

# EXPANDEX

## POWDERED EXPANDABLE ADDITIVE FOR MORTAR AND CONCRETE

### SHRINKAGE

Shrinkage is a natural deformation of cement based material. Normally, the deformation of a cement-based product depends on the quantity and the degree of evaporation of the water in the cement-aggregate system. The degree of evaporation of the water gives rises the entity and the type of capillary porosity and consequently the shrinkage.

Aggregates size distribution has an important role in the entity and type of shrinkage.

The shrinkage depends on several variables inter-connected to each other such as:

- Mix design (cement, aggregate, water and admixtures type and content)
- Aggregate elastic module
- Conservation time and conditions
- Surface/volume ratio

| Causes                      | Phase              | Development               |
|-----------------------------|--------------------|---------------------------|
| Water evaporation           | plastic & hardened | up to 90 days             |
| Aggregate water absorption  | plastic            | up to 2 hours (max)       |
| Cement hydration            | plastic & hardened | from 1 hour up to 90 days |
| Background water absorption | plastic            | up to 2 hours             |

Other parameters are:

- Shrinkage depends on water/cement and cement/aggregate ratio and the highest is the ratio the highest is the shrinkage.
- Shrinkage depends on the concrete/plaster age
- Shrinkage is influenced by the environmental condition (moisture, temperature, ventilation and irradiation)
- Shrinkage depends on the surface/volume ratio and the highest is this ratio the highest is the shrinkage.
- Shrinkage depends on the aggregate physical-chemical properties.

### REASON FOR AN EXPANSIVE ACTION

In cement based material an expansion action is required in order to avoid cracking and/or to improve the physical-mechanical performances allowing the natural deformation to occur in the elastic field.

The expansion, when is necessary, must be quantitatively and qualitatively, formulated both in the plastic and hardened phase in order to oppose the natural shrinkage of the cement based product.

### WHAT IS EXPANDEX?

**EXPANDEX** is a powder product that doesn't contain chlorides or other corrosive compounds. It's a high calcium content silicate product treated thermally by a particular process. It counteracts natural shrinkage of mortars and concrete. It is supplied in 25kg bags.

## WHAT IS EXPANDEX USED FOR?

**EXPANDEX** is used to counteract the normal contraction of mortar and concrete, avoiding the formation of fissures, conferring better waterproofing and, consequently, increasing the durability against the chemical and physical actions of aggressive agents. **EXPANDEX** is indispensable for aqueous works such as: basins, pools, cisterns, sewers, purification plants, paving etc. and can be also used in reinforced or precast concrete structures such as: beams, flagstones, walling etc.

## HOW DO YOU USE EXPANDEX?

**EXPANDEX** is in powder form and it is supplied in 25 kilo bags.

**EXPANDEX** is used in reinforced or precast concrete, mixing it from 0.2 to 0.8% of total weight.

**EXPANDEX** is used in mortar mixing it from 0.6 to 1.2% of total weight.

It is advisable, anyway, to optimize the dosage by doing preliminary tests.

## EXPANDEX TECHNICAL CHARACTERISTICS

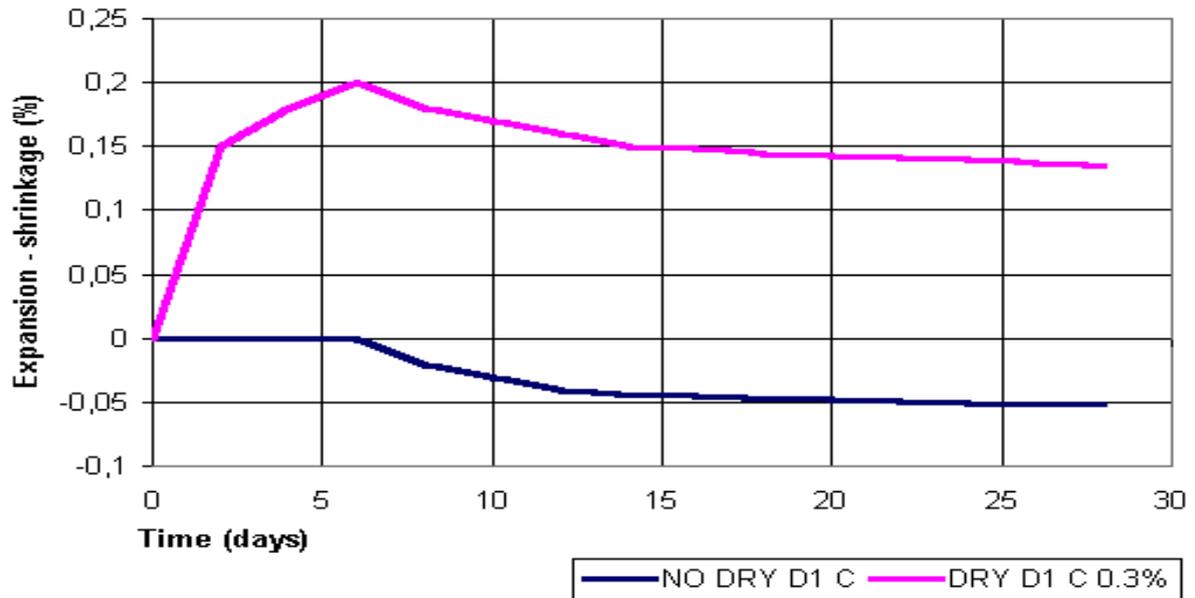
**EXPANDEX** adhere to UNI 8146, 8147 and 8148 Italian specifications. Technical data sheet and expansive effects on cement based mortar and concrete are reported below:

| <b>Restrained expansion (<math>\mu\text{m}/\text{m}</math>)<br/>of cement based concrete and mortar - indicative average values</b> |   |            |            |                                   |            |            |
|---|---|------------|------------|-----------------------------------|------------|------------|
| <i>(Determination acc. to UNI 8147 and UNI 8148 test methods – corresponding to ASTM C 878 test method)</i>                         |   |            |            |                                   |            |            |
| <i>Specimens demoulding : after 8 hrs - storage conditions : at 20°C in water</i>   |   |            |            |                                   |            |            |
| Storage time (days)<br>After demoulding   | Percentage of <b>EXPANDEX</b> (on cement + aggregate content) |            |            |                                   |            |            |
|   | <b>EXPANDEX ( for concrete) (*)</b>                           |            |            | <b>EXPANDEX (for mortar) (**)</b> |            |            |
|   | <b>0.2</b>  | <b>0.4</b> | <b>0.6</b> | <b>0.5</b>                        | <b>1,0</b> | <b>1.5</b> |
| 1   | 110   | 145        | 210        | 120                               | 150        | 270        |
| 2   | 130   | 165        | 240        | 150                               | 175        | 340        |
| 3   | 145   | 190        | 275        | 170                               | 205        | 380        |
| 7   | 180   | 250        | 375        | 230                               | 275        | 440        |
| 14  | 210   | 280        | 405        | 300                               | 350        | 510        |
| 28  | 240   | 300        | 440        | 350                               | 450        | 615        |
| 90  | 280   | 340        | 480        | 420                               | 520        | 705        |
| <b>Unrestrained expansion (at 24 hrs)</b>   | > 0,1 % b.v.  |            |            | > 0,3 % b.v.                      |            |            |

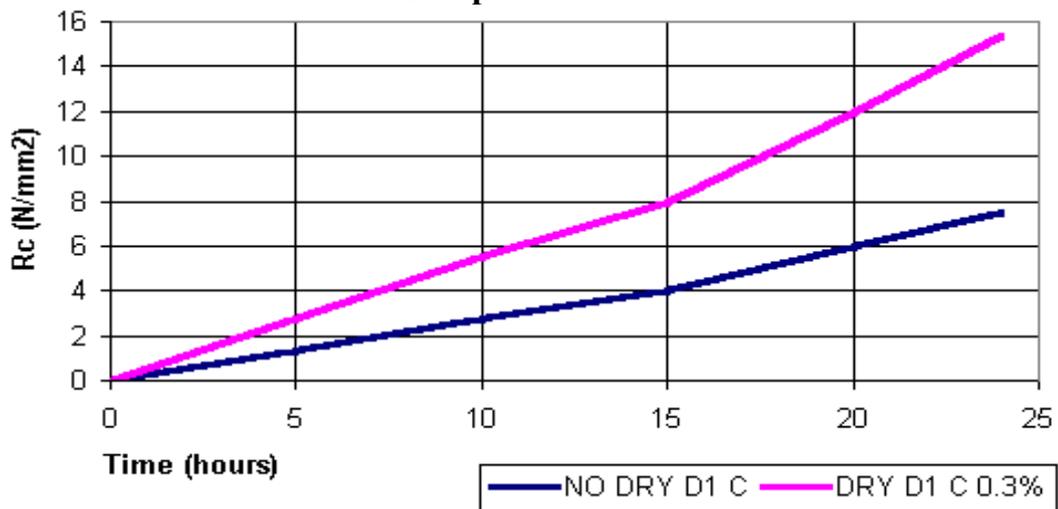
(\*) silico-calcareous aggregate:  $D_{\text{max}}$  20 mm; cemente type I (52,5) content: 400 kg/m<sup>3</sup>; concrete consistence: plastic-fluid

(\*\*) normal sand:  $D_{\text{max}}$  3 mm; sand/cement (type I - 52,5) ratio = 3; mortar consistence : plastic-fluid

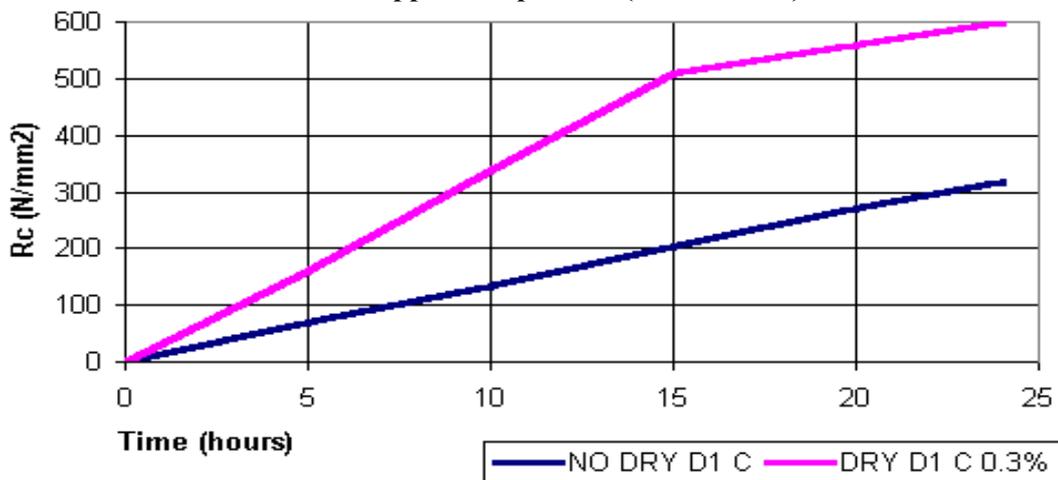
**EXPANDEX (Formerly called DRY D1 C) - Dimensional variations of the concrete**

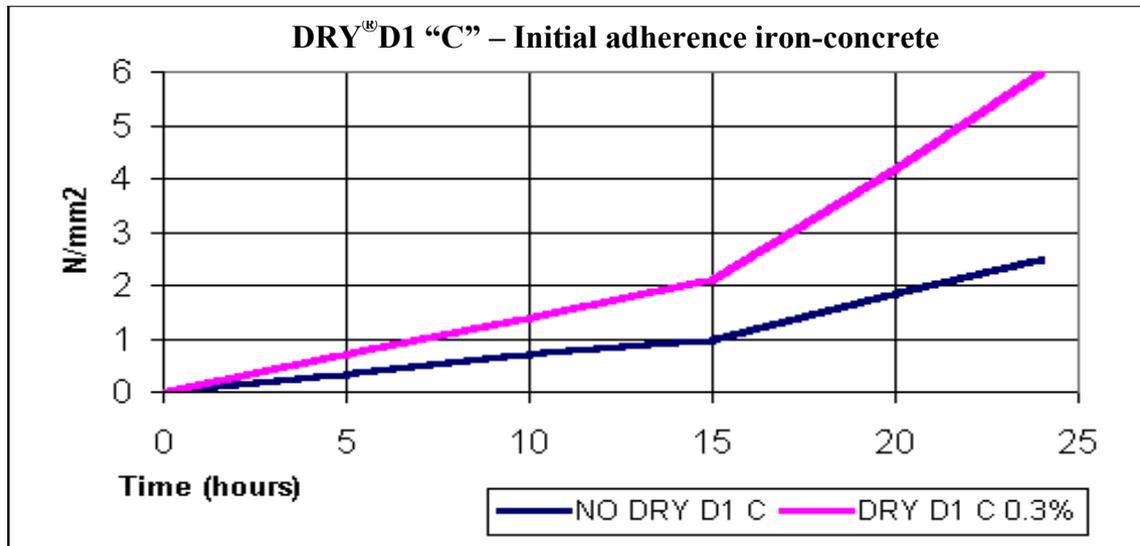


**DRY<sup>®</sup>D1 “C” – Compressive resistance of the concrete**



**DRY<sup>®</sup>D1 “C” – Opposed expansion (ASTM C878) of the concrete**





## REASONS FOR TECHNICAL ENQUIRES

An expansive action adjustable in entity and growth terms allows to decrease, gets null or even to overcome the shrinkage negative effects.

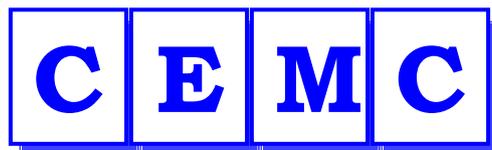
Technical information regarding the product is therefore necessary for choosing the most suitable expansive agent and gets it available in a high qualitative standard.

Technical information are also very important in order to prepare the most selected samples with which your technicians can do the all the tests in order to verify:

- The efficiency of the expansive agent sample proposed
- The most convenient dosage
- Establish the eventual corrective actions on the expansive agent in order to get it suitable for your needs.

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