitox®	Cr-Co-Mo Alloy
Wear against UHMWPE, pin-on-disc tests in distilled water to ASTM F732-82		
Wear rate, mg/million cycles	0.040	1.050
Wear factor (k), (mm ³ /Nm)10 ⁻⁹ (5M cycles)	3.3 HIP Vitox®	100 Stainless Steel
Wear factor (k) against UHMWPE, pin-on-disc tests		
Dry, (mm ³ /Nm)10 ⁻⁷	1.7	3.4
In distilled water, (mm ³ /Nm)10 ⁻⁷	0.7	0.87
Wear factor (k) against UHMWPE, pin-on-plate tests		
In distilled water, (mm ³ /Nm)10 ⁻⁷	0.68	1.12
In physiological saline, (mm ³ /Nm)10 ⁻⁷	0.57	3.89
In calf bovine serum, (mm ³ /Nm)10 ⁻⁷	1.01	1.81

Colour	White
Bulk Density (fired)	3.978 Mg/m ³
Grain Size	1.2 μm
Porosity (apparent)	0% (fully dense) % nominal
Vickers Hardness	22.1 GPa @ Hv 1.0kg
Rockwell hardness (R45N)	90
Flexural Strength (4-point)	550 MPa
Flexural strength (biaxial)	380 MPa
Young's modulus	407 GPa
Fracture toughness	4.0 K _{IC} (SENB), MPa.m ^{1/2}
Thermal Conductivity	30.4 W/m.K
Thermal Expansion Coefficient	6.8 10 ⁻⁶ /C
Specific heat	800 J/kg.K

Please note that all values quoted are based on test pieces and may vary according to component design. These values are not guaranteed in anyway whatsoever and should only be treated as indicative and for guidance only.