Evaluation of mould growth resistance

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REPORT

(QUI543/19)

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1 - Background and scope of this report

This report is the outcome of the evaluation of mould growth resistance of a set of expanded insulation cork boards (ICB) manufactured by Amorim Isolamentos, S.A. To this purpose, triplicate tests were performed on specimens of four different ICB references with dimensions of 100 mm x 70 mm (Table 1).

Table 1: References of the tested pieces

Itecons Ref.	Origin of test pieces	Description of test pieces
QUI552A/19.1 a QUI552A/19.3	Positive control	Gypsum board
QUI553A/19.1 a QUI553A/19.3	Amorim Isolamentos	ICB *Standard* (90/110 kg/m^3)
QUI554A/19.1 a QUI554A/19.3	Amorim Isolamentos	ICB MD (140/160 kg/m^3)
QUI555A/19.1 a QUI5555A/19.3	Amorim Isolamentos	ICB MDFacade (140/160 kg/m^3)
QUI556A/19.1 a QUI556A/19.3	Amorim Isolamentos	ICB HD (170/190 kg/m^3)

2 - Description of experimental approach

To evaluate the resistance of expanded insulation cork boards to mould growth, a methodology adapted from the ASTM D3273 -16 (Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber) was applied. The test apparatus comprises a low-density polyethylene tank (610 mm x 450 mm x 610 mm) within a calibrated environmental chamber capable of maintaining a relative humidity of 95 ± 3 % and a temperature of 32.5 ± 1 °C. In this tank, it was

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introduced, at different levels, deionized water, a greenhouse soil inoculated with suspensions of different fungi and the test specimens.

The tank was filled with deionized water up to a height of 75 mm. Above the water level, a tray made of 316 stainless steel (wire mesh 200) were used to support the greenhouse soil. This greenhouse soil, constituted by humus (70%) and highly quality peat moss (30%), was inoculated with four fungi species (*Aspergillus niger*, derived from ATCC® 6275™, *Penicillium citrinum*, derived from ATCC® 9849™, *Aureobasidium pullulans*, derived from ATCC® 15233™, *Alternaria alternata*, DSM No. 12633) previously cultivated in potato dextrose agar (PDA) medium. After two weeks of incubation for sporulation of mould, the test specimens, including the positive control, were suspended approximately 75 mm above the surface of the inoculated soil (Figure 1).

Figure 1: Test apparatus used for the evaluation of mould growth resistance.

To verify the viability of mould growth in the test apparatus, Petri dishes with PDA medium were placed at several locations on the specimen holder. After one hour, these dishes were removed and kept under the same temperature and humidity conditions of the test for seven days. After this time of incubation, the Petri dishes were visually inspected to verify the presence of moulds and their conformation (**Error! Reference source not found.**).

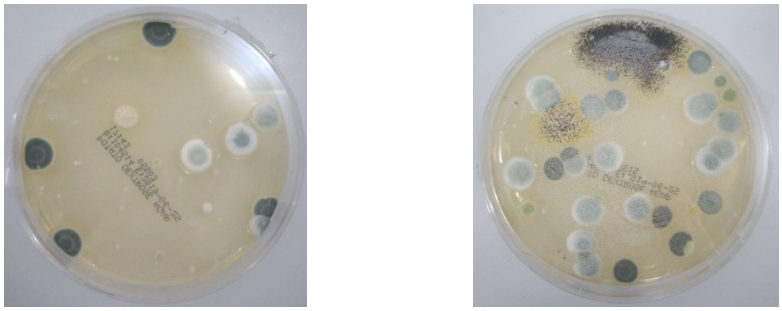

Figure 2: Mould growth in PDA medium after one hour of exposition in the test apparatus.

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3 - Results and discussion

The apparatus containing the test specimens, including the positive controls, were maintained inside the environmental chamber under the previously described test conditions for 4 weeks. Visual inspections were carried out every week to evaluate fungal development according to the rating scale presented in the ASTM D3273-16 standard (Table 2).

Table 2: Rating scale of fungal development based on the estimate of the percentage of colonized surface, as described in ASTM D 3273-16

Rating	Defacement (%)
0	91 to 100
1	81 to 90
2	71 to 80
3	61 to 70
4	51 to 60
5	41 to 50
6	31 to 40
7	21 to 30
8	11 to 20
9	1 to 10
10	0

The determination of fungal growth and the percentage of defacement was performed taking into account the two surfaces of the test pieces. The results obtained are summarized in Table 3.

Table 3: Results of weekly examination of fungal development for the different test specimens according to the rating scale given by ASTM D 3273-16

Itecons Ref.	Test pieces	Week 1	Week 2	Week 3	Week 4
QUI552A/19.1	Positive control	10	9	8	2
QUI552A/19.2		10	9	9	4
QUI552A/19.3		10	9	8	4
QUI553A/19.1	ICB *Standard* (90/110 kg/m^3)	10	9	9	9
QUI553A/19.2		10	10	10	9
QUI553A/19.3		10	10	10	8

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Itecons Ref.	Test pieces	Week 1	Week 2	Week 3	Week 4
QUI554A/19.1	ICB MD (140/160 kg/m^3)	10	10	10	8
QUI554A/19.2		10	10	10	10
QUI554A/19.3		10	10	10	9
QUI555A/19.1	ICB MDFacade (140/ 160 kg/m^3)	10	10	10	10
QUI555A/19.2		10	10	10	10
QUI555A/19.3		10	10	10	10
QUI556A/19.1	ICB HD (170/190 kg/m^3)	10	9	9	8
QUI556A/19.2		10	9	9	9
QUI556A/19.3		10	10	9	8

As can be observed, after 4 weeks of testing, the gypsum board panels, which were used as positive control, received a final classification of 3, indicating that 61 to 70% of the surface area was covered by fungi. The ICB HD test pieces received a final classification of 8, indicating that 11 to 20% of the surface area was covered by fungi. The ICB Standard and MD received a final classification of 9, indicating that 1 a 10% of the surface area was covered by fungi. Lastly, the ICB MDFacade test pieces received a final classification of 10, indicating that no fungal growth was observed on the surface of test pieces.

4 - Final considerations

The reported study allows to conclude that all expanded cork agglomerate boards tested have high resistance to fungal growth under the test conditions, with the MDFacade presenting the best results.

Coimbra, 17 de October de 2019

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