Data Sheet

Vitox® AMC Alumina Matrix Composite

Description

A very high purity, sub-micron grain sized zirconia toughened alumina matrix composite ceramic. Composed of a 99.9% alumina and 3mol% yttria partially stabilised zirconia (Y-PSZ), produced specifically for surgical implant devices.

Prime Features:

- Ultra-fine sub-micron grain size
- Homogeneous microstructure
- High Mechanical strength
- High fracture toughness
- High levels of QA and traceability

Excellent wear resistance

Specifications

- Meets requirements of ISO10993-1
- Exceeds requirements of ISO 6474
- Manufacturing systems approved to ISO 9001:2000 and ISO 13485

Product Axial Compressive Strength

Femoral Head	
28mm / L (12/14) on Ti6Al4V stem	>77kN
28mm / S (12/14) on Ti6Al4V stem	>100kN
Acetabular Cup	
28/37 (18 degree) in Ti6Al4V stem	>100kN

Physical Properties

Colour	White
Bulk Density (fired)	4.26 Mg/m^3
Alumina Grain size (average)	0.67 μm
Y-PSZ grain size (average)	0.16 μm
Vickers Hardness	17 GPa @Hv 1.0kg
Fracture Toughness	5.7 K_{IC} (Indentation), $MPa.m^{½}$
Fracture Toughness	4.5 K_{IC} (SEVNB), $MPa.m^{½}$
Flexural Strength	(4-point) 700 MPa
Flexural Strength	(biaxial) 400 MPa
Elastic Modulus	370 GPa

Typical Applications:

- Joint replacement components
- Femoral heads to match cup liners of same material, HIP Vitox or UHMWPE
- Cup liners
- Other implantable devices

Production Capabilities:

- 26 to 60 mm head diameters with various neck length and taper options
- Taper lock cup inserts for 28 to 72 mm heads
- Hemispherical designs for 28 to 68 mm heads
- Custom design femoral heads and cup inserts to OEM requirements

Radiochemical Analysis

- Massic activity determined by y-spectroscopy U-238 + Ra-226 + Th-232, Bq/kg
- Bio AMC <20, ISO/ASTM ≤100

Comparative Wear Data *

	Vitox AMC	HIP Vitox ®
Vitox AMC	0.06	0.06
HIP Vitox ®	0.04	0.05
ISO6474	<0.1	

Ring on-disc wear as per ISO6474 (Mean wear rate), mm3

* 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.

Morgan Advanced Materials is a global materials engineering company which designs and manufactures a wide range of high specification products with extraordinary properties, across multiple sectors and geographies.
From an extensive range of advanced materials we produce components, assembles and systems that deliver significantly enhanced performance for our customers' products and processes. Our engineered solutions are produced to high tolerances and many are designed for use in extreme environments.

We design and manufacture products for demanding applications in a variety of markets using a comprehensive range of advanced ceramic, glass, precious metal, piezoelectric and dielectric materials. We utilise core competences of applications engineering and superior materials technology, together with state of the art fully integrated manufacturing processes to offer precision ceramic components, ceramic-to-metal assemblies and special coatings for use in a variety of applications.