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Institute of Building Materials, Concrete Construction and Fire Safety | Braunschweig Civil Engineering Materials Testing Institute

Expert Opinion

– Translation –

Document number:	(3466/537/14) – CM dated 03/07/2014
Client:	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelszau
Order date:	26.06.2014
Order ref:	Mr Sailer
Order received:	26/06/2014
Subject:	Assessment of Würth TIPP® AERO 400 M8/M10 ventilation pipe clamps (AERO DN80 to DN400) in conjunction with threaded rods regarding their behaviour on exposure to fire according to the standard temperature-time curve in accordance with DIN EN 1363-1 : 1999-10
Basis for assessment:	See Section 1
Valid until	03/07/2019

This expert opinion comprises 7 pages including cover sheet and 1 annex.

This expert opinion is no substitute for the certificate of suitability for use (abP, abZ, ETA) in accordance with the German supervisory authority approval requirements.

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Notified body (0761-CPR) -
Approved as a civil engineering testing, inspection and certifying body as well as notified as a civil engineering testing and certifying body.

1 General

An expert opinion on the Würth TIPP® AERO 400 mounting system was commissioned in writing by Würth on 26/06/2014.

The examinations performed with Würth TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) ventilation pipe clamps in conjunction with threaded rods under exposure to fire according to the standard temperature-time curve in accordance with DIN EN 1363-1 : 1999-10 are the basis for preparation of this expert opinion.

The documents serving as basis for the expert opinion are listed below:

[1] DIN EN 1363-1 : 1999-10, Fire resistance tests - Part 1: General Requirements,

[2] DIN 4102-4 : 1994-03, Fire Behaviour of Building Materials and Components,

[3] Specimen guideline on fire protection requirements pertaining to conduits (Specimen Conduit Guideline (German designation: MLAR)), edition of 17/11/2005,

[4] Test Report No. 3179/179/13 – CM dated 09/05/2014, issued by MPA Braunschweig,

[5] Technical data sheets from the client for Würth TIPP® AERO 400 ventilation pipe clamps.

The assessment regarding for TIPP® AERO 400 ventilation pipe clamps was conducted on the basis of the tests carried out under exposure to fire. Existing technical directives and technical specifications currently provide no complete design concept for clamp mounting systems covering situations that arise in the event of fire. There is currently no verification certificate (e.g. ETA) for Würth TIPP® AERO 400 mounting systems that lays down the regulations to be met in the event of fire.

Based on the tests conducted, the Würth TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) ventilation pipe clamps shall be assessed with regard to fire resistance and the necessary minimum distances of the components arranged below (e.g., suspended ceilings).

2 Structural design and design proposal

Würth TIPP® AERO 400 ventilation pipe clamps are mounting systems made from galvanized steel that are used to fix pipes under primarily dead loads.

The pipe clamps consist of two metal strips (galvanized steel) provided with a prefabricated EPDM rubber profile insert. The upper clamp strip of the Würth ventilation pipe clamps is provided with a welded connecting head for M8/M10 threads. The strips are connected with each other via a locking screw on one side and by hooking the lower strip part into the upper one.

Table 1: Product range of Würth TIPP® AERO 400 ventilation pipe clamps

Designation Würth TIPP® AERO 400 ventilation pipe clamps		**Clamp strip Width x material thickness**	**Article number**	
Span	**Nominal size DN**			
[mm]	**[mm]**	**[mm]**		
80 to 400	80	25.0 x 1.50	0543 830	080
	100		0543 830	100
	112/115		0543 830	115
	125		0543 830	125
	140		0543 830	140
	150		0543 830	150
	160		0543 830	160
	180		0543 830	180
	200		0543 830	200
	224		0543 830	224
	250		0543 830	250
	280		0543 830	280
	300		0543 830	300
	315		0543 830	315
	355		0543 830	355
	400		0543 830	400

Würth TIPP® AERO 400 ventilation pipe clamps are regulated for use in the Technical Datasheets of Adolf Würth GmbH & Co. KG.

2.1 General requirements

To ensure the functioning of the load-carrying system, the following boundary conditions are to be observed. The structural design of the clamp mounting systems is also included in Annex 1.

The following assessment for the Würth ventilation pipe clamps rules out use of the pipe clamps for structures that have to meet the requirements of a fire resistance class or a functional integrity class as overall system, e.g. **cable systems with built-in functional integrity** and **class E cable conduits** as per DIN 4102-12 : 1998-11. For these types of application, further assessments and verifications of the system as a whole are necessary.

2.2 Design proposal for the clamp mounting systems (assessment with regard to maximum load)

Based on the available test results, fire resistance times according to the following table are recommended for the TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) pipe clamps made from galvanized steel, as a function of the maximum load and with one-sided exposure to fire in accordance with DIN EN 1363-1 : 1999-10.

Table 2-1: Fire resistance time of TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) made from galvanized steel in conjunction with corresponding threaded rods (M8 or M10, strength class ≥ 4.8) as a function of the maximum load

Würth TIPP® AERO 400 ventilation pipe clamps	**Fire resistance time as a function of the maximum load**			
Span	**t [min]**			
	30	**60**	**90**	**120**
[mm]	**max. N [kN]**			
TIPP®AERO 400 DN 80 to DN 400	0.25	0.13	0.08	-

2.3 Design proposal for the clamp mounting systems (assessment with regard to deformation), taking the requirements of the Specimen Conduit Guideline (German designation: MLAR), edition of 17/11/2005 into account

If requirements of the Specimen Conduit Guideline (MLAR, edition of 17/11/2005, Section 3.5.3) have to be met, it is often necessary – with fire exposure in accordance with the standard temperature-time curve – to limit the loads with regard to a fire resistance time of 30 minutes, while keeping a minimum clearance of a ≥ 50 mm (see Fig. 2.1).

For applications of the Würth ventilation pipe clamps, those loads are indicated below that allow for excluding larger temperature-dependent vertical deformations of the Würth ventilation pipe clamps.

With the loads indicated and a minimum clearance distance kept of a ≥ 50 mm (e.g., between the top side of the suspended ceiling and the underside of the Würth ventilation pipe clamps), fire-protection-related impairments (e.g. of a suspended ceiling) due to deformation under exposure to fire of the Würth ventilation pipe clamps can be excluded.

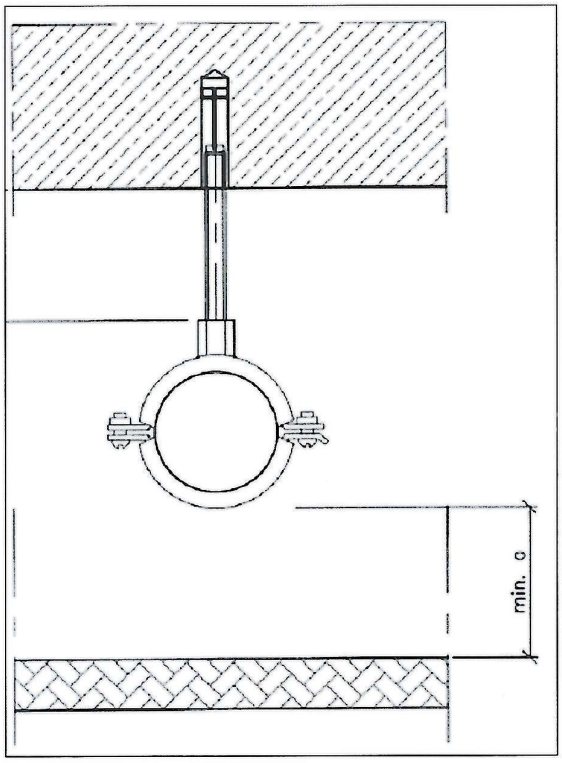

Fig. 2-1: Exemplary view of the installation of Würth ventilation pipe clamps in areas between ceilings where the suspended ceiling is of relevance for fire protection

The following table lists maximum loads for Würth ventilation pipe clamps for a minimum clearance of a ≥ 50 mm to underlying components for suspension heights of h ≤ 500 mm.

Table 2-2: Maximum loads for Würth TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) ventilation pipe clamps made from galvanized steel only in conjunction with corresponding threaded rods (M8 or M10, strength class ≥ 4.8) and a suspension height of h ≤ 500[2)] mm with a fire resistance time of 30 minutes and a minimum clearance of a ≥ 50[1)] mm

Würth TIPP® AERO 400 ventilation pipe clamps	**Fire resistance time of 30 minutes**
Span	**Suspension height a ≤ 500 mm**
[mm]	**max. N [kN]**
TIPP®AERO 400 DN 80 to DN 400	0.13

[1)] The minimum clearance min a refers only to deformations of the clamp systems resulting from exposure to fire; additional deformation, e.g. due to the installation (the pipes, pipe clamps, ...) has to be assessed separately if required.

[2)] Longer suspensions (maximum suspension height: 1500 mm) can be calculated taking the thermal length variation of the threaded rods into account.

The installation has to be carried out in accordance with Sections 2.1 to 2.3 and Annex 1.

3 Special notes

3.1 This Expert Opinion is no substitute for the certificate of suitability for use (abP, abZ, ETA) in accordance with German supervisory authority approval requirements.

3.2 This Expert Opinion applies only to the tested Würth TIPP® AERO 400 M8/M10 (AERO DN80 to DN400) ventilation pipe clamps made from galvanized steel taking into account the constraints listed in the technical data sheets of the test report or, respectively, the applicable technical data sheets published by Adolf Würth GmbH & Co. KG.

3.3 This Expert Opinion for the above mentioned mounting systems applies only in conjunction with the corresponding threaded rods (strength class ≥ 4.8) and with components that can be classified in at least the same fire resistance class as the mounting systems.

3.4 Fasteners in possession of the appropriate fire rating (fire resistance classification) have to be used to fasten the mounting systems to structural ceilings or wall constructions of the corresponding fire resistance class.

Anchors have to be suitable for the subfloor and the type of application and have to comply with the applicable requirements of the national technical approvals (abZ) issued by the DIBt (German Institute for Construction Technology), Berlin or a European Technical Assessment (ETA). If the abZ approval or ETA does not specify the fire behaviour of the fasteners, these are to be installed with $2h_{ef}$ (double embedment depth) – however, at least with a depth of 6 cm – and a maximum computational tensile load per anchor of 500 N (see DIN 4102-4: 1994-03, Section 8.5.7.5). The effective embedment depth (h_{ef}) is to be taken from the applicable

approval. Alternatively, those anchors may be used the suitability of which in terms of fire protection was proved by a general appraisal certificate or a fire protection certificate (e.g., test and assessment by an authorised inspection authority).

Anchors are to be installed in accordance with the technical documentation (assembly directives), normally in accordance with the requirements as stated in the approval (abZ or ETA) or in the general appraisal certificate (abP). In any case, the suitability of the anchors for the subfloor and the type of application has to be proved also for the cold as-installed condition.

3.5 The validity of this Expert Opinion No. (3466/537/14) – CM ends on 03/07/2019.

This document is the translated version of Expert Opinion No. 3466/537/14 *– CM dated 03/07/2014. The legally binding text is the aforementioned German Expert Opinion.*

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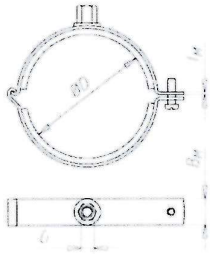
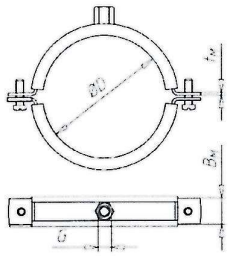
Braunschweig, 03/07/2014

VENTILATION PIPE CLAMP TIPP® AERO



DN 80 - DN 400



DN 450 - DN 1250

For fastening sheet metal air ducts and fittings with circular cross-sections in accordance with DIN EN 1506, ventilation for buildings.

Quick-action snap lock up to DN 400 mm

- Can also be mounted quickly and easily on an individual basis
- To close, suspend the pipe clamp using the long arm of the click mechanism
- Time-saving and simple alignment or moving of mounted pipes

Glued-in profile rubber

EPDM rubber pipe clamp is firmly glued-in to prevent it falling out when moving the pipe.

Rubber insert:

- For DIN 4109
- Ozone-resistant in accordance with DIN 53509-1 or ISO 1431/1
- Ageing-resistant in accordance with DIN 53508
- Reacts to fire in accordance with DIN 4102-1 (B2 non-flammable)
- Resistant to diluted acids and bases at room temperature and to solutions containing alcohol
- Not resistant to oils, greases and fuels

Connection thread (G)	M8 x M10
Metal-band width (B_M)	25 mm
Min./max. temperature resistance	-30 to 100 °C
Material	Steel
Material of the rubber profile	EPDM
Silicone-free	Yes
Chlorine-free	Yes
Halogen-free	Yes

Suitable for DN nominal width (⌀D)	Length (L)	Permissible load	Metal belt thickness (t_M)	Surface	Weight	Art. No.	P. Qty.
DN.. 80..	130 mm	600 N	1.5 mm	Galvanised	135 g	**0543 830 080**	30
DN.. 100..	150 mm	600 N	1.5 mm	Galvanised	162 g	**0543 830 100**	30
DN.. 115..	160 mm	600 N	1.5 mm	Galvanised	175 g	**0543 830 115**	30
DN.. 125..	180 mm	600 N	1.5 mm	Galvanised	190 g	**0543 830 125**	25
DN.. 140..	190 mm	600 N	1.5 mm	Galvanised	207 g	**0543 830 140**	25
DN.. 150..	200 mm	600 N	1.5 mm	Galvanised	218 g	**0543 830 150**	25
DN.. 160..	210 mm	600 N	1.5 mm	Galvanised	262 g	**0543 830 160**	25
DN.. 180..	240 mm	600 N	1.5 mm	Galvanised	256 g	**0543 830 180**	20
DN.. 200..	250 mm	600 N	1.5 mm	Galvanised	282 g	**0543 830 200**	20
DN.. 224..	280 mm	600 N	1.5 mm	Galvanised	331 g	**0543 830 224**	15
DN.. 250..	300 mm	600 N	1.5 mm	Galvanised	332 g	**0543 830 250**	15
DN.. 280..	330 mm	600 N	1.5 mm	Galvanised	373 g	**0543 830 280**	10
DN.. 300..	370 mm	600 N	1.5 mm	Galvanised	398 g	**0543 830 300**	10
DN.. 315..	380 mm	600 N	1.5 mm	Galvanised	412 g	**0543 830 315**	10
DN.. 355..	410 mm	600 N	1.5 mm	Galvanised	462 g	**0543 830 355**	10
DN.. 400..	460 mm	600 N	1.5 mm	Galvanised	513 g	**0543 830 400**	10
DN.. 450..	510 mm	800 N	3 mm	Sendzimir galvanised	956 g	**0543 830 450**	1
DN.. 500..	560 mm	800 N	3 mm	Sendzimir galvanised	1238 g	**0543 830 500**	1
DN.. 560..	620 mm	800 N	3 mm	Sendzimir galvanised	1325 g	**0543 830 560**	1
DN.. 600..	660 mm	800 N	3 mm	Sendzimir galvanised	1410 g	**0543 830 600**	1
DN.. 630..	690 mm	800 N	3 mm	Sendzimir galvanised	1525 g	**0543 830 630**	1
DN.. 710..	770 mm	800 N	3 mm	Sendzimir galvanised	1710 g	**0543 830 710**	1
DN.. 800..	860 mm	800 N	3 mm	Sendzimir galvanised	1820 g	**0543 830 800**	1
DN.. 900..	960 mm	800 N	3 mm	Sendzimir galvanised	2125 g	**0543 830 900**	1
DN.. 1000..	1060 mm	800 N	3 mm	Sendzimir galvanised	2350 g	**0543 831 000**	1
DN.. 1120..	1180 mm	800 N	3 mm	Sendzimir galvanised	2690 g	**0543 831 120**	1
DN.. 1250..	1310 mm	800 N	3 mm	Sendzimir galvanised	2710 g	**0543 831 250**	1

Scope of delivery: Up to DN 400 hex Screw AF 10 combination slot, from DN 450 hex. Screw M10 x 35 mm and hex. M10 nut DIN 934