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Subject

Assessment on an openable fabric curtain, type ‘Firescreen Temperature’
Efectis Nederland-report 2012-Efectis-R9369b [Rev. 1]

Date

16th May 2013

Our reference

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The Standard Conditions for Research Instructions given to TNO, as filed at the Registry of the District Court and the Chamber of Commerce in The Hague shall apply to all instructions given to Efectis; the Standard Conditions will be sent on request.

Dear Sir,

On your request we have written an assessment to state that the openable fabric curtain, type ‘Firescreen Temperature’ can be enlarged.

This assessment should state how much the size can be increased, while the fire resistance will remain within the classification as tested.

First test

On May the 4th 2012, Efectis Nederland BV, Center for Fire Safety has performed a fire test for Hoefnagels Branddeuren BV, on an openable fabric curtain. The motor and guiding system was mounted on the non exposed side. The performed test is reported in Efectis Report 2012-Efectis-R0754[Rev.2]. The curtain was classified as EI₁45, EI₂120, EW60 and E120. This classification means the construction maintained its integrity for a minimum of 120 minutes. It maintained its insulation (with regard to radiation) for a minimum of 60 minutes. It maintained its insulation (with regard to temperature) for a minimum of 45 minutes (according to the EI₁ criteria) and 120 minutes (according to the EI₂ criteria).

When this test was ended after a heating period of 134 minutes, the integrity of the test specimen had not failed.

Construction first test specimen

The test specimen consisted of a stainless steel wire reinforced glass fabric curtain with a specially formulated coating on one side. From this fabric pouches were made of approx. 3500 x 240 mm. Each pouches was sown to another pouch at its top and at its bottom, thus forming the height of the curtain. The pouches were filled with polyester bags filled with expandable graphite.

The curtain was guided through two Promat filled steel casings on the sides. The curtain hung from a steel cylinder which was mounted in a steel casing. The bottom plate of the casing could slide by in order to accommodate the expansion of the fire curtain during the heating. A second cylinder was placed closer to the wall in order to guide the curtain to the vertical steel.

Second test

On June the 14th 2012, Efectis France has performed a fire test for Hoefnagels Branddeuren BV, on an openable fabric curtain. The motor and guiding system were mounted on the exposed side. The performed test is reported in Efectis France Report 12-G-385. Based on these test results, the curtain could be classified as EI₁30, EI₂30, EW60 and E60. This classification means the construction maintained its integrity for a minimum of 60 minutes. It maintained its insulation (both with regard to temperature and radiation) for a minimum of 30 minutes.

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Construction second test specimen

The test specimen was as in the first fire test of May the 4th, had much larger dimensions. The free opening was 5000 x 4000 mm (width x height).

Third test

On September the 5th 2012, Efectis Nederland BV, Center for Fire Safety has performed a fire test for Hoefnagels Branddeuren BV, on an openable fabric curtain. The motor and guiding system were mounted on the exposed side. The performed test is reported in Efectis Report 2012-Efectis-R9369a. The curtain was classified as EI₁60, EI₂60, EW60 and E120. This classification means the construction maintained its integrity for a minimum of 120 minutes. It maintained its insulation (both with regard to temperature and radiation) for a minimum of 60 minutes. When this test was ended after a heating period of 134 minutes, the integrity of the test specimen had not failed.

Construction third test specimen

The test specimen was as in the first fire test of May the 4th, but had a few alterations. The cylinder that guided the curtain had 3 reinforced areas divided over the length of the cylinder. This construction did not have a sliding plate at the bottom of the steel casing. The opening between the bottom plate and the curtain was significantly wider than in the first test.

Size variations

Paragraph 13.3 of the EN 1634-1:2008 gives rules for size variations of fire resistance tests for doors, shutters and openable windows. These rules for size variations do not apply for openable fire curtains.

The test specimen did however fulfill the performance criteria for an extended test time (134 minutes for 60 and 120 minutes fire resistance, as well as 41 minutes for 30 minutes fire resistance), as mentioned in paragraph 13.3.2 of the EN 1634-1:2008.

We do consider the size variations given in 13.3.2 valid, based on the following arguments:

- The specimens were very stable at the end of the tests;
- Constructing this fire curtain in a bigger size will not lead to bigger gaps at the sides, because of deflection, as it might in a regular door.;
- The main consequence of increasing the size of the fire curtain is increasing the weight of the curtain hanging from the roll. This increased weight will put a bigger strain on it. Since the roll did not fail during the test, or seem very strained after the test, this extra weight is justifiable.

During the test some observations were made, because of which the size variations can not be bigger than in the values mentioned in table 1:

- At some point a small hole appeared, but closed again (the expandable material closed it);
- Near the end of the test the expandable material at the top of the specimen started to sink a bit, leaving an area with less and less insulation capacity.
- A wider curtain would put a higher stress on the roll and it would sooner bend under the load;
- A higher curtain would put more stress on the upper sections of the curtain fabric, so it would be more likely to break. It would also make it harder for the graphite in the upper sections to expand.

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Table 1: The following size variations are allowed:

clearance opening		EI ₁ 60 + EI ₂ 60	EW120
	tested	60 minutes	120 minutes
width (mm)	3200	3680 (+ 15%)	3520 (+ 10%)
height (mm)	2920	3920 (+ 1m)	3420 (+ 0.5m)
area (m ²)	9.3	14.4	12.0

The calculated maximum linear dimensions are exclusively valid for the specimen described in test report 2012-Efectis-R0754rev1 and 2012-Efectis-R9369a.

Table 2: The following size variations are allowed:

clearance opening		EI ₁ 30 + EI ₂ 30
	tested	30 minutes
width (mm)	5000	5750 (+ 15%)
height (mm)	4000	5000 (+ 1m)
area (m ²)	20.0	24.0 (+20%)

The calculated maximum linear dimensions are exclusively valid for the specimen described in test report 12-G-385.

Validity

This assessment is based on the knowledge and experience within Efectis with regard to experimental determination of the fire resistance of this type of constructions.

Because of development in the European regulations, and the influence this may have on the assessment of the fire resistance of constructions, this assessment is valid until the new 1634-1 will become final.

If, in the future the European regulations are changed, this assessment needs to be re-evaluated.

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With kind regards,



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