

ZrO₂ ZIRCONIA FEEDSTOCKS



ZrO₂ Zirconia Feedstocks by HARCANE industries

Meeting the performance and cost needs of their clients, HARCANE industries is now marketing several families of ZrO₂ Zirconia feedstocks for CIM – Ceramic Injection Molding.

Ultra-Fine Yttria partially Stabilized Zirconia

TYS-UF grade, Yttria partially stabilized Zirconia – 3%mol, produced through an optimized process which highly reduces the production costs, leads to very competitive prices and performances.

The injection material keeps of course the feedstock properties that made HARCANE reputation, as:

Low viscosity, which allows to completely fulfill the prints and to perfectly weld the lines. The HARCANE feedstock properties offer to inject CIM parts with the same parameters as for plastic injection, which means with a low pressure and short injection cycles. Injection pressures are typically between 400 and 600 bars. A low viscosity is also required for multiple prints molds – molds until 16 prints are currently set with this feedstock.

Reduced cycle time. With such a short cooling time, the complete cycle time for a 1 cc part, for example, can be brought under 10 seconds. The decreased cycle time combined with a multiple prints mold, places the CIM process as an

alternative to pressing processes, while adding the very important advantage of the 3D shaping.

High density and high mechanical properties, the organic materials in HARCANE feedstock formulation provide an optimal densification of the green part, resulting in a very high sintered density. The obtained density is relatively 0.01 to 0.02 g/cc higher than obtained by pressing, with a ready-to-press material.

A 100% thermal debinding material can also be performed – besides standard solvent debinding capability – which eases significantly the global production process. According to the volume of the parts and to their wall thickness, the maximum complete cycle time – including the sintering operation – is about 72 hours for small parts to 120 hours for parts with a 4mm section. An equipment adapted to a pressing process with a ready-to-press material can be used for the thermal debinding of this HARCANE feedstock.

Oversizing factors compatible with all other feedstock factors, which are typically 1.2885 this allows the user to keep their own molds without any modification.

		TYS-UF-15	TYS-UF-11	TYS-UF-02	ATZ-UF-23	ZTA-UF-50
D50	um	0.3	0.25	0.3	0.35	0.4
Yttria content	%mol	3	3	2.85	2.4	0.75
Alumina content	%wt	0.25	0.25	5	20	75
Density	g/ccm	>6.05	>6.05	5.88	5.5	4.35
Toughness K1C	Mpa*m ^{0.5}	6	6	6	6	8
Bending strength	MPa	1350	1350	1350	1350	700

Ultra-Fine Magnesia Stabilized Zirconia

MGS-UF feedstocks grade is related to Magnesia stabilized Zirconia. This material is characterized by its properties to resist to thermal shock.

As for Yttria partially stabilized Zirconia, advantages on properties are fully maintained, i.e.: **low viscosity, reduced cycle time, 100% thermal debinding material** – besides standard solvent debinding capability.

The HARCANE feedstock formulations are optimized to obtain the highest sintered densities.

The loading rates, impacting the oversizing factor, are improved to get the best densifications already at the green stage.

The HARCANE feedstock is available for the following Magnesia stabilized Zirconia:

		MGS-UF-40	MGS-UF-41	MGS-UF-42	MGS-UF-43
D50	um	0.7	0.7	0.7	0.7
Magnesia content	%wt	2.45	2.80	3.25	3.50



Colorized Zirconia

TYS-UFC feedstocks grade is related to the colorized Zirconia especially dedicated for aesthetic applications.

As for Yttria stabilized Zirconia, advantages on properties are fully maintained, i.e.: **low viscosity, reduced cycle time, 100% thermal debinding material** – besides standard solvent debinding capability.

The HARCANE feedstock formulations are optimized to obtain the highest sintered densities and also the highest mechanical properties.

The loading rates, impacting the oversizing factor, are improved to get the best densifications already at the green stage.

The HARCANE feedstock is available for the following colorized Zirconia:

		Black	Blue	Chocolate	Customized
D50	um	0.3	0.3	0.3	-
Yttria content	%mol	>2.85	>2.85	>2.85	-
Density	g/ccm	5.99	5.96	6	-



HIC – High Impact Zirconia

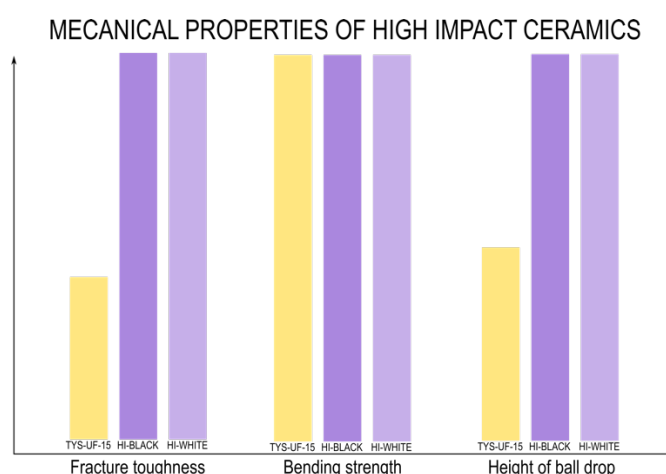
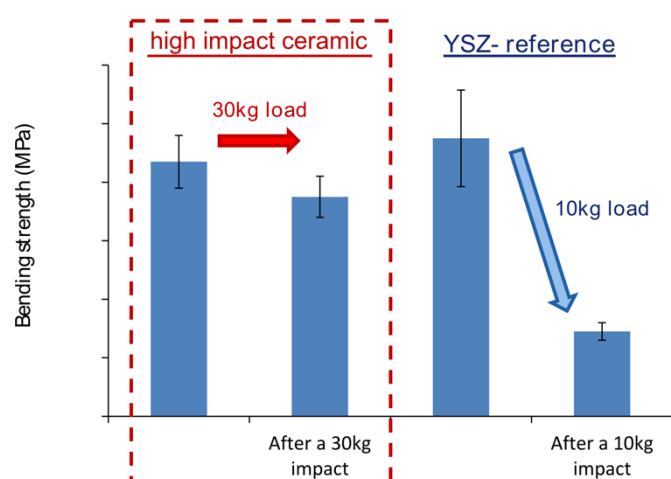
The HIC feedstocks are a grade of ceramics with high impact resistance.

The HIC High Impact Ceramic is a Zirconia based ceramic which shows a large resistance to breakage after a drop. The bending strength does not decrease after an impact: due to the material structure, micro cracks that could appear do not propagate.

The HARCANE feedstock formulations are optimized to obtain the highest sintered densities.

The loading rates, impacting the oversizing factor, are improved to get the best densifications already at the green stage.

The HARCANE HIC feedstock is available in black and in white color.



		Black	White
D50	um	0.3	0.3
Alumina content	%wt	<1	20
Density	g/ccm	6	>5.5
Toughness K1C	Mpa*m ^{0.5}	14	14
Bending strength (no impact)	MPa	1350	1350
Bending strength (10kg impact)	MPa	~1200	~1200
Bending strength (30kg impact)	MPa	>900	>900

ZrO_2 FEEDSTOCKS CODIFICATION



ZrO_2 Zirconia Feedstocks by HARCANE industries
CODIFICATION

Zirconia Feedstocks Codification

Harcane Feedstocks are produced through an optimized process which highly reduces the production costs, leads to very competitive prices and performances.

Since 2014, Harcane industries SA (first under sister company Harcane Sàrl) owns a 200 feedstock formulations catalog, of which 50 of the most efficient are daily operated, as well as compared and validated for powder technology application on a regular basis.

These formulations are specifically adapted to the different materials according to their physical and chemical specifications, in order to achieve an efficient use in terms of rheology and powder densification, which after sintering leads to the best physical and aesthetical characteristics.

Reference code: **AAA – UFy – xx**

AAA

TYS = Tetragonal Yttrium Oxide Zirconia stabilized

MGS = Tetragonal Magnesia Oxide Zirconia stabilized

ATZ = Alumina Toughened Zirconia

UFy

UF = Ultra Fine (Zirconia grain size)

y = Color (option)

xx

xx = Number – Binder type / out of a 50 (200) formulations catalog

Example

Reference: TYS – UFB – 03

TYS = Tetragonal Yttria Stabilized

UF = Ultra Fine

B = Black

03 = Binder number → *formulation # 3 / 50*