Laboratory for Fire Safety

C 1847-4E-RA-001

Summary assessment - examination of the fire resistance of a Staircraft wooden floor construction with Aurora Lighting downlights in a plasterboard ceiling

This document provides a summary of the field of application regarding the fire resistance of various Aurora Lighting downlights mounted in a Staircraft wooden floor construction. Detailed drawings of the specific Aurora Lighting downlights and the Staircraft floor constructions are included in report C 1847-2E-RA-003 dated January 29th, 2019 available from Aurora Ltd or Staircraft Group Ltd.

Staircraft floor constructions with Aurora Lighting downlights: **REI 30**
expressed in analogy with the European fire classification system

The Staircraft floor constructions are made of wooden I-joists covered with chipboard flooring (22 mm) and standard (Type A) gypsum board ceiling (12.5 or 15 mm). No insulation material is added in the floor cavity. The Aurora Lighting downlights are mounted in the gypsum board ceiling. Only the downlights mentioned in table t1 are covered by this summary assessment report.

The span of the floor construction is in principle limited to a maximum of 4150 mm, but may be increased under certain circumstances:

- The spacing of the I-joists (600 mm) may be decreased, or the depth (220 mm) and flange size (47 mm x 47 mm) of the I-joists increased, provided that the maximum moments and shear forces on the I-joists, considering the load applied in practice, are not greater than those tested, when calculated on the same basis in the fire condition.
- The maximum load used in the calculations in the tested floor construction is 102 kg/m^2 for all downlights except the downlight types with number EN-DLM981X / bezel EN-BZ91 (IP20) and EN-DLM982X / bezel EN-BZ92. For these downlights the maximum load in the calculations is limited to 94 kg/m^2. See also table t1.

The downlights mentioned in table t1 may only be applied in a Staircraft floor construction as stated in report C 1847-2E-RA-003 under the following restrictions:

- The dimension perpendicular to the span direction is unlimited provided that the spacing of the I-joists is not greater than 600 mm.
- The height of the cavity between the ceiling and the flooring may be increased but with a minimum I-joist height of 220 mm. No extra material shall be added to that cavity other than needed for the downlights incorporated.

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- The number of downlights incorporated in the gypsum board ceiling is limited to a maximum of 2 downlights per square metre. The distance between 2 random downlights shall be at least 600 mm, centre-to-centre. The distance between a downlight and a joint of the gypsum boards shall be at least 100 mm measured from the centre of the downlight.
- Only I-joists as mentioned in the appropriate Staircraft Q-mark Registration Schedule (see report C 1847-2E-RA-003) shall be used. The mean density of the I-joists shall be at least 500 kg/m^3 for the flanges and 600 kg/m^3 for the web. Holes needed for wiring of the downlights shall only be performed as described in the Q-mark Registration Schedule. Holes other than those described in the Q-mark are not allowed.
- The maximum dimensions of the ceiling boards are 2450 x 1250 mm, provided that the centre-to-centre distance of the fixings is limited to the maximum distance according to table t1. Drywall screws Ø3.5 x 38 mm or bigger shall be used to fix the gypsum boards along all joists. In case of combining different types of downlights the smallest centre-to-centre distance of the drywall screws as given in table t1 shall be used.
- The diameter of the holes in the gypsum boards needed for the installation of the downlights shall not exceed the values given in table t1.

t1 Limitation of the maximum centre-to-centre distance of the drywall screws of the gypsum board ceiling, maximum diameter of the holes in the gypsum boards and the maximum load to be used in calculations of the moments and shear forces in de cross section of the I-joists

Aurora Lighting downlight	Centre-to-centre distance of the drywall screws		Maximum diameter of holes in the gypsum boards	Maximum load used in the strength analysis of the I-joists
	12.5 mm gypsum board	15 mm gypsum board		
AU-A1ZBMPRO1ZX	150 mm	150 mm	Ø 70 mm	102 kg/m^3
AU-STZBMPRO1	150 mm	150 mm	Ø 70 mm	102 kg/m^3
AU-MPRO1	150 mm	150 mm	Ø 70 mm	102 kg/m^3
AU-MPRO2	230 mm	230 mm	Ø 85 mm	102 kg/m^3
EN-DLM981X / EN-BZ91 (IP20)	150 mm	230 mm	Ø 75 mm	94 kg/m^3
EN-DLM981X / EN-BZ93 (IP65)	150 mm	230 mm	Ø 75 mm	102 kg/m^3
EN-DLM982X / EN-BZ92	150 mm	230 mm	Ø 85 mm	94 kg/m^3
EN-DE5	150 mm	150 mm	Ø 65 mm	102 kg/m^3
EN-DE6PRO / EN-BZE8	150 mm	150 mm	Ø 70 mm	102 kg/m^3
EN-DE8 / EN-BZE8	150 mm	150 mm	Ø 70 mm	102 kg/m^3
EN-DE52	230 mm	230 mm	Ø 75 mm	102 kg/m^3
EN-DE82	230 mm	230 mm	Ø 85 mm	102 kg/m^3
EN-FD101W	150 mm	150 mm	Ø 75 mm	102 kg/m^3
EN-FD102	230 mm	230 mm	Ø 90 mm	102 kg/m^3
EN-FD103W	150 mm	150 mm	Ø 75 mm	102 kg/m^3

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