HOW TO MIX THERMOPOUR WITH CEMENT

Introduction
All the principles of good concrete practice apply to **Thermopour** mixes.

Equipment
A mechanical means of mixing is suggested. A pan mixer is preferable as a drum mixer tends to make balls. If this equipment is not available, manual mixing with shovels is acceptable.
As **Thermopour** is a non-absorbent volcanic glass, water will not be absorbed into the material. The use of a sealed, leak proof container is therefore recommended to prevent leaching of the required amount of water.
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Mixing Instructions
- Mix **Thermopour** and cement in a dry state first (a little water may be used to dampen slightly in order to suppress dust.
- Add the correct amount of water (refer to "Mix design and suitability guide" – and note that the water is given in litres per 100 litres of **Thermopour**!) The product may appear very dry, especially if hand-mixed, but this is correct. It is important to monitor the amount of water added since small differences in water content have a large effect on overall consistency and slump.
- Mix, but do not overdo mixing time – about 30 seconds in a pan mixer is all that is required (longer mixing entrains too much air).

Yield
Approximately 11 bags of **Thermopour** will be required for each cubic meter of concrete/plaster to be mixed (cement and water will be added to this quantity of **Thermopour**.) This applies to all mixes mentioned in the mix design and suitability guide.

Gunnite and Loose-fill
Thermopour concrete may also be gunnited. Because air velocities are used than for ordinary gunniting procedures, the rebound is lower. A further advantage is that the rebound can be re-used. **Thermopour** can also be used as a loose-fill (without cement) to fill cavities for thermal insulation purposes.

SOME VERY IMPORTANT TIPS

1. The water content is very important. Too much water will yield poor results and lead to shrinkage, weak concrete and cracking. Use only water as per the "Mix design and suitability guide.
2. When plastering, use good conventional plastering techniques. Particular attention should be paid to the degree to which the plaster has set prior to levelling with straight edge. As with any plaster, it should be set sufficiently so that it is difficult to cause an indentation by applying thumb pressure. If the straight edge is applied prematurely, it will cause the plaster to debond from the wall and slump cracks will form.
3. As with any concrete or plaster, proper curing under damp conditions and out of direct sunlight is vital for success.
4. The application will determine the exact water : cement ratio. For example – for casting and plastering applications, the user may decide to use the high water content. (Refer to "Mix design and suitability guide"), whereas for screeds, a drier consistency and stringer product may be preferred, hence, a low water content may be chosen.
5. Once applied, the surface must be kept moist for the first 14 days while curing. If the finished product is to be exposed to direct sunlight or fast cured.

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PRODUCT DATA SHEET

THERMOPOUR
(TP)

INTRODUCTION

Thermopour is a unique volcanic glass, a large deposit of which is found only in South Africa.
This processed form of volcanic glass is ideally suited for use with cementitious and other binders.
It also possesses truly exceptional fireproofing properties.

PRODUCT BENEFITS

Excellent thermal insulator
("k" value in the loose state of + 0.05 W/m ºC.)
This property is derived from the low density and physical structure of the **Thermopour** grains.

Ultra lightweight
Density in the loose state is ≈ 100 kg/m³ and, when mixed with cement, practical concrete densities ranging from ≈ 300 kg/m³ to 1000 kg/m³ can be achieved. The **Thermopour** concrete will therefore float on water.
This property derives from the ore expansion ratio of ≈ 20 times (i.e. 1m³ of **Thermopour** ore expands to 20m³ of product).

Exceptional Fire Resistant
Notwithstanding the high melting temperature of ≈ 1250ºC **Thermopour** concrete can also maintain its structural integrity at high temperatures due to its thermal insulating property. The latter ensures a very high thermal gradient on the outer surface during fire conditions resulting in very low temperatures immediately below the fire exposed surface. Indeed, even if the surface melts, it coalesces into molten glass beads which insulate and protect the interior.

Compatibility with Portland Cement and Other Binders
Thermopour has a well-sealed tough structure. This prevents severe bead damage during mixing and facilitates low water absorption, hence proper curing of the cement.

Superior Strength

Ultra lightweight concretes are generally weak and, in the case of aerated concrete, are extremely vulnerable to total slump shortly after casting, especially if any vibration or disturbance is present. **Thermopour** concrete does not rely on air-entertainment and can be cured under any conditions of vibration. Once cured, the product exhibits surprising strength in comparison to other lightweight concretes. Strength varies with density but practical strengths in the range of 1.5 MPa up to 23 MPa are quite achievable.

Adhesion(Spray or Plaster)

Thermopour when mixed with cement can be plastered (without the use of additives) either with a trowel or by spray to most common surfaces with good adhesion.

Low Water Permeability

The Pre-treated **Thermopour**, when mixed with cement in the correct ratio, can be deemed to be completely watertight. Substrate corrosion is therefore minimized.

Non-toxic Dust

No dust is healthy. **Thermopour**, due to its amorphous (non-crystalline) structure has however been demonstrated to be a very low health risk dust.

Zero Smoke and Zero Fumes

Due to its inorganic structure **Thermopour** evolves zero smoke and zero fumes under fire conditions.

Amazing resistance to spalling

Under fire conditions and, more severely, under water quench following extreme heat, (e.g. from a fire hose) conventional concrete will spall and lose its integrity.
Thermopour exhibits no such tendency and, following a fire, the material generally need not be replaced.
Thermopour is supplied in 10kg (100 ℓ) bags

Mix Ratio (by volume) TP : Cement	3 : 1 1 Bag TP (100 ℓ) + 1 pocket OPC (33 ℓ)	4.5 : 1 1.5 Bags TP (150 ℓ) + 1 pocket of OPC (33 ℓ)	6 : 1 2 Bags TP (200 ℓ) + 1 pocket of OPC (33 l)	10 : 1 3.5 Bags TP (350 ℓ) + 1 pocket of OPC (33 ℓ)
THERMAL CONDUCTIVITY	0.15w/m.K	0.13w/m.K	0.12w/m.K	0.09w/m.K
TYPICAL APPLICATION				
External Plaster * †	√	√	X	X
Internal Plaster * †	√	√	√	X
Built–up floors	√	√	X	X
Insulating roof decks	√	√	√	X
Fire Seals	√	√	√	√
Castables	√	√	√	√
Spray Applications	√	√	√	X
Cast Thermal Insulation	X	X	√	√

√ = Suitable
X = Not Suitable

Mix ratio (by volume) TP : Cement	3 : 1 1 Bag TP (100 ℓ) + 1 pocket OPC (33 ℓ)		4.5 : 1 1.5 Bags TP (150 ℓ) 1 pocket of OPC ℓ)		6 : 1 2 Bags of TP (200 ℓ) + 1 pocket of OPC (33 ℓ)		10 : 1 3.5 Bags TP (350 ℓ) + 1 pocket of OPC (33 ℓ)	
Water (l) per 10kg (100 l) bag of TP	**Low Water* 23**	High Water 29	**Low Water* 19.2**	High Water 24.2	**Low Water* 19.2**	High Water 24.2	**Low Water* 19.2**	High Water 24.2
Slump (mm)	**55**	250	**45**	240	**50**	230	**30+**	90+
Flow (mm)	**370**	635	**380**	580	**365**	565	**355**	570
Measured air content (%)	**12**	16	**15**	18	**21**	21	**22**	21
Drying Shrinkage (%)	**0.17**	0.16	**0.18**	0.19	**0.16**	0.16	**0.12**	0.12
Wetting Expansion (%)	**0.14**	0.14	**0.17**	0.17	**0.15**	0.14	**0.10**	0.10
7-day ISO flexural strength (MPa)	**3.7**	1.9	**3.4**	2.0	**1.5**	1.1	**-**	-
28-day ISO flexural strength (MPa)	**4.9**	2.7	**4.2**	2.5	**1.8**	1.3	**-**	-
7-day ISO compressive strength (MPa)	**14.2**	5.0	**12.6**	5.2	**3.9**	2.3	**-**	-
28-day ISO compressive strength (MPa)	**19.8**	7.5	**16.9**	6.3	**4.4**	2.9	**-**	-
7-day 100mm cube strength (MPa)	**16.9**	7.3	**15.6**	6.9	**4.7**	3.10	**1.2**	0.8
28-day 100mm cube strength (MPa)	**23.0**	10.0	**19.0**	8.7	**6.0**	4.3	**1.7**	1.4
Wet density (kg/m³)	**1400**	1150	**1250**	1000	**900**	800	**750**	700
Dry density (kg/m³)	**1100**	900	**800**	650	**550**	450	**360**	350

*Recommended water content as indicated **bold**
The above are expected values using quality OPC, standard mixing times, proper curing correct water ratio.
***NB! The water : cement ratio is very important. Numbers shown are per 100 ℓ of TP.**