

Avis Technique 1/03-795

Accessoire pour joints
de dallage

TOFFOLO JOINT RULE

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Commission chargée de formuler des Avis Techniques
(arrêté du 2 décembre 1969)

N° 1 Specialized Group
Béton moulé et fixation

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Pour le CSTB : J.D. Merlet, Technical director

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TECHNICAL DOCUMENT

Drawn up by the applicant

A - Description

1 - Purpose and Principle

The system is intended for the creation of shrinkage joints in concrete slabs. Moreover it enables the slab level to be "adjusted" during the pouring of the concrete.

The Toffolo joint gives rise to surface divisions in the slab and allows the generation of cracks to be better controlled.

It consists of a light-colour, hollow PVC extruded section with a triangular shape, bearing very pronounced grooves on its lateral edges in order to obtain better adherence with the concrete. From this point of view the triangular form of the joint ensures superior stability to that of a rectangular profile with the same base and height.

The section base is wide (6 cm for the standard model) and curved inwardly to ensure its stability during laying. The top is thin and allows just a simple line to be visible on the surface. Joint rule of 8 cm is used when the thickness of concrete slabs is between 12 - 20 cm ; the 4 cm section is used for slabs with 8 - 12 cm. The Toffolo joint requires no additional accessory for its implementation, other than concrete mounds to hold the joint particularly during concrete pouring.

2 - Raw material

The non-plasticized vinylic compounds of the joint are obtained from top quality, recycled PVC resins resulting from off-cuts or downgraded products initially intended for interior fasteners.

3 - Elements

The Toffolo joint includes two types of section produced in a single extrusion operation and is available in 5 m and 3 m length. Laying does not require any particular accessory except for concrete mounds to ensure the stability of the joint during concrete pouring. The composition of the concrete used for the retaining mounds is as close as possible to that being used for the slabs with a minimum cement proportion of 300 kg/m³ ; the basic composition is obtained with a CPA CEMI 52,5 cement.

The standard model is 80 mm high and a 40 mm section exists for thin concrete slabs.

In order to ensure the connection between the two 80 mm joint, a 6 mm diameter high adherence rod is used.

4 - Manufacture and control

4.1 - Manufacture

Toffolo joints are manufactured by a company situated in Corbera in Spain. The manufacturing process is carried out using ready-to-use, top quality, recycled PVC resin granules employing the following procedure:

- ⇒ The mixture is heated to a temperature of 150° C to render it malleable ;
- ⇒ The material is then extruded through a mould that forms the joint section ;
- ⇒ The products is then cooled in a refrigerated chamber and extracted and extracted mechanically at the end of the production line.

4.2 - Controls

Samples are taken from the daily production that systematically subjected to the following control checks:

- ⇒ Determining external dimensions and thickness exterior faces ;
- ⇒ Determining weight per meter (3 times a day) ;
- ⇒ Checking joint straightness.

In addition, to the above quality checks, the follow supplementary checks are carried out once a week at start of production:

- ⇒ Measuring the resistance and flexibility of product ;
- ⇒ Measuring joint shock resistance (corresponding the fall of a weight from a height of 1 meter).

5 - Implementation

The areas to be laid are set using retaining concrete moud at least the day before in order that the joint be perfect stable during pouring. The spacing is 75 cm from axis to a for the 80 mm model and 60 cm for the 40 mm model. The concrete should remain as rough as possible to key bet with the poured concrete.

The perpendicular sections touch at the top thanks to a oblique cut at the base.

The joint end are connected with a high adherence 6 mm st rod for the 80 mm model that is inserted in the upper holl part of the joint. Minimum penetration of the section must equal to 20 times the diameter of the steel rod.

Once the joints are sealed in 25 m² squares, the concrete slab may be poured using the section tops as sliding guide level the concrete.

The sections so covered in concrete will localize cracking c avoid disorderly breaking. The Toffolo joint can also be us as a pouring stop.

6 - Packaging

The Toffolo joint is packed in wooden pallets containing :

- ⇒ For 8 cm model, 175 sections of 5 m leng representing 875 m.
- ⇒ For the 4 cm model, 320 sections of 3 m leng representing 960 m.

The lengths are grouped in packets of 5 inside the pallet and taped in several places. The pallets comprise lateral protection in order to avoid any problems arising from handling and transport. The pallet is in itself a package for storage in the warehouse of the builders merchants who distribute the product.

B - References for use

The Toffolo joint has been used in France for over 25 years.

During the last five years more than 1 million meters have been sold each year in France.

The n° 1 specialized group of the commission responsible for drawing up Technical Assessments examined, on 19th June 2003, the breaking joint system for concrete slabs known as "TOFFOLO JOINT RULE" operated by the Company TOFFOLO MATÉRIAUX SARL. After examination, the Group gave the following Technical Assessment. This Assessment has been given for use in continental France.

1 - BRIEF DEFINITION:

1.1 - Brief Description

This system is meant both for the creation of shrinkage joints in concrete slabs and for level adjustment. Basic elements of the system are composed by PVC sections incorporated at the time of the slab laying. The principle being that the system gives rise to surface divisions and allows the generation of cracks to be better controlled.

2 - ASSESSMENT

2.1 - Accepted areas of use

Joints in concrete slabs up to 20 cm thick maximum.

2.2 - System evaluation

2.2.1 - Compliance with rules and regulations in effect and other possible uses.

Stability

This process has no influence on the stability of the slabs for which it is used.

Fire safety

The implementation of this process does not require any particular measure to comply with rules governing this aspect.

Accidents prevention during implementation and maintenance.

From this point of view, the implementation of this system does not involve any specific operation likely to engender risks other than those corresponding to the implementation of works in which it is implicated.

Thermal insulation - Sound proofing.

The uses of this system is practically without influence on the characteristics of the works in which it is implicated.

2.2.2 - Durability

Taking into account the materials from which they are composed, their relatively protected position, especially in relation to direct sun, the low level level of stress to which they are exposed and the experience from which they benefit, it is considered that the PVC sections that comprise the basic elements of this system present no durability problems.

2.2.3 - Joint manufacture

Factory-made, the manufacture of the joint requires constant quality in the raw materials and, as is anticipated, regular checks of the finished product, especially the dimensions.

2.2.4 - Implementation

Carry out by construction companies to which the bearer of the Assessment hands the regulations, implementation requires particular precautions (cf Technical Instructions). The bearer of the Assessment will provide, upon request, technical assistance to the companies using the system.

2.3 - Technical Instructions

2.3.1 - Design conditions

- ⇒ For the 4 cm high joint, the thickness of the slab should be between 8 - 12 cm;
- ⇒ For the 8 cm high joint, the thickness of the slab should be between 12 - 20 cm;

- ⇒ Spacing of the joints should comply with the design documents in effect (currently the "Professional Regulations*" concerning concrete slabs).
- ⇒ Working drawings of the slab should show the position and setting of the joints.

2.3.2 - Manufacturing conditions

Manufacture is subject to internal checks especially of the evenness of the joint and the dimensions of the external and internal faces.

2.3.3 - Storing and Transport conditions

The various parts of the system should be delivered in clearly marked lots.

2.3.3 - Implementation conditions

- ⇒ Maintaining the joint in place should be ensured by mounds of concrete (see implementation described in Technical Document);
- ⇒ The joint should not be subject to shocks from vibrating machine;
- ⇒ The concrete should not be poured directly onto the joint;
- ⇒ The presence of this system does not imply that the usual conditions concerning concrete slabs need not to be observed.

CONCLUSION:

General appreciation

Favourable appreciation of the utilisation of this system in the accepted field of use.

Validity

Up to 30th June 2006

For and on behalf of the n°1
Specialized Group
Chairman
Ph. OUNIN

3- ADDITIONAL REMARKS FROM THE SPECIALIZED GROUP

The recycled PVC accessory implemented in this process is intended for the creation of shrinkage joints in the surface of traditional slabs as well as the adjustment of levels in these slabs. It has been deemed suitable for the fulfilment of these functions, being understood that its position above the wire mesh grid allows the mechanical continuity of the lower part of the slab to be maintained in order to ensure height uniformity in the area it defines.

At the Group's request an inspection was carried out on a former site subject to intense traffic in order to confirm that the edges of the concrete surface in contact with the joints did not display any particular weakness.

Report drawn up for the n°1 Specialized Group by
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