

# Technical guide for application of industrial flooring.

## 1. Types of Coatings

Surface stiffeners for concrete floors may be used to improve the characteristics of floor coatings based on hydraulic binders, whether monolithic coatings executed directly on the concrete of the resistant floor or coatings consisting of layers of complementary concrete, irrespective of whether they are made to adhere to, or disconnect from, the underlying resistant floor, in which case they are referred to as non-adherent coatings.

In the case of monolithic coatings, the surface hardener is applied by dusting onto the resistant floor while the concrete is still fresh. Under these conditions the floor coating on which the hardener is integrated becomes an integral part of the resistant floor.

In the case of coatings consisting of a compliant concrete layer, adherent or non-adherent, a layer of concrete of at least 50 mm thickness shall be applied to the resistant floor after complete hardening of the respective concrete. The surface hardener will then be applied over that concrete layer while it remains fresh.

## 2. Preliminary Preparation of Pavements

### 2.1 Ground Floors

Before the execution of a pavement, the situation regarding the geological morphology of the soils, control of homogeneity, subterranean cavitations, hydraulic situation, etc., should be taken into account, taking into account the prevention of eventual occasional or differential settlements.

#### 2.1.1 Compaction

After the tests, the box is executed in "tout-venant", to be executed by specialized personnel. It should be evenly compacted and leveled according to the intended type of execution. Whenever possible, "plate" or "troxler" tests should be carried out in order to determine the "proctor" of the ground, which in turn, associated with the type of intended use of the floor, will determine the thickness of the compression blade, which can vary between 12 and 30 cm.

#### 2.1.2 Transfer Bars (Bolts)

One of the most important factors in the design of an industrial floor is the distribution of loads on the pavement. In this sense, it is advisable, whenever possible, to use transfer bars (bolts) since they are essential to allow movement between the various concrete slabs. To this, there are added advantages of a possible reduction of concrete thickness and reduction in the rate of metal fiber to be used, thus providing a significant saving in the cost of a work.

We also point out that, with the use of transfer bars, we are eliminating the "piano" effect, that is the decompensation between two plates in their linearity.

### 2.2 Ground Flooring and Lages

#### 2.2.1 Metallic Fibers

A compression blade should be reinforced by means of metal reinforcement (electro welded mesh or reinforced iron) or by means of metallic fibers dosed in the concrete in the proportions between 20 and 40 kg / m<sup>3</sup> of concrete, in order to increase the increases of the resistances to flexo-traction (see data sheets).

#### 2.2.2 Polypropylene Fibers

Another factor of vital importance is the use of polypropylene fibers, especially in unfavorable conditions, especially during hot weather. These fibers significantly reduce cracking or microcracks caused by the eventual retraction of the concrete matrix (see data sheet).

## 3. Conditions to be satisfied by concrete

When it is desired to execute a monolithic floor, the concrete of the floor should have the following characteristics:

- meet the requirements of the structural project; • have a binder dosage between 300 and 400 kg of cement per cubic meter of concrete; • have a consistency equivalent to a lowering in the Abrams cone test of 8 to 12 cm (up to 15 cm for a pumped concrete); • be manufactured with type I cement.

When it is desired to perform an adhesive coating, it should be ensured that the concrete of the complementary layer has the minimum of retraction in order to facilitate adhesion to the concrete of the already hardened floor. The concrete to be applied in the execution of the complementary layer must satisfy the following requirements:

- have a binder dosage between 300 and 400 kg of cement per cubic meter of concrete; • be made with aggregates as thick as possible, but their maximum dimension must not exceed 1/3 of the thickness of the concrete layer to be applied; • have a dosage of water as low as possible, compatible with the compaction media available on site; • in the case of test specimens drawn by means of a die-cast test, an average value of the compression breaking stress, corrected for the dimensions of the test pieces, of at least 30 MPa.

Because it is a very unique execution process, SIB informs and recommends that this type of application should be exclusively executed by companies qualified and accredited for this purpose.

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Although in non-adherent type coatings the characteristics of the concrete of the complementary layer do not have as much influence on the behavior of the coating as in the previous case, it is recommended that, where possible, in the preparation of this concrete the above requirements for concrete to be applied in adherent coatings.

The conditions to be met by the concrete are merely indicative and are based on our experience. Concrete manufacturers may propose concretes with different characteristics and with satisfactory quality

## 4. Application of SIBLAND Hardener

On-site application of a surface hardener for concrete coatings, whether monolithic or non-monolithic, shall be carried out as follows:

1. Regularization of the surface of the coating immediately after the placement of the concrete. 2. Application by dusting of a first layer of the surface hardener immediately after the water of the concrete has disappeared from its surface. The time required to perform this operation, which depends on the composition of the concrete, its water / cement ratio, the ambient temperature and humidity of the site, is left to the discretion of the applicator. The amount of product to be incorporated in this first layer should be about 2/3 of the total amount to be applied (see data sheets). 3. Execution of mechanical scaling over the entire surface to ensure incorporation of the hardener into the floor covering. 4. Powder application of a second layer which will incorporate the remaining hardener quantity, 30 to 60 minutes after completion of the previous operation. 5. Execution of new mechanical scribing to ensure the incorporation of the second hardener layer in the floor covering. 6. Execution at regular intervals of new operations of scribing of the surface of the coating until its complete hardening. These operations must be carried out immediately after the surface of the coating has dried and the time interval between them varies according to the characteristics of the concrete and the temperature and the ambient temperature and humidity at the site. 7. After finishing, it is important to apply the SIBCURING curing membrane (see technical data sheet), which will avoid premature dehydration of the concrete and the consequent occurrence of micro-cracks.

## 5. Joints

### 5.1 Dilatation Joints

In monolithic coatings, expansion joints shall be provided in accordance with the expansion joints of the building structure. This rule may be waived in the case of ground floors in which the floor of the floor is completely disconnected from the structure of the building. On floors with a reinforced concrete layer, whether or not adherent, expansion joints shall be provided in accordance with the floors on which the coverings are to be executed.

In non-adherent coatings, additional expansion joints should exclusively be used when coating is likely to be subject to relevant movements of thermal origin or where there is a significant change in stiffness of the carrier (for example, in the passage from a rigid carrier to a resilient carrier).

In all cases, the expansion joints must be filled with mastics, and in the application of these should follow the indications of the respective manufacturer and the requirements of the respective Approval Document.

### 5.2 Retraction Joints

The retraction joints aim at the concentration of the cracks due to the retraction of the concrete, in previously defined places.

In the case of monolithic coatings, retraction joints shall be executed in the case of poorly constructed ground floors. Its location must be such that it allows the subdivision of the pavement into square-shaped panels, as much as possible, with areas between 30 and 50 m<sup>2</sup> and a side not exceeding 8 m. These joints, which must also be executed in the contour of emerging elements of the construction, must be performed by mechanical means within 3 days of the coating being carried out, have a width of about 3mm and a depth of 1/4 to 1/3 of the thickness of the floor. In the case of monolithic coatings applied on structural floors, the execution of these joints will in principle be dispensable, but can not be carried out without the approval of the designer.

In the case of coatings with an additional concrete layer, retraction joints with the same characteristics as those referred to above shall be provided in such a way as to subdivide the area of the coating into panels as much as possible squares, with areas between 30 and 50 m<sup>2</sup> and with no side greater than 8 m. These joints must also be executed in the outline of building elements.

### 5.3 Outsourced Joints

Separation joints may also be provided, where the entire surface of the coating is of interest, whenever it is desired to separate existing structural elements.

### 5.4 Boards of execution

Whenever possible, the entire surface of the coating must be run at one time, in order to avoid the creation of running joints. However, where this is not possible, it is advisable to provide a joint of MALHASOL CQ 30-type reinforcement with a width of 1 m in order to minimize the risk of cracking in the joint area.

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