Accredited testing and inspection body - gbd Lab GmbH

Test report

Climbing up, slipping and sliding through of railings with rope net infill

Client	Carl Steel ARC GmbH	**Address**	Station 740 A-6870 Bezau

Designation	Fall protection	**Identification**	X-TEND CXE Mesh size 40 mm
Frame material **Rope material**	Steel S235 Stainless Steel 1.4401	**Structure**	Type of net X-TEND CXE Rope diameter 1.5 mm

Basis	User security and accessibility	OIB Directive 4
Classification **Test element**	Railings with non-dimensionally stable rope net infill make climbing considerably more difficult than with guardrails with horizontal bars. Slip through is not possible Slipping through is not possible if the clear widths according to OIB RL 4 are observed.	
	Railings with the tested rope net infill have at least the same protection target according to OIB RL 4 as the tested railing with horizontal filler rods.	

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Testing laboratory **Test centre**	gbd Lab GmbH Accredited Testing and Inspection Body	**Address**	Steinebach 13a A-6850 Dornbirn
Accreditation	No. 0270	**Accredited according to**	EN ISO/IEC 17025 EN ISO/IEC 17020 Type A
Notified Body	No. 2065	**Construction Products Regulation**	(EU) No 305/2011

Sample number	---	**Sample receipt**	---
Testing location	Gemeindesaal Reuthe	**Test date**	05.09.2017
Test bench	---	**Inventory No.**	---
Testing temperature	20,0±3 °C	**Rel. humidity**	---

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1 Task definition

The client named on page 1 commissioned gbd Lab GmbH to carry out the following tests on elements provided:

- Verification of the equivalence of the climbability of fall protection systems with non-dimensionally stable (flexible) rope net infill in accordance with OIB Guideline 4:2015, point 4.2.1

The following characteristic values must be determined:

- Climbing up, slipping and sliding through in comparison with the fall protection described in OIB RL 4:2015 pt. 4.2.2.

2 Instructions for use

This test report serves to prove the above mentioned properties for these elements.

According to the manufacturer, the test elements originate from the company's own production and were selected by the client as representative components.

This test does not allow any statement about further performance and quality-determining properties of the present construction, in particular weathering and ageing phenomena as well as static requirements were not considered.

3 Applicable standards

OIB Directive 4:2015-03	User security and accessibility

4 Test specimen

4.1 Test specimen drawings

The following documents were provided by the client:

- Sectional drawings
- Detailed drawings

A complete verification of factual accuracy was not carried out.

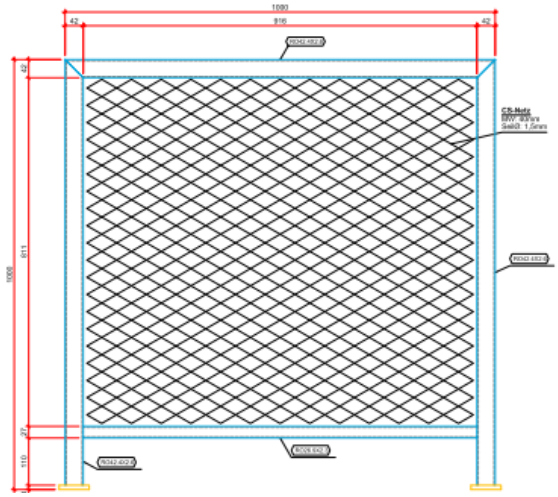

Figure 1: Railing with Xtend rope net MW 40x69

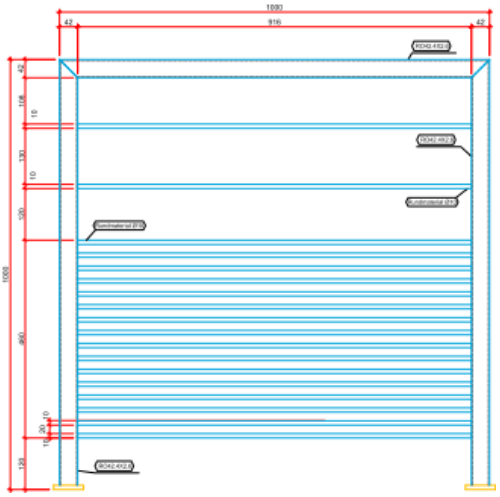

Figure 2: Railing according to OIB RL 4

4.2 Specimen description

The following test specimen description was provided by the client.
A complete verification of factual accuracy was not carried out.

Test specimen with rope net infill	
Manufacturer name + address	Client
Manufacturing date	WEEK 28/2017
Sampling by	Arnold Fetz
Frame	RR 42,4x2,6 welded Material 1.43.01
Rope net	Type X-TEND CXE Diameter 1,5 mm Rope construction 7x7 Material 1.4401 Mesh size 40 x 69 mm Mesh opening angle: 60 degrees Mesh direction: horizontal mesh
Overall external dimension	w x h = 1,000 x 1,000 mm
Number of elements	1 piece
Test element according to OIB RL 4 point 4.2.2	
Manufacturer name + address	Client
Manufacturing date	WEEK 28/2017
Sampling by	Arnold Fetz
Frame	RT ∅42,4x2,6 welded Material S235
Filling elements	FM ∅ 10 welded Material S235
Overall external dimension	w x h = 1,000 x 1,000 mm
Number of elements	1 piece
Responsible editor	
Name	Arnold Fetz

Table 1: Specimen description

Figure 3: Structure

4.3 Specimen overview

The following test specimen description was provided by the client.

4.4 Sampling report

See specimen description 4.2

5 Implementation

5.1 Sample Preparation

The test specimens are conditioned for at least 24 h at 20±2 °C and 50.0±5 % relative humidity before the test.

5.2 Persons present during the examination

Test inspector	Heinz Pfefferkorn	gbd Lab GmbH
Customer	Arnold Fetz	Carl Steel ARC GmbH

5.3 Test parameters

Tests

Climbing up
Slip through
Slide through

5.4 Evaluation criteria

Climbing up

In order to be able to evaluate the climbing compared to the railing according to OIB Guideline 4, children aged 2, 4, 7 and 9 years are observed.

Slip through, slide through

Plans are used to evaluate slippage and slide through.

5.5 Test result

5.5.1 Climbing up

Railing according to OIB Directive 4

For the 7- and 9-year-old children, climbing and climbing over the railing is possible with and without shoes due to their dexterity and with little effort.

The 4-year-old girl can climb the railing with or without shoes. It is possible to climb over the railing in a short time. The 20 mm clear width between the filler rods is large enough to find support in it.
Climbing up is easily possible.
With dexterity and little effort, climbing over is no problem.

The 2-year-old boy can climb the railing without shoes after 2-3 attempts. Climbing with shoes was not possible. In the trial period of approx. 2 hours, the boy climbed up the railing several times, but did not climb over it.
Climbing up is easy and requires little effort.
The railing was not climbed-over during the test period.

Figure 4: Climbing up (left: boy 2 years, right: girl 4 years)

Figure 5: Climbing up (left: girl 4 years, right: girl 7 years)

Railing with rope net infill

For the 7- and 9-year-old children, climbing and climbing over the railing is possible without difficulty, with or without shoes, due to their dexterity and with effort.

The 4-year-old girl can climb the railing with or without shoes without difficulty. It is possible to climb over the railing in a short time. The rope net serves as a support and not as a climbing aid in analogy to the horizontal filling rods.
Climbing up is possible.
With dexterity and effort, it is easy to climb over.

Figure 6: Climbing up with a rope net as a support aid (left: girl 4 years, right: boy 2 years)

The 2-year-old boy cannot climb the railing with shoes, as he cannot find a hold in the rope net due to the mesh size.
Without shoes only a short-term hold was possible, but no further climbing was possible, because the 1.5 mm steel rope caused pain. Without shoes it was just an attempt.
It was not possible to climb over during the test period.

Figure 7: Climbing up (left: girl 4 years, right: boy 2 years)

Figure 8: Climbing up (left: girl 4 years, right: boy 2 years)

5.5.2 Slip through

Due to the small clear opening width, it is not possible to slip through the mesh size MW 40 x 69 mm.

5.5.3 Slide through

If a clear distance between the upper edge of the floor and the lower edge of the horizontal tube of ≤150 mm is maintained, slipping through is not possible.

6 Summary

The tests were carried out with children aged 2 - 9 years.

Children (subjects aged between 4 and 9 years) who have already developed strength and dexterity can exceed both types of railing. With a railing according to OIB RL 4, the horizontal crossbars are used as "climbing ladders".
In the case of the railing with the non-dimensionally stable, flexible rope net infill, much higher effort is required because the children press their feet against the flexible rope net and do not use the rope net as a "climbing ladder". Rigid fillings (e.g. sheet metal, glass, etc.) instead of flexible rope net would make climbing and climbing over the rope net easier.

Infants (test person 2 years old) cannot climb or climb over the railing with the rope net infill. Children who are only able to climb over a railing via "fixed ladders" are not able to climb over the railing due to the small mesh size, the flexibility of the rope net and the thin rope.
In this case, the railing with rope net shows higher security against climbing over than the railing according to OIB RL 4.

It can be seen that the railing with a non-rigid rope net provides better protection against climbing than the railing according to OIB RL 4.

Examiner
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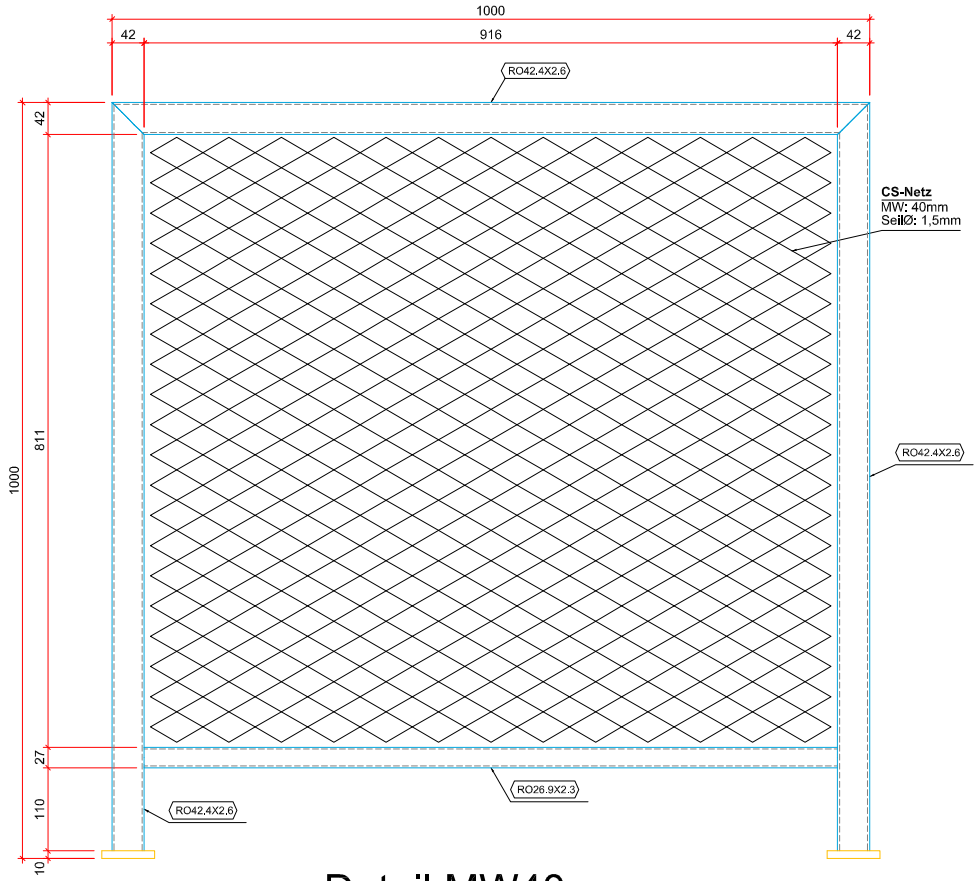
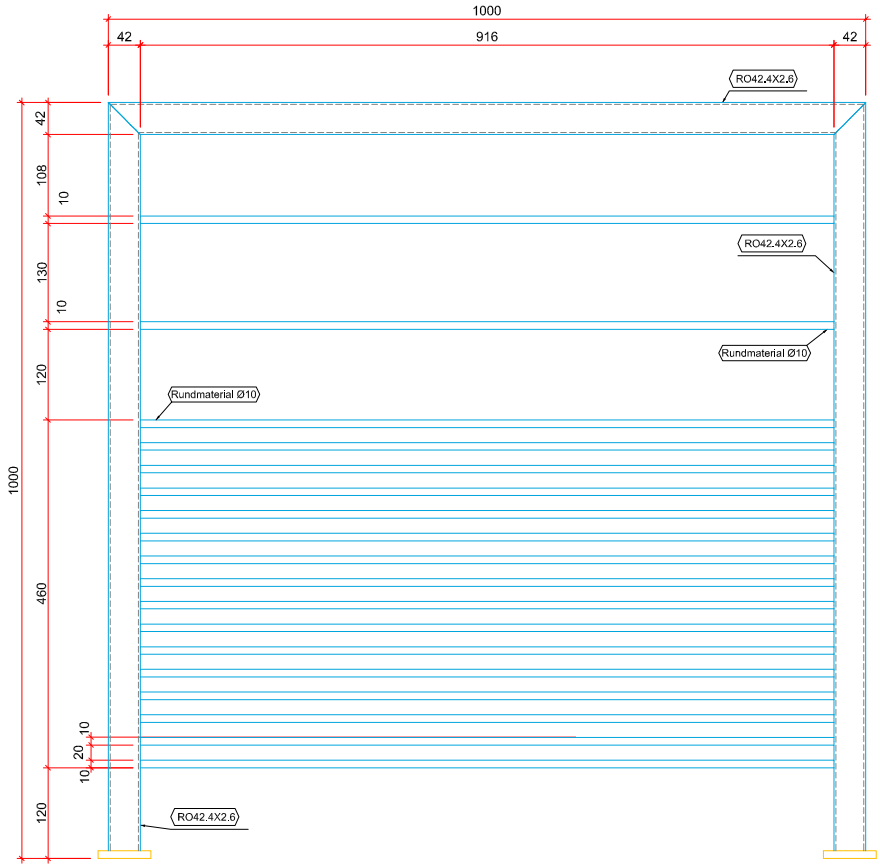
Dipl.-Ing. Heinz Pfefferkorn

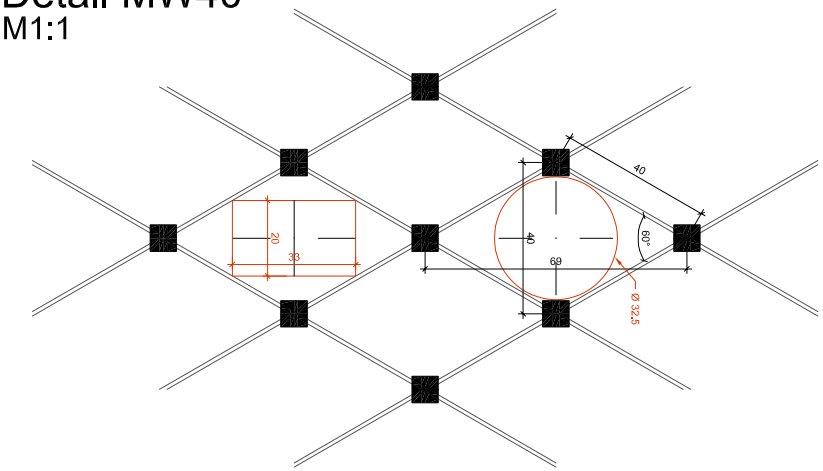
Appendix:
Appendix -1 test specimen drawings Pages 1

Prüfrahmen
M1:5





Detail MW40
M1:1



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Kundenunterlagen

Prüfrahmen MW40		
Planinhalt / Plan content: Prüfrahmen	Auftragsnummer / Plancodierung / Order No. / Plancode: 19052017	
Phase / Phase: Entwurfsplanung / Design planning	Maßstab / Scale: 1:20 und 1:1	Erstelldatum / Date: 22.05.2017

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