

Gorter Group BV
Attn. Mr. S. Beers
P.O. Box 265
1740 AG SCHAGEN
THE NETHERLANDS

Our reference 2021-Efectis-R001074(E)/LNA/TNL Bleiswijk (NL), July 22, 2021
Your reference -
Project number ENL-21-000749

Expert judgement of the fire resistance of a Gorter Roof Hatch RHTEI

Dear Mr. Beers,

You requested Efectis Nederland BV to perform an expert judgement on the expected fire resistance of a Gorter roof hatch, type RHTEI with fire from the outside.

A test has been performed on the Gorter roof hatch, type RHTEI, which is described in test report 2015-Efectis-R001575. The roof hatch was heated (standard fire curve) at the inside with the hatch lid locked. The question you asked is whether the results of the test report are expected to still be valid if the roof hatch will be heated from the outside.

This expert judgement assumes that the fire can occur on the outside of the roof hatch according to the reduced fire curve (external fire exposure curve).

The expert judgement concerns a construction that has not been tested as such. This question cannot be answered through DIAP/EXAP. Therefore, the conclusion will be given as an expectation of the fire resistance according to Annex A of the Dutch standard NEN 6069+A1+C1:2019 (NEN 6069:2019). The expectation is based on the knowledge and experience currently available at Efectis with regard to determining the fire resistance of such structures.

Efectis Nederland BV declares that this expert judgement represents an equivalent solution as allowed in the Dutch Building Code. In case of differences between the Dutch and the English version of this document, the Dutch document is leading.

An expert judgement is not a classification and is not intended for classification in accordance with EN13501-2 and/or substantiation for a declaration of performance (DoP) for products for which CE marking is mandatory.

1. CRITERIA

The expert judgement on the fire resistance will be based on annex A of NEN 6069+A1+C1:2019 (NEN 6069:2019). The following criteria have been used:

Integrity (E)

The criterion integrity means, as the word suggests, that in the tested construction no openings may develop through which heated unburnt gasses or flames can escape to the unexposed side of the test specimen.

Thermal insulation (I)

The fire resistance with regard to thermal insulation is determined by the moment the average temperature rise on the non-exposed side of the test specimen reaches 140 °C or the maximum temperature rise on the unexposed side of the test specimen reaches 180 °C.

In the specific case of doors and shutters, one out of two options of the thermal insulation criterion shall be used:

Thermal insulation (I₁)

The mean temperature rise on the unexposed face of the door leaf shall be limited to 140 °C above the initial mean temperature, with the maximum temperature rise at any point of the door leaf limited to 180 °C. No temperature measurements shall be taken into account on the door leaf within 25 mm from the border line of the visible part of the door leaf. The temperature rise at any point on the frame shall be limited to 180 °C.

Thermal insulation (I₂)

The mean temperature rise on the unexposed face of the door leaf shall be limited to 140 °C above the initial mean temperature, with the maximum temperature rise at any point of the door leaf limited to 180 °C. No temperature measurements shall be taken into account on the door leaf within 100 mm from the border line of the visible part of the door leaf. The temperature rise at any point on the frame shall be limited to 360 °C.

2. BASE FOR THE EXPERT JUDGEMENT

In particular, the following report has been used that is relevant to assess this construction:

- 2015-Efectis-R001575

A summary of the above-mentioned report is provided in Chapter 3 of this report.

3. SUMMARY 2015-EFFECTIS-R001575

For details about this construction, we refer to test report 2015-Efectis-R001575.

Construction	Gorter insulated steel roof hatch, type RHTEI
Test standard	EN 1634-1:2014
Supporting construction	Standard low density rigid supporting construction, reinforced aerated concrete floor
<i>Hatch lid (movable part):</i>	
Dimensions	2225 x 1225 x 90 x 2 mm (l x w x h x t)

Material	Powder coated steel sheet
Insulation	Rockwool Steprock ND Promaxon
<i>Hatch ridge (fixed part)</i>	
Dimensions	280 x 80 x 2 mm (h x w x t)
Material	Powder coated steel sheet
Insulation	Rockwool Steprock ND Promaxon
Intumescent material edge of the inside of the hatch lid	Promaseal GT (self-adhesive) Promaseal ST (self-adhesive)
Seal top of the ridge edge	Silicon seal from Promat
<i>Fire resistance test:</i>	
Results	Integrity (E): 134 min Thermal insulation (I ₁): 121 min Thermal insulation (I ₂): 121 min

4. EXPERT JUDGEMENT

Test report 2015-Efectis-R001575 describes the fire resistance test on a Gorter roof hatch, type RHTEI. The roof hatch was heated from the inside with the hatch lid locked. The roof hatch has achieved a fire resistance of 121 minutes based on the integrity (E) and thermal insulation (I₁ and I₂) criteria.

The question is whether the results from the test report are still expected to remain valid if the roof hatch is heated on the outside. Because of the low overrun time for 120 minutes, the expert judgement will be limited to a fire resistance of 90 minutes, based on the integrity and thermal insulation criteria.

Integrity

The integrity criterion (E) depends, among other aspects, on openings in the roof hatch construction.

Steel will expand under the influence of high temperatures in the event of a fire. The steel hatch lid will try to extend in relation to the non-exposed side, resulting in the steel hatch lid tending to bow away from the fire at the short edges. The multipoint lock of the hatch lid will partly prevent this. The frame will attempt to behave similarly, but because it is fixed to the supporting construction it may not move as much as the hatch lid. Because the roof hatch is heated on the outside, the short edges of the hatch lid will bend away from the fire, towards the frame. The hatch lid will be pressed against the frame. This is expected to have a positive effect on the integrity criterion, provided that the hatch lid is locked with the multi-point lock.

Thermal insulation

The fire resistance with regard to thermal insulation (I) is determined by the temperature rise on the non-exposed side of the roof hatch.

When the roof hatch will be heated on the outside, the conditions to which the roof hatch will be exposed are expected to be less severe than when the roof hatch is exposed to a compartment fire (standard fire curve vs. reduced fire curve). Due to the nature of external fire, there are additional possibilities for heat dissipation and a lower level of heat exposure may be taken into account. This is expected to have a favourable effect on the temperature rise on the non-exposed side of the roof hatch.

In addition, the temperature on the non-exposed side is expected to have risen less after 90 minutes than after 120 minutes, based on the measurement graphs of the thermocouples on the non-exposed side.

5. CONCLUSION

Based on this expert judgement Efectis Nederland BV expects the fire resistance according to annex A of NEN 6069:2019, of the mentioned roof hatch, to be at least 90 minutes, based on the EI₁ and EI₂ criteria, under the following conditions:

- The roof hatch is heated from the outside.

This conclusion is only valid for the constructions, the types of materials and fixings mentioned in the report. The exchange of built up, materials and fixings is not allowed and will have to be part of a separate expert judgement.

6. VALIDITY

This expert judgement is based on the information made available to Efectis Nederland BV with regard to the roof hatch. Based on this, the current expert judgement is given. Because of developments in the European legislation and the influence of this on the way expert judgements for the resistance to fire of constructions are made this expert judgement is valid till end July 2024 or earlier if CE marking becomes mandatory for this type of construction.

Best regards,



ir. A.A.C. Loman
Project leader Fire Engineering

anouk.loman@efectis.com
+31 88 3473 760



P.W.M. Kortekaas
Senior project leader fire resistance