

November 30, 2015

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Letter of the test results – fire resistance tests on hinged double leaf steel door

Two separate fire resistance tests were carried out in the vertical furnace of the VTT Expert Services Ltd fire laboratory in Espoo, Finland. Test with the hinged double leaf steel door, which opened away from fire, was carried out on April 13, 2015. Test with the hinged double leaf steel door, which opened towards fire, was carried out on April 15, 2015. Test method was standard SFS-EN 1634-1:2014 “*Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows*”

Construction of the hinged double leaf steel door in brief

Test specimens were hinged double leaf steel doors. The size of the door frame was 2000 x 2190 mm (width x height) and the size of the clear opening 1860 mm x 2050 mm (width x height).

The dimensions of door leaves were 940 mm x 2080 mm x 70 mm and 950 mm x 2080 mm x 70 mm (w x h x t). Door leaves were manufactured from 0.5 mm thick steel sheets and frame of 1.5 mm thick steel sheets. Frame and door leaves were constructed by welding. Door leaves were insulated with 50 mm thick SPU FS. There was a 6 mm thick MgO-sheet on both sides of SPU. Sheets were glued together with Kiilto KESTOPUR FP35-25, with the amount of 2 kg/m² (amount given by the customer). Around the door leaves there were two parallel seals, Joints Fire Quad Seal Pro+, with the size of 20 mm x 4 mm.

The door leaves were equipped with hinges: 3/door leaf x 2008.16.1 PL4 (Polar Metall Oy), lock case Finlox R4190M, key cylinder HEF 6600 CR LTK, handle M.H.L 10270 40200 and espagnolette Roca 100 (AISI316).

Test results relate only to the sample tested.

November 30, 2015

Fire resistance test on April 13, 2015 – hinged double leaf steel door opening away from fire

The test was terminated 102 minutes after the start of the test. The test specimen met criteria for integrity (E) for 102 minutes and for insulation (I₁) for 42 minutes and for insulation (I₂) for 60 minutes.

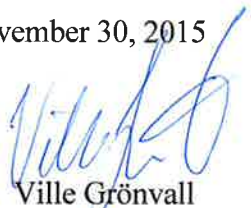
The test results and detailed description of the test specimen are presented in test report No VTT-S-03421-15 by VTT Expert Services Ltd.

Fire resistance test on April 15, 2015 – hinged double leaf steel door opening towards fire

The test was terminated 102 minutes after the start of the test. The test specimen met criteria for integrity (E) for 102 minutes and for insulation (I₁) for 36 minutes and for insulation (I₂) 61 minutes.

The test results and detailed description of the test specimen are presented in test report No VTT-S-03422-15 by VTT Expert Services Ltd.

Espoo, November 30, 2015


Ville Grönvall
Expert, Fire Safety

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Test results relate only to the sample tested.

November 30, 2015
APPENDIX 1

Photographs of the test specimen

**Fire resistance test on April 13, 2015
– hinged double leaf steel door opening away from fire**



Figure 1. Exposed side of the test specimen prior to the fire test.



Figure 2. Unexposed side of the test specimen prior to the fire test.



Figure 3. Unexposed side of the test specimen after the fire test.



Figure 4. Exposed side of the test specimen after the fire test.

**Fire resistance test on April 15, 2015
– hinged double leaf steel door opening towards fire**



Figure 1. Exposed side of the test specimen prior to the fire test.



Figure 2. Unexposed side of the test specimen prior to the fire test.



Figure 3. Unexposed side of the test specimen after the fire test.



Figure 4. Exposed side of the test specimen after the fire test.