

ERSOL

DEFINITIONS

The ERSOL solution:

in combination with the 1681 Dalle TJ BOTTOM SOLUTION, reduces the risk of glass infiltration problems to the greatest extent possible.

The ERSOL solution:

provides reinforcement for the electrofused AZS melter bottoms, improving both glass quality and mechanical resistance:

- the monolithic structure seals the entire surface of the melter bottom.
- the fused cast AZS grain composition provides the bottom with excellent resistance to chemical corrosion by the glass (and protects from the heavy corrosion caused by high temperatures and/or convection currents and polymetallic attacks).
- the chemical homogeneity of the Saint-Gobain SEFPRO AZS solution also contributes to superior stability of the glass/refractory interface, a very important factor in improving glass quality and in reducing the occurrence of differential expansion in the horizontal direction.

The ERSOL solution:

Combined with the 1681 Dalle TJ MELTER BOTTOM SOLUTION, the ERSOL solution means real time savings on the work site and lower investment costs.

The exceptional quality of the vertical joints in the 1681 Dalle TJ Solution significantly reduces the risks of glass infiltration in the sub-layers.

Due to the outstanding quality of these machine-ground joints, the electrofused AZS melter bottom jointing operations are no longer necessary.

The ERSOL solution includes 3 monolithic products:

ERSOL SL* / ERSOL 50 Cast provides the monolithic barrier in application.

ERSOL 06 Cement ensures the flatness of the 1681 Dalle TJ BOTTOM SOLUTION, and behavior independence for the upper and lower layers during heating-up.

* Self Leveling

ERSOL

CHARACTERISTICS

Chemical analysis

| PRODUCTS | ZrO ₂ | SiO ₂ | Al ₂ O ₃ | OTHER |
|-----------------|------------------|------------------|--------------------------------|-------|
| ERSOL SL | 33,3% | 11,2% | 53% | 2,5% |
| ERSOL 50 Cast | 30% | 20% | 48% | 2% |
| ERSOL 06 Cement | 30% | 20% | 48% | 2% |

Physico-chemical characteristics

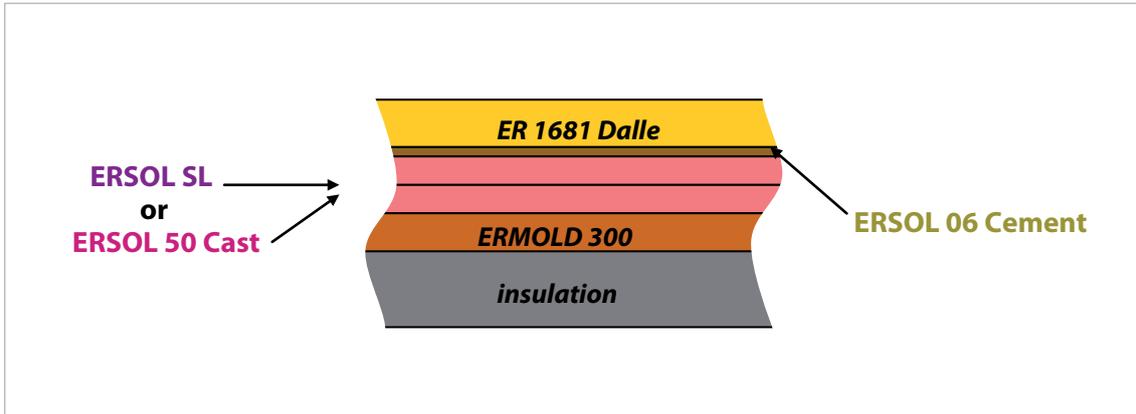
| PRODUCTS | CRYSTALLOGRAPHIC ANALYSIS after firing at: 1300°C / 1500°C | BLISTERING TENDENCY | CORROSION RESISTANCE |
|-----------------|--|---------------------|------------------------|
| ERSOL SL | CORUNDUM, ZIRCONIA | GOOD | EXCELLENT up to 1300°C |
| ERSOL 50 Cast | CORUNDUM, ZIRCONIA | GOOD | EXCELLENT up to 1300°C |
| ERSOL 06 Cement | CORUNDUM, ZIRCONIA | GOOD | EXCELLENT up to 1300°C |

Physical characteristics

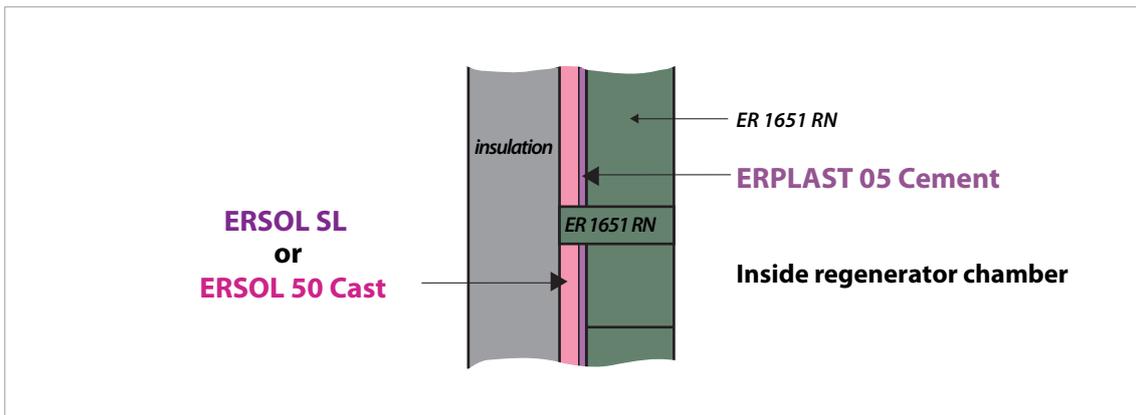
| PRODUCTS | BULK DENSITY IN USE | MAXIMUM DIAMETER | FAMILY | WATER CONTENT | SETTING | PACKAGING | SHELF LIFE | APPLICATION |
|-----------------|-------------------------|------------------|----------|--------------------|-----------|-----------|------------|--|
| ERSOL SL | 3.25 kg/dm ³ | 5 mm | SL/P* | 6.2% | Hydraulic | 25 kg | 12 months | • under bottom paving: melting end working end feeder channels |
| ERSOL 50 Cast | 3.2 kg/dm ³ | 5 mm | Castable | 4.5 to 4.7% | Hydraulic | 25 kg | 12 months | • under bottom paving: melting end working end feeder channels |
| ERSOL 06 Cement | 3.1 kg/dm ³ | 0.6 mm | Cement | 8 to 10% of weight | Organic | 25 kg bag | 12 months | • under bottom paving: between dalles and the ERSOL SL / ERSOL 50 Cast |

ERSOL DIAGRAMS

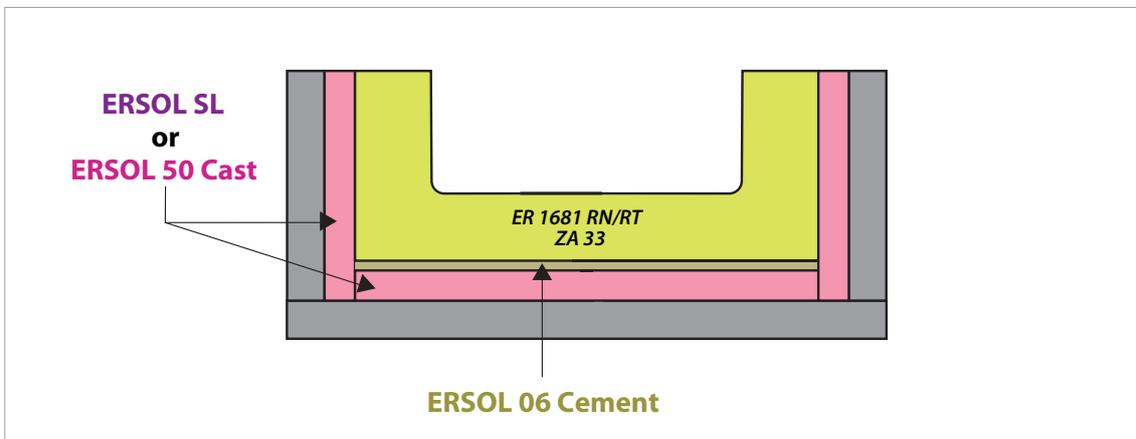
The Melting End



Target Wall



Safety layer for Feeder Channel

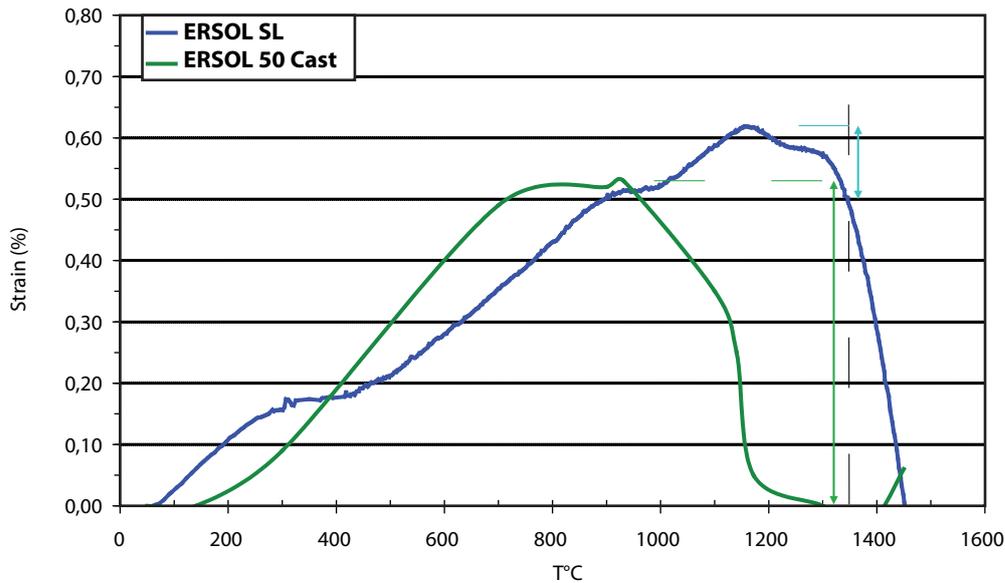


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ERSOL SL vs. ERSOL 50 Cast

ERSOL SL is a development of ERSOL 50 Cast which secures bottom paving solution by:

- Closing the thermal expansion joints after heating up.



Laboratory studies have shown the great advantage of using the double-layer ERSOL SL solution. The upper layer, which is protected from the sometimes erratic movement of the bottom sub-layers during the furnace heating-up stage by the bottom layer of ERSOL SL, totally fulfills the role of a monolithic slab, creating the required barrier against any glass passage. In order to be able to freely expand during the heating-up phase, the ERSOL SL layer must be laid on the ERSOL SL bottom layer.

- Improving the glass contact corrosion resistance.

ERSOL 50 Cast



ERSOL SL



Dynamic corrosion test 1400°C - 72 h

- Sodalime glass
- Rotation: 6 t/mn

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| ERSOL 50 Cast | 82 |

ERSOL Range

- > **ERSOL SL:** instructions for use, required equipment
- > **ERSOL 50 Cast / ERSOL 06 Cement:** instructions for use, accelerating agent, retarding agent, required equipment

Instructions for use: ERSOL SL

ERSOL SL is the easiest mortar to set up within the ERSOL SL Product range.

Its Self Leveling behavior allows suppressing the vibration operation when its pumping capability might save a lot of time during furnace erection or repair.

Instruction for use:

1. Prepare 1.5 L of potable water for a 25 kg of ERSOL (6% of weight)
2. Insert totality of batch in mixer
3. Insert totality of water in mixer
4. Mix concrete for at least 15 minutes: until the concrete is liquid.

IMPORTANT:

- Concrete seems very dry during 12-13 first minutes
- Do not add water and keep on mixing
- Use only planetary mixer

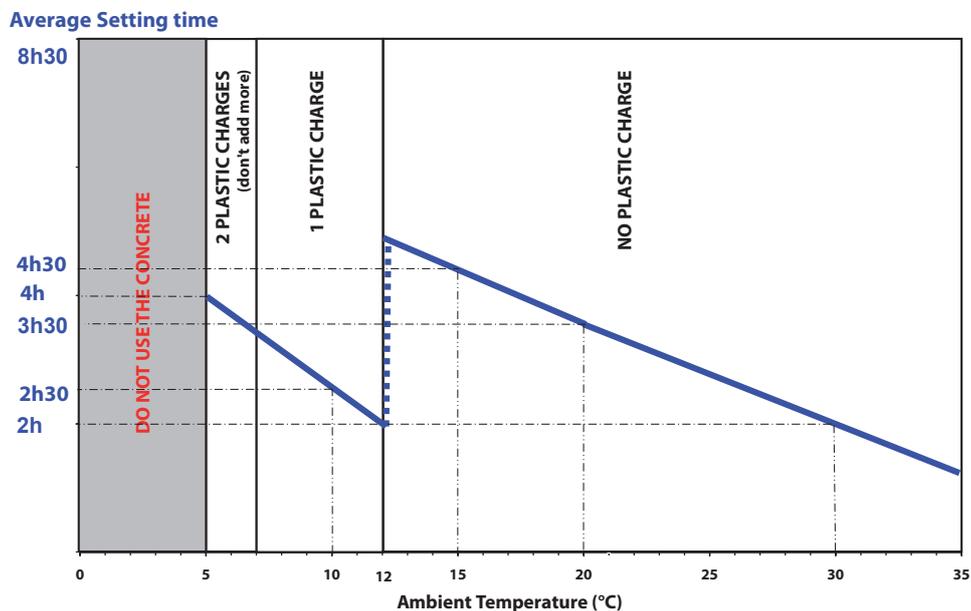
5. Stop mixer and use directly concrete.

IMPORTANT:

- Do not vibrate it

Thanks to below abacus you can adjust the setting time of ERSOL SL by using plastics charges of accelerating agent provided along with the ERSOL SL bags.

NUMBER OF PLASTIC CHARGES PER BAG OF 25 kg ERSOL



Required Equipment: ERSOL SL

- Graduated measuring device
- Screed beam (1 m maximum)
- Pump (if ERSOL is pumped)
- A series of studs the same height as the thickness of the slab, of standard length

Instructions for use: ERSOL 50 Cast

1. Prepare: 4.5 to 4.7% of weight in potable water, for ambient temperature between 5 and 28°C.
2. For extreme temperatures (between 0°C and 5°C and above 28°C), accelerating or retarding agents can correct setting time as a function of the ambient temperature.
3. Spread uniformly through the first part of the formwork to be vibrated. Leave a surcharge of approximately 1cm over the entire width to be vibrated, and over a length of approximately one meter in the direction you are working in.
4. Place the tips of the vibrating beam on the wood studs laid parallel to each other.
5. Keeping the beam perpendicular to the studs, activate the vibrator and using the two mobile handles, slowly slide the beam along the studs.
6. Carefully remove any concrete from the wooden studs, to avoid any excess thickness of the slab.
7. If a vibrating pin is used (tank and channel lining), plunge the pin into the layer of concrete to be vibrated at regular intervals which are, at the most, 8 to 10 times the diameter of the pin. Slowly remove the pin so that the concrete can completely fill the empty space left behind. The concrete is considered to be well vibrated when the surface surrounding the pin turns shiny and is free from all air bubbles.
8. When the ERSOL 50 Cast concrete has hardened, remove the wooden studs, and fill the empty spaces with ERSOL 50 Cast which must be vibrated with a vibrating pin.
9. Laboratory studies have shown the great advantage of using the double-layer ERSOL 50 Cast solution. The upper layer, which is protected from the sometimes erratic movement of the bottom sub-layers during the furnace heating-up stage by the bottom layer of ERSOL 50 Cast, totally fulfills the role of a monolithic slab, creating the required barrier against any glass passage. In order to be able to freely expand during the heating-up phase, the ERSOL 50 Cast layer must be laid on the ERSOL 50 Cast bottom layer once it has set.

Instructions for use of Accelerating Agent with ERSOL 50 Cast

On sites where the ambient temperature is at 10°C and below, a quantity of accelerating agent can be added to the ERSOL 50 Cast concrete batch to shorten the setting time and thus facilitate the installation work.

The prevailing site conditions may be such that the full measure may not be required; for example, in high ambient humidity conditions, setting time is longer than with low ambient humidity. Therefore before proceeding with the actual casting, a test batch should be made to determine the amount of accelerating agent to be added.

The following table gives an indication of the setting times for the average dose of accelerating agent of 110 g per 50 kg of concrete at various batch water quantities. This dose may be increased or decreased slightly to suit the conditions and requirements on site.

The accelerating agent should be incorporated into each batch by adding the full dose just after introduction of the first half of the ERSOL 50 Cast batch. The subsequent procedures remain unchanged.

| | | Setting time without accelerating agent | | Setting time with accelerating agent | |
|---------------------|-----------------------------------|---|----------|--------------------------------------|----------|
| | | 4.5 % | 4.7 % | 4.5 % | 4.7 % |
| Ambient Temperature | Proportion of water in batch in % | | | | |
| | + 5° C | 16 H | 16 H 30' | 12 H | 12 H 30' |
| | + 7° C | 12 H | 12 H 30' | 8 H | 8 H 30' |
| | + 10° C | 9 H | 9 H 30' | 5 H | 5 H 30' |

A measure is included with each package of accelerating agent. Filled to the brim, this measure contains the average dose of 110 g required for 50 kg of ERSOL 50 Cast

Gloves and goggles are required when handling the product.

Instructions for use of Retarding Agent with ERSOL 50 Cast

On sites where the ambient temperature is at 30°C and above, a quantity of retarding agent can be added to the ERSOL 50 Cast concrete batch to delay the setting time and thus facilitate the installation work.

The prevailing site conditions may be such that the full measure may not be required; for example, in high ambient humidity conditions, setting time is longer than with low ambient humidity. Therefore before proceeding with the actual casting, a test batch should be made to determine the amount of retarding agent to be added.

The following table gives an indication of the setting times for the average dose of retarding agent of 12 g per 50 kg of concrete at various batch water quantities. This dose may be increased or decreased slightly to suit the conditions and requirements on site.

The retarding agent should be incorporated into each batch by adding the full dose to the water before introducing the first half of the ERSOL 50 Cast batch. The subsequent procedures remain unchanged.

| | | Setting time without retarding agent | | Setting time with retarding agent | |
|---------------------|---------|--------------------------------------|---------|-----------------------------------|---------|
| | | 4.7 % | 4.9 % | 4.7 % | 4.9 % |
| Ambient Temperature | + 30° C | 1 H | 1 H 15' | 2 H 30' | 2 H 45' |
| | + 40° C | 0 H 30' | 0 H 45' | 1 H 15' | 1 H 30' |
| | + 50° C | 0 H 15' | 0 H 30' | 0 H 45' | 1 H |

A measure is included with each packet of retarding agent. Filled to the brim, this measure contains the average dose of 12g required for 50kg of ERSOL 50 Cast.

Gloves and goggles are required when handling the product.

Instructions for use: ERSOL 06 Cement

1. Prepare: 8 to 10% of weight in potable water, for temperatures between 5°C and 28°C.
2. Carefully homogenize the mixture prior to applying. Use a paddle mixer if possible.
3. Apply the mortar with a trowel, spreading it over a 5 mm thickness using a flat beam. To obtain consistent thickness, we recommend using flat or round metal sections, laid on the slab to guide you as you progress.
4. Spread the mortar over a width which is slightly wider than one row of tiles, and over a length which enables a few tiles to be laid.
5. Then, carefully lay the tiles on the mortar. You can either reserve space for the expansion joints required for the type of assembly planned, or you can lay the tiles against each other to obtain a closed joint. Carefully check that the mortar does not rise up between the tiles.
6. We recommend using a vacuum pad to lay the electrofused tiles.

Required Equipment: ERSOL 06 Cement ERSOL 50 Cast

- Paddle mixer
- 5 mm diameter round metal section or 5 mm thick flat plat metal section
- Vacuum pad to handle and lay tiles
- Long-handled scraper
- Steel wheelbarrows
- Shovels, brooms, trowels
- Graduated measuring device
- Screed beam (1 m max)
- Vibrating pin
- Pails
- Vibrating beam
- A series of studs the same height as the thickness of the slab, of standard length