

## **GENERAL COMMERCIAL TERMS TECHNISTONE, a.s.**

- Part I: General commercial conditions for sale
- Part II: Complaint rules
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- Part III/2: Technical manual for tiles installation
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### **PART III/1**

## **GENERAL TECHNICAL MANUAL**

### **for engineered stone Technistone<sup>®</sup>**

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## 1. General product information

### 1.1. Product composition

The engineered stone Technistone® is produced from inert materials (granulates – crushed granites, crushed quartz, crushed mirrors, siliceous sand, etc.), fillers (micronized siliceous raw material), binder (polyester resin), from color pigments and other additives.

### 1.2. Product surface finish of engineered stone Technistone®

#### 1.2.1. Standard surface finish

Standard surface finishes are **polished** and **slate**.

Polished surface is smooth, the degree of gloss depends on type of polishing tools.

Slate surface is textured; the degree of flatness/gloss depends on the declared level of surface finishing. The surface contains the texture according to the specific mould.

#### 1.2.2. Special surface finish

Special surface finishes are **honed**, **brushed** and **antique** surface.

Honed surface is mat, with marks after the previous grade of polishing/honing tools segments. These marks should be continuous, can include “fine grooves” in wide bands and should be distributed on the surface in regular, continuously connecting cycles. The surface can be covered with thin layer of dry, milled off material from honing and chamfering equipment.

Antique and brushed surface may also contain outstanding or depressed grains exposed by the technological process. The surface can be covered with thin layer of dry, milled off material from brushing and chamfering equipment.

### 1.3. Production groups of the engineered stone Technistone®

The engineered stone Technistone® is categorized into four basic production groups according to the predominant used inert material.

Production group	Sand	Granite	Mirrors	Crystal
<b>Predominant inert materials</b>	Siliceous sands + clear glass	Granites + siliceous sands	Mirror chips + clear glass + siliceous sands	Siliceous sands + quartzes
<b>Commercial names</b>	Gobi, Elegance	Taurus, Vesta, Kalahari, Sonora, Karpat, Classic White, Classic Beige, Classic Grey, Classic Black	Starlight, Venetians, Translucent, Fresh	Crystal, Classic Nevada, Classic Ice, Harmonia

## 2. Technical parameters of the product

Non-standard shapes, dimensions, sizes and physical-mechanical properties of the product can be made as well but must be agreed to by the manufacturer and customer in advance.

### 2.1. Slabs

#### 2.1.1. Sizes of the product

The production process results in a slab with dimensions 305 x 134,5 cm or 305 x 141,5 cm. Guaranteed usable surface is defined by Complaint Rules - General Commercial Terms part II.

The products can be manufactured in thickness from 10 up to 30 mm, the standard thickness being 10, 12, 20 and 30 mm.

#### 2.1.2. Tolerances of the slab thickness

Thickness tolerance: + 1,0 mm / - 1,2 mm from the basic thickness of the slab.

Basic thickness for polished, antique and slate finish is 10 mm, 20 mm or 30 mm. Basic thickness for brushed finish is 19,2 mm or 29,2 mm.

Thickness tolerance of slabs with slate finish: + 2,0 mm / - 1,2 mm from the basic thickness of the slab.

#### 2.1.3. Physical-mechanical characteristics of the product

The physical and mechanical properties of the product must comply with the basic technical requirements stated in tables below. The tests are performed on the machined product not earlier than 24 hours after the production of the semi-finished product. (The requirements for the absorbability are set at the level of surface machining: polished; the requirement for the flexural strength is set for the thickness 10 mm of the test sample).

### Basic technical requirements on the physical and mechanical characteristics of the product

Production group	Density ( <i>minimal</i> )	Water absorption after 48 hours ( <i>maximal</i> )	Flexural strength ( <i>minimal</i> )	Frost resistance coefficient ( <i>minimal</i> )
	( g / cm <sup>3</sup> )	( % by weight )	( MPa )	-
<b>Sand</b>	2,30	0,06	45	0,80
<b>Granite</b>	2,30	0,09	30	0,80
<b>Mirrors</b>	2,30	0,06	30	0,80
<b>Crystal</b>	2,30	0,07	35	0,80
Applied standard	ČSN EN 14617-1	ČSN EN 14617-1	ČSN EN 14617-2	ČSN EN 14617-5

Production group	Thermal expansion coefficient $\alpha$ (+20 to +70 °C) (maximal)	Thermal expansion coefficient $\alpha$ (+30 to +60 °C) (maximal)	Thermal expansion coefficient $\alpha$ (+20 to +130°C) (maximal)	Abrasion resistance (maximal)
	( $10^{-6} / ^\circ\text{C}$ )	( $10^{-6} / ^\circ\text{C}$ )	( $10^{-6} / ^\circ\text{C}$ )	( $\text{mm}^3$ )
<b>Sand</b>	40	30	35	7300
<b>Granite</b>	35	20	25	8600
<b>Mirrors</b>	40	25	30	8700
<b>Crystal</b>	43	35	40	7600
Applied standard	ČSN 64 0528	ČSN EN 14617-11	ČSN EN 14617-11	ČSN EN 14157 (B)

## 2.2. Tiles

### 2.2.1. Sizes of tiles

From the basic thickness of the slab a whole-format product can be prepared in the form of a slab or other elements may be cut – the tiles. The basic dimensions of the tiles are 30 x 30 cm, 40 x 40 cm, 60 x 30 cm and 60 x 60 cm. The products can be manufactured in thickness from 10 up to 30 mm, the standard thickness being 10, 12 and 20 mm.

### 2.2.2. Tolerances of the tile sizes

Allowed deviations correspond with EN 15285 Agglomerated stone – Modular tiles for flooring and stairs (internal and external); techniques of measurement correspond with EN 14617-16.

#### Maximal permitted size tolerances of tiles

Characteristics	Testing method	Declared value
<b>Size</b> - length and width	EN 14617-16	$\pm 0,5$ mm
<b>Side straightness</b>	EN 14617-16	$\pm 0,3$ mm
<b>Rectangularity</b>	EN 14617-16	$\pm 0,9$ mm
<b>Flatness</b> - central deformation - side deformation - torsion	EN 14617-16	$\pm 0,2$ % related to length

### 2.2.3. Tolerances of the tile thickness

Allowed deviations correspond with EN 15285 Agglomerated stone – Modular tiles for flooring and stairs (internal and external); techniques of measurement correspond with EN 14617-16.

Tolerances: + 0,5 mm / - 0,5 mm from the basic thickness of the slab.

Basic thickness for polished, antique and slate finish is 10 mm, 20 mm or 30 mm. Basic thickness for brushed finish is 19,2 mm or 29,2 mm.

#### 2.2.4. Physical-mechanical characteristics of the product

Basic technical requirements for physical-mechanical specifications of the tiles (according to standard EN 1585 Agglomerated stone – Modular tiles for flooring and stairs). The tests are performed on the machined product not earlier than 24 hours after the production of the semi-finished product. (The requirements for the absorbability are set at the level of surface machining: polished; the requirement for the flexural strength is set for the thickness 10 mm of the test sample.)

##### Classification of tiles according to their characteristics

Production group	Water absorption	Flexural strength (bending)	Reaction to fire	Heat conductivity	Slipperiness
	(%)	(MPa)	-	(W/mK)	SRV dry/ SRV wet (type of the surface)
<b>Sand</b>	$W4 \leq 0,05$	$F4 \geq 40$	B <sub>fl</sub> , s1	1,3 (tabular value)	86/50 (slate) 83/44 (brushed) 80/32 (honed) 72/23 (polished)
<b>Granite</b>	$0,5 \geq W3 > 0,05$	$25 \leq F3 < 40$			
<b>Mirrors</b>	$W4 \leq 0,05$	$F4 \geq 40$			
<b>Crystal</b>	$W4 \leq 0,05$	$F4 \geq 40$			
Applied standard	EN 14617-1	EN 14617-2	EN 13501-1	EN 12524	EN 14231

##### Another characteristics of tiles

Production group	Abrasion resistance (maximum)	Coefficient of the linear thermal expansion $\alpha$ (30 up to 60 °C) (maximum)	Coefficient of the linear thermal expansion $\alpha$ (- 20 up to + 130°C) (maximum)	Coefficient of the linear thermal expansion $\alpha$ (20 up to 70 °C) (maximum)	Coefficient of freeze resistance (minimum)
	(mm <sup>3</sup> )	(10 <sup>-6</sup> / °C)	(10 <sup>-6</sup> / °C)	(10 <sup>-6</sup> / °C)	-
<b>Sand</b>	25	30	35	40	0,80
<b>Granite</b>		20	25	35	
<b>Mirrors</b>		25	30	40	
<b>Crystal</b>		35	40	43	
Applied standard	EN 14617-4	EN 14617-11	EN 14617-11	EN ISO 10545-8	EN 14617-5

### 2.3. Non-standard sizes of tiles

Non-standard shapes, dimensions, sizes and physical-mechanical properties of the product can be made as well but must be agreed to by the manufacturer and customer in advance.

#### Technistone® non-standard large tiles possibilities

Length (cm)	Width (cm)	Average weight (kg) for tile of thickness			Length (cm)	Width (cm)	Average weight (kg) for tile of thickness		
		10 mm	12 mm	20 mm			10 mm	12 mm	20 mm
65	60	9	11	19	30	100	7	9	14
					40		10	12	19
120		17	21	35	60		14	17	29
		125	18	22	36		65	16	19
120							29	35	58
125		125	30	36	60				
30	75	5	7	11	30	150	11	13	22
40		7	9	14	40		14	17	29
60		11	13	22	60		22	26	43
65		12	14	23	65		23	28	47
120		22	26	43	120		43	52	87
125		23	27	45	125		45	54	90

### 2.4. Average values of achieved basic physical and mechanical characteristics of the production groups

#### 2.4.1. According to European standards

Production group	Density (average)	Water absorption 48 hours (average)	Flexural strength	Abrasion $\Delta I$ (average)
	( $g/cm^3$ )	(% by weight)	(MPa)	( $mm^3$ )
Sand	2,40	0,02	59	7300
Granite	2,45	0,04	43	8600
Mirrors	2,40	0,03	49	8700
Crystal	2,41	0,03	56	7600
Applied standard	ČSN EN 14617-1	ČSN EN 14617-1	ČSN EN 14617-2	ČSN EN 4157 (B)
Stated	Technistone laboratory			Stone and gravel test plant Hořice

Production group	Thermal expansion coefficient $\alpha$ (20 to 70 °C)	Thermal expansion coefficient $\alpha$ (30 to 60 °C)	Thermal expansion coefficient $\alpha$ (20 to 130 °C)	Frost resistance coefficient (average)
	( $10^{-6}/^{\circ}\text{C}$ )	( $10^{-6}/^{\circ}\text{C}$ )	( $10^{-6}/^{\circ}\text{C}$ )	-
Sand	28,5	21,8	30,0	0,9-1,1
Granite	21,9	13,4	17,3	0,9-1,1
Mirrors	24,5	17,5	22,7	0,9-1,1
Crystal	26,5	17,5-31,0	22,7-37,9	0,9-1,1
Applied standard	ČSN 64 0528	ČSN EN 14617-11	ČSN EN 14617-11	ČSN EN 14617-5
Stated	TZÚS Předměřice	TZÚS Plzeň	TZÚS Plzeň	Stone and gravel test plant Hořice

#### 2.4.1. According to American standards

Applied standard	Characteristic	Unit	Value for Technistone® product
ASTM C97	Absorption	%	0,01
ASTM C97	Bulk Specific Gravity	lb/ft <sup>3</sup>	151,3
ASTM C99	Modulus of Rupture	psi	5699 (dry) 6904 (wet)
ASTM C880	Flexural strength (bending)	psi	5771 (dry) 6698 (wet)
ASTM C1378	Resistance to Staining	-	no effect
ASTM C650	Resistance to Chemical Substances	-	no effect
ASTM C484	Thermas Shock Resistance	-	no visual defects
ASTM C648	Breaking Strength	lbf	1625
ASTM C1028	Static Coefficient of Friction	-	0,80 (dry) 0,57 (wet)
ASTM E84-10	Flammability	-	Class A
ASTM C241-09	Abrasion Resistance	-	79,16

Source: Tile Council of North America, Inc. and Applied Materials & Engineering, Inc., USA 2010



## 2.4.2. Physical-mechanical characteristics of the product Technistone EXTERIOR®

Characteristic	Density (minimum)	Water absorption (maximum)	Flexural strength (minimum)	Frost resistance coefficient (minimum)	Breaking load at dowel hole* (minimum)
	(g/cm <sup>3</sup> )	(% by weight)	(MPa)	-	(N)
requirement is based on CTA**	2,3	0,06	33,0	0,9	4000*
Technistone EXTERIOR®	2,4	0,02	40,6	1,0	4473

\* only for slabs with thickness 30mm

\*\* Construction Technical Attestation (CTA)

Characteristic	Thermal shock resistance – changes in mass (maximum)	Thermal shock resistance – loss of flexural strength (maximum)	Thermal expansion coefficient $\alpha$ (30 až 60 °C) (maximum)	Thermal expansion coefficient $\alpha$ (20 až 130 °C) (maximum)
	(%)	(%)	(10 <sup>-6</sup> / °C)	(10 <sup>-6</sup> / °C)
requirement is based on CTA**	0,15	10,0	25,0	30,0
Technistone EXTERIOR®	0,05	1,0	16,2	21,6

\*\* Construction Technical Attestation (CTA)

## 2.5. Other values of the physical - mechanical, chemical, hygienic and fire characteristics of the product

The following tests were performed in certified test laboratories or in the laboratory of the Technistone company. Each summary table is provided with the source of measurement.

In case of need it is possible to up-to-date results and to pass them on the distributor or the customer on request.

### 2.5.1. Antislipperness according to DIN 51130 (ČSN 725191)

Slip - resistance DIN 51130 (ČSN 725191, shoe)			
Production group	Surface finish	angle (°)	classification
Sand	Honed	12,0	R10
Granite	Honed	10,2	R10
Granite	Brushed	15,0	R10
Granite	Antique	8,8	R9
Mirrors	Polished	7,0	R9

Slip - resistance DIN 51130 (ČSN 725191, shoe)			
Production group	Surface finish	angle (°)	classification
Mirrors	Honed	13,0	R10
Mirrors	Brushed	16,8	R10
Crystal	Polished	9,0	R9
Crystal	Slate	17,1	R10
Crystal	Honed	11,1	R10

Source TZUS Praha - branch Plzeň

### 2.5.2. Technical fire characteristics of the product

#### Determination according to the ČSN and EN standards

Determination	Flammability	Index of flame spread $i_s$	Flash temperature	Firing point	Combustion heat	Heating power
Unit	-	mm/min	°C	°C	MJ/kg	MJ/kg
Applied standard	ČSN 13501-1	ČSN 73 0863	ČSN 64 0149	ČSN 64 0149	ČSN ISO 1928	ČSN ISO 1928
Engineered stone Technistone®	B / s <sub>2</sub> / d <sub>0</sub> (slabs) B <sub>fl</sub> / s <sub>1</sub> (tiles)	30,4	445	550	2,24	2,11

Source: Pavus, a.s., Technical fire laboratory Praha

### 2.5.3. Hygienic properties of the product

National health institute of the Czech Republic, Health and living conditions centre issued a Certificate of the health harmlessness of the Technistone® product based on an expertise.

The product was certified by the NSF International with the following result: the product is in compliance with the 51 NSF/ANSI Standard – Food equipment materials, Solid surfaces for Splash zone.

National health institute of the Czech Republic, Health and living conditions centre issued a laboratory expert's report Resistance of polished product Technistone® against cleaning agents and desinfectants which are used in public health; material Technistone® is resistant against these substances.

## Determination of organic volatile compounds (VOC)

Source	Applied standard	Results
National Institute of public health Czech Republic	SOP 1/12	No volatile organic compounds were found in product
Tile Council of North America, Inc. and Applied Materials & Engineering, Inc., USA 2010	California Specification 01350*	No volatile organic compounds were found in product

\* this test is used in terms of LEED certification

### 3. Recommended use of the product

The engineered stone Technistone<sup>®</sup> may be used for small-sized or large-sized wall and floor tiles, interior components, construction elements, furniture and accessory components.

**The product Technistone<sup>®</sup> is recommended for interior use only. For exterior facades product Technistone Exterior<sup>®</sup> is recommended.**

#### 3.1. Worktops

When using the product for worktops it is necessary to follow these recommendations:

- the higher the thickness of the product, the higher its strength and thermal resistance
- the hardness of the product surface and in this way also the long-term resistance against mechanical damage of the surface is given by the raw materials used
- the product surface is not infinitely resistant to strokes of hard (especially metallic) objects, or to the drops of hard (especially metallic) objects
- during selection of the product it is always necessary to take into account its characteristics (raw materials used) and the expected use and load of the final worktop
- hot objects are not to be laid directly onto the surface of the worktop
- the gloss and color shade of the product may be influenced by the exposure to some chemicals
- the fluorhydric acid causes an immediate erosion of the product surface layer
- some strongly coloring substances can change the color shade of the product locally
- the product reaches the highest closeness of the surface with the surface finish – polished

### 3.1.1. Recommendation of the usage of individual production groups for the worktops

Usage type	Example usage place	Sand	Crystal	Granite	Mirrors
Common usage	Kitchen countertops, tables, bars, countertops, vanity tops....	Yes	Yes	Yes	Yes
Higher, frequent mechanical load of the surface	Manufacturing counters	Yes	Yes	Yes	No
High, frequent thermal load	Industrial cooling, heating counters	Yes	Yes	Yes	No
Chemical load	Laboratory counters	Yes	Yes	No	No

### 3.1.2. Recommended usage of insulating pads against the thermal shock (valid also for the use of the product as kitchen countertops)

It is necessary to use insulating pads for putting off hot objects onto the surface of the product. These pads must also be placed below all cooking and baking appliances located on the kitchen countertop.

The usage of insulating pads is necessary especially:

- when the thickness of the countertop is lower than 30 mm
- when hot objects are put off near the edges and near the cut-outs of the countertop
- when using cooking and baking appliances located on the kitchen countertop
- when selecting coarse-grained Technistone® products
- when selecting production group Mirrors.

## 3.2. Tiles

Recommended usage of Technistone tiles is mentioned in General Commercial Terms – part III/2: Technical manual for tiles installation.

## 3.3. Other usage

All the production groups of the engineered stone are suitable for usage as interior components. Sizes of the used product must always be considered in relation to its physical-mechanical characteristics and with respect to the system of fixing the product. Regarding the resistance to aggressive influences (e.g. exposure to chemicals) the usage of products with characteristics reflecting the aggression of the surrounding environment is recommended. The degree of the surface finish of the product is to be chosen with respect to the expected usage of the product.