TREMCO

TECHNICAL BULLETIN

No. S.23.01 | Rev. 00/00/20

Lateral Water Migration: TREMproof Amphiba

Purpose

The purpose of this technical bulletin is to define lateral water migration as discussed in this technical bulletin relating to waterproofing in a blindside condition and to explain testing as it specifically relates to the TREMproof Amphibia membrane.

Introduction

Lateral water migration defined within this bulletin is the movement of water between the waterproofing membrane (that is pre-applied to a lagging wall or slab-on-grade condition) and the subsequent concrete pour that becomes the intended building structure.

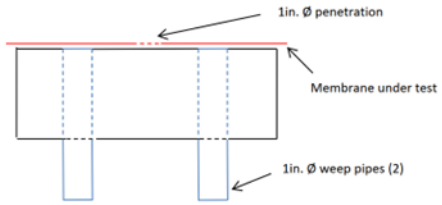

Figure 1

Current Recognized Test Method

The current industry wide test method relies on ASTM standard D 5385 for guidance. Manufacturers have modified this test method to try and similate a breach within the membrane capable of allowing water to migrate between the membrane and the substrate. A predetermined dimension of membrane (with a circular hole precut) is placed and concrete is poured onto the membrane and allowed to cure. Two predetermined weep tubes are also placed at a specified distance on opposite sides of the circular hole. Water is then introduced from the positive side breach and pressurized in increasing increments until the pressure reaches 100 psi. If water is observed leaking from the weep tubes at any time during the testing the result is considered a failure. (Figure 1)

It is important to note the following concerning this current test method

- The testing is performed in a sterile laboratory environment.
- Current membranes reporting ASTM D 5385M* are passive membranes.
- Most if not all rely on chemical reaction with the concrete to provide membrane adherence to the concrete.

Alternative Test Method

DIN EN 12390-8 is an alternate test method, more suitable for active membranes because of their specific behavior, that can also be performed to measure lateral water migration. In this test method, as shown in Fig.1, the testing sample consists in a cube of concrete with dimensions 5.9 x 5.9 x 2.8 in. (15 x 15 x 7 cm.) This sample is prepared by casting fresh concrete on the side with the non-woven fleece of TREMproof Amphibia. Once the concrete has cured, TREMproof Amphibia is fully bonded to the sample via mechanical adhesion provided by the fleece face of the membrane embedding into the concrete.

Fig.1: Testing Sample

In the middle of the TREMproof Amphibia sample a hole, 1.2 x 1.2 in. (3 x 3 cm) width (Fig.2,) is created as a “by pass point” allowing contact from a flow of pressurized water directly tothe interface between membrane and concrete.

Fig.2: Testing sample

Fig. 3 shows the samples installed in the testing device. This testing device is the same system used to carry out the water permeability test of concrete (according to standard DIN EN 12390-8) by keeping a constant pressure of water applied to the sample.

Fig.3: Testing device

In order to create a proper compaction load, a metal plate 5.9 x 5.9 x 1.6 in. (15 x 15 x 4 cm), with a hole in the middle, (Fig.4) is positioned as a support of the side of the sample where the TREMproof Amphibia is bonded.

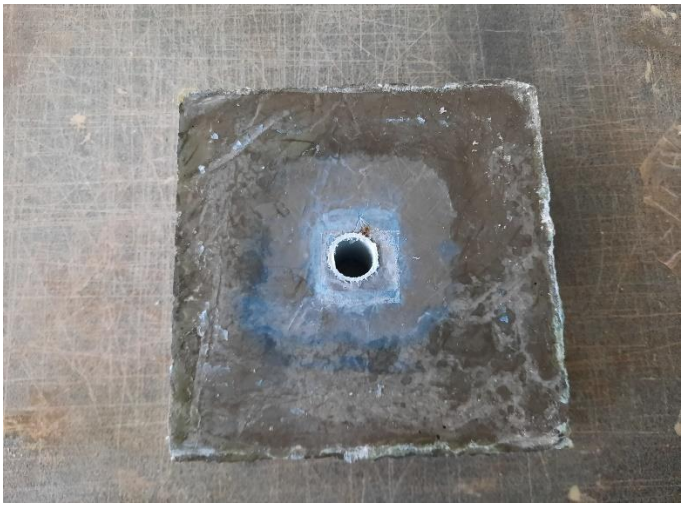

Fig.4: Confining plate

The test is carried out according to the following steps:

1. 24 hrs with an initial water pressure of 7.3 psi (0.5 bar) with the purpose to trigger an initial activation of the inner surface of TREMproof Amphibia.

   Throughout this phase the samples may not be totally water tight yet, so they could show wet surfaces. This is because the interface between TREMproof Amphibia and the concrete needs time to be properly activated by the water.

2. After 24 hrs the water pressure is increased to 29 psi (2 bar.)

Fig.5: Pressurized sample

3. After other 24 hrs, the water pressure is increased to 101.5 psi (7 bar) for 7 days. Fig. 5.

Fig.6: storage tanks for checking the flux of water

TREMproof Amphibia must be activated, or hydrated by water in order to exhibit lateral water migration resistance. As a support of the visual check mentioned, a numerical method also allows for the evaluation of lateral water migration.
We can calculate a flux, expressed as velocity in m/sec according to Darcy's law, by considering the difference of water volume (over time) contained in the transparent cylinders (Fig. 6) which are used as storage tanks for the pressurized water line of the testing device. The variation of flux is plotted in the below attached graph (Fig. 7).
The time of test (reported in X axis) is indicated, starting from the moment when pressure has been applied at 101 psi (7 bar.)

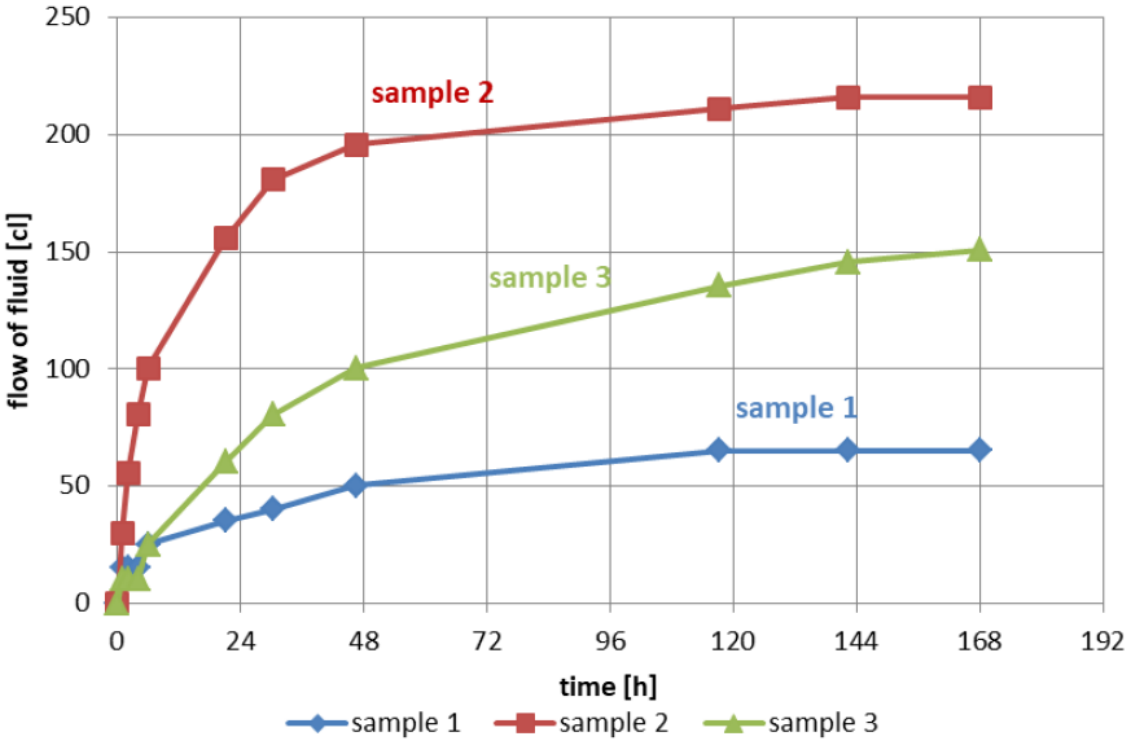

Fig.7: Trend of water flux under a pressure of 101.5 psi (7 bar)

From the attached graph it is possible to see how the recorded flux has slightly decreased during the time of test (reported in the X axis) with a tendency towards zero.

TREMproof Amphibia

The TREMproof Amphibia is an active membrane that consists of three active layers, a watertight EPDM barrier, an active core with the ability to seal when penetrated, an active barrier which seals the overlap, and also a non-woven fabric layer that promotes mechanical adhesion of the membrane to the concrete. This proprietary technology incorporates a hydrophilic gel that reacts immediately in the presence of water to swell and prevent, with proper compaction, its passage or movement to the concrete. It also provides adhesion to concrete, similar to passive membranes, but with the benefits of an active membrane. It is Tremco CPG's belief that the above DIN EN 12390-8 test method is the correct method to use when you have an active membrane. It clearly demonstates the ability of the membrane to stop lateral water migration.

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