



REPORT

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Accelerated weathering and hygroscopic properties according to EN 16755

Abstract

Accelerated weathering and hygroscopic properties testing of façade material/wall covering called "Yoroi" were performed by commission of Zwarthout Shou Sugi Ban BV. The EN 16755:2017 Annex A "Hygroscopic properties of fire-retardant treated wood-based products including those with fire-retardant coatings", and Annex B "Accelerated weathering of fire-retardant treated wood for fire testing" Method A were utilised. The specimens were fire tested before and after the accelerated weathering in the SBI according to EN 13823. The test results are given in Tables 1-3.

Materials

The materials were received on 22 (for accelerated weathering) and 28 (for hygroscopic properties) June 2021. According to the client:

Façade material/wall covering called "Yoroi", consisting of compressed bamboo boards, charred in an oven under controlled conditions of speed, temperature and oxygen, resulting in a carbon layer of at least 1,5 mm.

The product has a nominal density, before heat treatment, of 1050 kg/m³, an area weight of 20,7 kg/m² and a nominal thickness of 18 mm.

Hygroscopic properties

The moisture content was determined by measuring the constant mass according to EN 16755 at two different humidity conditions: first at 50 ± 3 % RH at 23 ± 2 °C and then at 90 ± 5 % RH at 27 ± 2 °C. Thereafter, the specimens were dried in an oven at 103 ± 2 °C. The weight was measured with balance Snabbväg/Mettler/PM4800/L. Four specimens, with length of 200 mm, were tested for the charred product "Yoroi" and four for the uncharred specimen (compressed bamboo boards) as a reference. The hygroscopic properties were tested between 16 November and 9 December 2021.

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Accelerated weathering

Accelerated weathering was performed according to EN 16755 Annex B "Accelerated weathering of fire-retardant treated wood for fire testing" Method A which involved accelerated weathering of the specimen in an exposure cycle consisting of twelve weeks. Each week cycle consisted of 96 h of water exposure and 72 h of drying. The accelerated test chamber were filled with the charred product "Yoroi". The accelerated weathering was performed between 23 August and 15 November 2021. The weight was measured with balance Snabbväg/Mettler/PM4800/L. The samples were edge sealed, first with an alkyd solvent borne primer and then with a thick coat of a silicone sealer. All specimens were conditioned to constant mass in a controlled climate chamber at 23 ± 2 °C and 50 ± 5 % RH at RISE Wood Building Technology before the accelerated weathering

Test results

Hygroscopic properties

The test results for the hygroscopic properties, according to EN 16755, are given in Tables 1-2.

Table 1. Moisture content according to EN 16755 for "uncharred reference product".

Specimen	Moisture content (%), at 50 % RH and 23 °C	Moisture content (%), at 90 % RH and 27 °C	Observations
1	1,3	12,4	-
2	1,0	11,5	-
3	1,4	13,1	-
4	1,4	12,3	-
Mean value	1,3	12,3	

Table 2. Moisture content according to EN 16755 for "charred product, Yoroi".

Specimen	Moisture content (%), at 50 % RH and 23 °C	Moisture content (%), at 90 % RH and 27 °C	Observations
1	1,2	15,2	-
2	1,8	9,7	-
3	1,4	12,4	-
4	1,3	11,9	-
Mean value	1,4	12,3	

Accelerated weathering

The test results from accelerated weathering are given mass loss during accelerated weathering in Table 3.

Table 3. Mass loss during accelerated weathering according to EN 16755.

Specimen	Mass before weathering (g)	Mass after weathering (g)	Mass loss during weathering (%)
1	1958	1881	3,9
2	1947	1906	2,1
3	1906	1874	1,7
4	1689	1639	3,0
5	1848	1800	2,6
6	2154	2093	2,8
7	2098	2050	2,3
8	1908	1948	2,5

The criteria for maintained reaction to fire performance after accelerated weathering is according to EN 16755: At least the same classification level as initially shall be reached when tested according to EN 13823 (SBI).

The charred product after accelerated weathering reached the same classification as initially.

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Performed by



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