Zfx™ RAWDENS
Zfx™ Zirconium

Version: **2 / 08.2018**
Compiled at **30.08.2018**
Effective date: **30.08.2018**
Replaces version: **1 / 04.2014**

Purpose of use

Manufacturing of crown and bridge frameworks

Description

- Average Dimension: 98 x 12 mm
- Appearance: industrially-manufactured solid
- Colour: white
- Odour: odourless

Properties and Composition

Synonyms	CAS-no.	EINECS-no.	Concentration	Molecular formula
Zirconium oxide (+hafnium oxide +yttrium oxide)	1314-23-4	215-227-2	88 - 96%	ZrO_2
Yttrium oxide	1314-36-9	215-233-5	4 – 6%	Y_2O_3
Hafnium oxide	12055-23-1	235-013-2	1 - 5%	HfO_2

Properties after final sintering	Unit	Result	Result
Density (ISO 6232, 13356)	g/cm^3	> 6.0	OK
TEC (25-500°C) (ISO 6872)	$10^{-6} K^{-1}$	10.5	OK
Fracture toughness (ISO 6872)	$MPa*m^{1/2}$	> 6.0	OK
Bending strength (4-point) (ISO 6872,13356)	MPa	1200 (+/-200)	OK
Hardness (ISO 8434)	HV2	> 1400	OK

Biocompatibility	Result
Cytotoxicity (ISO 10993-5)	OK
Biological evaluation of medical devices (Chemical Analysis) (ISO 10993-12, -18)	OK
Biological safety | Toxicology (ISO 10993-1, ISO 7405)	OK

Raw material quality:

Property	Unit	Standard requirement	Result
ZrO_2 | HfO_2 | Y_2O_3 (ISO 13356 : 2008)	%	≥ 99.0	≥ 99.0
Al_2O_3 (ISO 13356 : 2008)	%	≤ 0.5	0.27
HfO_2 (ISO 13356 : 2008)	%	≤ 0.5	1.80
Y_2O_3 (ISO 13356 : 2008)	%	> 4.5 - ≤ 6.0	5.41
Other oxides (ISO 13356 : 2008)	%	≤ 0.5	0.018
Radioactivity (ISO 6872 : 2008)	Bq/g	≤ 1.0	< 0.03

Zfx GmbH | Kopernikusstraße 15 | 85221 Dachau | Germany
Tel. +49 (0) 8131 / 33 244 - 0 | Fax +49 (0) 8131 / 33 244 - 10 | www.zfx-dental.com

Purpose of use

Manufacturing of crown and bridge frameworks

Description

- Average Dimension: 98 x 12 mm
- Appearance: industrially-manufactured solid
- Colour: white
- Odour: odourless

Properties and Composition

Synonyms	CAS-no.	EINECS-no.	Concentration	Molecular formula
Zirconium oxide (+hafnium oxide +yttrium oxide)	1314-23-4	215-227-2	70 - 100%	ZrO_2
Aluminum oxide	1344-28-1	215-691-6	0 – 1 %	Al_2O_3
Yttrium oxide	1314-36-9	215-233-5	3 – 15%	Y_2O_3
Hafnium oxide	12055-23-1	235-013-2	1 - 5%	HfO_2

Properties after final sintering	Unit	Result	Result
Density (ISO 6232, 13356)	g/cm^3	> 6.0	OK
TEC (25-500°C) (ISO 6872)	$10^{-6} K^{-1}$	10.5	OK
Fracture toughness (ISO 6872)	$MPa*m^{1/2}$	> 6.0	OK
Bending strength (4-point) (ISO 6872,13356)	MPa	1200 (+/-200)	OK
Hardness (ISO 8434)	HV2	> 1400	OK

Biocompatibility	Result
Cytotoxicity (ISO 10993-5)	OK
Biological evaluation of medical devices (Chemical Analysis) (ISO 10993-12, -18)	OK
Biological safety | Toxicology (ISO 10993-1, ISO 7405)	OK

Raw material quality:

Property	Unit	Standard requirement	Result
ZrO_2 | HfO_2 | Y_2O_3 (ISO 13356 : 2008)	%	≥ 99.0	≥ 99.0
Al_2O_3 (ISO 13356 : 2008)	%	≤ 0.5	0.27
HfO_2 (ISO 13356 : 2008)	%	≤ 0.5	1.80
Y_2O_3 (ISO 13356 : 2008)	%	> 4.5 - ≤ 6.0	5.41
Other oxides (ISO 13356 : 2008)	%	≤ 0.5	0.018
Radioactivity (ISO 6872 : 2008)	Bq/g	≤ 1.0	< 0.03

Purpose of use

Production of crowns and bridges

Description

- Average Dimension: 98.5 mm x 16 mm
- Appearance: solid
- Colour: silver-grey
- Odour: odourless

Properties and Composition

Synonyms	CAS-no.	EINECS-no.	Concentration
Titanium (Ti)	7440-32-6	231-142-3	~ 90%
Ferrum (FE)	7439-89-6	231-096-4	0.13%
Aluminium (Al)	7429-90-5	231-072-3	6.0%
Vanadium (V)	7440-62-2	7440-62-2	4.1%
Oxygen (O)	7782-44-7	231-956-9	0.1%
Hydrogen (H)	1333-74-0	215-605-7	0.001%
Nitrogen (N)	7727-37-9	231-783-9	0.01%
Carbon (C)	7440-44-0	231-153-3	0.03%

- Relative density: 4.43 gr/cm^3 at 20°C
- Solubility water / fat insoluble in water
- Other data: melting point at 1604°C to 1660°C

Specification	
Product	Copra Ti-5
Product type	Titan Grade 5 – milling blank
Product shape	Metal disc 98,3 mm Ø in different diameters an thicknesses
CE-Mark	CE 0483
Applied standards	DIN EN ISO 9001:2008, DIN ISO 5832-3 and ASTM F67 manufacturing and testing according to DIN EN ISO 13485 and medical products guideline 93/42/EEC annex II excluding sectoin 4
Veneer porcelain	All standard veneering procelains for titanium

Properties	Unit	Concentration
Density	g/cm^3	4.45
Vickers hardness		353
Module of elasticity	kN/mm^2	114
CTE	MPa	836
Yield strength	MPa	897
Tensile strength	%	12
Fracture strain		10,3 10^{-6}/m. Celsius

Purpose of use

Manufacturing of crown and bridge frameworks

Description

- Average Dimension: Ø 98.3 x 13.5 mm
- Appearance: solid
- Colour: silver-grey
- Odour: odourless

Properties and Composition

Synonyms	Unit	Concentration
Cobalt (Co)	%	~ 61
Chrom (Cr)	%	28.14
Wolfram (W)	%	8.12
Mangan (Mn)	%	0.23
Ferrum (Fe)	%	0.13
Silicium (Si)	%	1.63
Carbon (C)	%	0.03

Properties	Unit	Concentration
Density	g/cm³	8.3
E-Modul	MPa	190000
Melting Point (Solidus/Liquidus)	°C	1.390 – 1.415
Value of Extension (20 – 600°C)	µm/mK	14.5
Extension	%	10
Hardness		< 320 HV 10

Purpose of use

Auxiliary for manufacture of dental prothesis

Description

- Average Dimension: 20 mm
- Appearance: solid
- Colour: yellowish
- Odour: product specific

Properties and Composition

- Melting point / Melting range: Undetermined
- Boiling point / Boiling range: Undetermined
- Drip point: 100-130°C (212-266°F)

Properties	Specification	Unit	Measured value test method
Chemical composition			
Polyehylen wax	10-100	% (Weight)	100
Microcrystalline wax	0-20	% (Weight)	0
Physical properties			
Density	0.93-0.99	g/cm³	0.94
Drop point	100-130 (210-265)	°C (°F)	122
Flame point	> 220 (> 420)	°C (°F)	
Residues (ashes)	< 0.01	% (Weight)	0.005

Dimensions of the blank			
Diameter (outer)	98.3 + 0.3/-0.4	mm	98.4 +/-0.1
Diameter (inner)	93.9 ± 0.2	mm	93.5 +/-0.1 a.c.
Thickness (outer)	12.0 +0.2/-0.1 20.0 ± 0.1	mm mm	--- 20.0 +/-0.1
Thickness (outer)	10.0 + 0.3/-0.0	mm	10.0 +/-0.1 a.c.

a.c. authorised concession

Purpose of use

Auxiliary for manufacture of dental prothesis

Description

- Average Dimension: 18 mm
- Appearance: solid
- Colour: different according to coloring
- Odour: product specific

Properties and Composition

- Melting point / Melting range: ca. 100°C (ca. 212°F)
- Boiling point / Boiling range: Undetermined
- Flash point: > 250°C (> 482°F)
- Auto igniting: Product is not selfigniting

Properties	Specification	Unit	Measured value test method
Chemical composition			
PMMA	≥ 99	% (Weight)	100
Others	< 1	% (Weight)	0
Mechanical properties			
Density	1.19 ±	g/cm³	ISO 1183
Tensile strength at 23°C	80 ±	MPa	ISO 527-2/1B/5
Flexural strength	115 ±	MPa	ISO 178
Modulus of Elasticity	3300 ±	MPa	ISO 527-2/1B/1
Indentation Hardness ($H_{961/30}$)	175 ±		ISO 2039-1
Thermal properties			
Coefficient of linear thermal expansion	7x10-5 ±	1/K	DIN 53752-A
Vicat-softening temperature	115 ±	°C	ISO 306, method B50
Behaviour towards water			
Water absorption (24h, 23°C) Specimen 60x60x2 mm	41 ±	mg	ISO 62, method 1

Dimensions of the blank			
Diameter (outer)	98.3 +0.3/-0.4	mm	98.5 ± 0.1
Diameter (inner)	93.9 ±0.2	mm	94.0 ± 0.1
Thickness (outer)	18.0 ±0.1	mm	18.0 ± 0.1
Thickness (outer)	10.0 ±0.1	mm	10.0 ± 0.1