

General information

ISTRA 40 is a normal setting, rapid hardening Calcium Aluminate Cement (CAC) with high early strength. It differs substantially from the usual calcium silicate cements (Portland cements) in its manufacturing process, chemical composition and rapid strength gain. ISTRA 40 is composed of Calcium Aluminates with the following characteristics:

- High early strength
- Refractoriness
- High abrasion resistance
- Resistance to biogenic sulphuric acid corrosion (BSAC)

ISTRA 40 meets the requirements of EN 14647 for Calcium Aluminate Cements and is controlled in accordance with EN 14647.

ISTRA 40 has a shelf-life of approx. six (6) months when stored under dry conditions. The normal safety measures for cement must be followed. You will find further information in our safety data sheet.

Production

ISTRA 40 is produced by melting selected raw materials (bauxite and limestone) in special kilns. After cooling, the clinker is ground using ball mills.

Quality

Like all other Calucem products, the production of ISTRA 40 is subject to stringent quality control. Constant monitoring of all components ensures a consistent quality. The production plant is certified according following standards: ISO 9001:2015; ISO 14001:2015; ISO 50001:2018 and ISO 45001:2018

Technical data

The following information represents typical values for the quality control carried out in our plant.

Chemical composition (%)

SiO ₂	≤ 6
Al ₂ O ₃	38–42
Fe ₂ O ₃	13–17
CaO	36–40
MgO	< 1.5
SO ₃	< 0.4

Mineralogical composition

ISTRA 40 contains mainly monocalcium aluminate (CA). This mineral phase is responsible for the high early strength. When mixed with water ISTRA 40 forms calcium aluminate hydrates as its hydration products.

Mineral phases of ISTRA 40

Main mineral phase:	CA
Minor mineral phases:	C ₄ AF, C ₂ AS, C ₁₂ A ₇

Cement technical properties

Residue on sieve at:	90 µm < 5%
Fineness (Blaine) approx.:	3100–3700 cm ² /g
Bulk density approx.:	1.15 g/cm ³
Specific gravity:	3.2–3.3 g/cm ³
Refractoriness in cement approx.:	1270 °C

Setting time and water demand

The testing of the setting time is performed using the mortar in order to describe the behavior of the ISTRA 40 in mixtures with a workable consistency. A mixture containing CEN-standard sand and using a water/cement ratio of 0.4 is produced for testing the mortar based on EN 14647.

	Mortar
Initial set	1–4 h
Final set	maximum 120 min after initial set
Water demand	23 ± 2%

Development of strength

After setting, strength develops very rapidly. ISTRA 40 is a cement with very high early strength and high compressive strength. After one (1) day, the compressive strength is higher than that of high grade Portland cements CEM I 52.5 R after 28 days.

Development of strength [N/mm²]

Time	6 h	1 d
Compressive strength	>30	> 50

Resistance to corrosion

High resistance to waste waters in combination with extraordinary abrasion resistance and high resistance to biogenic sulphuric acid corrosion (BSAC) makes ISTRA 40 an ideal product for sewer systems and waste water plants. When ISTRA 40 is mixed with water, the hydration products of calcium aluminate are formed. They are extremely resistant to aggressive, slightly acid waters (pH factor > 3) including water soluble sulphates.

Refractoriness

After drying out, mortars and concretes made from ISTRA 40 slowly emit their hydrate water without destroying the matrix. At high temperatures (> 1000 °C), ceramic bonding occurs between the high alumina cement parts and the refractory aggregates. These ceramic bonds make ISTRA 40 an excellent binder in refractory concretes and other refractory mortars or gunning mixes.

Building chemistry

ISTRA 40, added to Ordinary Portland Cement, accelerates setting time and strength development. By further addition of calcium sulfate fast drying and shrinkage compensation can be achieved. Typical building product applications are:

- Self levelling compounds
- Tile adhesives
- Technical mortars

Mixing Advice

As with Portland cement, ambient conditions and temperatures of the ingredients will influence the length of time ISTRA 40 concretes and mortars will remain plastic and workable. Higher temperatures naturally will reduce this time while lower temperatures will extend it. Many types of mixes using ISTRA 40 are extremely sensitive to the characteristics of each ingredient in the mix and may require substantial lab testing to obtain optimum properties.

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