JEGYZŐKÖNYV
HOMLOKZATI TŰZTERJEDÉS
VIZSGÁLAT

Subject of test:	STACBOND facade cladding system		
Customer:	Sistemas Técnicos del Accesorio y Componentes S.L. (STAC) Polígono Industrial Picusa S/N Padrón (La Coruna), Spain 15900		
Order number, date:	13356085 2019. october 31.	**Project number / Test report number:**	93387904 / HU22J4K5 001
Customer's subject officer:	Diego Galbán	**The laboratory subject officer:**	Miklós Bencz

Test specification:

MSZ 14800-6:2020 (Fire resistance tests. Part 6: Fire spread testing on building facades),

Ambient temperature at the start of the test:17,0 C°

Wind speed at the start of the test:0,0 m/s

Test date / Location: 2022.09.06.
ÜV Rheinland InterCert Technical Inspection and Certification Ltd. Industrial Services Business Unit IO4 Business Area Materials Testing and Condition Monitoring Laboratory (8143 Sárszentmihály, Árpád út 1/A.)

The aim of the study. To evaluate the performance of the façade thermal insulation system:

In accordance with the requirements of MSZ 14800-6:2020 (Fire resistance testing - Part 6: Fire propagation testing on building facades). Determination of the technical properties of STACBOND facade cladding systems.

Detailed technical drawings of the products are given in Annex 1.

Sampling method:

The test specimen was built on the masonry of a three-storey test object constructed for this purpose.

Notes on measurement conditions and results:

The environmental effects (temperature, wind speed) were within the range of values specified in MSZ 14800-6:2020 (Fire resistance tests - Part 6: Fire spread tests on building facades).

This document is the English version of the protocol issued on 20.09.2022 under number HU22J4K5 001.
The Hungarian version shall prevail in all matters.

Approved by:	**Rewiewed :**	**Tested:**	**Date:**	**Test report number :**
Auguszt György	Kocsis László	Bencz Miklós	2022. 09. 20.	HU22J4K5 001

1.	**Datas**		**Döntés** Verdict
1.1	Manufacturer of the product and manufacturing plant: **Sistemas Técnicos del Accesorio y Componentes S.L. (STAC)** **Polígono Industrial Picusa S/N Padrón (La Coruna), Spain 15900**		
1.2.	Order date: 2019. october 31.		
1.3.	Customer's subject officer: Diego Galbán		
1.4.	Subject of the mandate: Ventilated façade cladding system made by STACBOND. (For a detailed description of the construction of the structure, see section 2.2.) Area of use: as an external cladding system for buildings.		
1.5.	Documents submitted: Node and drawing documentation of the test sample, technical documentation of products, product elements.		
Test Methods			
2.	**Test**		
2.1.	**Test Method**		
	MSZ 14800-6:2020 (Fire resistance tests - Part 6: Fire spread tests on building facades). The test specimen was erected on the masonry of a three-storey test object designed for this purpose. The temperature of the firebox was measured at 5 locations using firebox plate thermometers and, for information purposes, at 5 locations using Ni-CrNi thermocouples (thermocouples marked Fire1 - Fire 5) according to the previous version of the standard (MSZ 14800-6:2009) The temperature of the flame zone in front of the wall section between the openings was recorded in three rows, three per row at a distance of 10 cm from the wall section and three per row at a distance of 50 cm from the wall section (9-9 in total). I line 10 cm: FAC_I a 10 cm, FAC_I b 10 cm, FAC_I c 10 cm II. line 50 cm: FAC_II a 50 cm, FAC_II b 50 cm, FAC_II c 50 cm III. line 10 cm: FAC_III a 10 cm, FAC_III b 10 cm, FAC_III c 10 cm IV. line 50 cm: FAC_IV a 50 cm, FAC_IV b 50 cm, FAC_IV c 50 cm V. line 10 cm: FAC_V a 10 cm, FAC_V b 10 cm, FAC_V c 10 cm VI. line 50 cm: FAC_VI a 50 cm, FAC_VI b 50 cm, FAC_VI c 50 cm The temperature measured in the observation room was recorded by thermocouples placed in four rows, with 5 to 5 thermocouples per row (25 thermocouples in total). Tables and diagrams of the temperature data recorded by the thermocouples are given in Annex 2 to this report.		

In accordance with clause 6.6.1 of ISO 14800-6:2020, the facade fire limit (Th) is the time, measured and expressed in minutes, that elapses before any of the following phenomena occur (classified as 0, 15, 30 and 45 minutes):

(a) damage caused by combustion on the surface of the facade coating, cladding, insulation system, internal layers or air gap extends to the upper plane of the parapet wall,

(b) burning on the surface of the facade coating, cladding, insulation system, internal layers or air gap extends to 1,50 m from the side of the fire window opening in the horizontal direction at any point on the full height of the model;

(c) the difference between the temperature (Tlz) at the exit from the fire zone at the given points in the flame zone to be taken into account for the assessment and the temperature (Tany) in the window opening (measured in the projection) of the observation level, over a period of more than 2 minutes, is not greater than 300 K (Tlz - Tany ≤ 300 K);

(d) dangerous partial or total dropping of the facade cladding and coatings, i.e. external cladding, glass, stone and artificial stone, metal and plastic sheeting, wood cladding, composite external thermal insulation system, etc., to ground level in the area in front of the test model building. The individual mass of the burning, flaming or burning-dripping debris or non-burning damaged structural parts at the moment of arrival on the ground shall be considered as a hazardous event if it is 5 kg or more (m ≥ 5 kg, where m is the mass of the fallen debris determined by measurement or by a validated computational method based on its volume and body density). The mass measurement shall be carried out to an accuracy of 0,05 kg.

A phenomenon may be judged on a case-by-case basis, and may be considered to exceed the performance criterion, if adjacent cladding elements of larger masses (but not exceeding 5 kg individually) fall simultaneously, or if smaller masses of sharp, pointed material fall in large quantities in a mass, in a manner that is clearly life-threatening and seriously damaging to the environment, to occupants in the vicinity of the test model. The testing laboratory shall primarily determine its position on the basis of a visual inspection and may substantiate its assessment by video footage, and may in some cases develop its assessment in cooperation with the sponsor or the technical experts of the BM OKF.

Comments:

- No damage to the surface of the structures tested - changes in surface colour, fly ash or soot deposits, surface flaking, minor deformations not affecting the integrity of the structure.

- The flame temperature (Tlz) exiting the window opening of the firebox is represented by the highest of the averages of the values measured by 3 to 3 thermocouples in rows I to VI.

- The temperature (Tany) measured in the opening of the observation room is the average of the highest of the five temperatures measured by the 25 thermocouples placed in the projection of the opening.

- The start of 2 minutes represents the occurrence of the limit state.

- The first 300 seconds from the start of the test shall not be taken into account in the evaluation of the temperature difference criterion. If the maximum temperature rise measured on the thermocouples of the measuring grid is not greater than 180 K, the temperature difference criterion of 300 K shall not be taken into account.

2.2.	**Test model**

Basic wall construction:
The base wall structure of the façade test building consists of ytong masonry as the infill wall.

Support structure of the STACBOND ventilated façade cladding system:

Profile support "L" brackets are fixed vertically to the plastered base of the test building at a maximum distance of 903 mm from each other, using metal screw fixings with plastic tension sleeves and screws. The T-shaped vertical 6063 T5/T6 levelling profiles were fixed to the "L" brackets by self-tapping screws. The vertical levelling profiles had an axial spacing of 600 mm. On the profile systems thus formed, the suspension boards for hanging the external cladding panels were spaced at different distances (between 431-425 mm). The 4 mm thick, tray pre-bent STACBOND façade cladding sheet was placed on the wall plane thus formed.

Thermal insulation:

A STACBOND ventilated façade cladding system with 44 mm thick Rockwool Fixrock FB1 (32 kg/m3) rock wool insulation with standard markings was installed. The insulation is fixed to the base surface with plastic dowel pins (minimum 6 pcs / m^2).

Facade cladding:

An air gap of ~40 mm was created from the outer plane of the thermal insulation to the outer plane of the aluminium T and L profiles, by applying 4 mm thick STACBOND facade cladding boards fixed to the aluminium L profiles to achieve ventilation. The following board sizes were fixed by mechanical hanging along the entire length of the test wall. 1390 × 1140 mm (w × h) in the area between the openings, 1390 × 2790 mm (w × h) on the plinth and general surfaces and 839 × 2320 mm (w × h) on the plinth and general surfaces.

Fireplace window:

The position of the fireplace window is installed in the plane of the outer edge of the base wall structure. The opening liner is also made of 4 mm thick STACBOND sheet, which is also the material of the façade system. The thermal insulation of the firebox liner was also provided by Rockwool Fixrock FB1 (32kg/m3) rock wool insulation in 1 layer (44 mm) on the base wall structure, due to the position of the window. An opening of ~10 mm was left open at the eyebrow of the window for ventilation.Megfigyelőszinti ablaknyílás:
A tűztéri szinti ablaknak megfelelően készült.

The façade is also closed at the top and sides:
The bottom, side and top closures of the façade cladding are also made of 4 mm thick STACBOND sheet, which is the material of the façade system.

Fireplace window and fire dam size:
A 1200 × 1200 mm nominal size insulated glazed window was installed in the fire floor level within the solid wall structure in the external wall plane of the base wall structure, with the opening opening facing outwards. The window opening on the observation floor was left open. The size of the solid wall section of the window openings, which were placed one above the other, was 1300 mm.

Detailed drawing documentation of the Test Model is given in Annex 1.

2.3.	**Test fire performance**	
	For the model test, 650 kg of air-dried pine roof timbers (fire load ~620 MJ/m2) and 10 litres of diesel oil (fire load ~23 MJ/m2) provided the fire effect in the test facility firebox. The expected fire duration ≥ 45 min. The wood logs were placed 50 cm from the wall structure in accordance with the layout requirements of the test standard. The façade cladding sample on the model building was subjected to standard test fire exposure: $T-T_0 = 345 \lg (8t + 1)$ [K] : T = average temperature in the fire room at time t [°C] T0 = temperature of the firebox at the start of the test [°C] t = time from the start of the fire [minutes]	
2.4.	**Testing equipment**	
	The following measuring instruments and equipment were used in the test: - a reinforced concrete facade test structure - Ni-CrNi thermocouples - Wind turbine air velocity meter (Trotec BA06) - Keysight type data logger - stopwatch	
2.5.	**The circumstances of the test**	
	Test location: 8143 Sárszentmihály, Árpád út 1/A. Meteorological conditions before the start of the study: - air temperature: + 17,0°C - Wind speed: max. 0,00-1,40 m/s The test was photographed and video recorded.	
2.6.	**Test observations**	
	Date of the test: 9 September 2022. Test observations: [minutes] 00:00 Start of the test, lighting of the wooden torch. 04:00 Continuous smoke. 05:00 Opening the firebox window. 06:00 Firebox opening eyebrow, casing deformed, slightly distorted. 08:00 Slight surface delamination of the cladding plates. 10:00 Eyebrow part of firebox opening is peeling off. 13:00 Full overhead cladding burn patched between two windows. 24:00 Rockwool insulation between two windows is peeling off. 27:00 Observation deck window eyebrow is peeling off 29:00 Slight flaming is visible from the vertical edge of the observation room window. 46:00 End of investigation. During the test, the maximum wind speed did not exceed the standard value of 1.00 m/s on a sustained basis.	

Tests	
3.	**Test Results**
	The measurement results of the test are given in Annex 2 as follows: - Wind speed values and diagram measured during the test; - Data and diagram of the temperature rise in the fire zone; - The average of the temperatures measured in front of the wall section between the window openings in each row and their maximum (Tlz) and their diagrams; - The four maximum temperatures of the window opening at the observation floor and their average (Tany) and their diagrams; - Data and diagram of the calculated critical temperature difference (T_{lz} - T_{any});
3.1.	**Summary table of test results:.**. The test results of the STACBOND ventilated façade cladding system, tested according to the requirements of MSZ 14800-6:2020, are shown in the table below.

Test method	Criteria	Result
MSZ 14800-6:2020	Damage caused by surface burning of the facade coating, cladding, insulation system extends to the upper plane of the parapet wall	no limit condition has occurred
	The surface burning of the facade coating, cladding, insulation system shall extend to 1,50 m from the side of the firebox window opening in the horizontal direction at any point over the full height of the model	no limit condition has occurred
	The difference between the temperature (Tlz) at the exit from the fire zone at the given points in the flame zone to be taken into account for the assessment and the temperature (Tany) in the window opening (measured in projection) at the observation deck shall not exceed 300 K for a period of more than 2 minutes Tlz – Tany ≤ 300 K	no limit condition has occurred
	In the case of pavement systems, the mass and/or dangerous falling of individual elements.	no limit condition has occurred

Technical documentations	
4.	**Attachments**
	- - Annex 1: Test sample design and drawing documentation (13 pages) - - Annex 2: Measurement record of the test (45 pages) - - Annex 3: Photo supplement (10 pages)

END OF REPORT

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Approved by:	Rewiewed :	Tested:	Date:	Test report number :
Auguszt György	Kocsis László	Bencz Miklós	2022. 09. 20.	HU22J4K5 001