MFPA Leipzig GmbH

Testing, Inspection and Certification Authority for
Construction Products and Construction Types

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Advisory Opinion No. GS 3.2/15-141-3

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Translation of the original German document GS 3.2/15-141-3

Subject matter:	pipe clamps FRS-L M8/M10 Universal in the sizes 1" (31-37), 2" (60-66) and 4" (111-119) Advisory opinion on the strength and deformation behaviour under thermal exposure with the standard temperature-time curve (ETK) according to DIN EN 1363-1*.
Client:	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 D - 72178 Waldachtal
Date of order:	26. May 2015
Person in charge:	Dipl.-Wirtsch.-Ing. Sabine Kramer
Validity:	10. October 2021

This document consists of 6 pages and 2 enclosures.

1 Objective and request

MFPA Leipzig GmbH was commissioned on 26. May 2015 by fischerwerke GmbH & Co. KG to prepare an advisory opinion on the strength and deformation behaviour of the pipe clamps FRS-L M8/M10 Universal in the sizes 1", 2" and 4" with a exposure to fire according to DIN EN 1363-1. The characteristic values for a central tensile load and the occurring deformation behaviour in case of fire should be described.

2 Description of the construction

The pipe clamps FRS-L M8/M10 Universal (see Annex 1) are two-screw pipe clamps with a combination connection thread. Thea are made from two metal strips of electrogalvanised steel (material number 1.0332) which have a pre-assembled EPDM sound insulation lining. The terminal nut for thread dimensions M8/M10 is welded onto the top edge of the clamp. The two metal strips are connected on both sides with a locking screw where one of them is a floating single screw.

In Annex 1 installation parameters for the tested pipe clamps can be found.

3 Fire protection assessment

The permissible loads are determined on the basis of GAL-GZ 656 Fire-tested pipe supports: 2010-05 [1]. The following characteristic parameters for the load under central tension can be quoted for the pipe clamps FRS-L M8/M10 Universal on this basis (Table 1).

Table 1 Characteristic maximum tension resistance for the pipe clamps FRS-L M8/M10 Universal

pipe clamps FRS-L M8/M10 Universal		**Permissible maximum load as a function of the fire-resistance period**			
Span range	**Nominal size**	**30**	**60**	**90**	**120**
[mm]	**[inch]**	**Max. F [N]**			
8-11	-	270	140	90	70
12-15	1/4"				
16-19	3/8"				
20-24	1/2"				
25-30	3/4"				
31-37	1"				
38-45	1 1/4"	290	140	90	60
46-52	1 1/2"				
53-59	-				
60-66	2"				
67-75	-	530	350	270	220
76-84	2 1/2"				
85-93	3"				
94-100	-				
101-110	-				
111-119	4"				

The graphical analysis of the test results as well as the corresponding fire-resistance period can be found in Annex 2

3.1 Distance minimum to structural elements relevant for fire protection

If the pipe clamps FRS-L M8/M10 Universal are used in the intermediate ceiling area of suspended counter ceiling constructions that are relevant with respect to fire protection, a minimum gap "a" is defined on the safe side between the upper side of the suspended ceiling and the lower side of the clamps. The goal is to rule out any negative influence of the counter ceiling construction due to temperature-related vertical deformations of the clamps as well as the linear changes of the threaded rods.

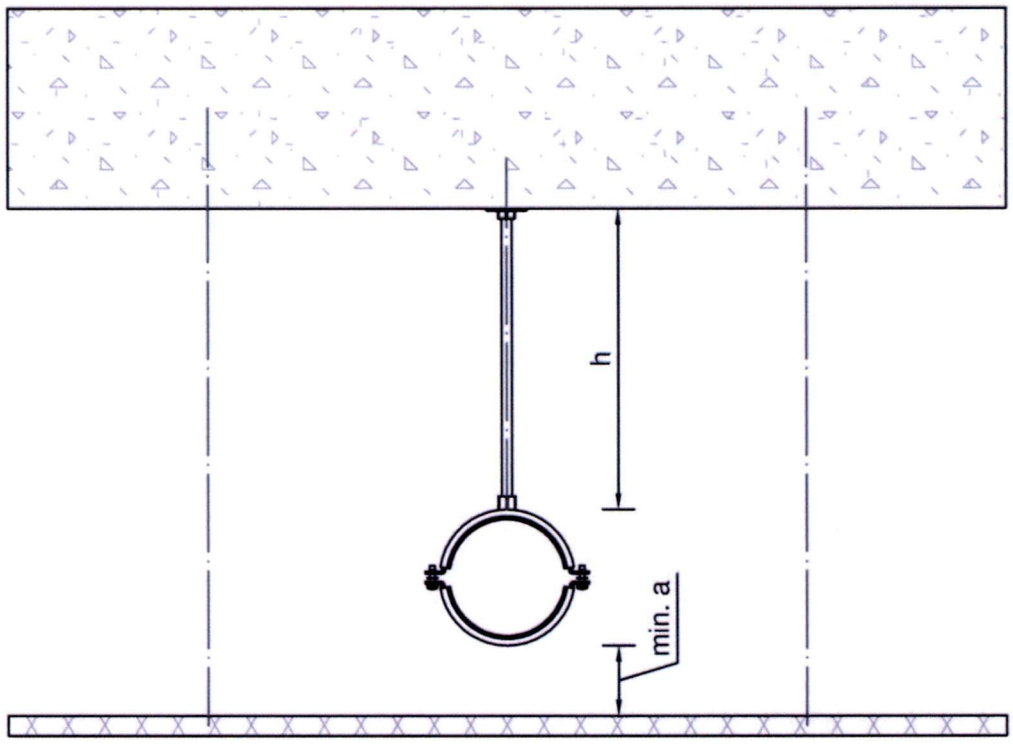

Figure 1 *Illustration of use of the pipe clamps FRS-L M8/M10 Universal in the intermediate ceiling area*

The minimum gaps “min a“ are shown in Table 2. The values shown there take into account the temperature-related change in length of the threaded rods used for suspension purposes as well as the maximum vertical deformations as a function of the span of the clamps.

The minimum gaps "min a" quoted here for components below this that are relevant for fire protection correspond to the maximum safety gaps assuming that the maximum permissible loads under exposure to fire corresponding to Table 1 act on the system.

Table 2 Minimum gaps "min a" for maximum permissible loads when the *pipe clamps FRS-L M8/M10 Universal* used in the intermediate ceiling area of counter ceilings relevant for fire protection

pipe clamps FRS-L M8/M10 Universal		**Minimum gap "min a" for suspended heights ha**			
Span range	**Nominal size**	**ha ≤ 250**	**ha ≤ 500**	**ha ≤ 750**	**ha ≤ 1000**
[mm]	**[inch]**	**min a [mm]**			
8-11	-	54	57	60	62
12-15	1/4"				
16-19	3/8"				
20-24	1/2"				
25-30	3/4"				
31-37	1"				
38-45	1 1/4"	72	75	78	80
46-52	1 1/2"				
53-59	-				
60-66	2"				
67-75	-	75	78	81	83
76-84	2 1/2"				
85-93	3"				
94-100	-				
101-110	-				
111-119	4"				

3.2 Maximum load at which the maximum deformation is smaller than 50 mm with a fire-resistance period of 30 minutes

Since the useful height in the intermediate ceiling area in practice is often limited, the aforementioned maximum safety gaps may not always be able to be realized. For this reason, reduced loads were determined for the system to be assessed which guarantee that with an exposure to fire acc. to the standard temperature-time curve for 30 minutes, the minimum gap "min a" = 50 mm is not exceeded.

The following Table 3 shows the maximum loads for minimum gaps "min a" ≤ 50 mm to structural components below the pipe clamps FRS-L M8/M10 Universal with respect to the requirements of the model conduit systems guideline (MLAR) as amended on 17.11.2005. [5].

Table 3 Maximum load at which the maximum deformation of the overall structure is ≤ 50 mm according to MLAR with a fire-resistance period of 30 minutes

pipe clamps FRS-L M8/M10 Universal		**Maximum load with a fire-resistance period of 30 minutes and "min a" ≤ 50 mm for suspended heights "ha"**			
Span range	**Nominal size**	**ha ≤ 250**	**ha ≤ 500**	**ha ≤ 750**	**ha ≤ 1000**
[mm]	**[inch]**	**Max F [kN]**			
8-11	-	0,27	0,26	0,24	0,22
12-15	1/4"				
16-19	3/8"				
20-24	1/2"				
25-30	3/4"				
31-37	1"				
38-45	1 1/4"	0,17	0,16	0,15	0,13
46-52	1 1/2"				
53-59	-				
60-66	2"				
67-75	-	0,53	0,53	0,53	0,53
76-84	2 1/2"				
85-93	3"				
94-100	-				
101-110	-				
111-119	4"				

The minimum gap "min a" refers to the deformations of the overall construction consisting of pipe clamps and threaded rods under exposure to fire. Additional deformations, e.g. from the installations (e.g. pipes) have to be investigated separately.

4 Restrictions on use

The foregoing assessment for the pipe clamps FRS-L M8/M10 Universal excludes their use for cable systems with integrated functional integrity acc. to DIN 4102-12: 1998-11. Further assessments and proofs are needed with respect to the overall system for such applications.

The pipe clamps FRS-L M8/M10 Universal can be used to fasten non-flammable pipes. In accordance with the comments on MLAR, flammable pipes with an outer diameter of da ≤ 160 mm can also be used if these are encapsulated in non-flammable, alu-foil-laminated insulation shells (melting point > 1000 °C, thickness > 30 mm, density approx. 80 – 120 kg/m³). The insulation must be secured with approx. 6 windings of binding wire per metre.

5 Special notes

The foregoing assessment only applies for the tested pipe clamps FRS-L M8/M10 Universal of electrogalvanised steel that have been installed in accordance with the mounting instructions in the technical data sheets of the firm of Firma fischerwerke GmbH & Co. KG.

On account of the better high-temperature behaviour of stainless steels, the figures also apply for pipe clamps and bolts with the same dimensions of stainless steel A2/A4.

The type of galvanisation has no effect on the fire resistance. This is why the figures also apply for pipe clamps FRS-L M8/M10 Universal hot-dip galvanised steel, provided the dimensions of the pipe clamps are identical to those of the tested pipe clamps.

The assessment only applies in conjunction with M8 and M10 threaded rods (strength class ≥ 4.8) and in components that can be classified in at least the fire-resistance class corresponding to the fire-resistance period of the rail constructions.

The pipe clamps have to be fastened to ceiling constructions with fasteners that have corresponding fire protection verification.

This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 11 October 2016

Dipl.-Ing. S. Hauswaldt
Head of Business Division

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Testing Engineer

Quellen

[1] RAL-GZ 656 Fire-tested pipe support: 2010-05 des Deutschen Instituts für Gütesicherung und Kennzeichnung e.V. (German Institute for Qualitiy Assurance and Certification).

[2] Technical data sheets for the pipe clamps FRS-L M8/M10 Universal from the firm of fischerwerke GmbH & Co. KG

[3] Test report PB 3.2/15-141-1 from 11.10.2016 of MFPA Leipzig GmbH: pipe clamps FRS-L M8/M10 Universal in the sizes 1" (31-37), 2" (60-66) and 4" (111-119)– Test in compliance with RAL-GZ 656 to determine strength and deformation behavior under thermal exposure with the standard temperature-time curve (ETK) according to DIN EN 1363-1*.

[4] DIN EN 1993-1-2:2010-12 Eurocode 3: Design of steel structures – Part 1-2: General rules– Structural fire design

[5] Model guideline for technical fire protection requirements on conduit systems (Model Conduit Systems Guideline MLAR) as amended on 17.11.2005

List of enclosures

Annex 1 Installation parameters for the tested pipe clamps FRS-L M8/M10 Universal

Annex 2 Graphical analysis of the test results

Annex 1 Installation parameters for the tested pipe clamps FRS-L M8/M10 Universal

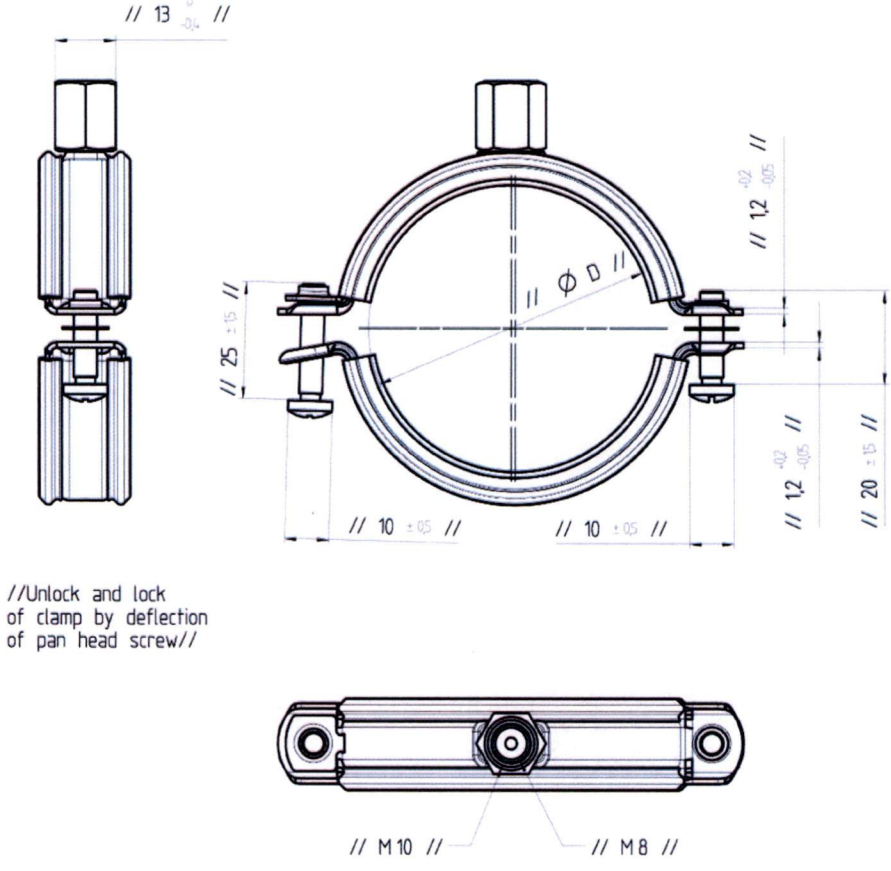


Table A1.1 Dimensions of the testes pipe clamps

Span range	Nominal size	Connecting thread	w x s	Locking screw	B	H	Z
[mm]	[inch]		[mm]		[mm]	[mm]	[mm]
31 – 37	1“	M8/M10	17 x 1,0	M5	74	60,7	19,3
60 – 66	2“		17 x 1,2	M5	104	89,9	19,2
111 – 119	4“		20 x 1,8	M6	165	144,6	21,4

Table A1.2 Materials for pipe clamp

Designation	Material
Clamp strip	Steel DD11 acc. to DIN EN 10111 (1.0332), electrogalvanised, 5 µm
Rubber profile/sound insulation lining	SBR/EPDM nach DIN 78078 BAE 4275; free from chlorine and silicone; 55 ± 5° Shore A
Locking screw	M5/M6 pan-head screw with cross recess shape H and additional slit, electrogalvanised ≥ 5 µm, strength class ≥ 4.8
Threaded rod	M8; electrogalvanised, strength class ≥ 4.8

Illustrations and tables taken from [2].

Annex 2 Graphical analysis of the test results

Diagram A2.1 Fire-resistance period for the pipe clamps FRS-L size 1“

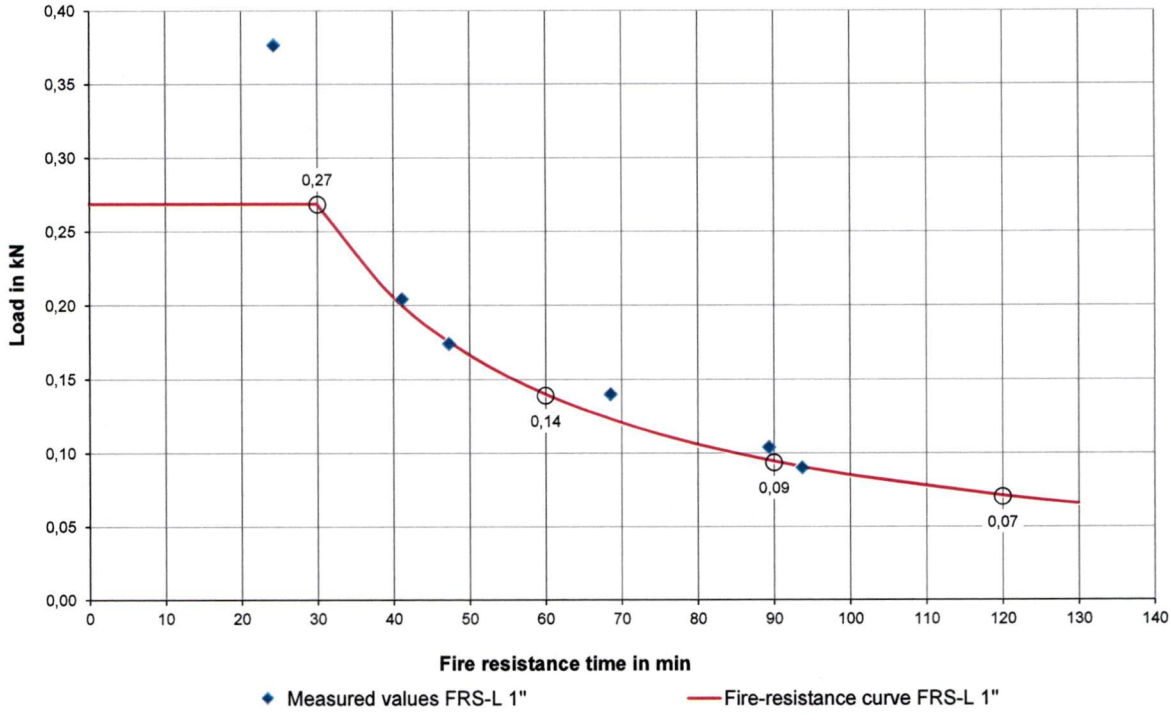


Diagram A2.2 Load-deformation curve for the pipe clamps FRS-L size 1“ with a fire-resistance period of 30 minutes

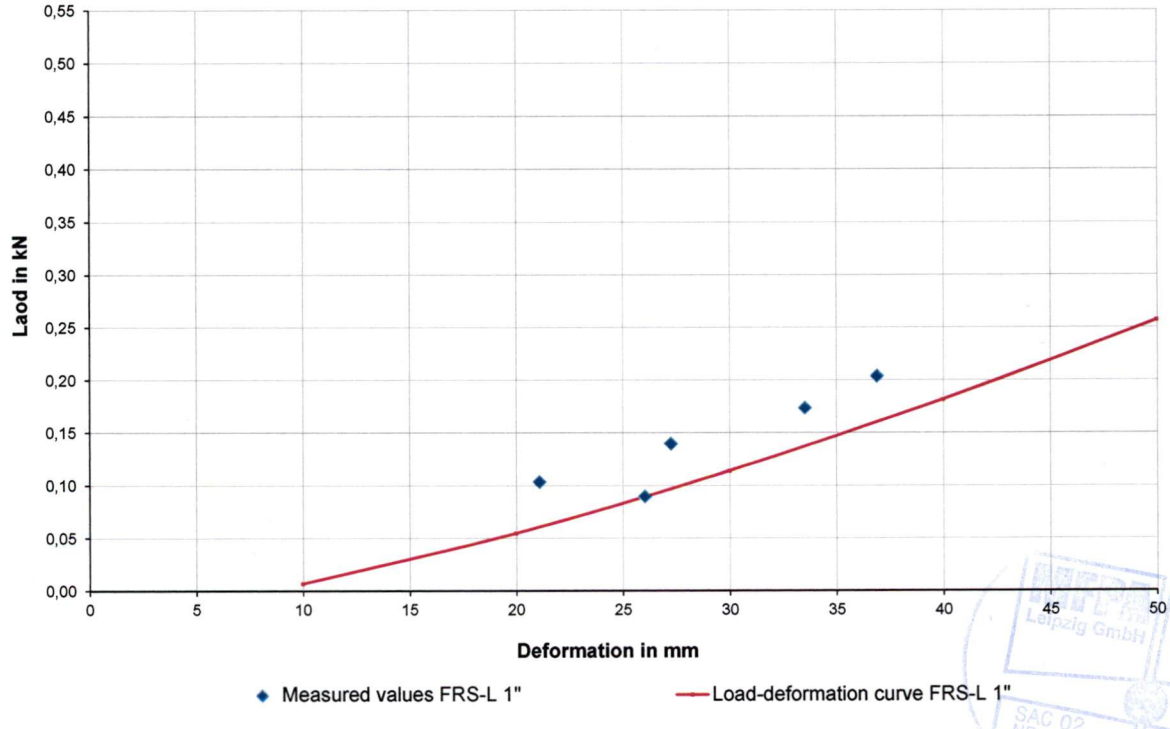


Diagram A2.3 Fire-resistance period for the pipe clamps FRS-L size 2“

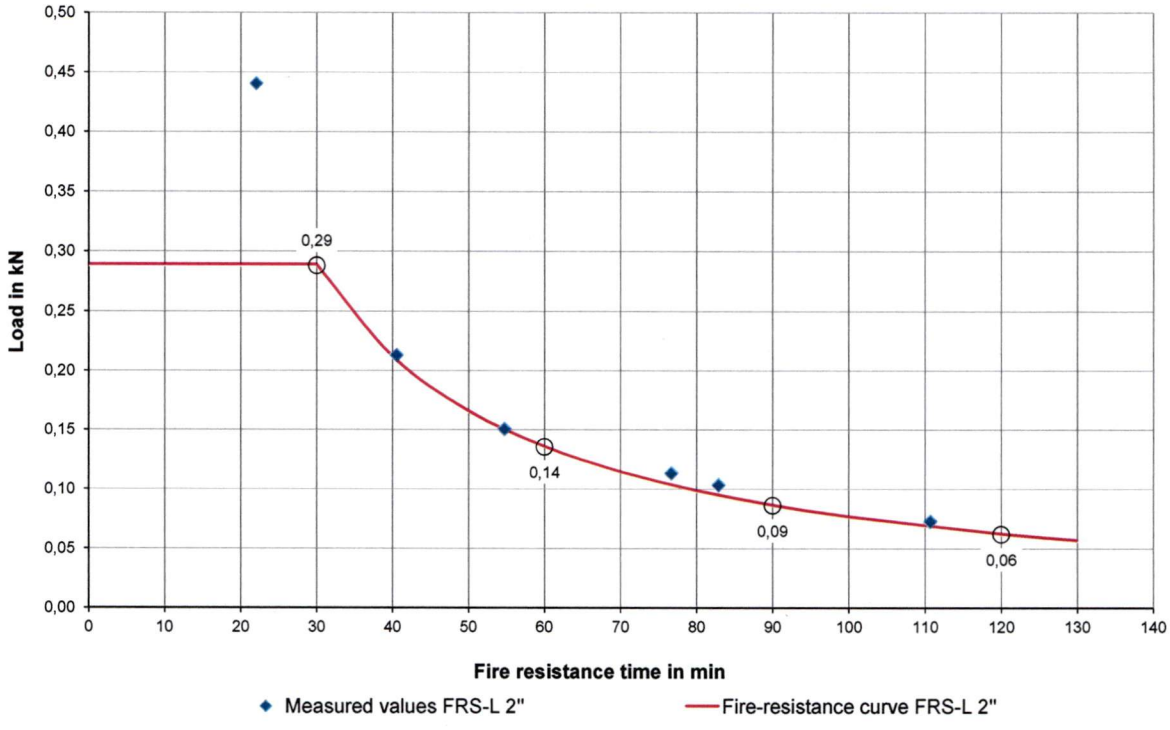


Diagram A2.4 Load-deformation curve for the pipe clamps FRS-L size 2“ with a fire-resistance period of 30 minutes

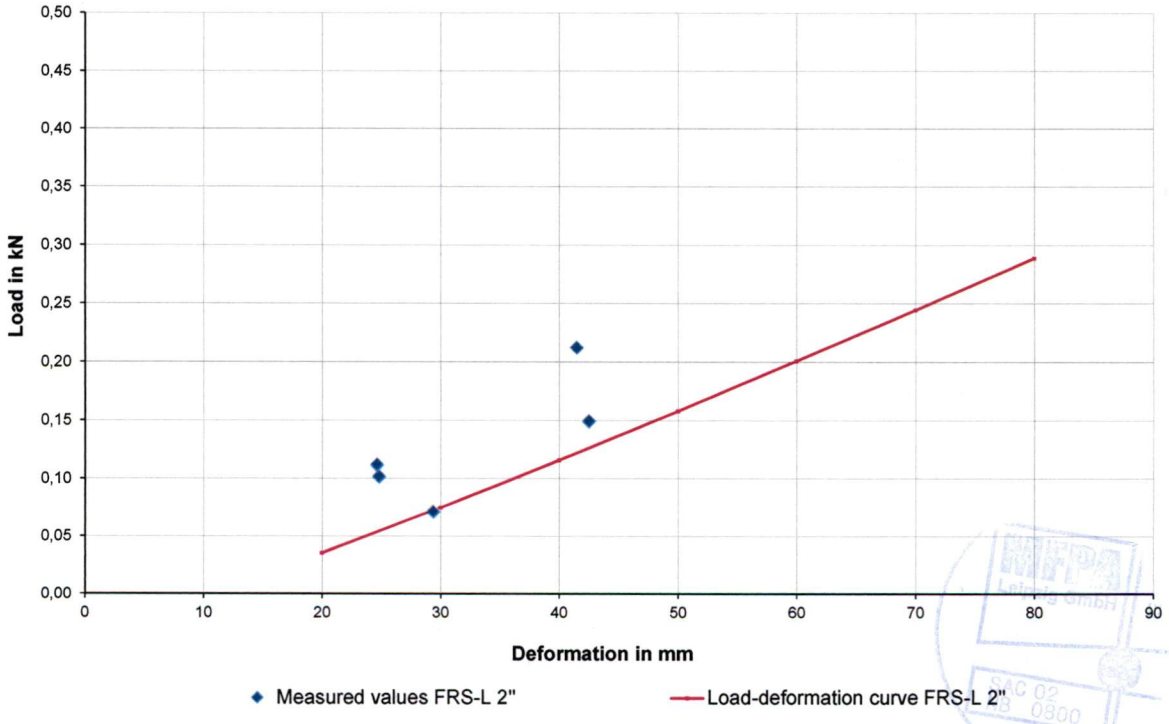


Diagram A2.5 Fire-resistance period for the pipe clamps FRS-L size 4“

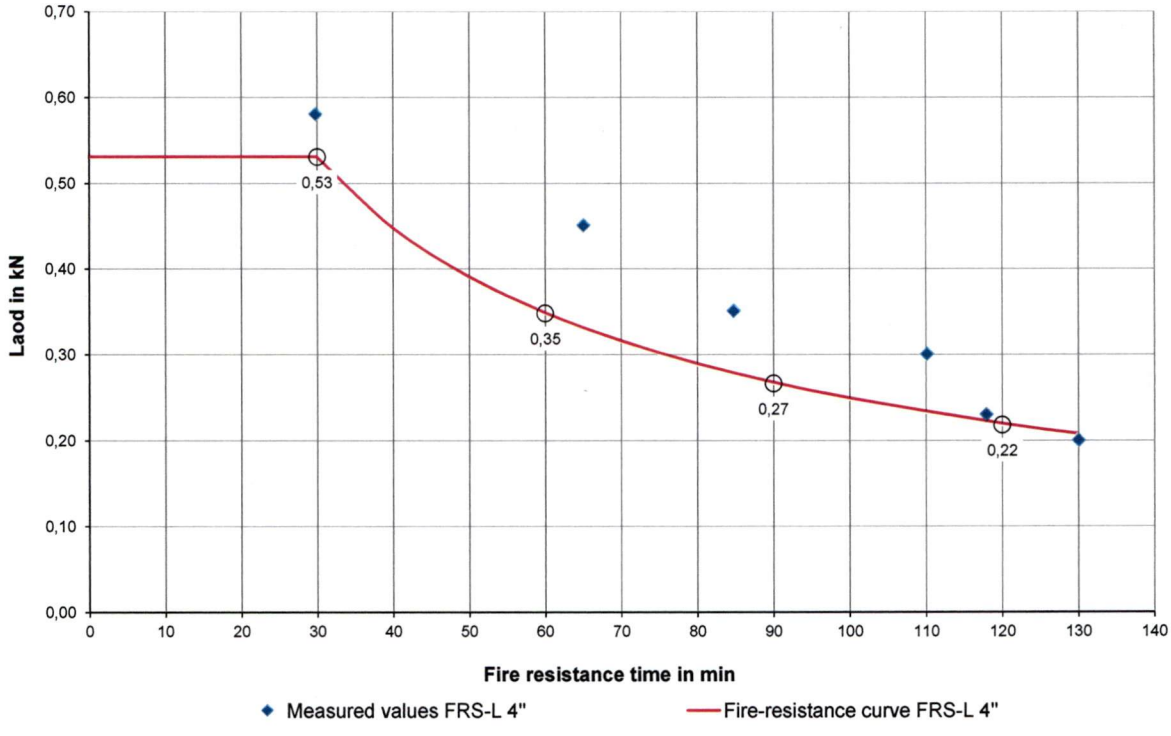
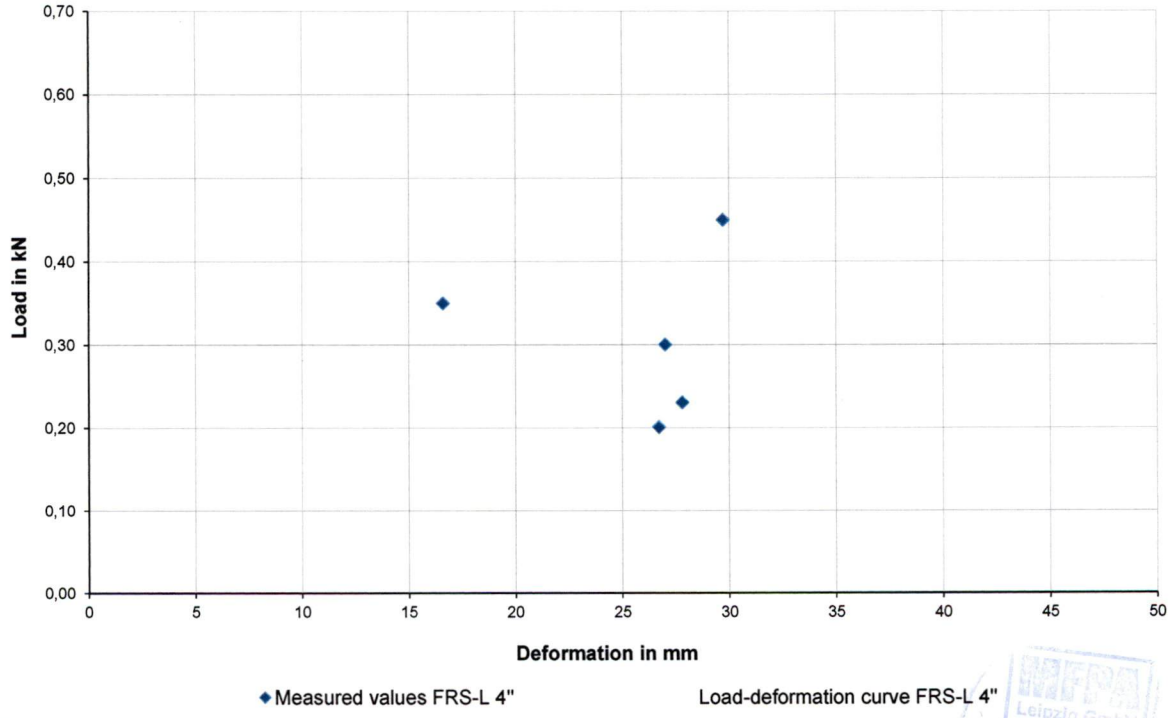


Diagram A2.6 Load-deformation curve for the pipe clamps FRS-L size 4“ with a fire-resistance period of 30 minutes



The test results show no clear load-deformation curve. However, even with a maximum load of 0.53 kN and exposure to fire for 30 minutes, no deformations greater than 50 mm are to be expected.