

**CLASSIFICATION OF THE FIRE RESISTANCE IN ACCORDANCE WITH
EN 13501-2:2016 OF STRUCTURAL STEEL MEMBERS PROTECTED BY
SINH BOARDS, THICKNESS 15 MM**

Classification no.	2017-Efectis-R002339(E)
Sponsor	SINH Building Solutions BV Saturnusstraat 60 U-67 2516 AH DEN HAAG THE NETHERLANDS
Product name	SINH boards 15 mm EN 13381-4
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1. INTRODUCTION

This classification report gives a classification of structural steel members protected by SINH boards in accordance with the procedures given in EN 13501-2:2016.

2. DETAILS OF CLASSIFIED PRODUCT

2.1 GENERAL

The SINH boards are defined as boxed applied passive protection to steel members. One loaded beam, one reference beam and four unloaded columns protected by SINH boards of 15 mm thickness were tested in accordance with EN 13381-4:2013. The loaded beam, the unloaded reference beam and 4 unloaded columns were test on the 23rd of November 2017.

2.2 DESCRIPTION

The product is fully described in the test report no. 2017-Efectis-R002268.

2.2.1 Steel sections

Table 1 Overview of all test specimens

Test specimen	Profile	Length (mm)	Protection thickness d_p (mm)	Boxed section factor (m^{-1})
Unloaded column	IPE 80	1000	15	332
Unloaded column	HEM 280	1000	15	50
Unloaded column	HEA 200	1000	15	154
Unloaded column	IPE 200	1000	15	213
Loaded beam	IPE 400	4500	15	116
Reference beam	IPE 400	1000	15	116

2.2.2 Protection system

The applied fire protection system consists of a single layer boxed protection of SINH boards of 15 mm thickness. The connections of the boards are created by staples length 35 mm at c.t.c. distances of 100 mm. The cladding – SINH boards - is connected in case of joints in the boards to noggings which consist of SINH board of dimensions 15 mm x 120 mm x distance between beam flanges.

The centre-to-centre distance of the noggings is 1200 mm.

Scheme of the fire protection system is given in Appendix B.

3. TEST REPORT, ASSESSMENT REPORT AND TEST RESULTS IN SUPPORT OF THE CLASSIFICATION

3.1 TEST & ASSESSMENT REPORT

Name of laboratory	Name of sponsor	Report ref. No.	Test method
Efectis Nederland BV	SINH Building systems	Test report: 2017-Efectis- R002268	EN 13381-4:2013
Efectis Nederland BV	SINH Building systems	Assessment report: 2017-Efectis- R002269	EN 13381-4:2013

3.2 RESULTS

Test method, number and date of report	Conditions	
	Parameter	Results
EN 13381-4:2013 2017-Efectis- R002268 December 2017	Fire exposure	standard temperature/time curve
	Number of exposed sides	Beam: 3 Column: 4
	Support conditions	Simply supported
	Length of the loaded beam	4500 mm
	Applied load to the loaded beam	60 % of the design moment resistance
	Loadbearing capacity	47 min
EN 13381-4:2013 2013-Efectis- R002269 December 2017	Relation of design critical temperature and section factor	Graphs in Appendix A

4. CLASSIFICATION AND FIELD OF APPLICATION

4.1 REFERENCE OF CLASSIFICATION

The classification has been carried out in accordance with Clause 7 of EN 13501-2:2007 +A1:2009.

4.2 CLASSIFICATION

The element structural steel member protected by SINH boards is classified according to the following performance parameter and classes:

<p>Fire resistance classification:</p> <p>R 15 – R 45</p>

4.3 FIELD OF APPLICATION

This classification is valid for the following end use of applications:

Classes of fire resistance	R 15, R 20, R 30, R 45
Design steel temperature	$350\text{ °C} \leq \theta_a \leq 750\text{ °C}$
Permitted section factor range:	$45\text{ m}^{-1} \leq A_m/V \leq 365.2\text{ m}^{-1}$ For section factors below the minimum the same protection thickness as that applied to the minimum section factor must be applied
Permitted protection thickness:	$14.25\text{ mm} \leq dp \leq 15.75\text{ mm}$
Grades of steel:	Any structural grade (S designation) according to EN 10025-1 (excluding S185); engineering grades (E designation) shall not be used; the results may also be applicable to fabricated sections
The maximum beam web depth	$331\text{ mm} + 50\% = 496.5\text{ mm}$
The maximum depth (h) of a column	600 mm
Number of exposed sides	3 or 4
The distance of SINH boards from a steel member	Column (tested distance 0 mm): 0 mm to 50 mm with no change of fixing Beam (tested distance 0 mm at the vertical sides and 0 mm at the lower flange): <ul style="list-style-type: none"> • 0 mm to 50 mm at the vertical sides • 0 mm to 50 mm at the lower flange with no change of fixing

4.4 LIMITATIONS

This classification document does not represent type approval or certification of the product.



P.W.M. Kortekaas
Senior Project Leader Resistance to Fire



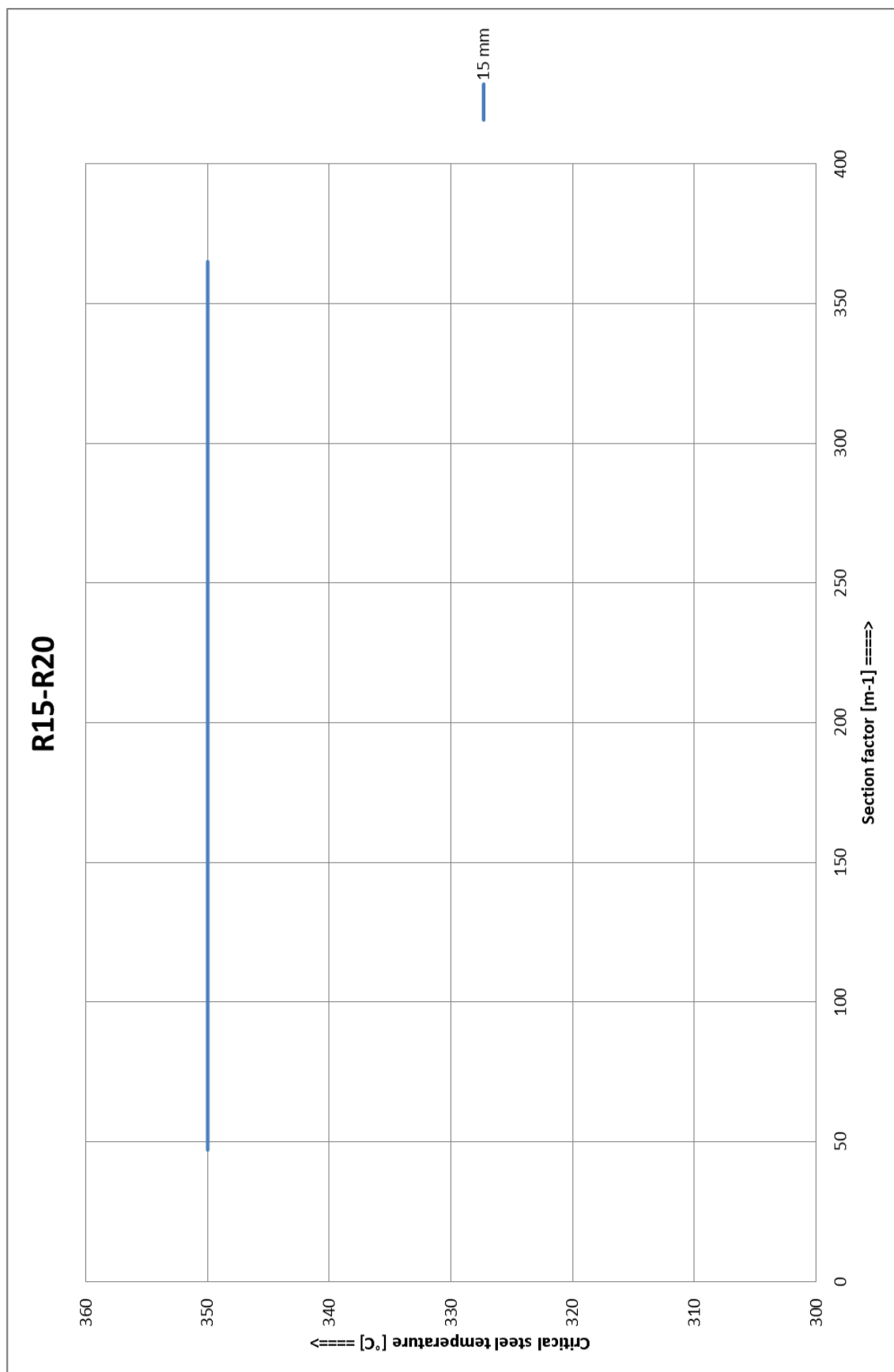
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APPENDIX A: GRAPHS

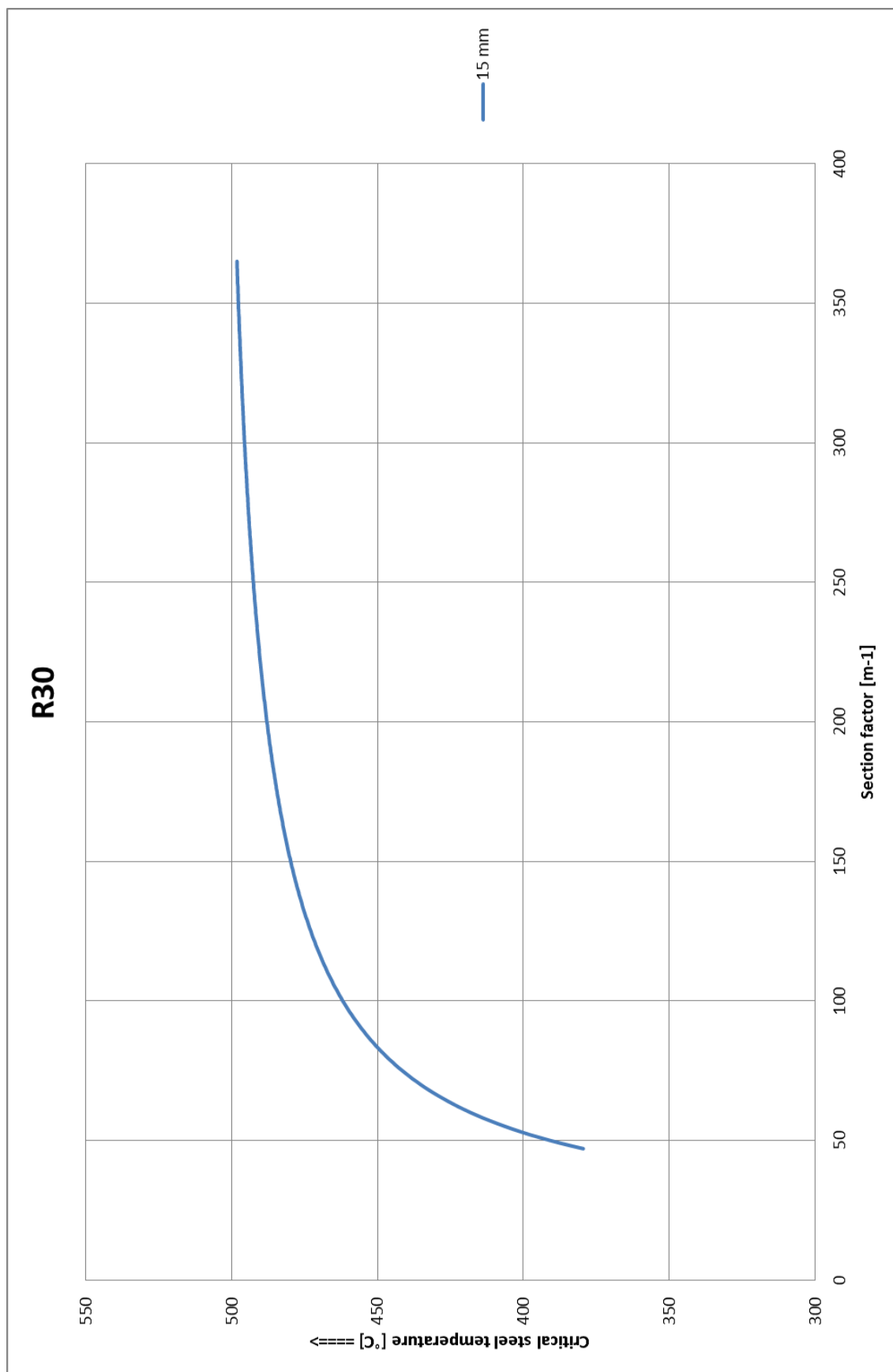
Graph A.1: Critical steel temperature vs. section factor: graph valid for R 15 – R 20

Graph A.2: Critical steel temperature vs. section factor: R 30

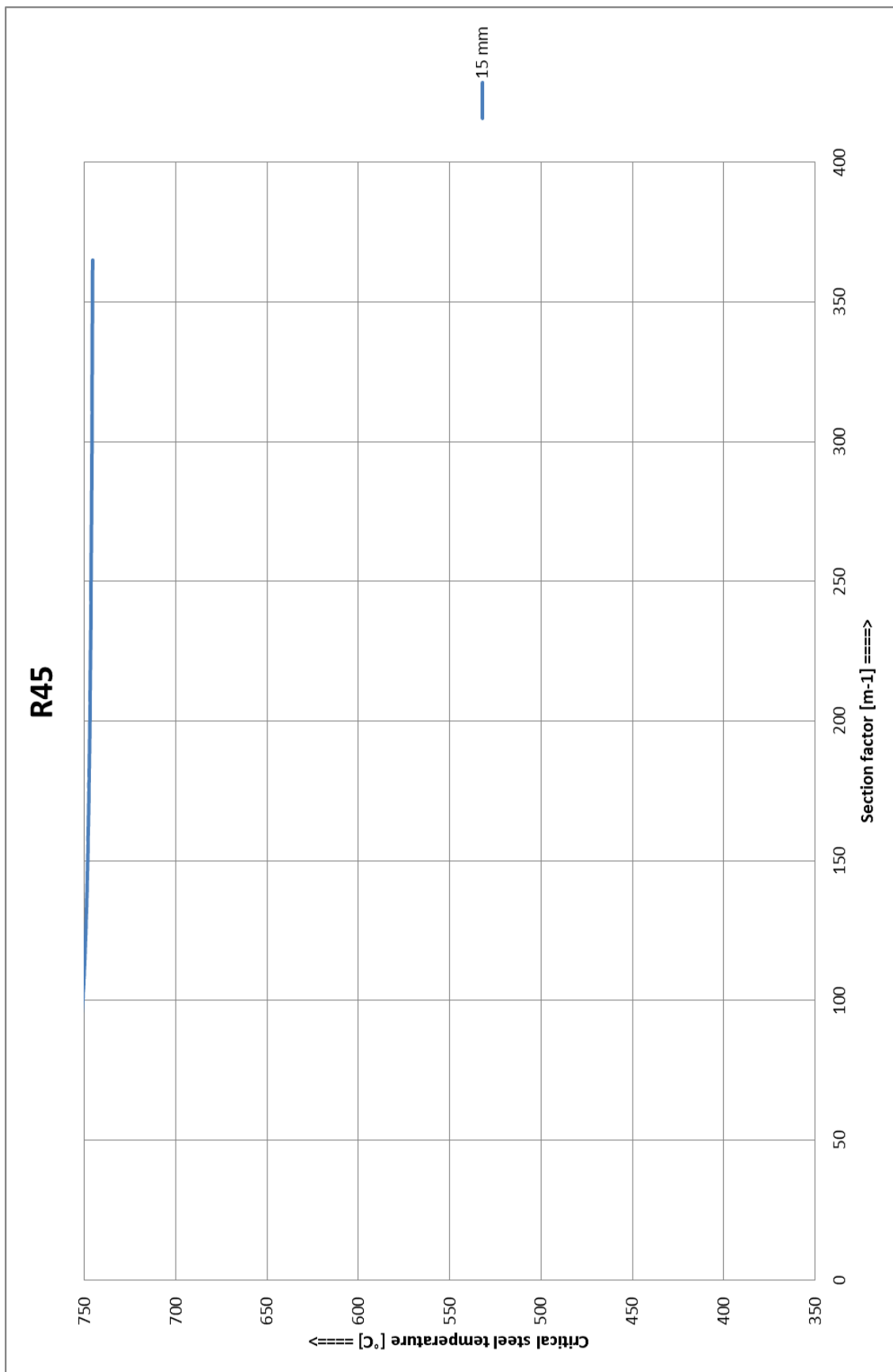
Graph A.3: Critical steel temperature vs. section factor: R 45



Graph A.1: Critical steel temperature vs. section factor: graph valid for R 15 – R 20



Graph A.2: Critical steel temperature vs. section factor: R 30



Graph A.3: Critical steel temperature vs. section factor: R 45

APPENDIX B: FIGURES

Figure B.1 : Protection of the loaded and the reference beam

Figure B.2 : Detail of a nogging

Figure B.3 : Detail of the protection system

Detail A doorsnede

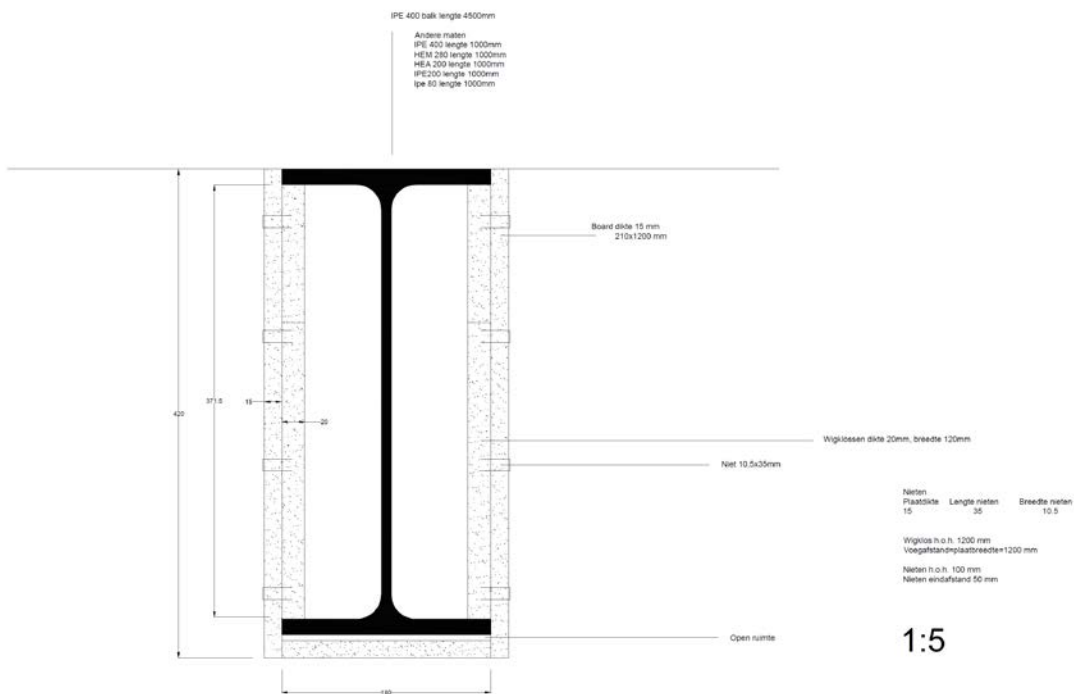


Figure B 1: Protection of the loaded and the reference beam

Detail B aanzicht

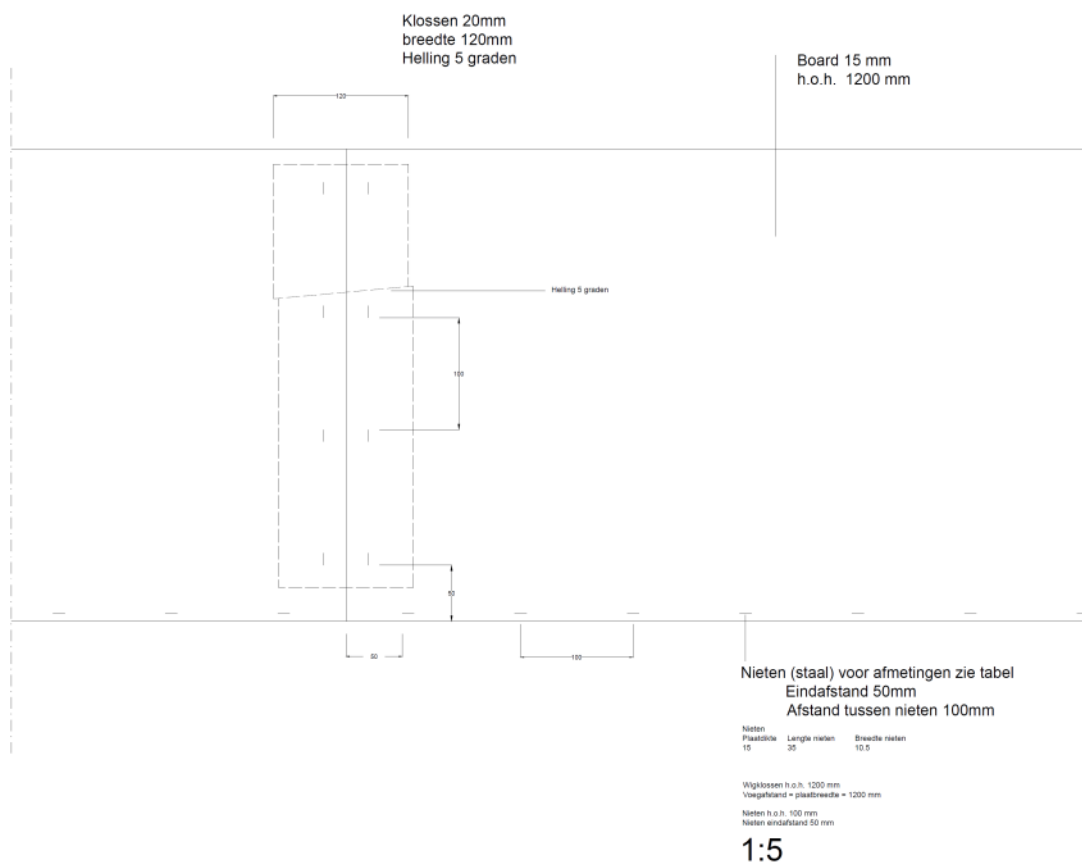


Figure B.2: Detail of a nogging

Detail C Isometrie

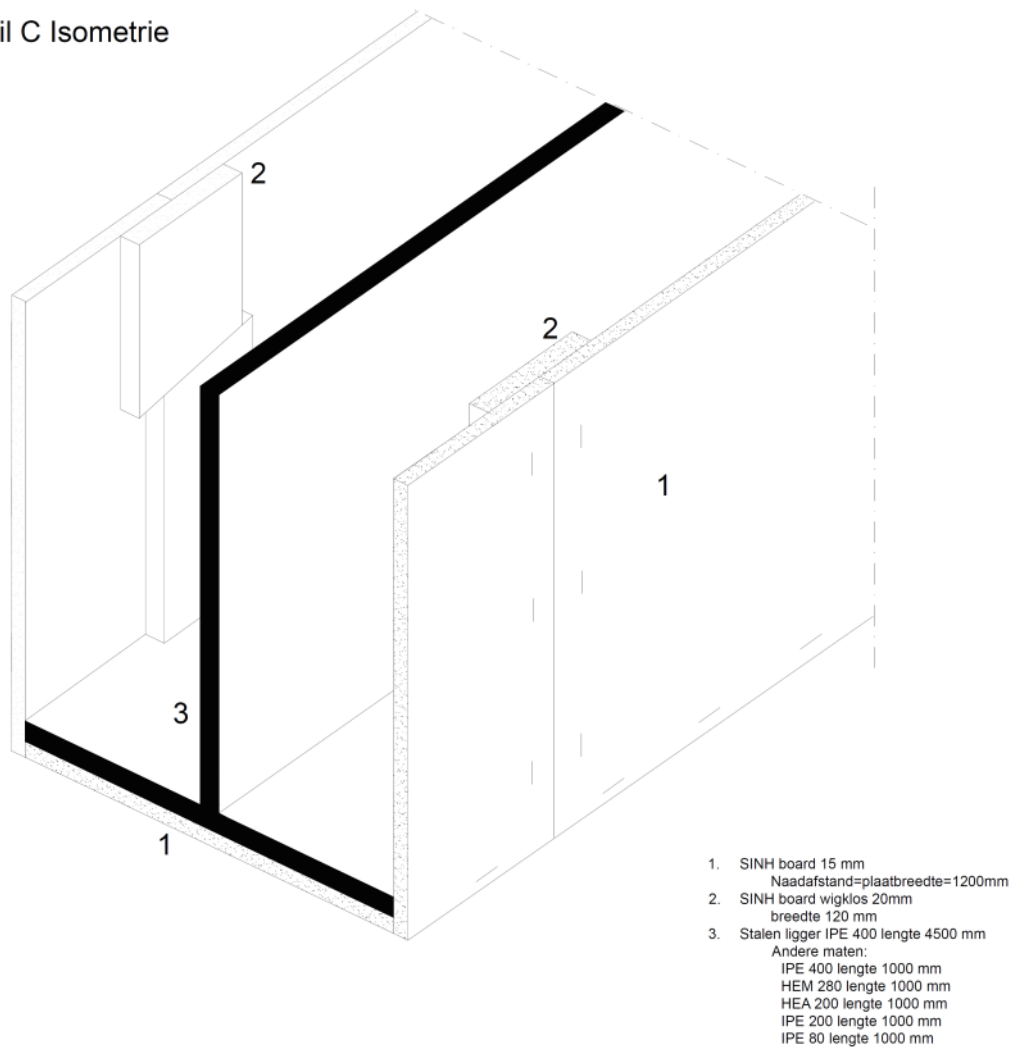


Figure B.3 : Detail of the protection system