Fire technical assessment

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Loadbearing wall – Reduction in load

Tekment A/S has asked the Danish Institute of Fire and Security Technology (DBI) about a fire technical assessment regarding a loadbearing wall construction.
The loadbearing wall has been tested after EN 1365-1. The question concerns the possibility to assess the wall REI30 with reduced load. Drawings of the wall can be found in the test report PGA11319A.

Fire technical documentation

Tekment A/S has referred to the following documentation.

Reports	Laboratory	Dated	Standard	Product	Results
PGA11319A	DBI	18-12-2018	EN 1365-1:2012	Loadbearing wall	R: 29 min E: 29 min I: 29 min

Fire technical rationale

For this fire scenario, Tekment A/S wishes to maintain the wall as tested and only reduce the load, so that the wall reaches REI30:

DBI have evaluated the above mentioned variations with regards to the three failure criteria's, loadbearing (R), Integrity (E) and Isolation (I).

Regarding the Integrity (E) and Isolation (I) criteria's, the results of the wall test shows that temperature rise on the unexposed side reached 0.4°C at the end of the test (the failure criteria is 180°C) and there was no sign of hot gasses or openings on the unexposed side. The failure of the Integrity (E) and Isolation (I) criteria's only occurs due to the failure of the loadbearing criteria. DBI evaluates that for this specific type of construction the critical failure criteria is the loadbearing and if this is obtained the Integrity (E) and Isolation (I) criteria's are passed as well.

Regarding the loadbearing criteria (R):

The wall was tested with an applied load of 25.7 kN/m. The wall failed the loadbearing criteria at the 29 minute because the load could not be maintained. The applied load dropped down to 19.6 kN/m in the 29 minute but was on 23.8 kN/m when the test ended in the 31 minute.

If the load is reduced to 18 kN/m DBI evaluates that the loadbearing capacity can be maintained for at least 30 minutes. 18 kN/m are lower than the minimum load applied during the test which was 19.6 kN/m. furthermore the wall showed that is was able to withstand a load of 23.8 kN/m in the 31 minute after it had failed.

In addition to this, reduction of the load will also delay the deformations of the wall and therefore reduce the bending moment caused by the horizontal deformation, increasing the time to failure.

With the reduction in load, it is the opinion of DBI that the test specimen will fulfil the requirements for loadbearing capacity for at least 30 minutes.

Assessment

It is the opinion of DBI that the loadbearing wall described above, with the change as described above, fulfils the requirements for a loadbearing wall with the classification

Assessed DK REI30

Conditions:

- Loadbearing part of the construction must be constructed as described in test report PGA11319A
- The maximum allowed loading on the wall is 18 kN/m
- The maximum allowed height of the wall is 3014mm
- The wall may only be used in buildings where the height to the top floor is below 5.1 m measured from terrain level
- The following changes are allowed and a taken from the DIAP in EN 1365-1:2012:
  - Decrease in height
  - Increase in the thickness of the wall (tested 338mm thick)
  - Increase in the thickness of component materials
  - Decrease in linear dimensions of boards but not thickness
  - Decrease in stud spacing
  - Decrease in distance of fixing centres
  - Increase in the number of horizontal joints
  - Unlimited increase in the width of the wall

Validity

This assessment is issued on the basis of test data and information available at the time of the issue. If contradictory evidence becomes available to DBI the assessment will be unconditionally withdrawn, and the manufacturer will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested because actual test data is deemed to take precedence over an expressed opinion. The assessment is valid for 5 years from the date of issue. DBI must reassess the validity after this period.

The assessment is only valid provided that no other modifications are made to the tested construction, other than those described in this report.

Limitation

This is a national assessment and can not be equated with a classification based on EN 13501-2.

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