



Laboratory for Fire Safety

Evaluation of the fire resistance of I-joist wooden floor constructions with Astro Lighting Ltd. downlights incorporated into a plasterboard ceiling

Assessment report



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Assessment report

Client	Astro Lighting Ltd River Way Harlow CM20 2GJ United Kingdom
Report number	C 2340-2E-RA-003 (replaces report C 2340-2E-RA-002, dated 10 June 2024)
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1 Introduction

Astro Lighting Ltd. has requested an assessment to determine whether the already tested downlights in *Metsä Wood* wooden floor construction (test report Y 2903-2E-RA-001) can achieve the same fire resistance (REI 30) when incorporated into *Staircraft*, *STEICO* and *James Jones & Sons* floor constructions.

The assessment is where relevant focused on construction-specific principles and is therefore not valid for situations other than those described in this report.

On behalf of *Staircraft*, *STEICO* and *James Jones & Sons*, fire resistance tests have previously been performed, the results of which, as well as the description of the tested constructions, have been outlined in the paragraphs below of this report.

The present report is mainly drawn up in accordance with EN 15725:2023 'Extended application reports on the fire performance of construction products and building elements'.

For the preparation of this report, use was made of test reports provided by the client (*Astro Lighting Ltd.*), *Staircraft*, *STEICO* and *James Jones & Sons* along with detailed drawings of the downlights.

This assessment has been drawn up in accordance with the guideline "Requirements for drawing up assessments – version 2022." as can be found on our website (in Dutch).

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to the Peutz Laboratory for Fire Safety the assessment will be unconditionally withdrawn and the applicant will be notified in writing. This report is valid for 3 years. At the end of this period, the validity period can be extended if it is demonstrated that the composition of the materials and the construction have not changed, the direct and extended field of application as described in the relevant standards have not been limited and no test results have become available that require adjustment of the conclusions in this report.

2 Data used

2.1 Standards used

Preparing this report, the applicable test standard EN 1365-2:2014 and its direct application were used. Regarding wooden floor constructions an Extended Application standard is not available. For wooden beams EAD 130367-00-0304 can be used. EAD 130367-00-0304 only concerns lightweight composite wood-based beams (and columns), which can be used for floor constructions, but the guideline doesn't provide rules for floor constructions. That means in this report EAD 130367-00-0304 is only used for assessing the *Staircraft*, *STEICO* and *James Jones & Sons* joists in the floor construction itself.

2.2 Reports used

Various reports have been made available by the client for the purpose of this assessment, see Table 2.1 below.

t2.1 Documents made available

Laboratory	Client	Number and date of the (test) report	Method used
Peutz bv	Staircraft Group Ltd.	Test report No Y 2252-5E-RA-001, July 29, 2020	EN 1365-2:2014
Peutz bv	STEICO	Test report No Y 2118-3E-RA-001, May 28, 2019	EN 1365-2:2014
Peutz bv	James Jones & Sons	Test report No Y 2153-3E-RA-001, January 24, 2020	EN 1365-2:2014
Peutz bv	Astro Lighting Ltd.	Test report No Y 2903-2E-RA-001, January 8, 2024	EN 1365-2:2014
Peutz bv	Astro Lighting Ltd.	Test report No Y 3308-3-E-BR, December 16, 2024	EN 1363-1:2020

The clients have confirmed that these are the most recent versions of the reports, that they have not been withdrawn and that the aforementioned reports may be used for the present assessment. A brief description of the reports is given below.

For a complete description of the floor constructions and the incorporated downlights we refer to the test reports as given in Table 2.1.

2.2.1 Test report Peutz Y 2252-5E-RA-001

This report describes the results of a fire resistance determination carried out on a loadbearing timber floor assembly, constructed as follows:

Dimensions floor joists:	Staircraft TFSi I-joists, 47 mm wide × 220 mm high × 4150 mm span length, comprise two rectangular timber flanges 47 mm × 47mm connected to each other with 11 mm OSB 4 board;
Centre-to-centre distance joists:	600 mm;
Density of the joists:	435 kg/m ³ (flanges) and 625 kg/m ³ (web);
Loading on the deck:	106 kg/m ² ;
Floor boards (deck):	chipboard 22 mm boards 600 mm wide, tongue and groove, nailed ca. 600 mm centres, gun nails Ø2.8 × 65 mm;
Ceiling boards:	Gyproc wallboard type A, 12.5 mm boards, dimensions 1200 mm × 2400 mm, screwed 230 mm centres along all joists, drywall screws Ø3.5 × 38 mm; joints filled with joint filler;
Downlights installed: (in various diameters from Ø63 – 75 mm)	12 x downlights from different manufacturers;
Summarized test results:	Loadbearing capacity (R): 38 minutes, Integrity (E): 38 minutes (due to failing R), Insulation (I): 38 minutes (due to failing R);
Main cause of failure:	the test was discontinued after a period of 38 minutes, all criteria were failed at that moment. After 38 minutes the whole floor assembly collapsed.

2.2.2 Test report Peutz Y 2118-3E-RA-001

This report describes the results of a fire resistance determination carried out on a loadbearing timber floor assembly, constructed as follows:

Dimensions floor joists:	I-Joists, 45 mm wide x 220 mm high x 4150 mm span length, comprise two rectangular timber flanges 45 mm x 39 mm connected to each other with 8 mm hardboard;
Centre-to-centre distance joists:	600 mm;
Density of the joists:	610 kg/m ³ (flange), 968 kg/m ³ (hardboard);
Loading on the deck:	103 kg/m ² ;
Floor boards (deck):	chipboard 22 mm boards 600 mm wide and 2400 mm long with tongue and groove, nailed ca. 600 mm centres, gun nails Ø2.65 x 65 mm;
Ceiling boards:	Siniat plasterboards, type A, 15 mm thick, dimensions 1250 mm x 1800 mm, screwed 230 mm centres along all joists, drywall screws Ø3.9 x 35 mm; joints taped with fibreglass tape and filled with joint filler;
Summarized test results:	Loadbearing capacity (R): 34 minutes, Integrity (E): 34 minutes (due to failing R), Insulation (I): 34 minutes (due to failing R);
Main cause of failure:	the test was discontinued after a period of 34 minutes, all criteria were failed at that moment. After 34 minutes the whole floor assembly collapsed.

2.2.3 Test report Peutz Y 2153-3E-RA-001

This report describes the results of a fire resistance determination carried out on a loadbearing timber floor assembly, constructed as follows:

Dimensions floor joists:	JJI-Joists, 47 mm wide x 235 mm high x 4150 mm span length, comprise two rectangular timber flanges 45 mm x 47 mm connected to each other with 9 mm OSB board;
Centre-to-centre distance joists:	600 mm;
Density of the joists:	520 kg/m ³ (flange), 574 kg/m ³ (OSB board);
Loading on the deck:	102 kg/m ² ;
Floor boards (deck):	chipboard 22 mm boards 600 mm wide and 1800 mm long with tongue and groove, nailed ca. 600 mm centres, gun nails Ø2.65 x 65 mm;
Ceiling boards:	British Gypsum plasterboards, type A, 15 mm thick, dimensions 1200 mm x 2400 mm, screwed 230 mm centres along all joists, drywall screws Ø3.5 x 42 mm; joints taped with fibreglass mesh tape and filled with joint filler;
Summarized test results:	Loadbearing capacity (R): 39 minutes, Integrity (E): 39 minutes (due to failing R), Insulation (I): 39 minutes (due to failing R);
Main cause of failure:	the test was discontinued after a period of 39 minutes, all criteria were failed at that moment. After 39 minutes the whole floor assembly collapsed.

2.2.4 Test report Peutz Y 2903-2E-RA-001

This report describes the results of a fire resistance determination carried out on a loadbearing timber floor assembly, constructed as follows:

Dimensions floor joists:	Finnjoists, 45 mm wide × 220 mm high × 4150 mm span length, comprise two rectangular LVL flanges 45 mm × 36 mm connected to each other with 9 mm OSB board;
Centre-to-centre distance joists:	600 mm;
Density of the joists:	500 kg/m ³ (flange), 652 kg/m ³ (OSB board);
Loading on the deck:	110 kg/m ² ;
Floor boards (deck):	chipboard 22 mm boards 600 mm wide, tongue and groove, glued and screwed ca. 600 mm centres, Ø4.2 × 45 mm screws;
Ceiling boards:	Gyproc Wallboard type A, 15 mm boards, dimensions 1200 mm × 2400 mm, screwed 230 mm centres along all joists, drywall screws Ø3.5 × 40 mm; joints taped with joint tape and filled with joint filler;
Downlight types installed:	1434007 in Ø62 mm, 1434002 in Ø70 mm, 1249038 in 86 × 86 mm, 1434008 in Ø79 mm, 1248017 in Ø79 mm, 1396036 in Ø79 mm, 1286096 in Ø79 mm, 1434004 in Ø83 mm, 1249036 in Ø86 mm, 1249034 in Ø86 mm, 1249040 in Ø86 mm, 1248019 in Ø79 mm;
Summarized test results:	Loadbearing capacity (R): 32 minutes, Integrity (E): 32 minutes (due to failing R), Insulation (I): 32 minutes (due to failing R);
Main cause of failure:	the test was discontinued after a period of 32 minutes, all criteria were failed at that moment. After 32 minutes the whole floor assembly collapsed.

2.2.5 Test report Peutz Y 3308-3E-RA

This report describes the results of a fire resistance determination carried out on a loadbearing timber floor assembly, constructed as follows:

Dimensions floor joists:	Solid timber joists, 45 mm wide × 195 mm high × 1600 mm span length;
Centre-to-centre distance joists:	600 mm;
Loading on the deck:	110 kg/m ² ;
Floor boards (deck):	chipboard 22 mm boards 600 mm wide, tongue and groove, glued and nailed ca. 200 mm centres, Ø4.0 × 60 mm screws;
Ceiling boards:	Gyproc Wallboard type A, 15 mm boards, dimensions 1200 mm wide, screwed 150 mm centres along all joists, drywall screws Ø3.5 × 40 mm; joints and heads of the screws filled with joint filler;
Downlight types installed:	1502001 (with Gen II LED module) in Ø83 mm, 1502001 (with Gen I LED module) in Ø83 mm, 1505001 (with Gen I LED module) in Ø79 mm, 1497001 (with Gen I LED module) in 86 × 86 mm, 1496001 (with Gen I LED module) in Ø86 mm;
Summarized test results:	Loadbearing capacity (R): 33 minutes, Integrity (E): 33 minutes, Insulation (I): 33 minutes;
Main cause of failure:	the test was discontinued after a period of 33 minutes, none of the criteria failed at that moment.

3 Description of the assessed construction and requirements

3.1 Description of the assessed construction

The assessed constructions are I-joist wooden floor constructions, built as described in the test reports mentioned in Table 2.1. Incorporated into the plasterboard ceiling are *Astro Lighting Ltd.* downlights as mentioned below.

The following downlights can be incorporated in the floor constructions:

GU 10 Downlights:

1248xxx [*] : 1248017 (Ø79 mm)	1249xxx [*] : 1249034 (Ø86 mm)	1434xxx [*] : 1434001 (Ø70 mm)
1248019 (Ø79 mm)	1249035 (Ø86 mm)	1434002 (Ø70 mm)
	1249036 (Ø86 mm)	1434003 (Ø83 mm)
1286xxx [*] : 1286095 (Ø79 mm)	1249037 (Ø86 mm)	1434004 (Ø83 mm)
1286096 (Ø79 mm)	1249038 (86 square)	1434007 (Ø62 mm)
	1249039 (86 square)	1434008 (Ø79 mm)
1396xxx [*] : 1396036 (Ø79 mm)	1249040 (Ø86 mm)	
1396037 (Ø79 mm)	1249041 (Ø86 mm)	
	1249042 (86 square)	
	1249043 (86 square)	

'Pro' Downlights using Gen I LED Module:

Minima Pro Round Fixed – 1494xxx [*] (Ø86 mm)	Pinhole Pro Square Fixed – 1501xxx [*] (Ø70 mm)
Minima Pro Round Adjustable – 1495xxx [*] (Ø86 mm)	Pinhole Pro Square Adjustable – 1502xxx[*] (Ø83 mm)
Minima Pro Round 25° - 1496xxx[*] (Ø86 mm)	Pinhole Pro Round Flush Fixed – 1503xxx [*] (Ø62 mm)
Minima Pro Square Fixed – 1497xxx[*] (86 square)	Pinhole Pro Round Flush Adjustable – 1504xxx [*] (Ø79 mm)
Minima Pro Square Adjustable – 1498xxx [*] (86 square)	Trimless Pro Round Fixed – 1505xxx[*] (Ø79 mm)
Pinhole Pro Round Fixed – 1499xxx [*] (Ø70 mm)	Trimless Pro Round Adjustable – 1506xxx [*] (Ø79 mm)
Pinhole Pro Round Adjustable – 1500xxx [*] (Ø83 mm)	

Drawings of the floor constructions are given in Appendix 1 – 4, drawings of the downlights are given in Appendix 5. Appendix 6 contains drawings of the construction as well as the tested downlights from a small-scale test.

3.2 Requirement

The assessed constructions requires a fire resistance of REI 30 in line with EN 13501-2:2023.

^{*}'xxx' represents a variant of the same product where the finish is different (*LED, Lens, and Filter (optional) for downlights using Gen I LED Module*), but the size, weight, construction and materials remain the same as tested, and does not impact the fire-rating performance (for example, 1249034 represents a downlight with a white matte finish, whereas 1249035 signifies a black matte finish).
Downlights that underwent the fire test (see test reports mentioned in paragraphs 2.2.4 and 2.2.5) are highlighted in bold font.

4 Assessment

4.1 General

Where relevant, the assessment focuses on construction-specific principles and therefore cannot be used in situations other than those described in this report.

Based on the fire resistance tests listed in Table 2.1, along with thorough information supplied by *Astro Lighting Ltd.*, it will be assessed in the following paragraphs whether it is possible (or not) to achieve the same fire resistance (REI 30) by incorporating lighting fixtures from Section 3.1 in *Staircraft*, *STEICO* and *James Jones & Sons* floor constructions.

4.2 Staircraft floor construction with Astro Lighting Ltd. downlights

Astro Lighting Ltd. downlight types:

- | | | |
|-----------|-----------|-----------|
| • 1248017 | • 1434007 | • 1249038 |
| • 1248019 | • 1434008 | • 1249040 |
| • 1434002 | • 1249034 | • 1286096 |
| • 1434004 | • 1249036 | • 1396036 |

These lighting fixtures were tested in a floor construction using *Metsä Wood* joists, as documented in fire test report Y 2903-2E-RA-001. The load applied in this test was 110 kg/m². The fire test achieved an overrun time of 2 minutes. In the fire test where *Staircraft* joists were used for the floor construction, the applied load was slightly lower and equal to 106 kg/m². In this test, downlight fixtures were also tested, and the construction achieved an overrun time of 8 minutes (see also Section 2.2.1 of this report). Taking into account that in the fire test using *Staircraft* joists, 12 downlights with similar openings in the ceiling lining were also tested, and considering that the flanges of *Metsä Wood* joists have smaller dimensions (45 wide and 36 mm high), it can be inferred that by replacing the lighting fixtures used during the Y 2252 fire test with those from *Astro Lighting Ltd.* (see Section 3.1), it is expected that the result would lead to at least 30 minutes on the REI performance criteria.

4.3 STEICO floor construction with Astro Lighting Ltd. downlights

Astro Lighting Ltd. downlight types:

- | | | |
|-----------|-----------|-----------|
| • 1248017 | • 1434007 | • 1249038 |
| • 1248019 | • 1434008 | • 1249040 |
| • 1434002 | • 1249034 | • 1286096 |
| • 1434004 | • 1249036 | • 1396036 |

These lighting fixtures were tested in a floor construction using *Metsä Wood* joists, as documented in fire test report Y 2903-2E-RA-001. The load applied in this test was 110 kg/m². The fire test achieved an overrun time of 2 minutes. The test without lighting fixtures incorporated in the ceiling (test report number Y 2118-3E-RA-001) achieved an overrun time of 4 minutes (total test duration 34 minutes).

According to the test report (Y 2903-2E-RA-001, *Metsä Wood* floor construction with *Astro Lighting Ltd.* lighting fixtures incorporated in the ceiling), the first piece of gypsum board fell into the oven after 26 minutes, and the rate of deflection was achieved after 27 minutes. In the test without lighting fixtures (*STEICO*), after 27 minutes, all gypsum boards are still attached to the joists and limit for rate of deflection was achieved after 30 minutes. The observed improvement in structural performance may be attributed to the larger cross-sectional dimensions of the *STEICO* joists compared to those employed in the test with *Metsä Wood* joists. In theory, lighting fixtures can lead to additional heat above the ceiling due to openings created as a result of the disintegration of downlights. According to the test report Y 2903-2E-RA-001, lighting fixtures did not create an opening before 30 minutes of testing, therefore it is expected that the negative impact on the fire resistance of the *STEICO* floor construction is negligible.

4.4 JJ & Sons floor construction with Astro Lighting Ltd. downlights

Astro Lighting Ltd. downlight types:

- | | | |
|-----------|-----------|-----------|
| • 1248017 | • 1434007 | • 1249038 |
| • 1248019 | • 1434008 | • 1249040 |
| • 1434002 | • 1249034 | • 1286096 |
| • 1434004 | • 1249036 | • 1396036 |

These lighting fixtures were tested in a floor construction using *Metsä Wood* joists, as documented in fire test report Y 2903-2E-RA-001. The load applied in this test was 110 kg/m². The fire test achieved an overrun time of 2 minutes. The test without lighting fixtures incorporated in the ceiling (test report number Y 2153-3E-RA-001) achieved an overrun time of 9 minutes (total test duration 39 minutes). According to the test report (Y 2903-2E-RA-001, *Metsä Wood* floor construction with *Astro Lighting Ltd.* lighting fixtures incorporated in the ceiling), the first piece of gypsum board fell into the oven after 26 minutes, and the rate of deflection was achieved after 27 minutes. In the test without lighting fixtures (*James Jones & Sons*), after 36 minutes, all gypsum boards are still attached to the joists and limit for rate of deflection was achieved after 37 minutes. The observed improvement in structural performance may be attributed to the larger cross-sectional dimensions and total high of the *James Jones & Sons* joists compared to those employed in the test with *Metsä Wood* joists. In theory, lighting fixtures can lead to additional heat above the ceiling due to openings created as a result of the disintegration of downlights. According to the test report Y 2903-2E-RA-001, lighting fixtures did not create an opening before 30 minutes of testing, therefore it is expected that the negative impact on the fire resistance of the *James Jones & Sons* floor construction is negligible.

4.5 Non-tested downlights

In addition to the tested lighting fixtures in the *Metsä Wood* floor construction, several similar lighting fixtures (see also Section 3.1) were not subjected to fire testing. The lighting fixtures in question are:

- | | | |
|-----------|-----------|-----------------|
| • 1434001 | • 1249037 | • 1249042 / 043 |
| • 1434003 | • 1249039 | • 1286095 |
| • 1249035 | • 1249041 | • 1396037 |

In this case assessed is whether the mentioned lighting fixtures can achieve the same or better fire resistance as when they were tested in the *Metsä Wood* floor construction. In the paragraphs before, the performance of the tested lighting fixtures in other floor constructions (*Staircraft*, *STEICO* and *James Jones & Sons*) has already been assessed. Therefore, it can be assumed that the untested lighting fixtures can be applied in *Staircraft*, *STEICO* and *James Jones & Sons* floor constructions, provided that the application of the lighting fixtures in the tested *Metsä Wood* floor construction would give a positive result (see next paragraphs).

4.5.1 1434001 downlight

This lighting fixture is very similar in construction to version 1434002, which has been tested. Its installation requires an identical opening in the plasterboard ceiling of 70 mm, and its weight is approximately 60 grams lighter than the tested downlight. The difference between these two products lies in the bezel, which in version 1434001 is round, whereas in the version subjected to fire testing (1434002), a square bezel was used. According to the test report Y 2903-2E-RA-001 tested downlight didn't create an opening before 30 minutes of testing. Additionally, the bezel is not a significant component that influences the formation of potential gaps in the structure. Therefore it is expected that a possible negative effect on the fire resistance of the floor constructions is negligible.

4.5.2 1434003 downlight

This lighting fixture is very similar in construction to version 1434004, which has been tested. Its installation requires an identical opening in the plasterboard ceiling of 83 mm, and its weight is approximately 22 grams lighter than the tested downlight. The difference between these two products lies in the bezel, which in version 1434003 is round, whereas in the version subjected to fire testing (1434004), a square bezel was used. According to the test report Y 2903-2E-RA-001 tested downlight didn't create an opening before 30 minutes of testing. Additionally, the bezel is not a significant component that influences the formation of potential gaps in the structure. Therefore it is expected that a possible negative effect on the fire resistance of the floor constructions is negligible.

4.5.3 1249042 / 043 downlight

This lighting fixture is very similar in construction to version 1249040, which has been tested. Its installation requires an opening in the plasterboard ceiling with dimensions of 86 × 86 mm (in version 1249040, it was a round opening with a diameter of 86 mm), and its weight is approximately 14 grams lighter than the tested downlight. The difference between these two products lies in the bezel, which in version 1249042 / 043 is square, whereas in the version subjected to fire testing (1249040), a round bezel was used. Concerning the double numbers (042 / 043), they serve solely to indicate the colour finish. According to the test report Y 2903-2E-RA-001 tested downlight didn't create an opening before 30 minutes of testing. Additionally, the bezel is not a significant component that influences the formation of potential gaps in the structure. Therefore it is expected that a possible negative effect on the fire resistance of the floor constructions is negligible.

4.5.4 1249035, 1249037, 1249039, 1249041, 1286095, 1396037 downlights

These numbers identify only different colour finishes of the versions that were used during the fire test, see test report number Y 2903-2E-RA-001 and also Chapter 3 of this report. Therefore, it is expected that any potential negative impact on the fire resistance of the ceiling constructions will be negligible.

4.6 Floor construction with new Astro Lighting Ltd. downlights

In this small scale fire test, which followed the most recent version of EN 1363-1, new versions of Astro Lighting Ltd. downlights were tested, incorporating new LED modules (Gen I and Gen II). A detailed description of the construction and downlights can be found in the report referenced in Table 2.1 (test report No Y 3308-3-E-BR, December 16, 2024), as well as in Appendix 6.

Five downlights, four of which contained the LED Gen I module and one the LED Gen II module, were installed in 15 mm plasterboards (type A) in accordance with the manufacturer's instructions. They were positioned to best represent their practical installation, meaning that some were installed directly next to solid timber joists, in the middle between two joists, and directly over the joints between two plasterboards. The load applied during the test was 110 kg/m².

During the fire test, within the first minute, downlight 1502001, which contained the LED Gen II module, fell into the furnace. The remaining downlights, all of which contained the LED Gen I module, stayed in place until the 30 min. of the test. After the 30 min., the first piece of gypsum board dropped into the furnace, and within the next three minutes, several other pieces followed, along with the downlights. The test was stopped at 33 minutes, with none of the criteria having been exceeded by that point.

This test demonstrated that the downlights with the LED Gen I module remained in place throughout the entire fire test. Considering this, it is expected that a full scale fire test conducted in accordance with EN 1365-2:2014 would achieve a result of at least 30 minutes for the REI performance criteria.

5 Field of application

Based on the fire resistance tests listed in Table 2.1, detailed information provided by the client (see Appendix 5), and the knowledge and experience gained by Peutz through numerous similar fire tests conducted over the years, it can be stated that floor constructions incorporating *Astro Lighting Ltd.* downlights (see also Chapter 4) can be assessed for a fire resistance of REI 30 in line with the classification standard EN 13501-2:2023. The field of application is based on the direct field of application in accordance with the classification report of Peutz. The field of application is only valid for constructions similar to that described in the report. Any changes other than those mentioned below are not allowed.

Only downlights as given in Section 3.1 may be incorporated in the floor construction as given in the mentioned reports.

5.1 Construction element

Staircraft floor construction

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

The spacing of the joists may be decreased, or the depth and flange size of the joists increased, provided that the maximum moments and shear forces on the joists, considering the load applied in practise, 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 unchanged floor construction is 106 kg/m² for all downlights.

STEICO floor construction

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

The spacing of the joists may be decreased, or the depth and flange size of the joists increased, provided that the maximum moments and shear forces on the joists, considering the load applied in practise, 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 unchanged floor construction is 103 kg/m² for all downlights.

James Jones & Sons floor construction

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

The spacing of the joists may be decreased, or the depth and flange size of the joists increased, provided that the maximum moments and shear forces on the joists, considering the load applied in practise, 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 unchanged floor construction is 102 kg/m² for all downlights.

5.2 Joists

Staircraft floor construction

The density of the joists shall be at least 435 kg/m³ (flanges) and 625 kg/m³ (web).

STEICO floor construction

The density of the joists shall be at least 610 kg/m³ (flanges) and 968 kg/m³ (web).

James Jones & Sons floor construction

The density of the joists shall be at least 520 kg/m³ (flanges) and 574 kg/m³ (web).

5.3 The dimension crosswise to the span direction

Staircraft, STEICO and James Jones & Sons floor constructions

The dimension perpendicular to the span direction is unlimited provided that the spacing of the joists is not greater than 600 mm.

5.4 Downlights

Staircraft, STEICO and James Jones & Sons floor constructions

The centre-to-centre distance between 2 random fittings shall be no less than 600 mm in the direction parallel to the joists and no less than 600 mm in the direction perpendicular to the joists. Alternatively the downlights may be spaced closer than 600 mm perpendicular to the joists provided that the spacing is adjusted accordingly in the parallel direction such that the density of downlights per m² is no greater than one downlight per m² for the entire ceiling area.

The distance between the centre of a downlight and the joint of the gypsum board, as well as between the centre of a downlight and the centre of a joist, shall be no less than 100 mm. The diameter/opening in the gypsum board for installing the downlight must not exceed those specified in Section 3.1.

5.5 Boards of the ceiling

Staircraft floor construction

The maximum size of boards of the ceiling is 2450 mm × 1250 mm, provided that the number of fixings per square meter remains at least the same as tested. The boards shall be of the type British Gypsum, Gyproc Wallboard, Type A, 12.5 mm.

STEICO floor construction

The maximum size of boards of the ceiling is 2450 mm × 1250 mm, provided that the number of fixings per square meter remains at least the same as tested. The boards shall be of the type Siniat, Type A, 15 mm.

James Jones & Sons floor construction

The maximum size of boards of the ceiling is 2450 mm × 1250 mm, provided that the number of fixings per square meter remains at least the same as tested. The boards shall be of the type British Gypsum, Gyproc Wallboard, Type A, 15 mm.

5.6 Cavity

Staircraft floor construction

The height of the cavity between the ceiling and the flooring may be increased with a minimum joists height of 220 mm. No extra material may be added to that cavity other than needed for the incorporated downlights.

STEICO floor construction

The height of the cavity between the ceiling and the flooring may be increased with a minimum joists height of 220 mm. No extra material may be added to that cavity other than needed for the incorporated downlights.

James Jones & Sons floor construction

The height of the cavity between the ceiling and the flooring may be increased with a minimum joists height of 235 mm. No extra material may be added to that cavity other than needed for the incorporated downlights.

6 In conclusion

Based on the fire test reports listed in Table 2.1, the use of lighting fixtures in *Staircraft*, *STEICO* and James Jones & Sons floor constructions is assessed for a fire resistance of REI 30 in accordance with the classification standard EN 13501-2:2023. The conclusion of this assessment is that all evaluated lighting fixtures in Section 3.1 are permissible in the aforementioned floor constructions (constructed according to the test reports listed in Table 2.1) with an expected fire resistance of 30 minutes (REI 30).

The fire resistance of the considered modifications to the tested constructions can only be determined with absolute certainty on the basis of a fire resistance test in accordance with the European test standard EN 1365-2:2014. The conclusion of this assessment is that if the floor constructions as described in this report were subject to such tests we would expect a REI 30 fire classification.

The assessment described in this report concerns equivalent solutions. The described equivalent solutions must be agreed with the competent authority in a timely manner.

Haps,



H.H.A. Leenders, BSc.

Head of the Fire Laboratory

This report contains 19 pages and 6 Appendices.

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A		B	C	D	E	F	G	THIRD ANGLE PROJECTION		DO NOT SCALE			
ITEM	DESCRIPTION	QTY.	NOTES / INSTRUCTIONS								SHEET 1 OF 6	SCALE	150
1	45 X 220 X 4250mm F-J-I-JOST	6	45X220-36 FINN JOIST, 4250mm LENGTH								astro		
2	30 X 220 X 568mm CEILING CLOSURE BLOCK (KERTO-Q, LVJ)	4	CUT SHAPE AROUND JOIST PROFILE								AST-IJ-REI30		
3	30 X 220 X 588mm CEILING CLOSURE BLOCK (KERTO-Q, LVJ)	6	CUT SHAPE AROUND JOIST PROFILE								AST-IJ-REI30		
4	30 X 220 X 3000mm RM BOARD (KERTO-Q, LVJ)	2	CUT AROUND JOIST PROFILE								AST-IJ-REI30		
5	75 X 220 X 569mm ROCKWOOL INSULATION SLAB (EUROCLASS A1)	4	COMPRESS SLAB TO FIT IN VOID BETWEEN CLOSURE BLOCK AND RM BOARD								AST-IJ-REI30		
6	75 X 220 X 591mm ROCKWOOL INSULATION SLAB (EUROCLASS A1)	6	COMPRESS SLAB TO FIT IN VOID BETWEEN CLOSURE BLOCK AND RM BOARD								AST-IJ-REI30		
7	50 X 600 X 1200mm ROCKWOOL INSULATION SLAB (EUROCLASS A1)	4	FIT BETWEEN AAC BLOCKWORK AND JOIST, COMPRESS TO 40-45mm THICKNESS								AST-IJ-REI30		
8	50 X 600 X 1200mm ROCKWOOL INSULATION SLAB (EUROCLASS A1)	2	CUT AROUND STRUCTURE ENDS AND FIT BETWEEN AAC BLOCKWORK AND JOIST, COMPRESS TO 40-45mm THICKNESS, CUT OUT OBSERVATION WINDOW OPENINGS								AST-IJ-REI30		
9	50 X 600 X 1200mm ROCKWOOL INSULATION SLAB (EUROCLASS A1)	2	CUT AROUND STRUCTURE ENDS AND FIT BETWEEN AAC BLOCKWORK AND JOIST, COMPRESS TO 40-45mm THICKNESS								AST-IJ-REI30		
10	150 X 200 X 600mm AUTOCLAVED AERATED CONCRETE (AAC) BLOCKWORK	-	SIZE AND JOIN DETAILS IN ACCORDANCE WITH TEST HOUSE INSTRUCTIONS								AST-IJ-REI30		
11	200 X 200mm LATERAL UNIVERSAL BEAM RSJ	2	SIZE AND JOIN DETAILS IN ACCORDANCE WITH TEST HOUSE INSTRUCTIONS								AST-IJ-REI30		
12	200 X 200mm LONGITUDINAL UNIVERSAL BEAM RSJ	2	SIZE AND JOIN DETAILS IN ACCORDANCE WITH TEST HOUSE INSTRUCTIONS								AST-IJ-REI30		
13	160 X 200mm LATERAL SUPPORT	2	SIZE AND JOIN DETAILS IN ACCORDANCE WITH TEST HOUSE INSTRUCTIONS								AST-IJ-REI30		
14	160 X 200mm LONGITUDINAL SUPPORT	2	SIZE AND JOIN DETAILS IN ACCORDANCE WITH TEST HOUSE INSTRUCTIONS								AST-IJ-REI30		
15	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	3	FULL BOARD 1200 X 2400mm								AST-IJ-REI30		
16	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	2	CUT BOARD TO 150 X 600mm								AST-IJ-REI30		
17	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	2	CUT BOARD TO 150 X 2400mm								AST-IJ-REI30		
18	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	1	CUT BOARD TO 450 X 600mm								AST-IJ-REI30		
19	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	1	CUT BOARD TO 450 X 2400mm								AST-IJ-REI30		
20	15mm BRITISH GYPSUM GYPROC WALLBOARD TYPE A PLASTERBOARD	3	CUT BOARD TO 600 X 1200mm								AST-IJ-REI30		
21	22mm CABERFLOOR P5 T&G CHIPBOARD FLOORBOARD	7	FULL BOARD 600 X 2400mm								AST-IJ-REI30		
22	22mm CABERFLOOR P5 T&G CHIPBOARD FLOORBOARD	1	CUT BOARD TO 150 X 600mm								AST-IJ-REI30		
23	22mm CABERFLOOR P5 T&G CHIPBOARD FLOORBOARD	1	CUT BOARD TO 150 X 2400mm								AST-IJ-REI30		
24	22mm CABERFLOOR P5 T&G CHIPBOARD FLOORBOARD	4	CUT BOARD TO 600 X 600mm								AST-IJ-REI30		
25	22mm CABERFLOOR P5 T&G CHIPBOARD FLOORBOARD	3	CUT BOARD TO 600 X 600mm OPPOSITE SIDE								AST-IJ-REI30		
26	Ø3.5 X 40mm BRITISH GYPSUM DRYWALL SCREWS	1	SUPPLIED IN A BOX OF 100PCS								AST-IJ-REI30		
27	Ø4.0 X 60mm CSK WOOD SCREWS	1	SUPPLIED IN A BOX OF 200PCS								AST-IJ-REI30		
28	Ø4.2 X 45mm CSK WOOD SCREWS	2	SUPPLIED IN BOXES OF 200PCS								AST-IJ-REI30		
29	Ø5.0 X 100mm CSK WOOD SCREWS	1	SUPPLIED IN A BOX OF 100PCS								AST-IJ-REI30		
30	CABERPEX D4 ADHESIVE	5	SUPPLIED IN 1L BOTTLES								AST-IJ-REI30		
31	BRITISH GYPSUM GYPROC FIBA JOINT TAPE	1	SUPPLIED AS 48mm X 90M REEL								AST-IJ-REI30		
32	BRITISH GYPSUM GYPROC READYMIX JOINT CEMENT	1	SUPPLIED IN A 12L CONTAINER								AST-IJ-REI30		
33	BRITISH GYPSUM GYPROC DRIMWALL ADHESIVE	1	SUPPLIED IN A 25KG BAG								AST-IJ-REI30		
34	SQUDAL INTUMESCENT SEALANT	2	SUPPLIED IN 300ML CARTRIDGES								AST-IJ-REI30		
				UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETRES									
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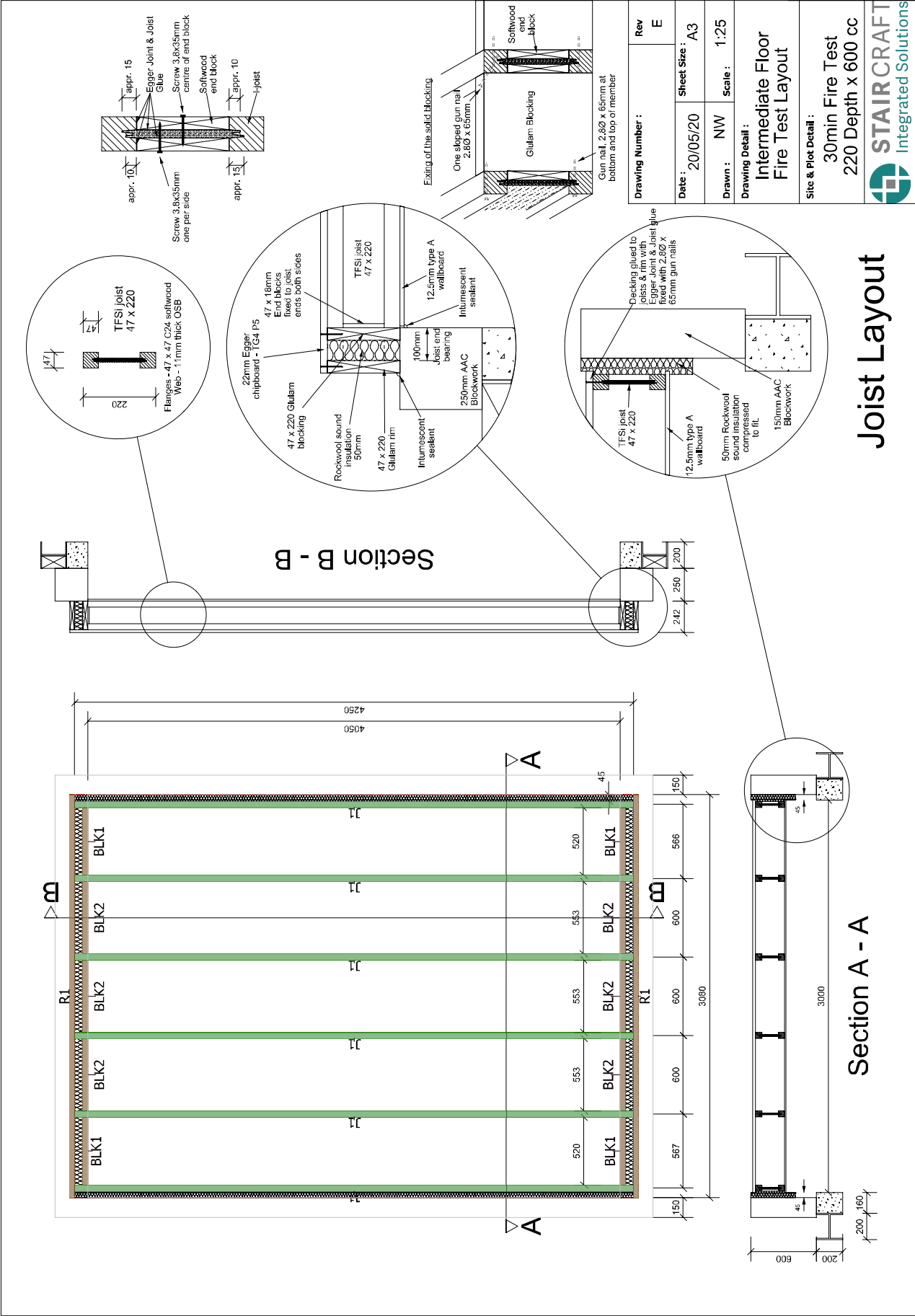
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LONGITUDINAL EDGE FIXING DETAILS DETAIL H SCALE 1 : 10									
LATERAL EDGE FIXING DETAILS DETAIL I SCALE 1 : 10									
PLASTERBOARD FIXING DETAIL									
PLASTERBOARD FIXING DETAIL CONTINUED									
EXAMPLE A: TOO DEEP - NOT ACCEPTABLE RESULT: THE PAPER FACING OF THE PLASTERBOARD WILL TEAR AND COULD RESULT IN THE SHEET PULLING OFF THE SCREW EXAMPLE B: NOT DEEP ENOUGH - NOT ACCEPTABLE RESULT: THE SCREW HEAD WILL CAUSE PROBLEMS WHEN APPLYING PAPER TAPE AND JOINT FILLER (READY MIX JOINT CEMENT) EXAMPLE C: PAPER FACING DAMAGED BY TOOL - NOT ACCEPTABLE RESULT: THE PAPER FACING OF THE PLASTERBOARD WILL TEAR AROUND THE SCREW HEAD WEAKENING THE BOARD, SAME AS EXAMPLE A. CAUSED BY WRONG POWER TOOL OR SCREW / DIMPLER BIT EXAMPLE D: PROPERLY SET - CORRECT RESULT: THE SCREW DIMPLES BUT DOES NOT BREAK THE PAPER FACING OF THE PLASTERBOARD. THIS PROVIDES THE STRONGEST CONNECTION AND ALLOWS FOR EASIER FINISHING.									
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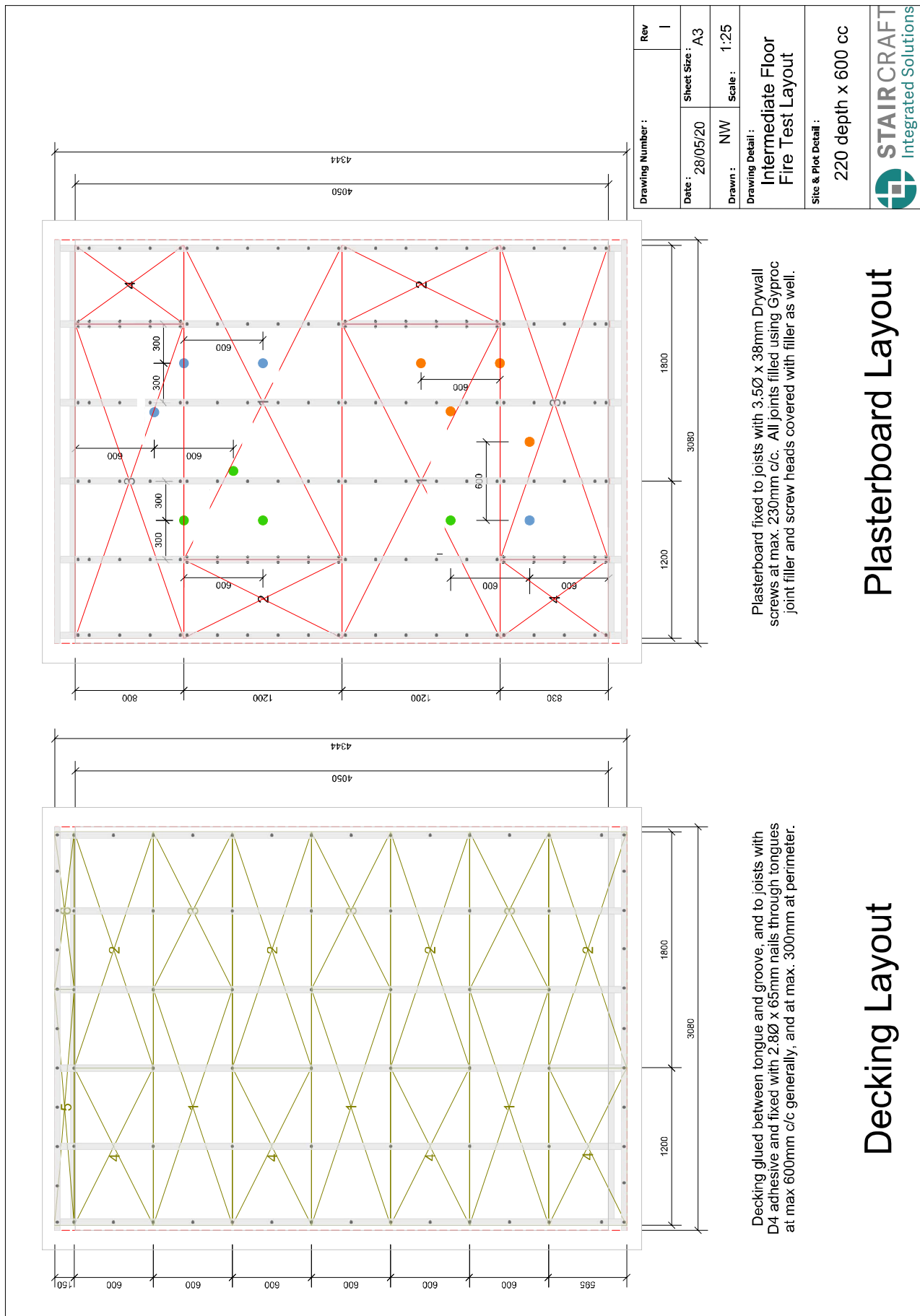
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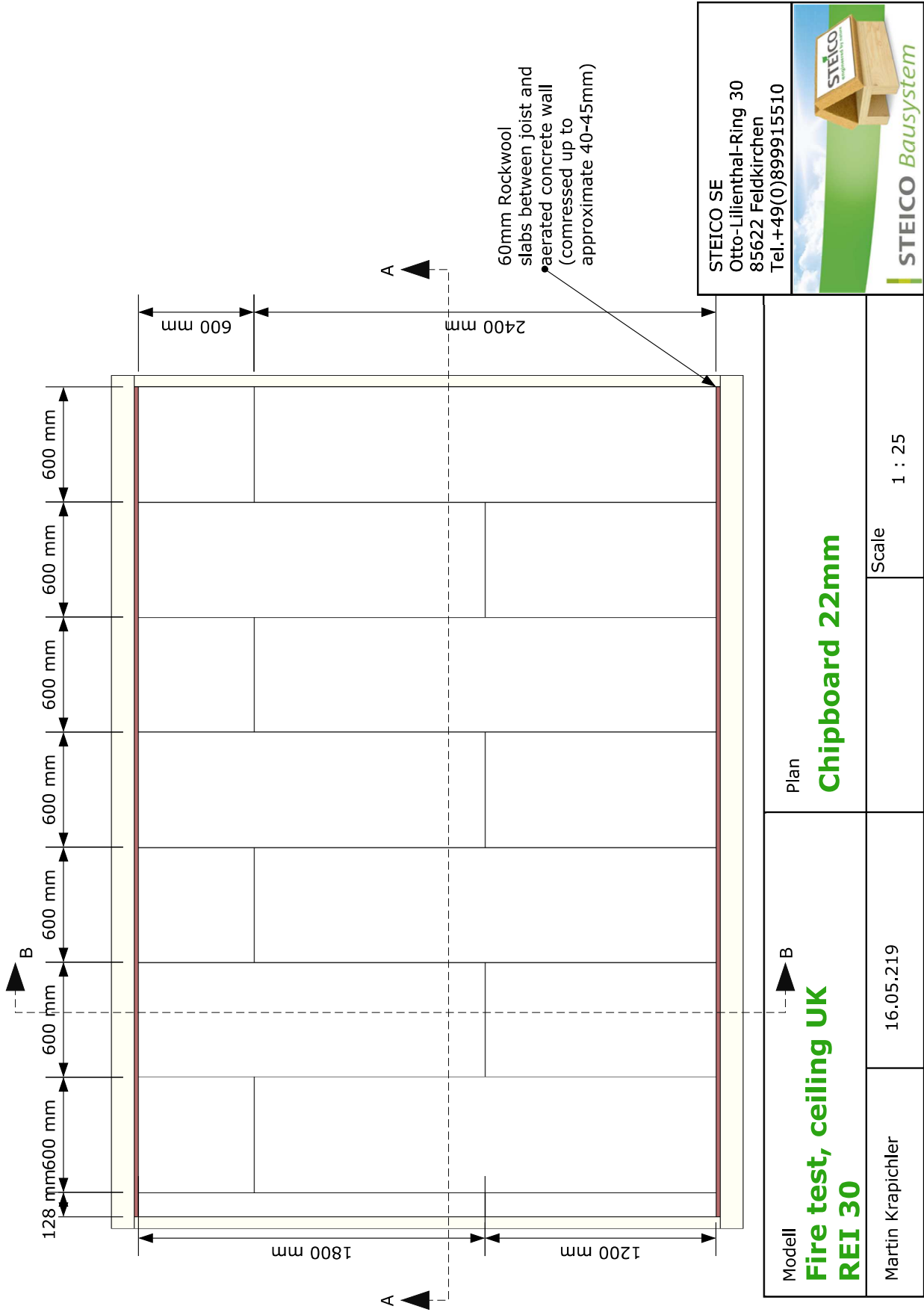
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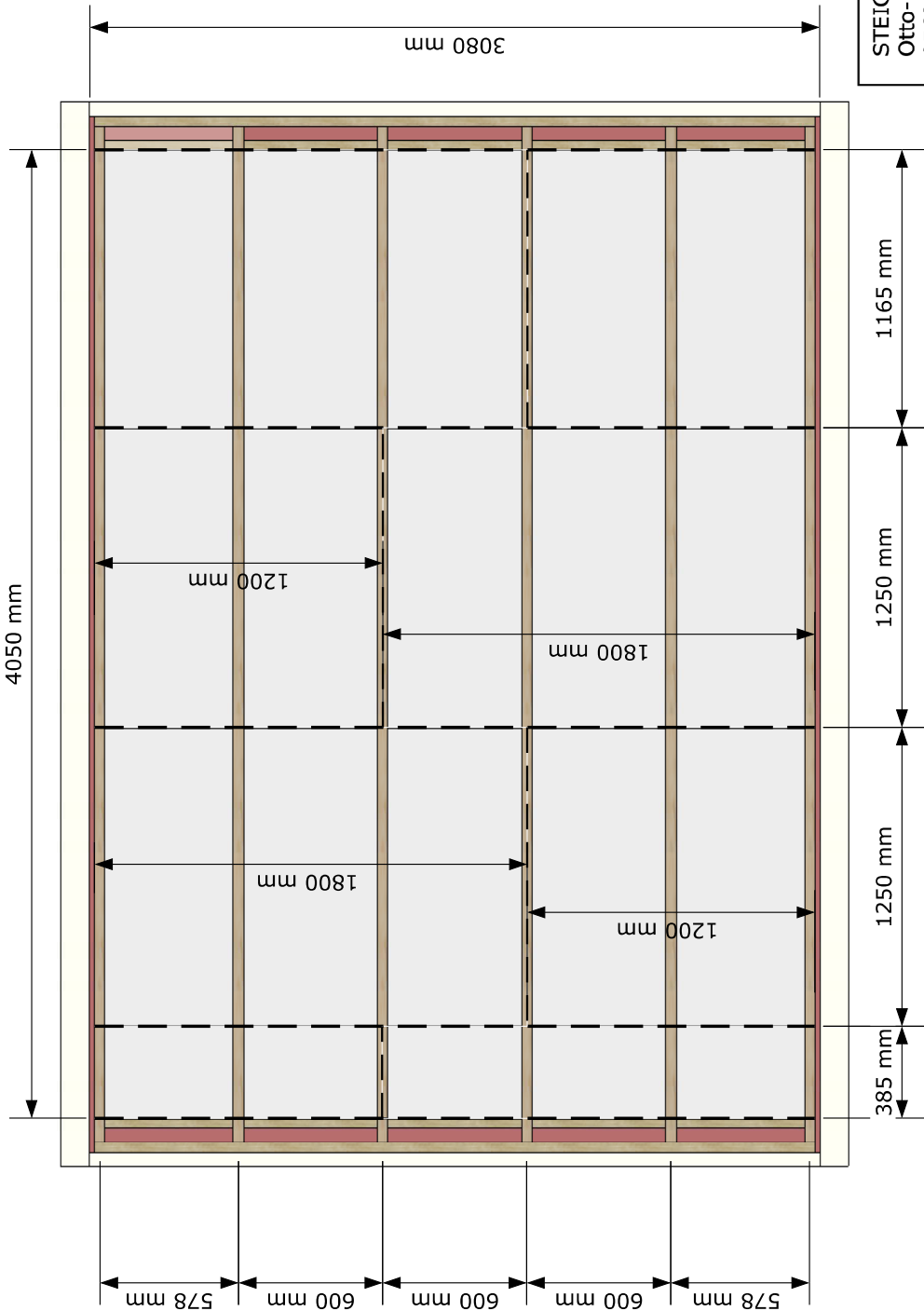


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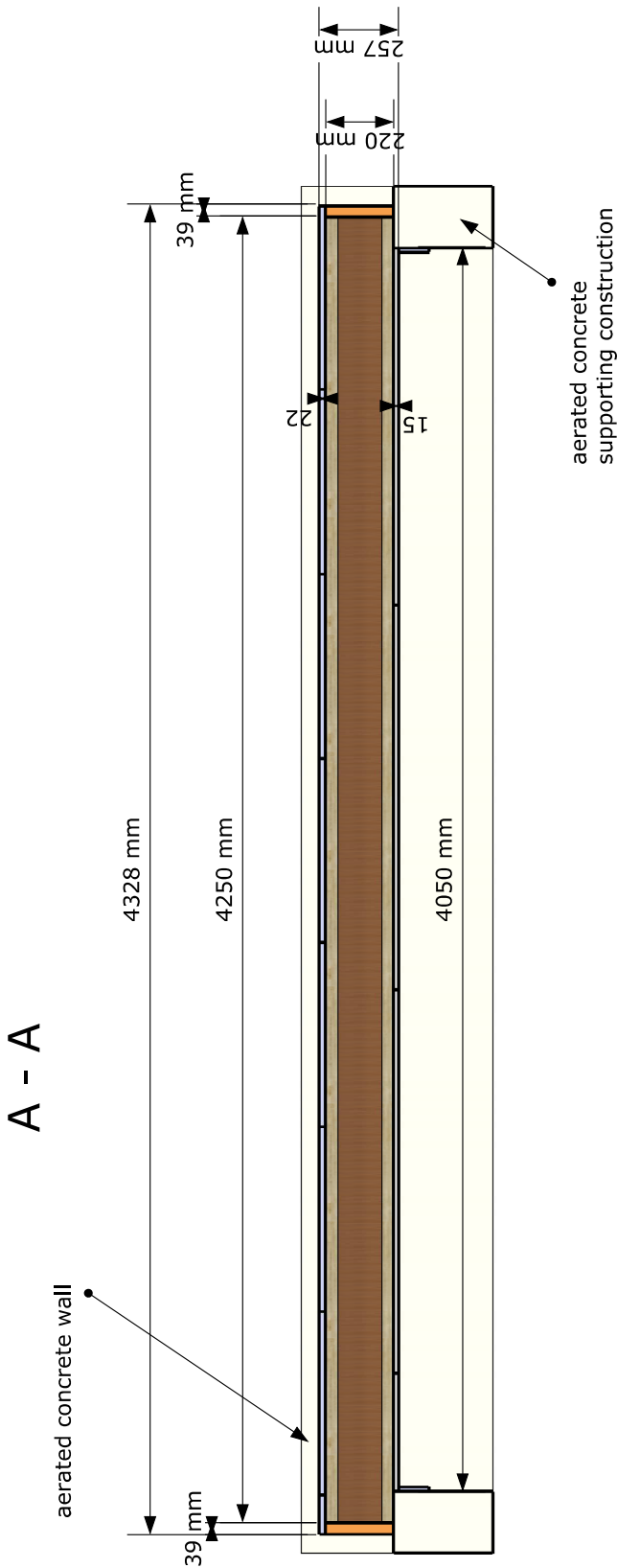
Section A - A





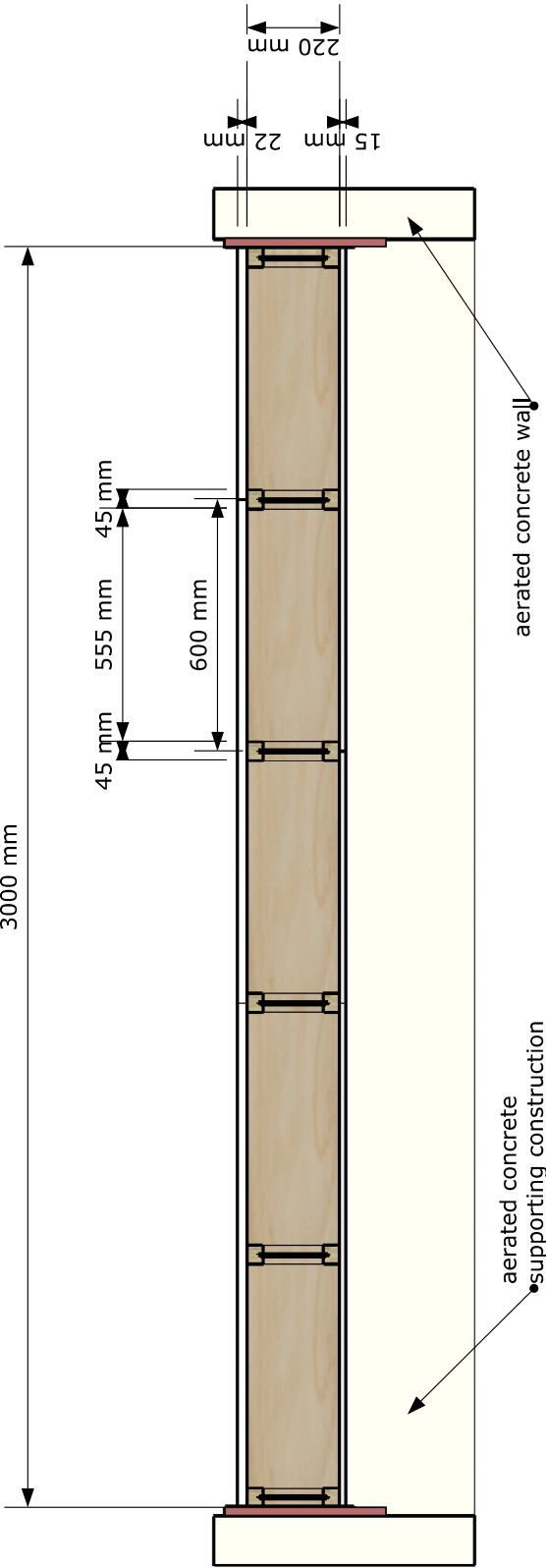


STEICO SE Otto-Lilienthal-Ring 30 85622 Feldkirchen Tel. +49(0)899915510			
Modell Fire test, ceiling UK REI 30		Plan Plasterboard Typ A 15mm	
Martin Krapichler		Scale 1 : 25	
16.05.219			

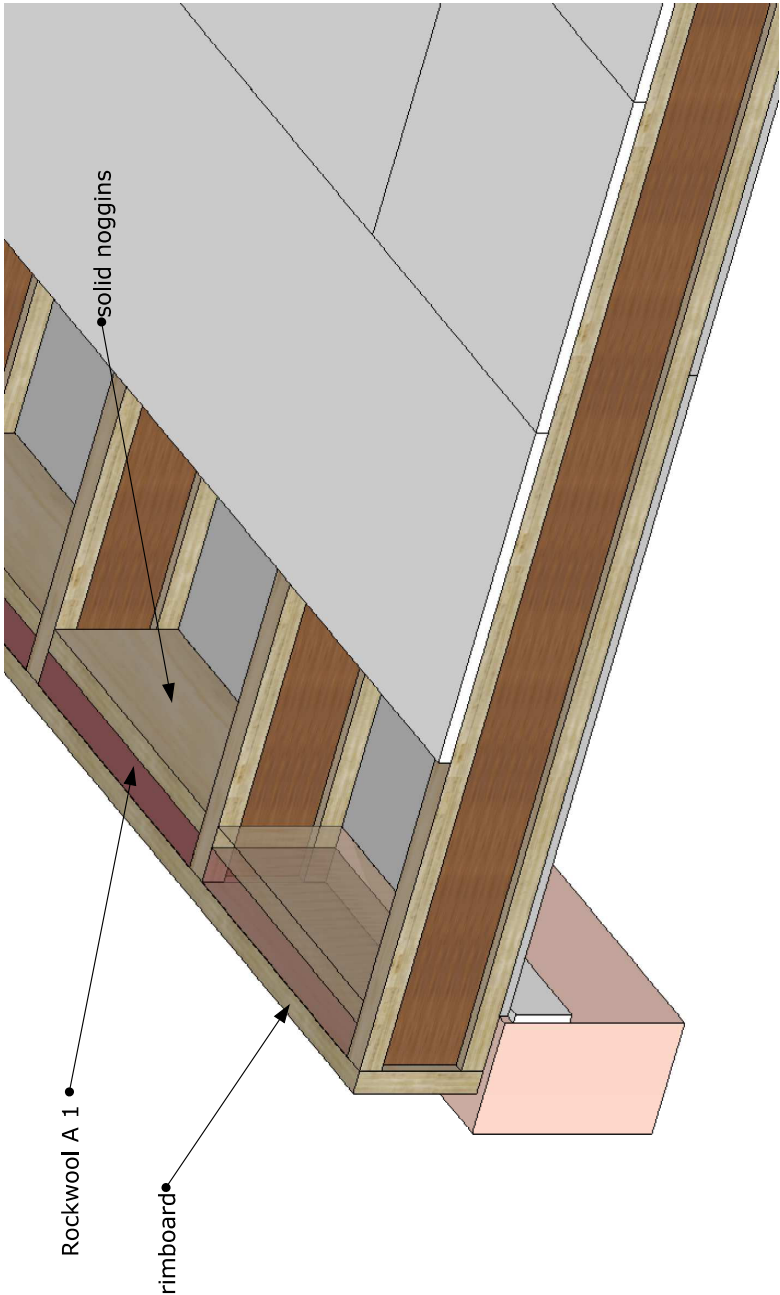


STEICO SE Otto-Lilienthal-Ring 30 85622 Feldkirchen Tel. +49(0)899915510		 STEICO Bausystem	
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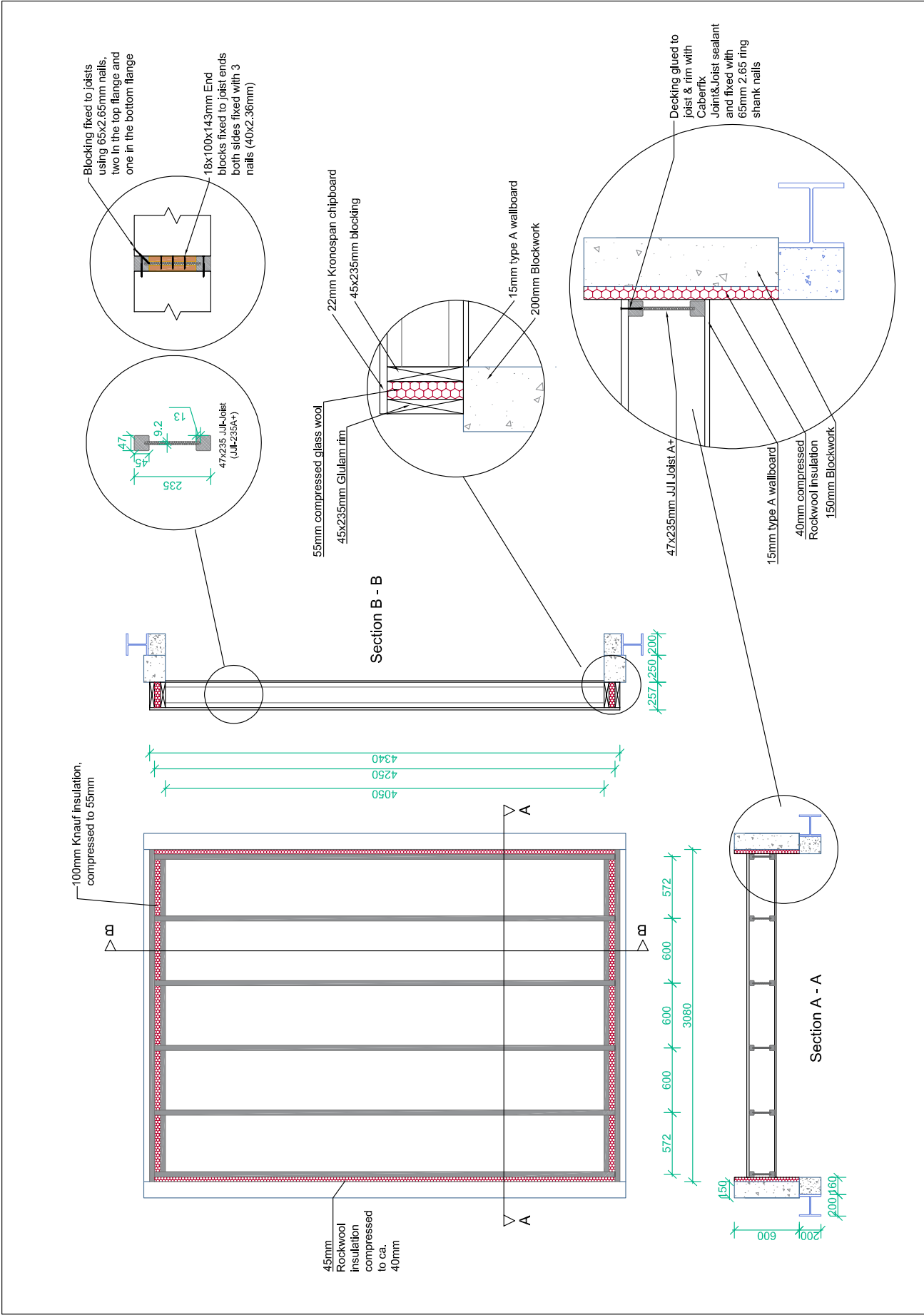
B - B

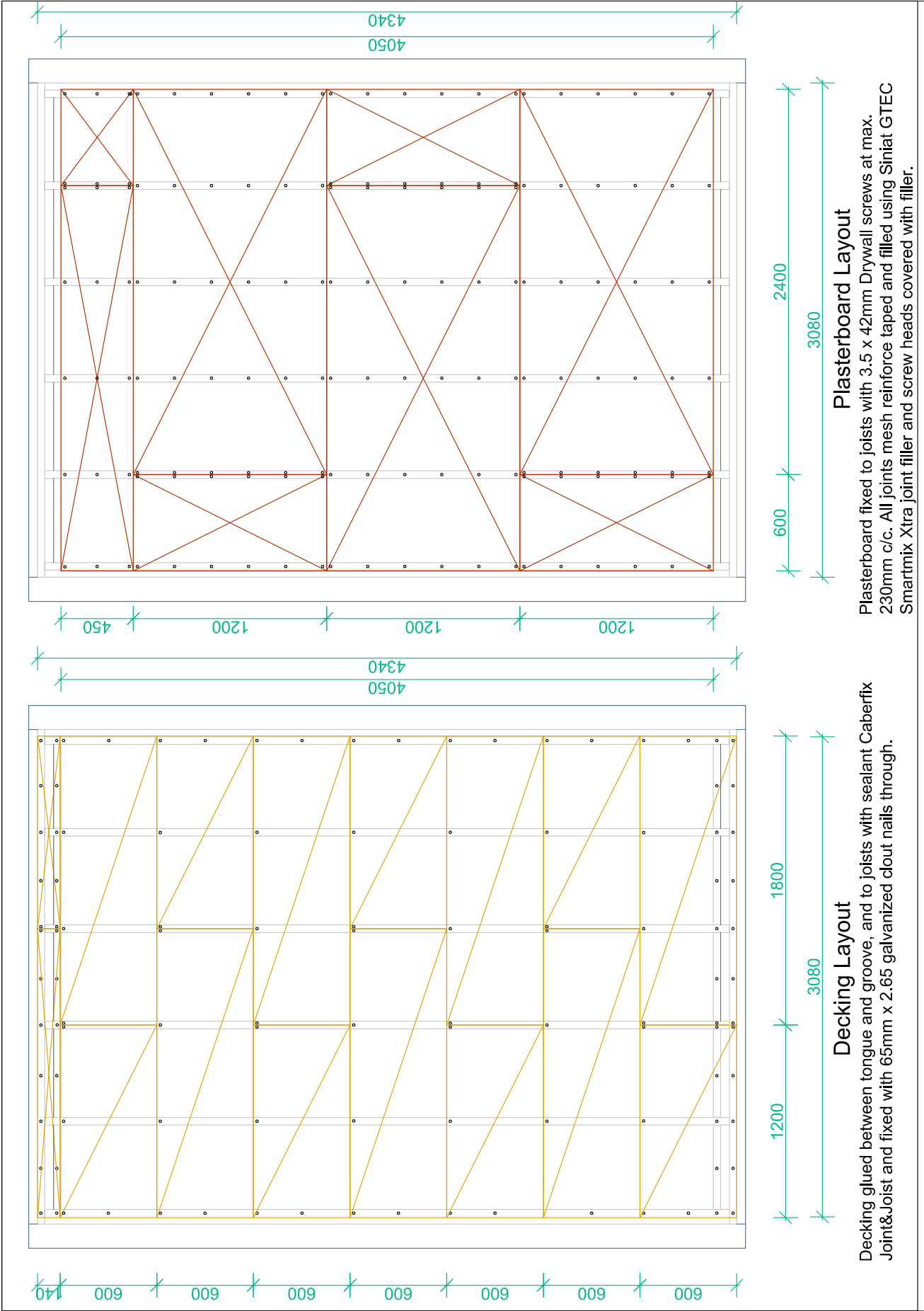


STEICO SE Otto-Lilienthal-Ring 30 85622 Feldkirchen Tel. +49(0)899915510		 STEICO Bausystem	
Modell Fire test, ceiling UK REI 30	Plan Section B-B		Scale 1 : 15
	Martin Krapichler	16.05.219	



STEICO SE Otto-Lilienthal-Ring 30 85622 Feldkirchen Tel. +49(0)899915510		 STEICO Bausystem	
Modell Fire test, ceiling UK REI 30		Plan Bearing view 3D	
Martin Krapichler	16.05.219	Scale	1 : 10





						A	B	C	D	E	F	G
Item No.	Description	QTY.	Part Number	Revision	Process	Material	Finish					
1	Body Pinhole Trimless	1	DL133-01-PHT	3	See Part Drawings	See Part Drawings	See Product Specifications					
2	Lamp Bezel Subassembly Pinhole	1	DL133-A-PH	3	See Part Drawings	See Part Drawings	See Product Specifications					
3	Lamp Bezel Spring	1	DL133-02	2	Formed	Spring Steel	Nickel Plated					
4	Lampholder and Terminal Block Subassembly	1	DL133-B	1	See Part Drawings	See Part Drawings						

CLIP SPRING IN TO GROOVE ON HOUSING

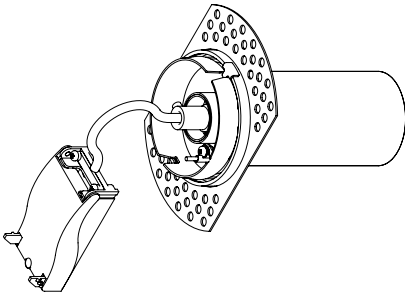
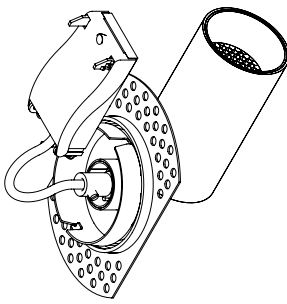
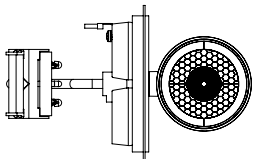
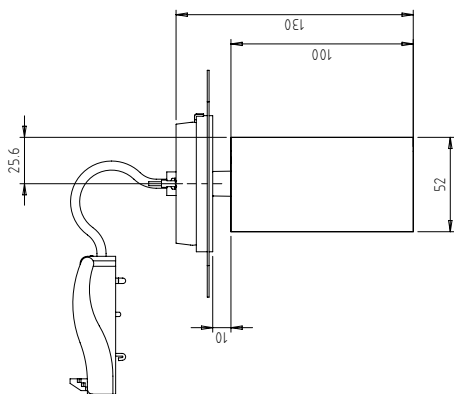
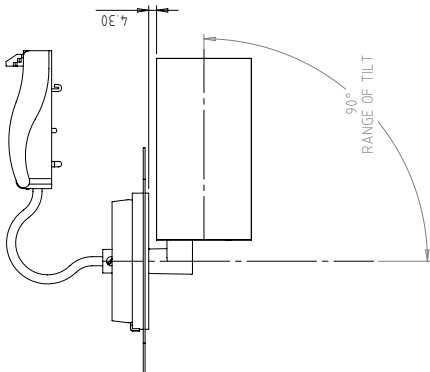
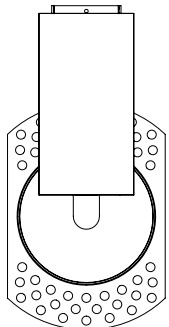
SECTION A-A

C 2340-2E-RA-003 5.2

C 2340-2E-RA-003 5.3

[illegible]

C 2340-2E-RA-003 5.5

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SHEET 1 OF 3						SCALE	12.5
astro							
DEVELOPMENT CODE						SP14.9	
PART NO.						SP14.9.00	
DESCRIPTION						Can 50 Trimless GA	
DRAWN						HS	POSITION
DATE						20/10/2022	
CHECKED						HS	POSITION
MATERIAL						See Part Drawings	
PROCESS						THICKNESS mm	
FINISHES						See Part Drawings	
NOTES						CHANGES FOR ISSUE 2: PRODUCT SPEC CHANGE TO FIRE RATED INNER RING AND INTUENSCENT MATERIAL ADDED. ALL METAL PARTS ARE MILD STEEL. CHANGES FOR ISSUE 3: HEAD ASSEMBLY LENGTH CORRECTED FROM 90MM TO 100MM	
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DESCRIPTION
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DRAWING
SCALE
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MATERIAL
See Part Drawings

THICKNESS
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NOTES

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DIMENSIONS ARE IN MILLIMETRES
DIMENSIONS IN PARENTHESES ARE IN MICRONS
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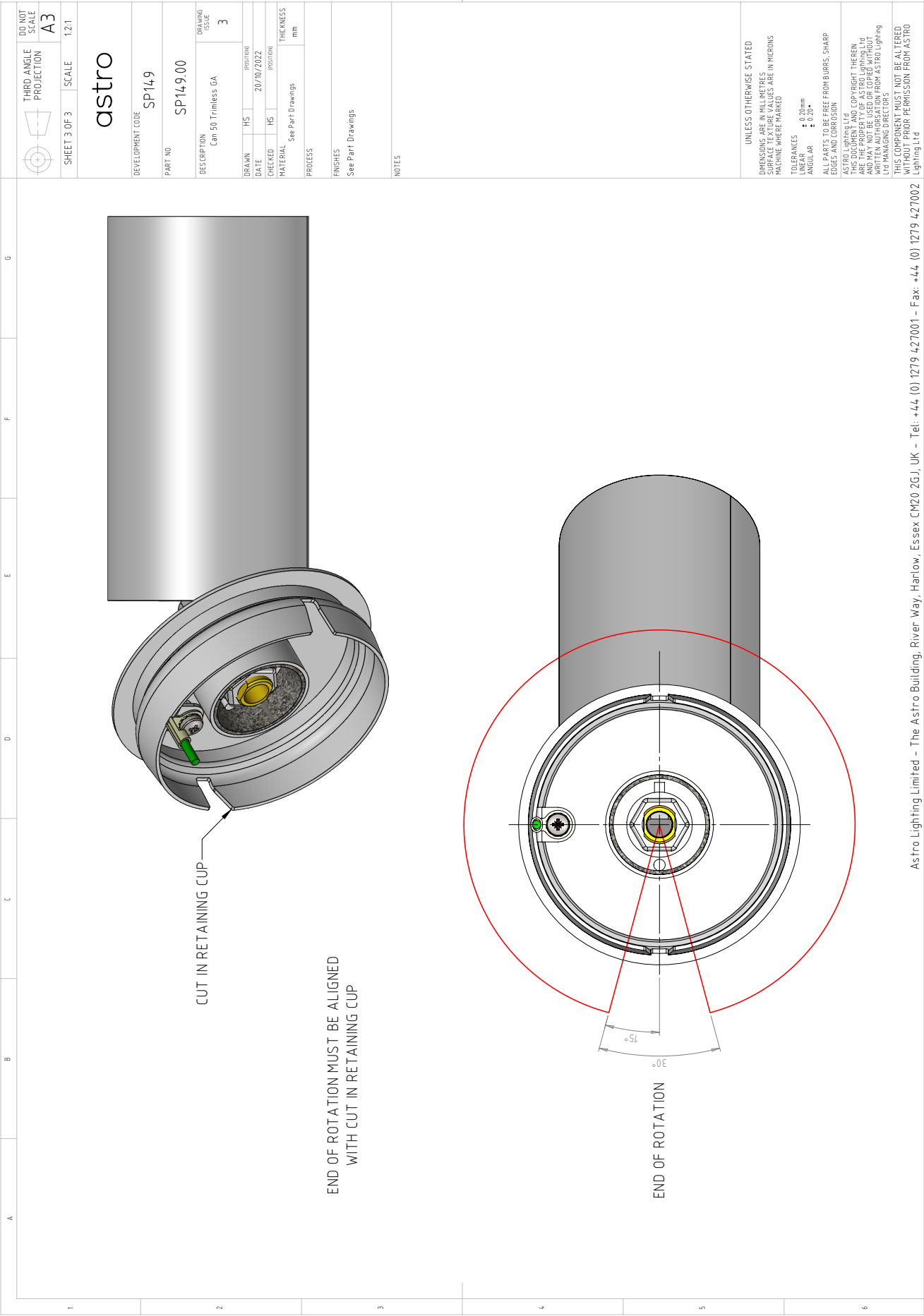
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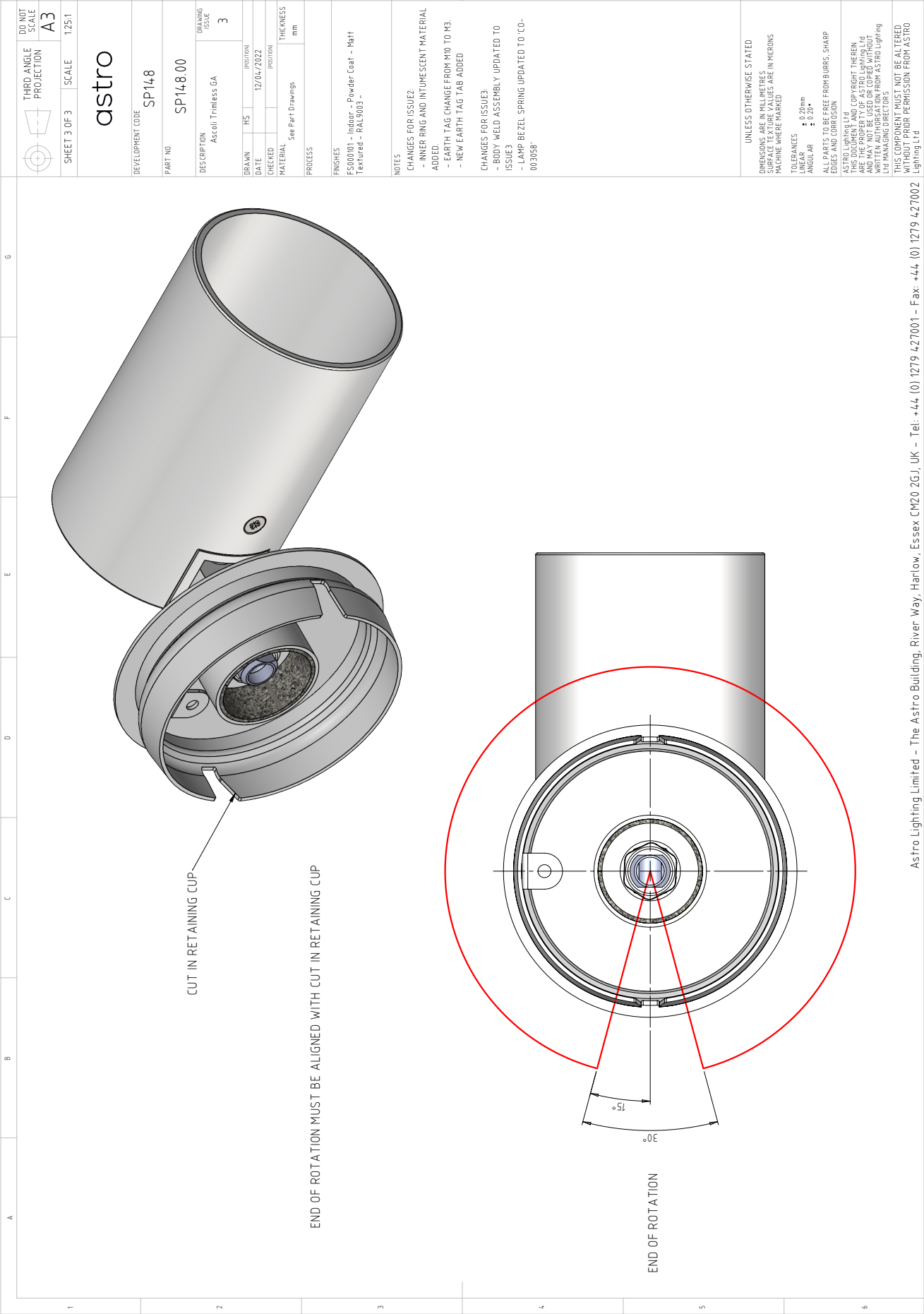
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DESCRIPTION Ascoli Trimless GA					
DRAWING ISSUE 3					
DRAWN HS		POSITION 12/04/2022		POSITION	
CHECKED					
MATERIAL See Part Drawings		THICKNESS mm			
PROCESS					
FINISHES F500001 - Indoor - Powder Coat - Matt Textured - RAL9003 -					
NOTES CHANGES FOR ISSUE2: - INNER RING AND INTUMESCENT MATERIAL ADDED - EARTH TAG CHANGE FROM M10 TO M3 - NEW EARTH TAG TAB ADDED CHANGES FOR ISSUE3: - BODY WELD ASSEMBLY UPDATED TO ISSUE3 - LAMP BEZEL SPRING UPDATED TO CO-003058					
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETRES SURFACE TEXTURE VALUES ARE IN MICRONS MACHINE WHERE MARKED TOLERANCES LINEAR ANGULAR ± 0.20mm ± 0.20° ALL PARTS TO BE FREE FROM BURRS, SHARP EDGES AND CORROSION ASTRO LIGHTING LTD THIS DOCUMENT AND COPYRIGHT THEREIN ARE THE PROPERTY OF ASTRO LIGHTING LTD AND MAY NOT BE USED OR COPIED WITHOUT THE WRITTEN PERMISSION OF ASTRO LIGHTING LTD MANAGING DIRECTORS THIS COMPONENT MUST NOT BE ALTERED WITHOUT PRIOR PERMISSION FROM ASTRO Lighting Ltd					

PEUTZ

C 2340-2E-RA-003 5.10



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Item No

1

Description

Body Minima Wall Wash

QTY

1

Part Number

DL133-01-MNW

Revision

3

Process

See Part Drawings

Material

See Product Specifications

Finish

See Product Specifications

1

2

Lamp Bezel Subassembly Minima

Fixing Spring

1

2

DL133-A-MIN

DL133-05

See Part Drawings

Formed

See Part Drawings

Spring Steel Ø1.3mm

See Product Specifications

Nickel Plated

4

5

Flange Seal Minima Round

Lamp Bezel Spring

1

1

DL133-16-MNR

DL133-02

Stamped

Formed

Silicone Shore A 50

Spring Steel

Natural Clear

Nickel Plated

6

Lampholder and Terminal Block Subassembly

1

DL133-B

See Part Drawings

THIRD ANGLE
PROJECTION

DO NOT
SCALE

A3

SHEET 1 OF 1

SCALE

1:2

astro

DEVELOPMENT CODE

DL133

PART NO.

DL133-MNW

DESCRIPTION

Minima Wall Wash

DRAWING
ISSUE

CO-002497

DRAWN

PO

SIGNATURE/DRAWN

CHECKED

XX

DATE

06/11/2020

MATERIAL

See Part Drawings

THICKNESS

mm

PROCESS

See Part Drawings

FINISHES

See Product Specifications

NOTES

[CRITICAL / 关键]

GLASS MUST CONFORM TO GLASS MATERIAL
NOTE DETAILED ON DL133-04 PART DRAWING

1

2

3

4

5

6

CLIP SPRING IN TO GROOVE ON HOUSING

FIX SEAL TO HOUSING WITH
CLEAR FLOWABLE SILICONE
TOP SURFACE MUST BE FLAT

SECTION A-A

VIEW D

125 (WITH LAMP)

Ø 100

Ø 86
[3.386]
CUTOUT

Component Surface Quality:

△ = A Surface

△ = B Surface

△ = C Surface

UNLESS OTHERWISE STATED

DIMENSIONS ARE IN MILLIMETRES

SURFACE TEXTURE VALUES ARE IN MICRONS

MACHINE WHERE MARKED

TOLERANCES

LINEAR

± 0.20mm

ANGULAR

± 0.20°

ALL PARTS TO BE FREE FROM BURRS, SHARP
EDGES AND CORROSION

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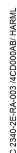
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C 2340-2E-RA-003 /4CD000AB/ HARMIL

C 2340-2E-RA-003 / 4CD000AB/ HARMIL

ASSEMBLY DRAWING

ITEM No. Description QTY. Part Number Revision Process Material Finish

1	Minima Square Fixed Body	1	DL133.SA02.v03.A	A	Assembly	See Product Specification	See Product Specification
2	Glare Guard	1	DL133.PT13.v02.A	A	See product specification	See product specification	See product specification
3	LED Module	1	ATB18.SA01.CE.v01.B	B	Assembly	See Subassembly Drawings	See Subassembly Drawings
4	Lens	1	See Product Specification	A	Market Sourced	See Product Specification	See product specification

REVISIONS

ZONE	REV.	DESCRIPTION	CHANGE ORDER REFERENCE	DATE
	B	DRAWING ORDER RESTRICTURED		29/10/2024

ITEM STATUS: Development (unreleased)

DESIGN ENGINEER: Jake Chamberlain

DEVELOPMENT CODE: DL133

ITEM NUMBER: DL133.GA03.CK.v01.B

DESCRIPTION: Minima Square Fixed LED

DRAWING ISSUE NUMBER: 01

DRAWN BY: Jake Chamberlain

CHECKED BY: David Locke

DRAWING ISSUE DATE: 12/12/2024

GENERAL NOTES

SEE PRODUCT SPECIFICATIONS FOR MARKET SOURCED COMPONENT MATERIALS.

NOTES

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Product Development Code

Item Category: pt, bk, or sbu

Item Category Number

EX001.PT01.A.v01.1A

Certification (Gas only) (pt, bk, or sbu)

Form Factor (gas only) / A, L, U, or J

Design Variant

Revision

Body Options -

- 70444018 Minima Square Fixed LED Matt White
- 70444007 Minima Square Fixed LED Black

Glare Guard Options -

- 6040001 Honeycomb Glare Guard
- 6040002 3-D Beam Angle Lens
- 6040003 Frosted Glare Guard

Lens Options -

- 7046001 1.1° Beam Angle Lens
- 7046002 3-D Beam Angle Lens
- 7046003 3.5° Beam Angle Lens

Module Options -

- 7045001 High Efficacy 2700K
- 7045002 High Efficacy 3000K
- 7045003 High Quality 2700K

SECTION AA

250±5 TRAILING WIRE

100

100

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