

Fixing of sprinkler pipelines.



Fire protection is not the same as sprinklers!

Preventive fire protection

- Structural fire protection
- Technical fire protection

Fire protection objectives

On the one hand, fire protection provides personal protection, as a protection objective required in the building legislation of the respective countries (or federal states in the country). It is usually ensured by structural fire protection measures such as fire-resistant walls and ceilings, etc. Fire protection to protect property as a protection objective of the property insurance companies, such as the VdS or FM, not only use structural fire protection measures, but also primarily technical fire protection measures. Some requirements extend beyond those of the building legislation. Technical fire protection such as alarm systems and extinguishing systems,

which also include sprinkler systems, must be installed with approved or listed components according to the selected directive or guidelines.

Sprinkler systems are alarm and extinguishing systems

Sprinkler systems are water extinguishing systems, which are usually installed extensively. I.e. sprinklers are installed in all rooms and along all escape routes of a building and are designed according to the necessary fire hazard. This fact also makes the sprinkler system an alarm/detection system, as the temperature-dependent opening of a sprinkler causes an audible alarm to be emitted and in general, this is also forwarded to the fire detection and alarm system. In addition, the extinguishing success of sprinkler systems has been very high for decades, which is why they are a standard feature in some types of buildings.

Fixing of sprinkler systems.

Sprinkler systems are designed and installed to different standards. For example, to the German VdS standard (VdS CEA 4001), to the American FM standard 1951 (Factory Mutual Insurance Company, FM Global), to the UL (Underwriters Laboratories, UL) based on the NFPA 13 standard (National Fire Protection Association, NFPA) or to the European standard EN 12845.

The European guideline CEA 4001 was introduced in 1995 by the insurance industry in collaboration with the manufacturers' association and in Germany in 2003 by "VdS Schadensverhütung GmbH" as VdS CEA 4001.

EN 12845 was created on the basis of the CEA 4001 of 1995 and the VdS CEA 4001 of 2003, so that the resulting standard is virtually the same. The EN 12845 is supplemented by the EN 12259 series of standards for the most important components but does not cover the further requirements of fixing products.

The American standards correspond with each other and with the European standards and guidelines regarding the fixing of pipework. The differences are in the detail and must be noted in the respective use.

Certification symbol



VdS CEA 4001 compliance symbol in concrete ceilings:



Requirements for pipe fixings.

Apart from pipe clamps or pipe loops, all other types of fixing elements such as plugs, anchors, beam clamps, trapezoidal sheet hangers, etc. belong to the pipe hangers.

Depending on the standard, different load requirements apply to the hangers of sprinkler pipes, as test load or minimum load

Pipe clamps and pipe loops must be approved or meet the requirements.

Pipe clamps and pipe loops must be FM-approved and listed, the same is required by UL. The VdS standard and according to EN 12845, there are defined minimum requirements that must be met

capacity, fixing spacings and connecting thread sizes for the use of steel pipes, which are listed in the tables on the next page for the most widely used guidelines. EN 12845 contains the same values as VdS CEA 4001.

in addition to the load requirements shown on the next page. If there are deviations from the requirements according to VdS CEA 4001, the product must be recognised by the VdS or must be available for the use.

Table of the minimum requirements for the material thickness and width of hangers				
Nominal diameter of the pipe „d“ [mm]	Flat iron holder (EN 12845) hanger material (VdS CEA 4001)		Pipe clamps (EN 12845) pipe loops (VdS CEA 4001)	
	Galvanised [mm]	Ungalvanised [mm]	Galvanised [mm]	Ungalvanised [mm]
d ≤ 50	2.5	3.0	25 × 1.5	25 × 3.0 ¹⁾
50 < d ≤ 200	2.5	3.0	25 × 2.5 ¹⁾	25 × 3.0 ¹⁾

¹⁾ According to VdS CEA 4001 the requirement for hanger materials applies here (s. left side of the table)



Loads

Load requirements, fixing spacings and connecting thread of the standards.

Pipe size DN	FM1951/FMDS0200				NFPA13				VdS CEA 4001 (EN 12845)			
	Test load [kN]	Max. spacing [m]	Min. thread size		Calculated test load [kN]	Max. spacing [m]	Min. thread size		Minimum load capacity [kN]	Max. spacing [m]	Min. thread size	
			[metric]	[inch]			[mm]	[inch]			[metric]	[inch]
15	n/a	n/a	n/a	n/a	1.4	3.7	10	3/8	2.0	4.0	M8	n/a
20	1.512	3.6	M10	3/8	1.5	3.7	10	3/8	2.0	4.0	M8	n/a
25	1.824	3.6	M10	3/8	1.7	3.7	10	3/8	2.0	4.0	M8	n/a
32	1.913	3.6	M10	3/8	1.9	3.7	10	3/8	2.0	4.0	M8	n/a
40	2.313	4.6	M10	3/8	2.4	4.6	10	3/8	2.0	4.0	M8	n/a
50	2.825	4.6	M10	3/8	2.9	4.6	10	3/8	3.5	4.0	M10	n/a
65	4.181	4.6	M10	3/8	3.8	4.6	10	3/8	3.5	4.0	M10	n/a
80	4.715	4.6	M10	3/8	4.8	4.6	10	3/8	3.5	4.0	M10	n/a
90	5.583	4.6	M10	3/8	5.7	4.6	10	3/8	3.5	4.0	M10	n/a
100	6.561	4.6	M10	3/8	6.7	4.6	10	3/8	3.5	4.0	M10	n/a
125	8.896	4.6	M12	1/2	9.2	4.6	13	1/2	5.0	4.0	M12	n/a
150	11.632	4.6	M12	1/2	12.0	4.6	13	1/2	5.0	4.0	M12	n/a
200	16.903	4.6	M12	1/2	18.3	4.6	13	1/2	8.5	4.0	M16	n/a
250	26.044	4.6	M16	5/8	26.7	4.6	16	5/8	10.0	4.0	M20	n/a
300	35.141	4.6	M16	5/8	36.1	4.6	20	3/4	12.5	4.0	M20	n/a

For the design of the hangers, the two American guidelines allow calculation of the loads which provides comparability of the load level and can be described as recommended or approved loads, as the basis for the products such as pipe loops and plugs.

Comparison of the sprinkler loads per pipe hanger								
Pipework, water-filled			Max. allowable spacings			Loads (kg) based on calculated pipe loads/table		
Dimensions		Schedule 40*	NFPA	FM	VdS	NFPA	FM	VdS
[DN]	[Inch]	[kg/m]	[m]	[m]	[m]	5-times+114kg	2-times+170kg	see table
25	1	3.1	3.7	3.6	4	170	192	200
32	1 1/4	4.4	3.7	3.6	4	195	201	200
40	1 1/2	5.4	4.6	4.6	4	238	219	200
50	2	7.6	4.6	4.6	4	289	240	350
65	2 1/2	11.7	4.6	4.6	4	384	278	350
80	3	16.1	4.6	4.6	4	484	318	350
90	3 1/2	20.1	4.6	4.6	4	575	355	350
100	4	24.4	4.6	4.6	4	675	395	350
125	5	34.9	4.6	4.6	4	917	491	500
150	6	47.2	4.6	4.6	4	1,199	604	500
200	8	71.0	4.6	4.6	4	1747	823	850

* Weight of 8" steel pipe Schedule 30 (NFPA specification)

The calculations described above in the table are based on the following subitems of the guidelines:

- NFPA 13, 17.1.2 (old: 9.1.1.2): Five times the water-filled pipe, plus 114 kg as preload.
- FM 1951, 3.3.3 A or FMDS0200 2.5.4.3.1: Twice the water-filled pipe, plus 170 kg as preload.
- EN 12845 specifies identical loads to CEA 4001, however, only up to DN200.

Plug and anchor requirements for fixing in concrete.

In the guidelines named above, the respective requirements are listed in the following.

Anchors according to CEA 4001 – 15.2.4 Anchoring in concrete ceilings.

Plugs must have a CE marking based on a corresponding ETA:

- For single fixings in cracked concrete (European Technical Assessment or approval according to ETAG 001/Part 1-4 Opt. 1-6 or EAD 330232-00-0601/Opt. 1-6).
- For multiple fixings of non-load-bearing constructions (European Technical Assessment or approval according to ETAG 001/Part 6 or EAD 330747-00-0601 in preparation).
- For comparable national approvals, such as the still valid national technical approvals of the Deutsche
- Institut für Bautechnik (DIBt) for plugs for anchoring lightweight ceiling linings and suspended ceilings are equated with the approvals according to ETAG 001/Part 6.

The anchors are designed according to the approval, whereby the relevant load equals 1.4 times the actual load. The plugs must meet the tensile capacity (steel failure, $N_{Rk,s}$) and threaded connection (if present) the requirements of the following table.

Use for fixing pipework with pipe nominal size D on ceilings with one anchor per fixing point	Minimum threaded connection of the anchor	Characteristic tensile capacity (steel failure) $N_{Rk,s}$ [N]
D ≤ DN 50	M8	≥ 6,000
DN 50 < D ≤ DN 100	M10	≥ 10,500
DN 100 < D ≤ DN 150	M12	≥ 15,000
DN 150 < D ≤ DN 200	M16	≥ 25,500
DN 200 < D ≤ DN 250	M20	≥ 30,000
DN 250 < D ≤ DN 300	M20	≥ 37,500

VdS CEA 4001 - Table 15.04: Minimum tensile capacity and minimum threaded connection

Anchors according to EN 12845: Design of hangers according to 17.2.3 Design.

- Unlike the VdS CEA 4001, minimum lengths are defined for anchor bolts, however, they include further conditions.
- Basically, plugs and anchors with corresponding ETA (see above regarding VdS CEA 4001) can be used, as they are legitimised in building law terms on the basis of the Construction Products Regulation (CPD).
- The VdS CEA values from the load requirements, fixing spacing and connecting thread table can be used as a requirement for the loads.

Anchors according to NFPA 13, 17.2.2 (old 9.1.3) Fixings in concrete (Basis for UL listing).

- Basically, NFPA 13, 17.2.2.1 (old 9.1.1.4) specifies that all components of the hangers, which hold the pipe and all products that connect the hanger to the structural substrate require a listing according to the UL guidelines.
- The required load capacity according to NFPA 13, 17.1.2 (old 9.1.1), as contained in the Load requirements (s. table), fixing spacings and connecting thread table, with the calculated test loads, also applies to plugs and anchors.
- Section 17.2.2 (old 9.1.3) also describes rules for the use of plugs (inserts) and anchors in different types of concrete such as lightweight concrete and similar.

Anchors according to FM1951 – 3.2 Technical and constructive properties.

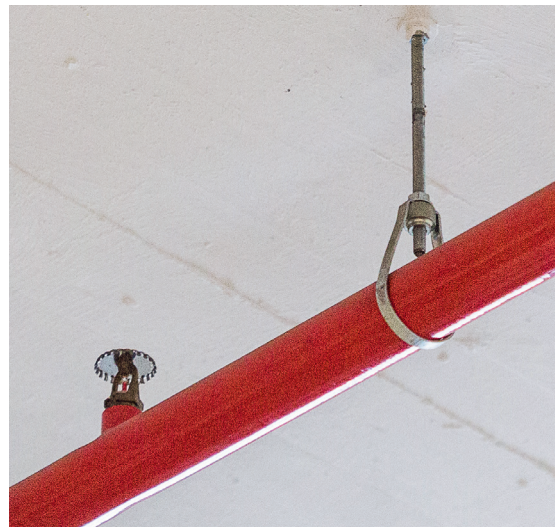
- The same provision applies as defined in NFPA 13, i.e. that all components of the hangers that hold the pipe and all products that connect the hanger to the structural substrate must be subjected to approval according to the FM guidelines and must be listed as FM-approved.
- Section 3.2.2 defines the requirements for anchors and plugs (parts of the hanger that connect to the structural substrate). The requirements are entered in the load requirements (s. table), fixing spacings and connecting thread table.

Summarising

If the test loads of the American standards and the characteristic loads of the European standards are compared, it can be stated that the load levels are harmonised and thus the same plugs and anchors can be used for the same sprinkler system applications, depending on the listing, approval or compliance with the guidelines.








Fixing plug and anchor requirements.

In addition to fixings in concrete, diverse lightweight concrete types and aircrete or other types of masonry are available as fixing substrates. Steel constructions with different forms of steel girders and wood constructions as fixing substrates are also available and are taken into consideration in the standards. Here, too, the fixing elements used must meet the requirements of the guidelines.



Approvals and usability for the sprinkler fixing.

Overview of the tests for plugs and anchors and their usability for sprinkler fixings

Type	 ETA concrete, single 	ETA concrete, multiple	 ETA masonry 	 VdS compliant	 VdS approved	 FM approved
FAZ II	Option 1	-	-	●		●
UltraCut FBS II	Option 1	● (FBS 6)	-	● (Incl. FBS 6)		-
FZA	Option 1	-	-	●		-
FHB II	Option 1	-	-	●		●
FZEA II	Option 7	-	-	●		●
EA II	Option 1	●	-	●		-
FIS V/FIS V Plus/FIS VL	Option 1	-	●	●		-
FIS SB	Option 1	-	-	●		-
FNA II	-	●	-	●		-
FPX-I	-	-	● Aircrete	-	● Aircrete	-
FDN II	-	●	-	●		-
SXR/SXRL	DIBT approval for single fixings in cracked concrete	●	●	●		-

























ETA concrete, single, Option 1 = suitable for cracked and uncracked concrete,
 ETA concrete, single, Option 7 = suitable for uncracked concrete
 ETA concrete, multiple = suitable for cracked and uncracked concrete (redundant)

Fixing solutions for sprinklers. Flexibility guaranteed.

Hangers for sprinklers

Mounting recommendation for

	Concrete		Aircrete		Trapezoidal sheet metal		Structural steel-work
---	----------	---	----------	---	-------------------------	---	-----------------------

FAZ II 		FPX-I 	VdS	TZH 	VdS	TK 	VdS 
FH II-I 				TZ 	VdS	TKLS 	
FZA 				TZA 			VdS 
FZEA II 				KDS 	VdS 		
EA II 					KDS 10		
FBS II 6-I 							



Product range and technical data.

Profile hangers TZ/TZH



TZ



TZH

Item	Item No.	VdS approved	FM approved	Thread	Max. rec load (cent tension) [kN]	Sales unit [pcs]
TZ M8	064094	●	–	M8	3.0	25
TZH M8	079825	●	–	M8	4.0	25
TZA M10	524047	–	●	M10	3.0	50
TZ M10	064095	●	–	M10	3.0	25
TZH M10	079826	●	–	M10	4.0	25

Steel girder clamp hanger TKLS



TKLS



SS-TKLS

Item	Galvanised galv Item No.	Stainless steel A4 Item No.	VdS approved	FM approved	Hole- ϕ [mm]	Clamp area [mm]	Max. rec static load (cent tension) [kN]	Max. rec pipe ϕ to VDS CEA 4001	Sales unit [pcs]
TKLS ϕ 9	531134	–	●	–	9	8 – 20	2.00	\leq DN 50	25
TKLS ϕ 11	531136	564391	●	●	11	8 – 20	3.50	$>$ DN 50 \leq DN 100	25
TKLS ϕ 13	531137	–	●	●	13	8 – 20	5.00	$>$ DN 100 \leq DN 200	25
TKLS ϕ 17	531138	–	●	●	17	11 – 26	10.00	$>$ DN 200 \leq DN 250	16
SS-TKLS M10	566855	–	●	–	–	–	–	–	50
SS-TKLS M10	–	564399	●	–	–	–	–	–	25
SS-TKLS M12	566856	–	●	–	–	–	–	–	50
SS-TKLS M16	566857	–	●	–	–	–	–	–	50

Girder clamp hanger TKL



TKL



SS-TKL

Item	Galvanisch verzinkt galv Item No.	Hot-dip galvanised fvz Item No.	VdS approved	FM approved	UL approved	Clamp area [mm]	Thread	Max. rec static load (cent tension) [kN]	Sales unit [pcs]
TKL L M8	064055	564392	●	–	–	0 – 18	M8	1.20	50
TKL M8	079687	–	●	–	–	0 – 23	M8	2.50	50
TKL L ϕ 9	077605	–	●	–	–	0 – 18	ϕ 9	1.20	50
TKL M10	079688	564393	●	●	●	0 – 20	M10	2.50	50
TKL ϕ 11	079689	–	●	●	●	0 – 20	ϕ 11	2.50	50
TKL M12	020949	564394	●	●	●	0 – 26	M12	3.50	50
TKL ϕ 13	043275	–	●	●	●	0 – 26	ϕ 13	3.50	50
SS-TKL M10/M12	048154	048154	●	–	–	–	ϕ 10/ ϕ 12	–	25

Threaded rod G



Item	Item. No.	Length [mm]	Thread	Sales unit [pcs]
G 8	079740	1000	M8	25
G 10	079744	1000	M10	25
G 12	020957	1000	M12	20
G 16	020958	1000	M16	10
G 20	557295	1000	M20	5
G 8/2	079741	2000	M8	25
G 10/2	079745	2000	M10	25
G 12/2	579746	2000	M12	25
G 10/3	557092	3000	M10	5
G 12/3	064056	3000	M12	5

Spring toggle fixing KDS



Item	Item. No.	VdS approved	FM approved	Thread	Thread length [mm]	Drillhole diameter, trapezoidal sheet [mm]	Allowable tensile load to VdS and FM [kN]	Allowable tensile load for non-VdS and FM. Relevant applications on trapezoidal sheet* [kN]	Max. rec tensile load without consideration of substrate [kN]	Sales unit [pcs]
KDS 8x100	563859	●	–	M8	100	22	0.8	1.0	8.0	50
KDS 8x200	563860	●	–	M8	200	22	0.8	1.0	8.0	25
KDS 8x300	563861	●	–	M8	300	22	0.8	1.0	8.0	25
KDS 8x500	563862	●	–	M8	500	22	0.8	1.0	8.0	25
KDS 10x100	563863	●	●	M10	100	25	0.8	1.0	8.5	25
KDS 10x200	563864	●	●	M10	200	25	0.8	1.0	8.5	25

* Note the allowable loadability of the trapezoidal sheet. Approved for use in stationary fire protection systems (for pipes up to 2")

Riser pipe clamp RCWR



Item	Item. No.	UL approved	Clamp area [mm]	Width [mm]	Width x thickness of clamp strap [mm]	Max. recommended transverse tensile load [kN]	Tightening torque of screws [Nm]	Sales unit [pcs]
RCWR 1/2"	516673	●	22	215	25 x 5.0	3.30	25	35
RCWR 3/4"	516674	●	28	229	25 x 5.0	3.30	25	30
RCWR 1"	516675	●	34	230	25 x 5.0	3.30	25	25
RCWR 1 1/4"	516676	●	43	241	25 x 5.0	3.30	25	25
RCWR 1 1/2"	516677	●	49	251	25 x 3.0	3.30	25	25
RCWR 2"	516678	●	62	262	30 x 5.0	3.30	25	25
RCWR 2 1/2"	532380	●	75	281	30 x 5.0	3.70	25	25
RCWR 3"	516679	●	91	299	30 x 5.0	4.60	25	20
RCWR 4"	516680	●	116	329	38 x 6.0	6.60	60	12
RCWR 5"	516681	●	144	362	38 x 6.0	8.90	60	12
RCWR 6"	516682	●	171	394	50 x 6.0	11.50	60	8
RCWR 8"	516683	●	223	464	50 x 9.5	18.00	100	4

Product range and technical data.

FRSL sprinkler clamp



FRSL

Item	Item. No.	VdS approved	Nominal size [Zoll]	Connecting thread	Height [mm]	Width x thickness of clamp strap [mm]	Max. rec static load (cent tension) [kN]	Sales unit [pcs]
FRSL 34 M8	538082	●	1"	M8	67	10 x 1.8	2.0	50
FRSL 43 M8	538083	●	1 1/4"	M8	67	10 x 1.8	2.0	50
FRSL 49 M8	538084	●	1 1/2"	M8	72	10 x 1.8	2.4	50
FRSL 60 M8	538085	●	2"	M8	81	10 x 1.8	2.9	50
FRSL 34	513302	●	1"	M10	67	10 x 1.8	2.0	50
FRSL 43	513303	●	1 1/4"	M10	67	10 x 1.8	2.0	50
FRSL 49	513304	●	1 1/2"	M10	72	10 x 1.8	2.4	50
FRSL 60	513307	●	2"	M10	81	10 x 1.8	2.9	50
FRSL 76	513308	●	2 1/2"	M10	98	10 x 2.5	3.9	25
FRSL 90	513309	●	3"	M10	113	10 x 2.5	4.9	25
FRSL 115	513310	●	4"	M10	143	10 x 2.5	6.8	25
FRSL 140	513311	●	5"	M12	157	13 x 2.5	9.2	25
FRSL 170	513312	●	6"	M12	187	13 x 2.5	12.0	25

FRSP sprinkler clamp



FRSP

Item	Item. No.	FM approved	UL approved	Nominal size [Inch]	Thread ø x Length [mm]	Height [mm]	Width x thickness of clamp strap [mm]	Max. rec static load (cent tension) [kN]	Sales unit [pcs]
FRSP 1/2"	516662	–	●	1/2"	M10 x 22.5	55	16 x 1.2	2.0	100
FRSP 3/4"	516663	●	●	3/4"	M10 x 22.5	62	16 x 1.2	2.0	100
FRSP 1"	516664	●	●	1"	M10 x 22.5	70	16 x 1.2	2.0	100
FRSP 1-1/4"	516665	●	●	1 1/4"	M10 x 22.5	78	16 x 1.2	2.0	100
FRSP 1-1/2"	516666	●	●	1 1/2"	M10 x 22.5	83	16 x 1.2	2.4	100
FRSP 2"	516667	●	●	2"	M10 x 22.5	93	16 x 1.2	2.9	100
FRSP 2-1/2"	516668	●	●	2 1/2"	M10 x 22.5	126	19 x 2.2	3.9	60
FRSP 3"	516669	●	●	3"	M10 x 22.5	147	19 x 2.2	4.9	60
FRSP 4"	516670	●	●	4"	M10 x 22.5	180	19 x 2.2	6.8	24
FRSP 5"	532356	●	●	5"	M12 x 26.8	210	19 x 2.5	9.2	24
FRSP 6"	516671	●	●	6"	M12 x 26.8	251	19 x 3.0	12.0	24
FRSP 8"	516672	●	●	8"	M12 x 26.8	301	19 x 3.0	17.4	12

Sprinkler clamp FCHS



FCHS

Item	Item No.	FM approved	UL approved	Size [inch]	Hole-Ø [mm]	Clamping range [mm]	Height [mm]	Width [mm]	Width x thickness clamp band [mm]	Max. recom. static load (centr. tension) [kN]	Sales unit [pcs]
FCHS 1/2"	532187	X	X	1/2"	10.5	19 - 23	51	49	19 x 2,0	3.00	100
FCHS 3/4"	532190	X	X	3/4"	10.5	24 - 29	58	55	19 x 2,0	3.00	100
FCHS 1"	532195	X	X	1"	10.5	33 - 37	70	61	19 x 2,0	3.00	100
FCHS 1-1/4"	532197	X	X	1 1/4"	10.5	40 - 45	84	74	25 x 2,0	3.00	100
FCHS 1-1/2"	532198	X	X	1 1/2"	10.5	47 - 52	100	80	25 x 2,0	3.00	50
FCHS 2"	516695	X	X	2"	10.5	60 - 65	114	93	25 x 2,0	3.00	50
FCHS 2-1/2"	516696	X	X	2 1/2"	13.5	73 - 78	133	107	30 x 2,5	5.00	50
FCHS 3"	516697	X	X	3"	13.5	88 - 93	153	126	30 x 2,5	5.00	25
FCHS 4"	516699	X	X	4"	16.8	108 - 116	192	158	30 x 3,0	5.00	25
FCHS 5"	516700	X	X	5"	16.8	138 - 145	238	213	30 x 4,0	6.00	15
FCHS 6"	516701	X	X	6"	20.5	165 - 172	272	248	38 x 5,0	9.00	10
FCHS 8"	516702	X	X	8"	20.5	219 - 225	333	305	38 x 5,0	9.00	6
FCHS 10"	516703	—	—	10"	24	267 - 273	400	372	50 x 6,0	16.00	2
FCHS 12"	516704	—	—	12"	24	320 - 328	479	426	50 x 6,0	16.00	2

U-bolt ETR



ETR

Item	Item. No.	Connecting thread	Length [mm]	Length [mm]	Nominal size [Inch]	Width [mm]	Sales unit [pcs]
ETR 8 - 13	024415	M6	30	20	1/4"	20	10
ETR 12 - 17	024416	M6	35	20	3/8"	24	10
ETR 15 - 21	024417	M6	40	25	1/2"	28	10
ETR 20 - 27	024418	M8	50	32	3/4"	36	10
ETR 26 - 34	024419	M8	55	32	1"	43	10
ETR 33 - 42	024420	M8	68	38	1 1/4"	51	10
ETR 40 - 49	024421	M8	70	38	1 1/2"	58	10
ETR 50 - 60	024422	M8	80	40	2"	69	10
ETR 60 - 70	024423	M10	100	43	—	82	10
ETR 66 - 76	024424	M10	110	50	2 1/2"	88	10
ETR 70 - 82	024425	M10	115	50	—	94	10
ETR 80 - 90	024426	M10	115	50	3"	102	10
ETR 90 - 102	024427	M12	145	55	3 1/2"	116	5
ETR 100 - 108	024428	M12	150	50	—	122	5
ETR 102 - 114	024429	M12	156	60	4"	128	5
ETR 121 - 127	024430	M12	170	60	—	141	5
ETR 126 - 133	024431	M12	180	70	—	147	5
ETR 131 - 140	024432	M14	185	70	5"	156	5
ETR 143 - 153	024433	M14	193	70	—	169	5
ETR 150 - 159	024434	M14	200	70	—	175	5
ETR 168	024435	M14	210	70	6"	184	5
ETR 193,7	024436	M14	232	70	—	209	5
ETR 219	024437	M14	270	70	8"	236	5

Dealer:

www.fischer-international.com



fischer stands for

Fixing Systems
Automotive
fischertechnik
Consulting
Electronic Solutions

fischerwerke GmbH & Co. KG
Klaus-Fischer-Straße 1 · 72178 Waldachtal
Germany
T +49 7443 12 - 0
www.fischer-international.com · info@fischer.de
