Fire test report

valid for

MPR-Support Channels
41/82/2,0
In connection with
MPR-Connection lock type S+

MPA NRW
Materialprüfungsamt Nordrhein-Westfalen
PRÜFEN · ÜBERWACHEN · ZERTIFIZIEREN

MPA NRW • Außenstelle Erwitte • Auf den Thränen 2 • 59597 Erwitte

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Your reference	: MÜPRO MPR-support channels
Your message of	: 12.10.2017
Our reference	: 210007317-3
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Date	: 24.10.2018

Assessment regarding fire protection of „MÜPRO MPR-Systemschienen 41/82/2,0 H-Profil" which are loaded by centric tension for the use in the area between raw ceiling and fireproof designed supported ceiling

Dear Sir or Madam,

With letter dated 12 Oct. 2017 MÜPRO Services GmbH, Hofheim-Wallau comissioned the Materialprüfungsamt Nordrhein-Westfalen to issue an assessment regarding fire protection of loaded MÜPRO MPR-support channels 41/82/2.0 H-profile, one-field systems (U-shape and L-shape) regarding an application in the area between raw ceilings and fire proof designed supported ceilings (intermediate ceiling area) according to „Muster-Leitungsanlagen-Richtlinie (MLAR).

1 General information

„MPR-Systemschienen 41/82/2,0 H-Profil“ of MÜPRO Services GmbH, Hofheim-Wallau, which were loaded with tension, were exposed to fire according to DIN EN 1363-1:2012-10 on 25 Jan. 2017, 8 Febr. 2017 and on 4 Dec. 2017 in the laboratory of Materialprüfungsamt NRW. The fire test was used to determine the load-bearing behavior and the deformation depending on the test duration. The „MPR-Systemschienen 41/82/2,0 H-Profil“ were tested in U-shape and L-shape, each designed as one-field-system, with a suspension height of 600 mm and 625 mm, respectively.

The test results are shown in the test reports no. 210007130-1 of 04/04/2017, no. 210007130-2 of 31/07/2017 and no. 210007317-1 of 28/08/2018.

The assembly of the support systems corresponds to the information in clause 3.

2 Requirements according to „Muster-Leitungsanlagen-Richtlinie (MLAR)“ regarding the interpretation of the fastening of pipe systems

According to „Musterbauordnung (MBO)“ circuit systems (e.g. conduit, cable systems) in required stairwells, in rooms between required stairwells and exits to the outside, in necessary corridors and in open corridors in front of building walls may be only installed, if there are no concerns regarding fire safety. In the guideline for fire protection requirements for circuit systems („Muster-Leitungsanlagen-Richtlinie“ (MLAR) *circuit system guideline*) boundary conditions are specified with which these requirements are met. According to MLAR, clause 3.5.3 and others, circuit systems may be laid in necessary corridors above suspended ceilings, in the area between raw ceiling and suspended ceiling (intermediate ceiling area), if the suspended ceilings can be classified in fire resistance class F30 when they are exposed to fire as well from below as from above and when they consist of non-combustible building material. A fireproof fastening is required for the fixing of the circuit systems.

3 Constructive assembly

3.1.1 U-shape

The U-shaped rails with outer dimensions of 1000 mm x 600 mm (length x height) consist of a horizontal part made of a Müpro MPR-support channel 41/82/2.0 H-profile (in distances of 160 mm, clinched) and two vertical parts made of Müpro MPR-support channels 41/41/2.5. The connection of the horizontal channel with the vertical channels was made with a Müpro MPR-construction bracket type S+ or a Müpro MPR-construction bracket with frame type S+ and four Müpro MPR-connection locks type S+. The Müpro MPR-construction brackets were mounted in opposite directions. The top ends of the vertical support channels were fixed with two Müpro MPR-connection locks type S+, each, to a Müpro saddle support longitudinal type S+ (for profiles 41/41). The Müpro saddle supports longitudinal type S+ were mounted with threaded rods M12 in “push-through installation” to the supporting construction by girder clamps/support brackets with hole, washers and hexagonal nuts M12.

3.1.2 L-shape

The L-shaped rails with outer dimensions of 1500 mm x 600 mm (length x height) consist of a horizontal part of a Müpro MPR-support channel 41/82/2.0 H-profile (in distances of 160 mm, clinched) and of a vertical part of a Müpro MPR-support channel 41/41/2.5.

The connection of the horizontal channel with the vertical channels was made with a Müpro MPR-construction bracket tpye S+ or a Müpro MPR-construction bracket with frame type S+ and four Müpro MPR-connection locks type S+. The top end of the vertical support channel was fixed with two

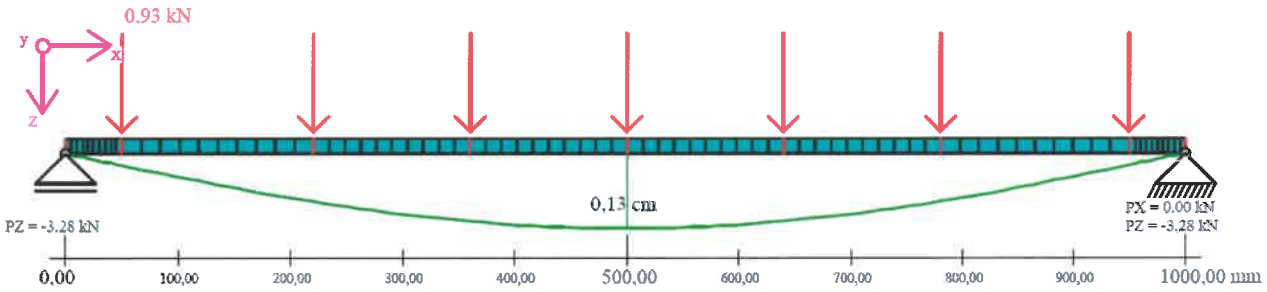
Müpro MPR-connection locks type S+ to a Müpro MPR-saddle support longitudinal type S+ (for profiles 41/41). The Müpro saddle supports longitudinal type S+ were mounted with threaded rods M12 in „push-through installation" to the supporting construction by girder clamps/support brackets with hole, washers and hexagonal nuts M12. The free end of the horizontal support channels were fixed with four Müpro MPR-connection locks type S+ to a Müpro MPR-saddle support longitudinal type S+ (for profiles 41/82). The Müpro MPR-saddle supports longitudinal type S+ were fixed with threaded rods, washers and hexagonal nuts M12 in „push-through installation" to the partition (wall).

4 Load of the MPR-support channels

The MPR-support channels were loaded by single loads as well as by line loads.

The supporting system in U-shape as well as in L-shape were loaded centrally by single load.

The load points of the line loads are shown in the following figures.



Eingabedaten :

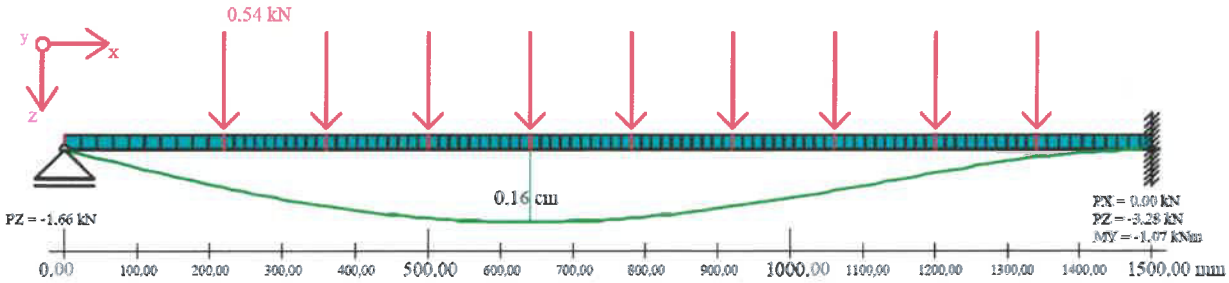
*** Lagerungsbedingungen : 2 ***

	Position	Nr	PX	PY	PZ	MX	MY	MZ	MG	Markiert
1	0.00000	1	0	1	1	0	0	0	0	1
2	1000.00000	81	1	1	1	0	0	0	0	1

*** Knotenlasten : 7 Größte Ordinate : 0.93160 [kN] ***

	Position	Nr	Px [kN]	Py [kN]	Pz [kN]	My [kNm]	Mz [kNm]
1	50.00000	11			0.93160		
2	220.00000	21			0.93160		
3	360.00000	31			0.93160		
4	500.00000	41			0.93160		
5	640.00000	51			0.93160		
6	780.00000	61			0.93160		
7	950.00000	71			0.93160		

Figure 1: Line load 7-fold– U-shape



Eingabedaten :

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*****************************************************************************
***   Lagerungsbedingungen   :  2                                         ***
*****************************************************************************
        Position  Nr     PX PY PZ   MX MY MZ   MG  Markiert
  1      0.00000   1      0  1  1    0  0  0    0  1
  2   1500.00000 101      1  1  1    0  1  0    0  1

*****************************************************************************
***   Knotenlasten          :  9  Größte Ordinate :      0.54230 [kN]     ***
*****************************************************************************
        Position  Nr      Px [kN]      Py [kN]      Pz [kN]     My [kNm]     Mz [kNm]
  1    220.00000  11                                0.54230
  2    360.00000  21                                0.54230
  3    500.00000  31                                0.54230
  4    640.00000  41                                0.54230
  5    780.00000  51                                0.54230
  6    920.00000  61                                0.54230
  7   1060.00000  71                                0.54230
  8   1200.00000  81                                0.54230
  9   1340.00000  91                                0.54230
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Figure 2: Line load 9 fold – L-shape

5 Fire resistance duration

The fire resistance durations (load-bearing behaviour as a function of time) of the MPR-support channels as a function of the maximum load "max. F" [kN] are listed below.

5.1 One-field system in U-shape

5.1.1 max. load at central single load

Designation	Fire resistance duration [min]			
	30	60	90	120
	max. F [kN]			
MÜPRO MPR-support channel 41/82/2.0 H-profile (mounting and fixing see clause 3.1.1) Static span ≤ 1000 mm	≤ 1.75	≤ 1.2	≤ 0.85	≤ 0.85

5.1.2 max. load at 7 fold line load

Designation	Fire resistance duration [min]			
	30	60	90	120
	max. F [kN]			
MÜPRO MPR-support channel 41/82/2.0 H-profile (mounting and fixing see clause 3.1.1) Static span ≤ 1000 mm	≤ 2.45	≤ 1.3	≤ 1.25	≤ 1.05

5.2 One-field system L-shape

5.2.1 max. load at central single load

Designation	Fire resistance duration [min]			
	30	60	90	120
	max. F [kN]			
MÜPRO MPR-support channel 41/82/2.0 H-profile (mounting and fixing see clause 3.1.2) Static span ≤ 1500 mm	≤ 1.4	≤ 0.8	≤ 0.6	≤ 0.5

5.2.2 max. load at 9 fold line load

Designation	Fire resistance duration [min]			
	30	60	90	120
	max. F [kN]			
MÜPRO MPR-support channel 41/82/2.0 H-profile (mounting and fixing see clause 3.1.2) Static span ≤ 1500 mm	≤ 2.2	≤ 1.35	≤ 0.9	≤ 0.9

6 Assessment of the supporting construction with regard to the minimum distances a_{min} for use above constructions which are designed in terms of fire protection (e.g. suspended ceilings).

On basis of the performed tests, MPR-support channels 41/82/2.0 H-profile of MÜPRO Services GmbH, Hofheim-Wallau, should be evaluated regarding the load-bearing capacity in case of fire exposure according to the standard temperature-time curve („Einheits-Temperaturzeitkurve" – ETK) according to DIN EN 1363-1:2012-10 over a period of 120 minutes and the corresponding minimum distances to building elements arranged below (e.g. suspended ceiling constructions relevant in terms of fire protection).

As follows, the minimum distance a_{min} between the lower edge of MPR-support channels and the top edge of the suspended ceiling construction (see figure 3) is defined according to the test results in order to exclude negative influence for the suspended ceiling construction due to the temperature-related vertical deformations of the supporting system.

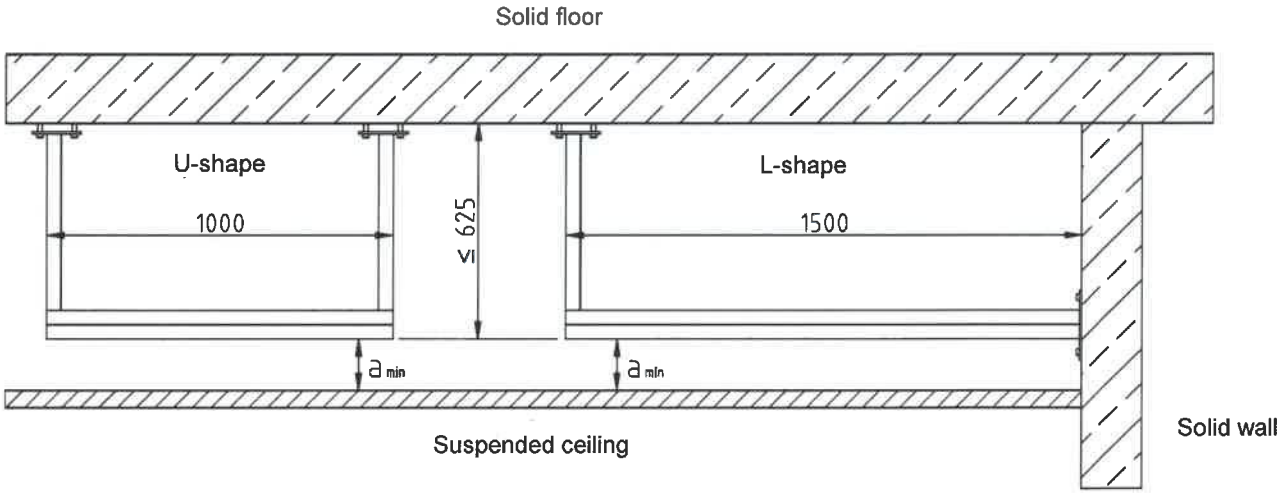

Figure 3: Minimum distance a_{min} between lower edge of the MPR-support channel and top edge of the suspended ceiling

The specified minimum distances are valid for suspended and directly mounted MÜPRO MPR-support channels 41/82/2.0 H-profile in conjunction with the correspondingly specified maximum loads at a fire exposure of max. 120 minutes according to the standard temperature-time curve („Einheits-Temperaturzeitkurve" – ETK) according to DIN EN 1363-1:2012-10.
This minimum distance a_{min} takes into account the results of the deformation measurement documented in test reports no. 210007130-1, no. 210007130-2 and no. 210007317-1, the static span of the MPR-support channels as well as the protrusion of the threaded rods on the bottom side of the MPR-support channels of $u_1 = 20$ mm. In case of greater protrusions of the threaded rods ($u_2 > 20$ mm) the difference of the protrusions ($u_2 - u_1$) has to be added to the minimum distances a_{min}. The here specified minimum distances are valid for a suspended height up to 625 mm.

6.1 Minimum distance a_{min} for one-field systems MÜPRO MPR-support channels

6.1.1 MÜPRO MPR-support channels U-shape, span l ≤ 1000 mm, single load

6.1.1.1 Fire resistance duration 30 minutes - U-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system / single load	≤ 1000	≥ M12	30	≤ 1.75	174	194

6.1.1.2 Fire resistance duration 30 to 60 minutes - U-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system / single load	≤ 1000	≥ M12	30	≤ 1.2	39	59
				60		157	177

6.1.1.3 Fire resistance duration 30 to 120 minutes - U-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system / single load	≤ 1000	≥ M12	30	≤ 0.85	25	45
				60		76	96
				90		102	122
				120		140	160

6.1.2 MÜPRO MPR-support channels U-shape, span l ≤ 1000 mm, line load 7 fold

6.1.2.1 Fire resistance duration 30 minutes - U-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-filed system/ line load 7 fold	≤ 1000	≥ M12	30	≤ 2.45	28	48

6.1.2.2 Fire resistance duration 30 to 60 Minuten - U-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-filed system/ line load 7 fold	≤ 1000	≥ M12	30	≤ 1.3	27	47
				60		59	79

6.1.2.3 Fire resistance duration 30 to 90 minutes - U-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-filed system/ line load 7 fold	≤ 1000	≥ M12	30	≤ 1.25	25	45
				60		93	113
				90		121	141

6.1.2.4 Fire resistance duration 30 to 120 minutes - U-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-filed system/ line load 7 fold	≤ 1000	≥ M12	30	≤ 1.05	18	38
				60		49	69
				90		67	87
				120		77	97

6.1.3 MÜPRO MPR-support channels L-shape, span l ≤ 1500 mm, single load

6.1.3.1 Fire resistance duration 30 minutes - L-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system/ single load	≤ 1500	≥ M12	30	≤ 1.4	164	184

6.1.3.2 Fire resistance duration 30 to 60 minutes - L-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system/ single load	≤ 1500	≥ M12	30	≤ 0.8	208	228
				60		337	357

6.1.3.3 Fire resistance duration 30 to 90 minutes - L-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system/ single load	≤ 1500	≥ M12	30	≤ 0.6	105	125
				60		225	245
				90		308	328

6.1.3.4 Fire resistance duration 30 to 120 Minuten - L-shape, single load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system/ single load	≤ 1500	≥ M12	30	≤ 0.5	19	39
				60		85	105
				90		111	131
				120		149	169

6.1.4 MÜPRO MPR-support channels L-shape, span l ≤ 1500 mm, line load, 9 fold

6.1.4.1 Fire resistance duration 30 minutes - L-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system// line load 9 fold	≤ 1500	≥ M12	30	≤ 2.2	52	72

6.1.4.2 Fire resistance duration 30 to 60 minutes - L-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system// line load 9 fold	≤ 1500	≥ M12	30	≤ 1.35	61	81
				60		206	226

6.1.4.3 Fire resistance duration 30 to 120 minutes - L-shape, line load

Designation	System/ type of load	Span [mm]	Fixings	Fire resistance duration [min]	Load max. F [kN]	Max. deformation [mm]	Minimum distance a_{min} [mm]
MÜPRO MPR-support channel 41/82/2.0 H-profile	One-field system// line load 9 fold	≤ 1500	≥ M12	30	≤ 0.9	36	56
				60		117	137
				90		148	168
				120		175	195

7 Special notes

7.1

Fire resistance durations were established according to the specifications in clause 5 for MÜPRO MPR-support channels with profile dimensions 41/82/2.0 in conjunction with Müpro MPR-construction bracket with frame type S+. The assessment of MÜPRO MPR support channels is only valid in conjunction with building elements that have at least the same fire resistance duration as the MÜPRO MPR support channels.

7.2

When using MÜPRO MPR-support channels in conjunction with Müpro MPR-construction bracket with frame type S+ with fixing devices ≥ M12 according to clause 3 in the intermediate ceiling area of suspended ceiling constructions with fire resistance classification, a minimum distance a_{min} is determined between the top of the supported ceiling and the bottom of the MÜPRO MPR-support channels in accordance with figure 3 and the specifications in the tables in clause 6.1.

By observing the minimum distances a_{min}, the suspended ceiling construction is not affected due to the temperature-related, vertical deformations of the supporting system under fire stress.
When attaching MÜRPO pipe clamps or other (loaded) construction elements, which are tested under fire stress according to DIN 4102-2:1977-09 or DIN EN 1363-1:2012-10, to the bottom of the above-mentioned MÜPRO MPR-support channels, the sum of the individual deformations resulting of the deformations of the MÜPRO MPR-support channels, the MÜPRO pipe clamps and other construction elements is decisive as minimum distance a_{min}.

MÜPRO MPR-support channels in accordance with the specifications given in the above-mentioned tables may alternatively also be used with greater wall thickness or greater construction height.

7.3

The channels and construction elements may alternatively be used with anti-corrosion coatings.

7.4

For reasons of fire protection, there are no objections to the use of MÜPRO MPR-support channels when they are alternatively be made of stainless steel in A2 or A4 quality. When replacing the galvanized steel by the above-mentioned materials, it is a non-essential deviation in the opinion of MPA NRW.

7.5

The period of validity of this letter is not limited.

This letter written in English language is issued additionally to the letter in German language with the same ref. number. In case of doubt the German version is solely valid.

Erwitte, 24/10/2018

On behalf

Dipl.-Ing. Cordula Schafranitz
(Person in charge)

Materialprüfungsamt MPA NRW 38 Nordrhein-Westfalen

Date of issue of this English version: 11 February 2019