

Technical Data Sheet

i.speed 3D R (Premix for 3D Technology)

Description

i.speed 3D R is a ready to use dry mortar developed to meet the needs of the user who intends to undertake realizations using 3D printing extrusion technologies. It is composed of selected sands and admixtures in order to ensure buildability properties during the printing process as well as the original shape of the extruded elements expected by the 3D model. At the same time, the product has very good workability and very rapid strength development within one hour from the concrete printing.

Applications

i.speed 3D R is highly suitable for the production by 3D printing extrusion technology of:

- Vertical elements for both structural and non-structural use;
- Vertical curved elements, also with overhang, for both structural and non-structural use;
- Both precast (off-site) and cast in place (on-site) 3D printed elements, where rapid handling is required.

Specifications

Product data

Appearance	Dry Powder
Colour	Grey
Aggregates	0-2 mm

Characteristics at fresh state (*)

Bulk density of fresh mortar (EN 1015-6:1998, EN 1015-6:1998/A1:2006)	2150 Kg/m ³
Water amount	16-18%
Workable life of fresh mortar (EN 1015-9:1999, EN 1015-9:1999/A1:2006)	20 min
Temperature range	Between 5°C and 30° C
Setting Time (EN 196-3:2016)	Initial: ≤ 30 min Final: ≤ 45 min
Consistence of fresh mortar (EN 1015-3:1999, EN 1015-3:1999/A1:2004, EN 1015-3:1999/A2:2006)	140 ± 5 mm

(*) Data obtained from laboratory tests in a conditioned environment and could be significantly modified by the conditions of the real application.

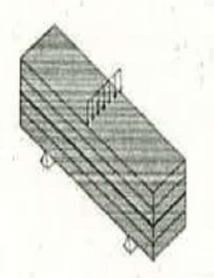
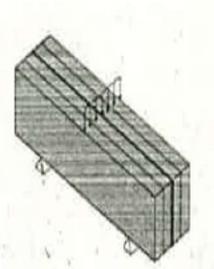


Characteristics at hardened state (**)

Dry bulk density of hardened mortar (EN 1015-10:1999, EN 1015-10:1999/A1:2006)	1980 Kg/m ³					
	4 hours	8 hours	1 day	2 days	7 days	28 days
Compressive Strength (EN 196-1:2016)	≥ 6 MPa	≥ 9 MPa	≥ 18 MPa	≥ 25 MPa	≥ 40 MPa	≥ 55 MPa
Flexural Strength (EN 196-1:2016)	≥ 1 MPa	≥ 2 MPa	≥ 4 MPa	≥ 5 MPa	≥ 8 MPa	≥ 8 MPa
Young's Modulus after 28 days (ASTM C 215)	--	--	--	--	--	> 20-25GPa

(**) Data on samples 4x4x16 cm³, in accordance with EN 196-1:2016.

Characteristics of the final elements (***)

Layout	Configuration scheme [1]	Flexural Strength [MPa]	Compressive Strength [MPa]
Load applied in parallel to the printing layer		≥ 3	≥ 40
Load applied perpendicular to the printing layer		≥ 5	≥ 30
Load applied perpendicular to the printing layer		≥ 9	≥ 25

(***) These average derive from tests carried out on a vertical element 2.40 m long, 1.0 m high and 4.0 cm thick, printed using a robotic arm and an average printing speed of 300 mm/s; the thickness of each layer was 4 cm and the height 6 mm. The printed element was stored at a temperature of 20°C and R.H. of 50% and 5 4x4x16 cm³ specimens were obtained from it; on these specimens, the determinations reported in the table were carried out.

[1] R.J.M. Wolfs, F.P. Bos, T.A.M., Hardened properties of 3D printed concrete: the influence of process parameters on interlayer adhesion, Cement and Concrete Research, 2019, Vol. 199, pages. 132-140.



Method of use

Fresh mortar preparation

3,5 - 4 liters of water for 22 kg bag

The preparation of the fresh mortar has to follow the highlighted proportion of dry powder and water. The mixing should be carried out with a mixing/pumping system (For example, the plastering machine m-tec Duo Mix 2000) that is able to mix the dry mixture with water and then pump the material in a continuous mode. The main phases are as follows:

1. Weight and pour the right quantity of premix into the mixing/pumping system;
2. Dose the right quantity of water as indicated in this technical data sheet in terms of water/dry powder ratio;
3. Check the consistency of the fresh mortar before connecting the 3D printer feeding hose to the mixing/pumping system;
4. Connect the 3D printer feeding hose to the mixing/pumping system and to the 3D printer;
5. Proceed with the 3D concrete printing session according to the desired model previously designed.

Precautions

- Temperatures working conditions should be between 5°C and 30°C. Depending on the temperature, material usage timing may vary.
- Mix the right quantity of clean water in order to obtain the desired workability; in case of low temperature, is recommended to use water at about 20°C; in case of temperature higher than 30°C, thermostat water at below of 20°C.
- During setting and hardening, protect the printed elements from frost, wind and sun exposure.
- During curing, protect the printed elements from evaporation by using curing sheets, particularly in case of conditions with relative humidity lower than 50%.
- After 24 hours, the printed elements have to be kept in humid environment at 20°C and 50% relative humidity for at least 7 days. For the first 7 days, avoid storing the printed elements in a dry, hot and ventilated environment.

Packaging and Storage

i.speed 3D R is available in 22 kg bags on Europallets, for a total of 1,056 kg, and protective plastic covering sheet. Keep the premix in a dry and cool warehouse between 5°C and 20°C.

In the hot season, store all the raw materials at a lower temperature than the room temperature.

In the cold season, store all the raw materials at a temperature not lower than 5°C.

The shelf life of the premixed product is 6 months, when stored in a cool and dry place.

Product for professional use. The use of the product should be based on the applicator's own research and experience

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