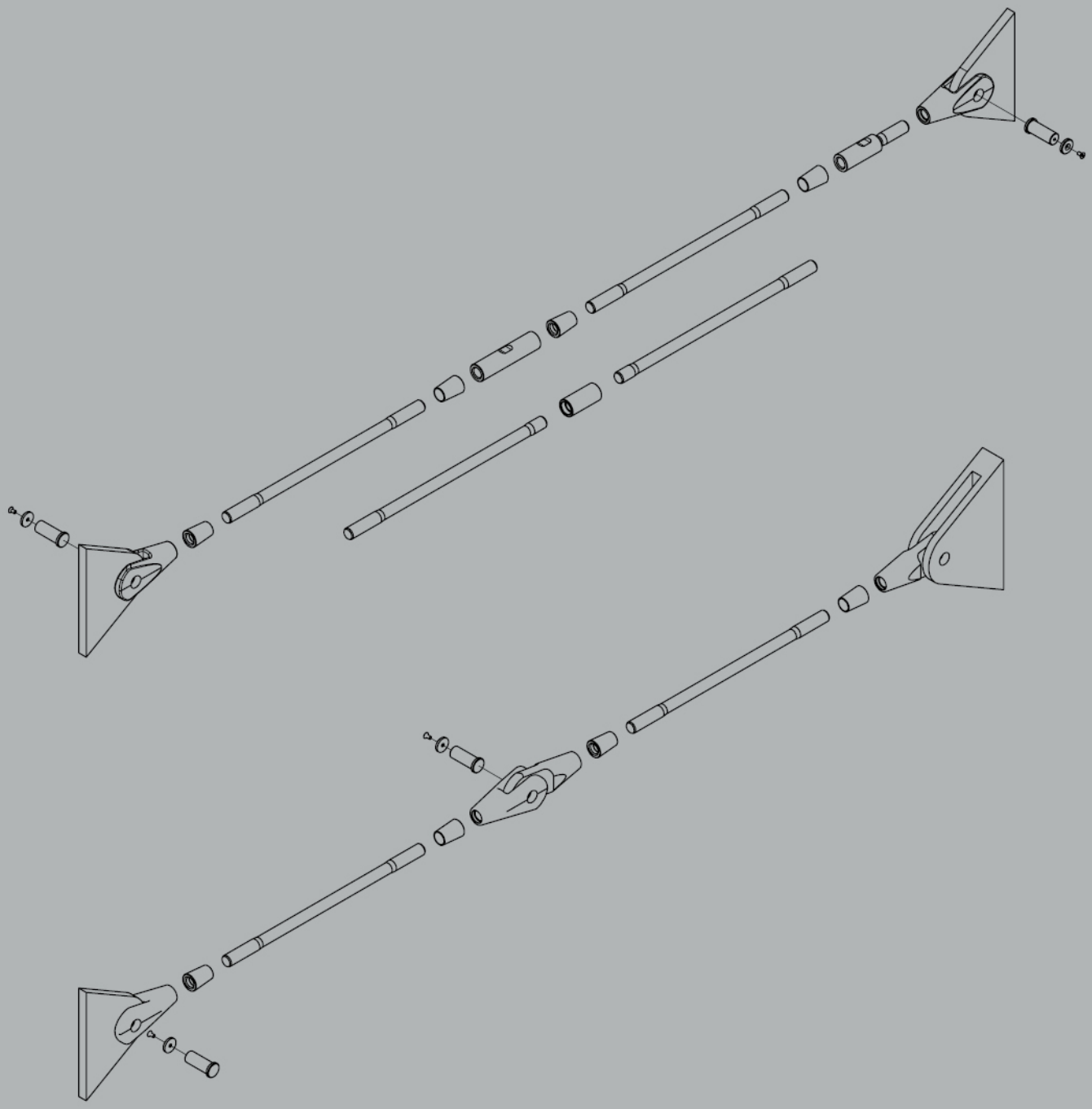

PFEIFER Tension Rod System

European Technical Assessment

ETA-18/0878

PFEIFER

Deutsches Institut für Bautechnik

DIBt

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-18/0878 of 7 June 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	PFEIFER Tension Rod System UMIX
Product family to which the construction product belongs	Prefabricated tension rod system with special end connectors
Manufacturer	Pfeifer Seil- und Hebetechnik GmbH Dr.-Karl-Lenz-Str. 66 87700 Memmingen DEUTSCHLAND
Manufacturing plants	T1 T2
This European Technical Assessment contains	20 pages including 15 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 200032-00-0602

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Specific Part

1 Technical description of the product

The construction product is a prefabricated tension rod system of different system sizes made of steel and used as a kit (see Annexes B1 and B2). The tension rod system consists of tension rods with external threads which are connected to each other and to the corresponding structure by special connecting devices. The tension rods are connected to the corresponding structure by fork end connectors with two eye loops and internal thread. The fork end connectors are connected by double shear pin connections to corresponding connecting plates or intersection plates. The tension rods can be connected to each other by couplers, connectors, intersection couplers or by a double shear pin with a spade end connection.

The tension rod system comprises tension rods, fork end connectors, pins, connecting plates, intersection plates, couplers, connectors, intersection couplers, spade end connectors and adapters with metric ISO threads M 8 to M 120.

Drawings of the tension rod system and the components as well as the essential dimensions of the components are given in the Annexes to this ETA.

Dimensions and tolerances not indicated in the Annexes shall correspond to the indications laid down in the technical documentation[1] to this European Technical Assessment.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The tension rod system is intended for the use in structures with static or quasi-static loads according to EN 1990:2002, where no verification of fatigue relating to EN 1993-1-9:2005 is necessary.

The intended use comprises for instance the suspension of roof structures or vertical glazings as well as bracings and truss structures.

The tension rod system is not subjected to systematic bending.

The fork end connectors may also be connected to compression struts. The compression struts themselves are not part of the ETA.

The performances given in Section 3 are only valid if the tension rod system is used in compliance with the specifications and conditions given the Annexes.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the tension rod system of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

[1] The technical documentation to this European Technical Assessment is deposited with Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure is handed over to the approved bodies.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Fork end connector, pin, connecting plate, intersection plate, coupler, connector, intersection coupler, spade end connector and adapter

Essential characteristic	Performance
Geometry incl. tolerances	See Annexes D1, D2, D4 to D8
Dimensions incl. tolerances	
Thread incl. tolerances	
Material	See Annex C
Load bearing capacity	See Annex A1 and A2
Resistance to corrosion	

3.1.2 Tension rod

Essential characteristic	Performance
Nominal rod diameter	See Annexes D3
Thread incl. tolerances	
Yield strength	See Annexes C
Tensile strength	
Material	
Tension resistance	See Annex A1 and A2
Compression force	
Resistance to corrosion	

3.2 Safety in case of fire (BWR 2)

Tension rod, fork end connector, pin, connecting plate, intersection plate, coupler, connector, intersection coupler, spade end connector and adapter

Essential characteristic	Performance
Reaction to fire	Class A1 according to EN 13501-1:2007+A1:2009

The components of the tension rod system satisfy the requirements for performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC (as amended).

3.3 Safety and accessibility in use (BWR 4)

Same as BWR 1.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with European Assessment Document EAD No. 200032-00-0602, the applicable European legal act is: 98/214/EC.

The system to be applied is: 2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 7 June 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Bertram

Annex A

A.1 Assumptions concerning design

The design of the tension rod system is carried out under the following conditions:

The loading is static or quasi-static according to EN 1990:2002 without need of verification of fatigue relating to EN 1993-1-9:2005.

The tension rod systems are not used, when constructions are susceptible to vibrations under wind loads or wind-induced cross vibrations of the entire construction appear.[2]

Dimensions, material properties and minimum screw-in lengths are observed. The minimum screw-in length in the Annexes D1, D2, D4, D5 and D7 corresponds to the screw-in length "ET" less the permissible adjustment length "VW". In Annex D6, the minimum screw-in length corresponds to the screw-in length "ET".

The tension rod system is not subjected to systematic bending.

The verification concept stated in EN 1990:2002 as well as the design values of resistance stated below are used for design.

The rules given in EN 1090-2:2008 and EN ISO 12944:1998 are taken into account.

Design is carried out by the designer of the structure experienced in the field of steel structures.

If connection plates other than those assessed in the ETA are used, these are calculated according to EN 1993-1-8:2005.

Design tension resistance of the entire tension rod system:

The design value $F_{t,Rd}$ of the tension resistance of the entire tension rod system (tension rod, fork end connector, pin, connecting plate, intersection plate, coupler, connector, intersection coupler, spade end connector and adapter) is the minimum value of the design tension resistance $F_{t,Rd,\ Tension\ Rod}$ of the tension rod.

The design values shall be determined according to EN 1993-1-1:2005 and EN 1993-1-8:2005 as follows:

$$F_{t,Rd,\ Tension\ Rod} = \min \{A \cdot f_{y,k}/\gamma_{M0};\ 0.9 \cdot A_S \cdot f_{u,k}/\gamma_{M2}\}$$

A = net cross section of the unthreaded part of the tension rod

A_S = of the threaded part tensile stress area of the tension rod

$f_{y,k}$ = characteristic value of the yield strength of the tension rod material according to $R_{p0,2}$ given in Annex C

$f_{u,k}$ = characteristic value of the tensile strength of the tension rod material according to R_m given in Annex C

with:

γ_{M0} = 1.0 for steel

γ_{M2} = 1.25

The values given for the partial safety factors γ_{M0} and γ_{M2} are recommended minimum values. They should be used in cases where no values are given in national regulations of the Member State where the tension rod system is used or in the respective National Annex to Eurocode 3.

[2] The national provisions of the Member State applicable for the location where the product is incorporated in the works shall be taken into account.

Design values of the compression force of tension rods

The design value of the compression force $F_{c,Rd}$ of tension rods in combination with fork end connectors according to Annex D1 is the minimum of

- the design value of the compression force of struts in the cross-section of the thread and
- the design value of the compression force of struts calculated according to EN 1993-1-1:2005.

Design value of the compression force of struts in the cross-section of the thread $F_{c,Rd}$ should be determined as follows:

$$F_{c,Rd} = \left[\frac{\gamma_{M2}}{A_S \cdot f_{u,c}} + \frac{\left(\frac{B - T_{GL}}{2} + \frac{H}{50} \right) \cdot \gamma_{M0}}{W_{pl,S} \cdot f_{y,c}} \right]^{-1}$$

Where:

A_S tensile stress area of the thread

$W_{pl,S}$ plastic section modulus of the core cross section

$f_{y,c}$ characteristic value of the yield strength of the strut, where $f_{y,c} = R_{eH}$ characteristic value of the yield strength of the strut according to product standard

$f_{u,c}$ characteristic value of the tension resistance of the strut, where $f_{u,c} = R_m$ characteristic value of the tensile strength of the strut according to product standard

The dimensions of B, T_{GL} and H are stated in Annex D1.

Recommended values for the partial safety factors γ_{M0} and γ_{M2} are:

γ_{M0} = 1.00 for steel

γ_{M2} = 1.25

The design value of the compression force of struts has to be determined according to EN 1993-1-1:2005 considering the additional bending strength in consequence of one-sided contact of the gusset plates.

In addition EN 1993-1-1:2005 applies for verification against buckling.

A.2 Assumptions concerning Installation

The installation of the tension rod system is carried out under the following conditions:

The installation is only carried out according to the manufacturer's instructions. The manufacturer hands over the assembly instructions to the assembler. From the assembly instructions it is followed that, prior to installation, all components of the tension rod system shall be checked for their perfect condition and that damaged components shall not be used.

The fork end connectors are not subjected to sudden or impact loads (for instance pins of fork end connectors may not be adjusted by hammer blows).

The minimum screw-in lengths are marked in an appropriate way. The keeping of the minimum screw-in lengths in accordance with A.1 and the Annexes D1, D2 and D4 to D7 is checked by the assembler. How to do this is described in the assembly instructions. The compliance of the screw-in lengths shall be attested with a written confirmation by a person responsible for the construction site.

All relevant components shall be checked continuously regarding corrosion damage after installation. The result of the checks should be recorded.

The conformity of the installed tension rod system with the provisions of the ETA is attested by the executing assembler.

A.3 Indications to the manufacturer

The manufacturer shall ensure that the information on the specific conditions is given to those who are concerned. This information may be given by reproduction of the European Technical Assessment. In addition all essential installation data (e.g. the minimum screw-in length in accordance with A.1 and the Annexes D1, D2 and D4 to D7) shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The prefabricated tension rod system should be packaged and delivered as a complete unit only (Tension rod, fork end connector with pin, connecting plate, intersection plate, coupler, connector, intersection coupler, spade end connector and adapter).

The fork end connectors used for the connection to compression struts may also be delivered separately.

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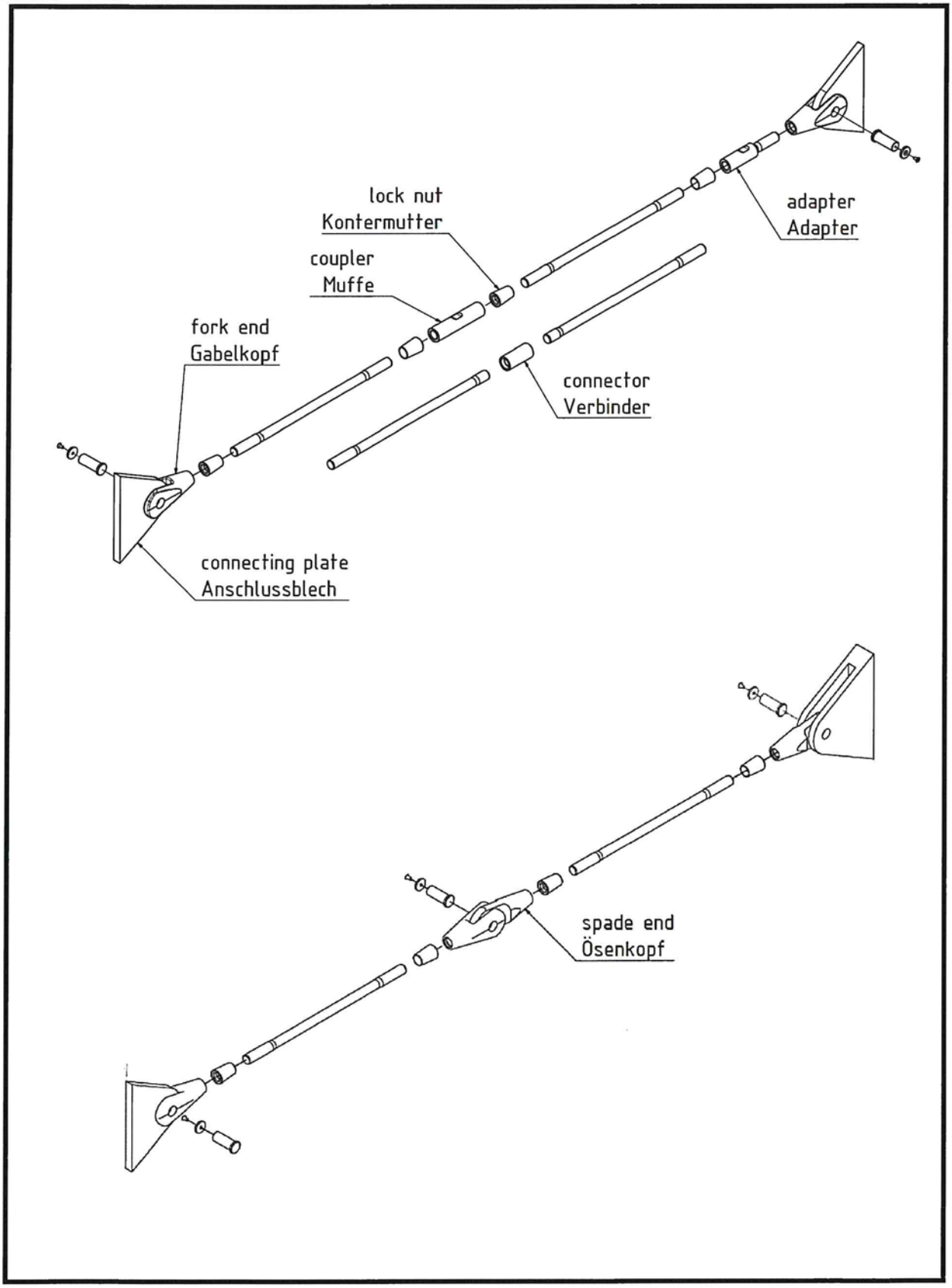

PFEIFER Tension Rod System UMIX PFEIFER Zugstabsystem UMIX	Annex B1 Anhang B1
Components, System Options Bauteile, Systemvarianten	

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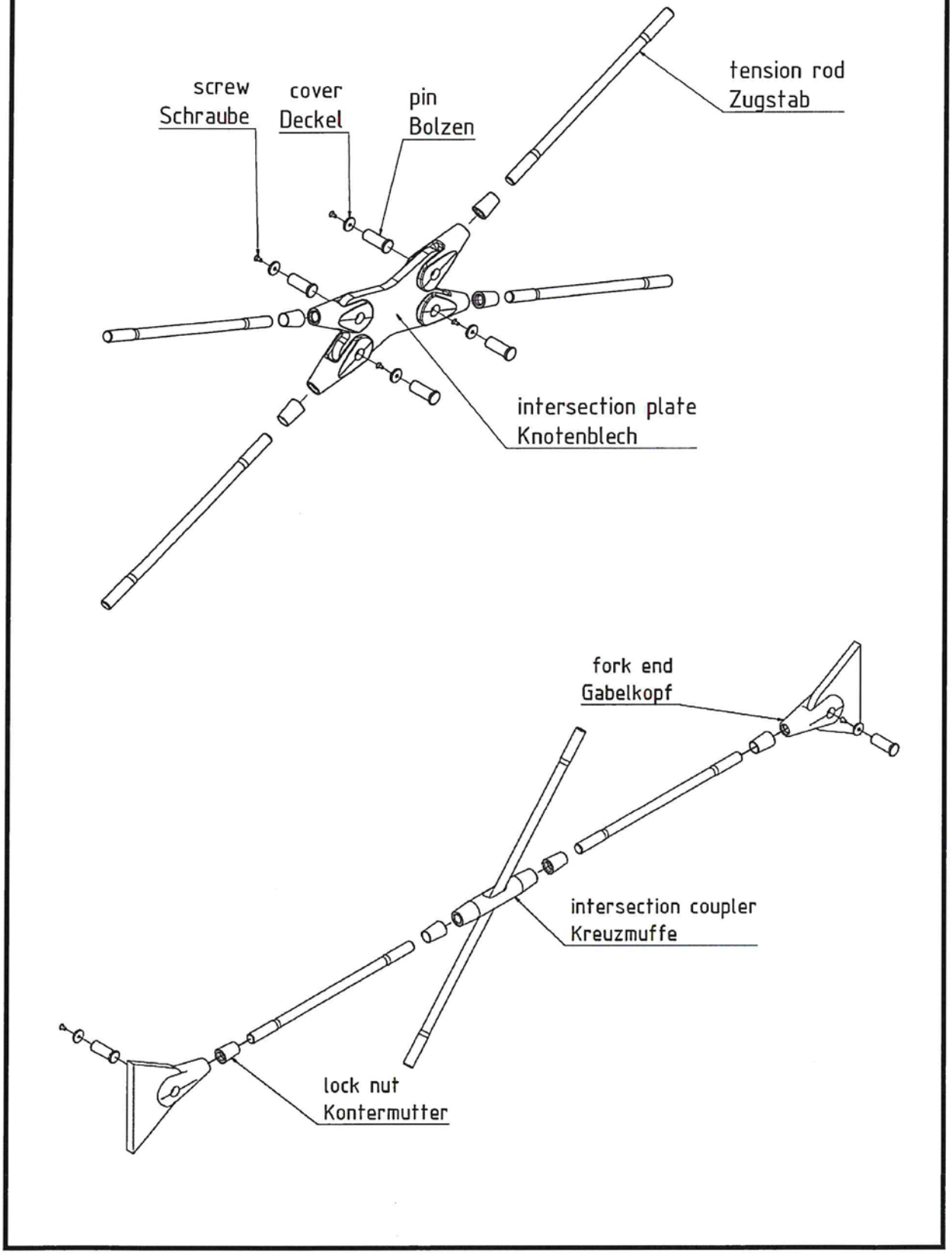

PFEIFER Tension Rod System UMIX PFEIFER Zugstabsystem UMIX	Annex B2 Anhang B2
Components, System Options Bauteile, Systemvarianten	

Steel grade, mechanical properties (minimum values)
Stahlsorten, Mechanische Eigenschaften (Mindestwerte)

Components Bauteile	Steel grade Stahlsorte		Mechanical properties (minimum values) Mechanische Eigenschaften (Mindestwerte)				
	Symbol Kurzname	Material-No. Werkstoff Nr.	Thickness Erzeugnissdicke t in mm	Yield strength Streckgrenze $R_{p0,2}$ in N/mm²	Tensile strength Zugfestigkeit R_m in N/mm²	Elongation Bruchdehnung A_5 in %	Impact strength Kerbschlagarbeit α_k in J/°C (ISO-V)
Fork end Gabelkopf	EN-GJS-400-18-LT	5.3103	according to/gemäß EN 1563:2012-03				
	S355J2	1.0577	according to/gemäß EN 10025-2:2005-04				
Pin/Bolzen	34CrNiMo6+QT	1.6582	according to/gemäß EN ISO 683-2:2018-09				27/-20
Spade End/ Ösenkopf	S355J2	1.0577	according to/gemäß EN 10025-2:2005-04				
Lock Nut/ Kontermutter	S355J2	1.0577	according to/gemäß EN 10025-2:2005-04				
Tension Rod/ Zugstab	S520*			530	710	17	27/-20
Connecting Plate/ Anschlussblech	S355J2	1.0577	according to/gemäß EN 10025-2:2005-04				
Adapter	S520*/S600*			530	710	17	27/-20
	34CrNiMo6+QT	1.6582	based on/in Anlehnung an EN ISO 683-2:2018-09			12	27/-20
Coupler/ Muffe	S520*/S600*			530	710	17	27/-20
	34CrNiMo6+QT	1.6582	based on/in Anlehnung an EN ISO 683-2:2018-09			12	27/-20
Intersection Coupler/ Kreuzmuffe	S520*/S600*			530	710	17	27/-20
	34CrNiMo6+QT	1.6582	based on/in Anlehnung an EN ISO 683-2:2018-09			12	27/-20
Connector/ Verbinder	S520*/S600*			530	710	17	27/-20
	34CrNiMo6+QT	1.6582	based on/in Anlehnung an EN ISO 683-2:2018-09			12	27/-20
Intersection Plate/ Knotenblech	S355J2	1.0577	according to/gemäß EN 10025-2:2005-04				

* based on/in Anlehnung an EN 10025-3:2005-02

PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Material / Steel grade, Mechanical Properties (minimum values)
Material / Stahlsorten, Mechanische Eigenschaften (Mindestwerte)

Annex C
Anhang C

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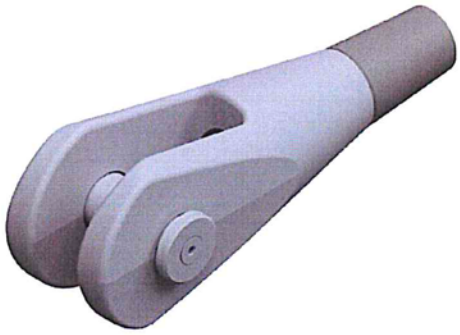
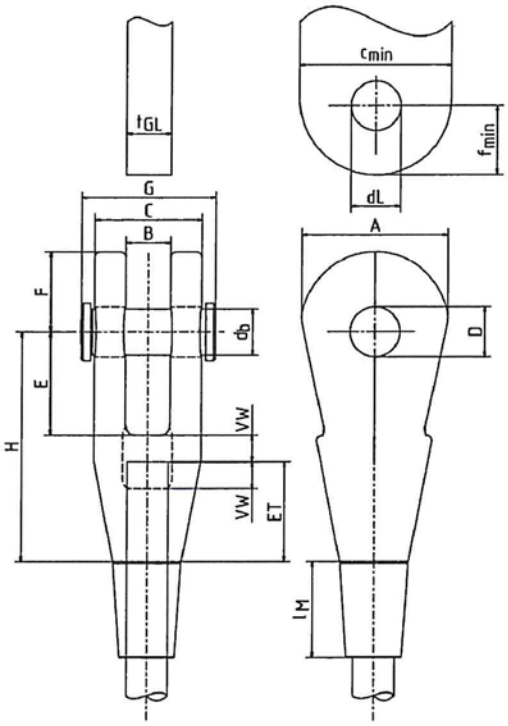




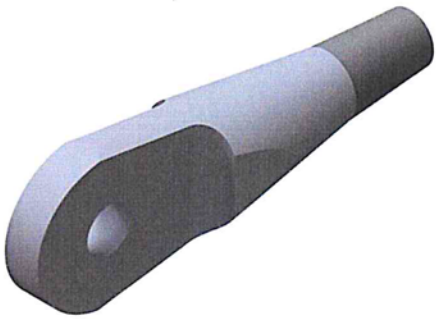
Size Größe	Fork End Gabelkopf									Pin Bolzen		Lock Nut Kontermutter	Connecting Plate Anschlussblech			
M mm	A mm	B mm	C mm	D mm	E mm	F mm	H mm	ET mm	±VW mm	dB mm	G mm	lM mm	tGL mm	fmin mm	cmin mm	dL mm
8	26,0	10,0	21,0	9,0	18,5	14,5	40,5	17,5	4,5	8,0	29,0	17,0	8,0	14,5	25,0	9,0
10	32,0	12,0	25,6	11,0	22,5	17,5	50,0	22,0	5,5	10,0	34,5	21,0	10,0	17,5	31,0	11,0
12	38,5	14,0	31,0	13,5	27,5	21,5	60,5	26,0	6,5	12,0	40,5	25,0	12,0	21,5	38,0	13,5
14	47,0	17,0	36,0	16,0	32,0	26,0	73,0	32,0	9,0	14,0	45,5	31,5	15,0	26,0	45,0	16,0
16	53,0	18,0	40,0	18,0	37,0	29,0	80,0	34,0	9,0	16,0	52,0	33,0	15,0	29,0	53,0	18,0
20	66,0	23,0	51,0	22,0	45,0	35,0	100,0	43,5	11,5	20,0	65,0	42,0	20,0	35,0	66,0	22,0
24	77,0	23,5	56,5	26,0	54,0	42,0	120,0	52,0	14,0	24,0	70,5	50,0	20,0	42,0	78,0	26,0
27	87,5	23,5	61,5	30,0	60,0	48,0	134,0	58,0	16,0	27,0	78,0	55,5	20,0	48,0	88,0	30,0
30	98,0	28,5	70,5	33,0	65,0	53,0	147,0	64,5	17,5	30,0	90,0	62,0	25,0	53,0	98,0	33,0
36	115,0	28,5	79,5	39,0	76,0	62,0	174,0	77,0	21,0	36,0	99,0	73,0	25,0	62,0	115,0	39,0
42	133,0	34,0	94,0	45,0	86,0	72,0	201,0	90,0	25,0	42,0	116,0	86,0	30,0	72,0	135,0	45,0
48	151,0	39,0	108,0	51,0	96,0	82,0	227,0	102,5	28,5	48,0	130,0	98,0	35,0	82,0	153,0	51,0
52	162,0	45,0	121,0	55,0	104,0	88,0	235,0	100,0	31,0	52,0	144,0	105,0	40,0	88,0	163,0	55,0
56	176,0	45,0	126,0	59,0	111,0	95,0	252,0	107,5	33,5	56,0	149,0	113,0	40,0	95,0	175,0	59,0
60	187,0	50,0	138,0	63,0	118,0	100,0	269,0	115,5	35,5	60,0	166,0	119,5	45,0	100,0	186,0	63,0
64	200,0	50,0	144,0	67,0	125,0	107,0	286,0	123,5	37,5	64,0	172,0	127,0	45,0	107,0	199,0	67,0
70	220,0	55,0	157,0	73,0	138,0	117,0	314,0	135,0	41,0	70,0	187,0	138,0	50,0	117,0	217,0	73,0
80	257,0	65,0	181,0	83,0	155,0	133,0	356,0	153,5	47,5	80,0	215,0	155,0	60,0	133,0	254,0	83,0
90	289,0	75,0	210,0	95,0	177,0	152,0	406,0	175,0	55,0	92,0	244,0	175,0	70,0	152,0	288,0	95,0
100	325,0	80,0	233,0	109,0	200,0	174,0	453,0	193,0	60,0	106,0	273,0	190,0	75,0	174,0	321,0	109,0
110	367,0	91,0	258,0	121,0	222,0	193,0	498,0	211,0	65,0	118,0	300,0	205,0	85,0	193,0	371,0	121,0
120	400,0	101,0	283,0	132,0	240,0	210,0	540,0	230,0	70,0	129,0	325,0	220,0	95,0	210,0	394,0	132,0

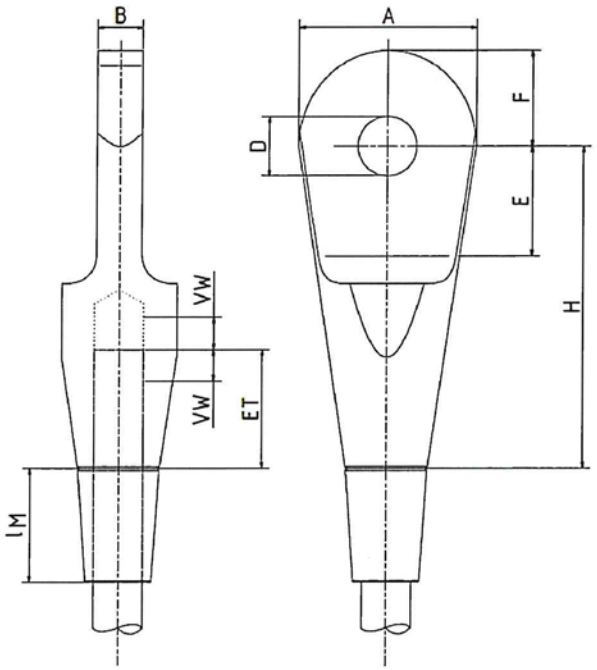
PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Fork End
Gabelkopf

Annex D1
Anhang D1

Deutsches Institut für Bautechnik DIBt





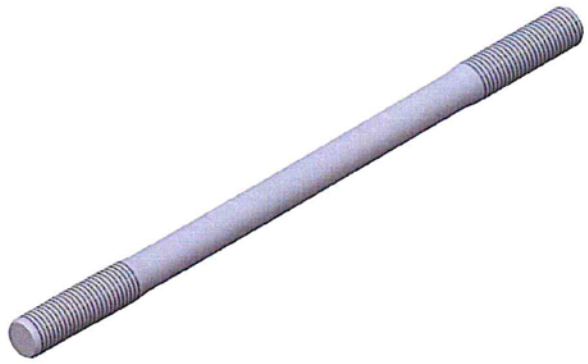
Size Größe	Spade End Ösenkopf								Lock Nut Kontermutter
M	A	B	D	E	F	H	ET	±VW	lM
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
8	25,0	8,0	9,0	16,5	14,5	47,5	17,5	4,5	17,0
10	31,0	10,0	11,0	20,5	17,5	59,0	22,0	5,5	21,0
12	38,0	12,0	13,5	24,5	21,5	70,5	26,0	6,5	25,0
14	45,0	15,0	16,0	29,0	26,0	86,0	32,0	9,0	31,5
16	53,0	15,0	18,0	33,0	29,0	93,0	34,0	9,0	33,0
20	66,0	20,0	22,0	40,0	35,0	117,0	43,5	11,5	42,0
24	78,0	20,0	26,0	48,0	42,0	141,0	52,0	14,0	50,0
27	88,0	20,0	30,0	54,0	48,0	159,0	58,0	16,0	55,5
30	98,0	25,0	33,0	59,0	53,0	173,0	64,5	17,5	62,0
36	115,0	25,0	39,0	66,0	62,0	205,0	77,0	21,0	73,0
42	135,0	30,0	45,0	78,0	72,0	240,0	90,0	25,0	86,0
48	153,0	35,0	51,0	87,0	82,0	270,0	102,5	28,5	98,0
52	163,0	40,0	55,0	94,0	88,0	283,0	100,0	31,0	105,0
56	175,0	40,0	59,0	100,0	95,0	305,0	107,5	33,5	113,0
60	186,0	45,0	63,0	106,0	100,0	320,0	115,5	35,5	119,5
64	199,0	45,0	67,0	112,0	107,0	343,0	123,5	37,5	127,0
70	217,0	50,0	73,0	124,0	117,0	375,0	135,0	41,0	138,0
80	254,0	60,0	83,0	139,0	133,0	422,0	153,5	47,5	155,0
90	288,0	70,0	95,0	158,5	152,0	481,5	175,0	55,0	175,0
100	321,0	75,0	109,0	180,0	174,0	539,0	193,0	60,0	190,0
110	371,0	85,0	121,0	200,0	193,0	584,0	211,0	65,0	205,0
120	394,0	95,0	132,0	216,0	210,0	640,0	230,0	70,0	220,0

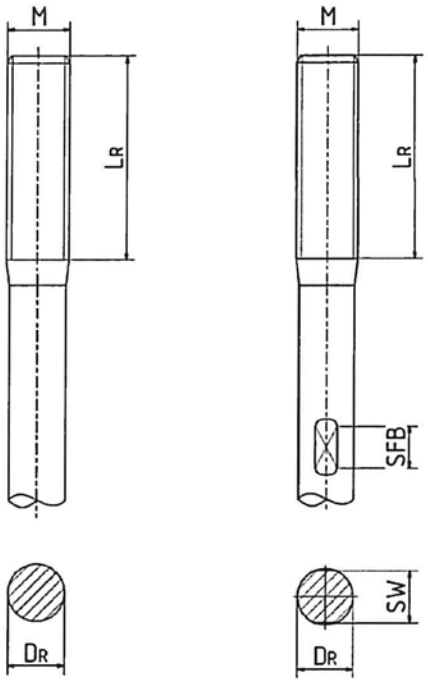
PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Spade End
Ösenkopf

Annex D2
Anhang D2

Deutsches Institut für Bautechnik DIBt





Size Größe	Tension rod Zugstab			
M mm	DR mm	LR mm	SFB mm	SW mm
8	7,0	26,0	12,0	6,3
10	9,0	32,5	12,0	8,0
12	10,5	38,5	12,0	9,5
14	12,5	48,0	12,0	11,0
16	14,5	51,0	16,0	13,0
20	18,0	65,0	16,0	16,5
24	22,0	78,0	16,0	20,0
27	25,0	87,5	16,0	23,0
30	28,0	97,0	20,0	25,0
36	33,0	116,0	20,0	30,0
42	39,0	136,0	20,0	36,0
48	45,0	155,0	20,0	41,0
52	49,0	157,0	---	---
56	52,0	169,0	---	---
60	56,0	181,0	---	---
64	60,0	193,0	---	---
70	66,0	212,0	---	---
80	76,0	241,0	---	---
90	86,0	275,0	---	---
100	96,0	303,0	---	---
110	106,0	331,0	---	---
120	116,0	360,0	---	---

PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Tension Rod
Zugstab

Annex D3
Anhang D3

Deutsches Institut für Bautechnik

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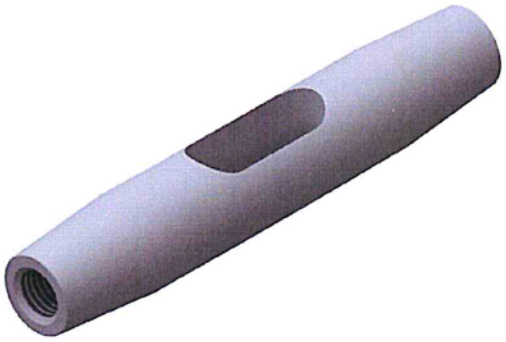

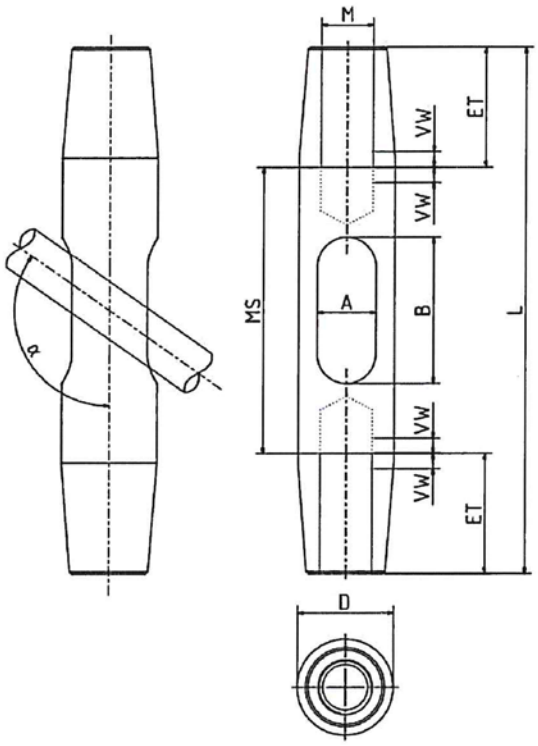

Size Größe	Intersection Coupler Kreuzmuffe							
M mm	L mm	D mm	MS mm	A mm	B mm	α °	ET mm	±VW mm
8	86,0	16,0	51,0	10,5	26,0	125,0	17,5	4,5
10	106,0	20,0	62,0	13,0	31,0	125,0	22,0	5,5
12	126,0	23,0	74,0	15,0	36,0	125,0	26,0	6,5
14	149,0	27,0	85,0	17,0	41,0	125,0	32,0	9,0
16	162,0	30,0	94,0	19,0	48,0	125,0	34,0	9,0
20	203,0	37,0	116,0	23,0	57,0	125,0	43,5	11,5
24	241,0	44,0	137,0	27,0	67,0	125,0	52,0	14,0
27	271,0	49,0	155,0	30,0	78,0	125,0	58,0	16,0
30	300,0	55,0	171,0	34,0	84,0	125,0	64,5	17,5
36	332,0	65,0	178,0	40,0	100,0	125,0	77,0	21,0
42	389,0	76,0	209,0	46,0	117,0	125,0	90,0	25,0
48	443,0	86,0	238,0	52,0	133,0	125,0	102,5	28,5
52	460,0	94,0	260,0	57,0	146,0	125,0	100,0	31,0
56	497,0	101,0	282,0	61,0	159,0	125,0	107,5	33,5
60	534,0	108,0	303,0	65,0	172,0	125,0	115,5	35,5
64	563,0	115,0	316,0	69,0	177,0	125,0	123,5	37,5
70	614,0	126,0	344,0	76,0	192,0	125,0	135,0	41,0
80	704,0	144,0	397,0	86,0	222,0	125,0	153,5	47,5
90	800,0	162,0	450,0	96,0	250,0	125,0	175,0	55,0
100	884,0	180,0	498,0	106,0	278,0	125,0	193,0	60,0
110	968,0	198,0	546,0	116,0	306,0	125,0	211,0	65,0
120	1055,0	216,0	595,0	126,0	335,0	125,0	230,0	70,0

PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Intersection Coupler
Kreuzmuffe

Annex D4
Anhang D4

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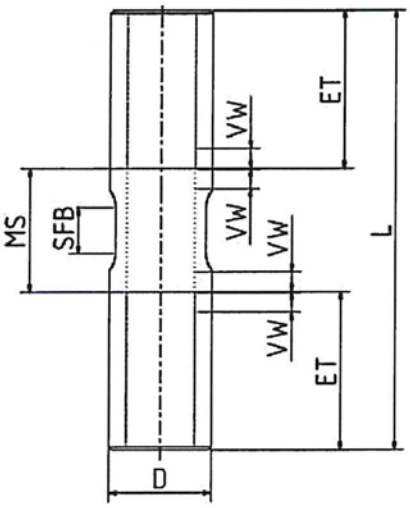

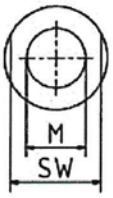

Size Größe	Coupler Muffe						
M mm	L mm	D mm	MS mm	SFB mm	SW mm	ET mm	±VW mm
8	56,0	12,0	21,0	12,0	11,0	17,5	4,5
10	68,0	15,0	24,0	12,0	13,0	22,0	5,5
12	80,0	18,0	28,0	12,0	16,0	26,0	6,5
14	92,0	21,0	28,0	12,0	19,0	32,0	9,0
16	104,0	24,0	36,0	16,0	22,0	34,0	9,0
20	129,0	30,0	42,0	16,0	27,0	43,5	11,5
24	153,0	36,0	49,0	16,0	32,0	52,0	14,0
27	171,0	40,5	55,0	16,0	36,0	58,0	16,0
30	196,0	45,0	67,0	20,0	40,0	64,5	17,5
36	232,0	54,0	78,0	20,0	49,0	77,0	21,0
42	269,0	63,0	89,0	20,0	57,0	90,0	25,0
48	306,0	72,0	101,0	20,0	65,0	102,5	28,5
52	266,0	78,0	66,0	---	---	100,0	31,0
56	288,0	84,0	73,0	---	---	107,5	33,5
60	308,0	90,0	77,0	---	---	115,5	35,5
64	327,0	96,0	80,0	---	---	123,5	37,5
70	358,0	105,0	88,0	---	---	135,0	41,0
80	408,0	120,0	101,0	---	---	153,5	47,5
90	466,0	135,0	116,0	---	---	175,0	55,0
100	512,0	150,0	126,0	---	---	193,0	60,0
110	558,0	165,0	136,0	---	---	211,0	65,0
120	606,0	180,0	146,0	---	---	230,0	70,0

PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Coupler
Muffe

Annex D5
Anhang D5

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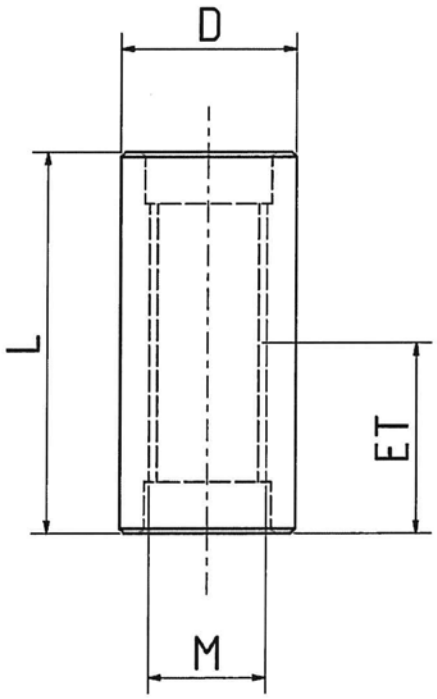


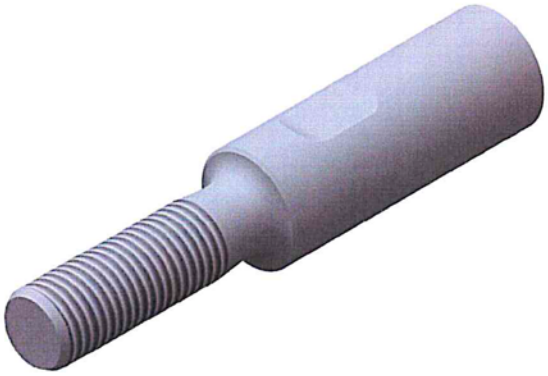
Size Größe	Connector Verbinder		
M mm	D mm	L mm	ET mm
8	12,0	28,0	14,0
10	15,0	35,0	17,5
12	18,0	41,0	20,5
14	21,0	47,0	23,5
16	24,0	52,0	26,0
20	30,0	66,0	33,0
24	36,0	78,0	39,0
27	40,5	85,0	42,5
30	42,0	97,0	48,5
36	50,0	114,0	57,0
42	59,0	132,0	66,0
48	67,0	150,0	75,0
52	73,0	159,0	79,5
56	79,0	173,0	86,5
60	84,0	183,0	91,5
64	89,0	195,0	97,5
70	98,0	210,0	105,0
80	116,0	234,0	117,0
90	130,0	258,0	129,0
100	145,0	282,0	141,0
110	160,0	306,0	153,0
120	174,0	330,0	165,0

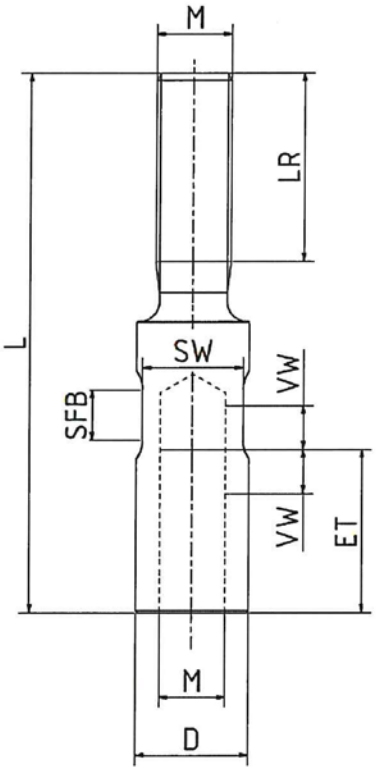
PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Connector
Verbinder

Annex D6
Anhang D6

Deutsches Institut für Bautechnik DIBt





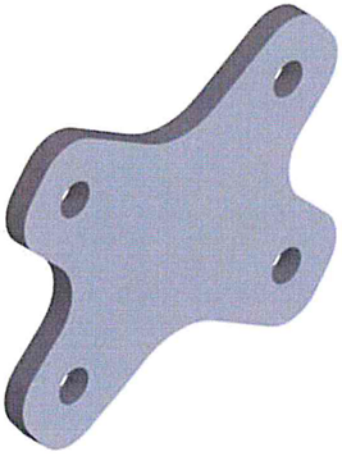
Size Größe	Adapter Adapter						
M mm	L mm	D mm	LR mm	SFB mm	SW mm	ET mm	±VW mm
8	60,0	12,0	20,0	12,0	11,0	17,5	4,5
10	74,0	15,0	25,0	12,0	13,0	22,0	5,5
12	89,0	18,0	30,0	12,0	16,0	26,0	6,5
14	107,0	21,0	37,0	12,0	19,0	32,0	9,0
16	113,5	24,0	39,0	16,0	22,0	34,0	9,0
20	144,0	30,0	50,0	16,0	27,0	43,5	11,5
24	172,0	36,0	60,0	16,0	32,0	52,0	14,0
27	191,0	40,5	68,0	16,0	36,0	58,0	16,0
30	214,0	45,0	75,0	20,0	40,0	64,5	17,5
36	242,0	54,0	90,0	20,0	49,0	77,0	21,0
42	283,0	63,0	106,0	20,0	57,0	90,0	25,0
48	322,0	72,0	121,0	20,0	65,0	102,5	28,5
52	336,0	78,0	131,0	---	---	100,0	31,0
56	362,0	84,0	141,0	---	---	107,5	33,5
60	380,0	90,0	151,0	---	---	115,5	35,5
64	412,0	96,0	161,0	---	---	123,5	37,5
70	459,0	105,0	176,0	---	---	135,0	41,0
80	520,0	120,0	201,0	---	---	153,5	47,5
90	586,0	135,0	230,0	---	---	175,0	55,0
100	643,0	150,0	253,0	---	---	193,0	60,0
110	691,0	165,0	276,0	---	---	211,0	65,0
120	750,0	180,0	300,0	---	---	230,0	70,0

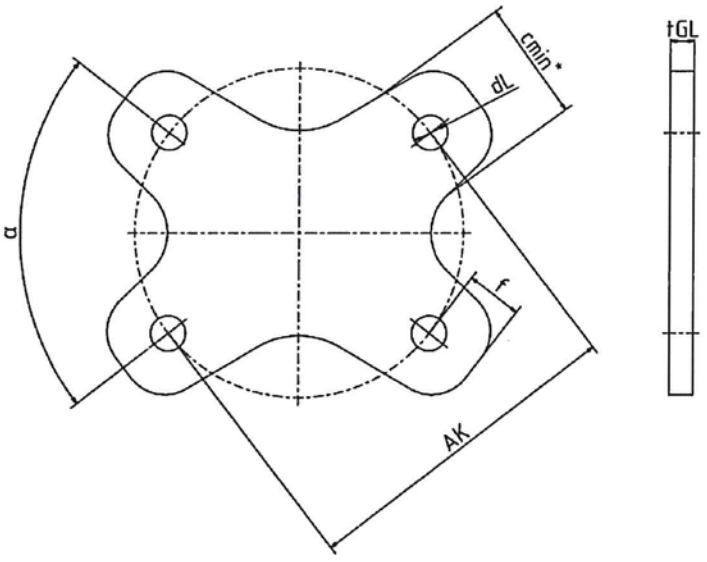
PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Adapter
Adapter

Annex D7
Anhang D7

Deutsches Institut für Bautechnik DIBt





cmin* ≥ cmin connecting plate of fork end (Annex D1)

cmin* ≥ cmin Anschlussblech von Gabelkopf (Anhang D1)

Size Größe	Intersection Plate Knotenblech				
M mm	tGL mm	dL mm	f mm	AK mm	Anwendungsbereich / application range α °
8	8,0	9,0	14,5	83,0	40-90
10	10,0	11,0	17,5	103,0	40-90
12	12,0	13,5	21,5	125,0	40-90
14	15,0	16,0	26,0	148,0	40-90
16	15,0	18,0	29,0	165,0	40-90
20	20,0	22,0	35,0	205,0	40-90
24	20,0	26,0	42,0	245,0	40-90
27	20,0	30,0	48,0	270,0	40-90
30	25,0	33,0	53,0	309,0	40-90
36	25,0	39,0	62,0	356,0	40-90
42	30,0	45,0	72,0	410,0	40-90
48	35,0	51,0	82,0	475,0	40-90
52	40,0	55,0	88,0	509,0	40-90
56	40,0	59,0	95,0	551,0	40-90
60	45,0	63,0	100,0	585,0	40-90
64	45,0	67,0	107,0	626,0	40-90
70	50,0	73,0	117,0	683,0	40-90
80	60,0	83,0	133,0	784,0	40-90
90	70,0	95,0	152,0	885,0	40-90
100	75,0	109,0	174,0	971,0	40-90
110	85,0	121,0	193,0	1080,0	40-90
120	95,0	132,0	210,0	1180,0	40-90

PFEIFER Tension Rod System UMIX
PFEIFER Zugstabsystem UMIX

Intersection Plate
Knotenblech

Annex D8
Anhang D8

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Size Größe	Design tension resistance $F_{t,Rd}$ Bemessungswert der Zugbeanspruchbarkeit $F_{t,Rd}$
M mm	kN
8	19
10	30
12	43
14	59
16	80
20	125
24	180
27	235
30	286
36	417
42	573
48	753
52	898
56	1037
60	1207
64	1367
70	1663
80	2220
90	2857
100	3574
110	4371
120	5249

Design values calculated as examples according to Annex A1 using the following calculation formulas and partial safety factors:

$$F_{t,Rd} = F_{t.Rd,Tension\ Rod} = \min \{ A \cdot f_{y,k}/\gamma_{M0} ; 0.9 \cdot A_S \cdot f_{u,k}/\gamma_{M2} \}$$

$\gamma_{M0} = 1.0$ for steel
$\gamma_{M2} = 1.25$

The values given for the partial safety factors γ_{M0} and γ_{M2} are recommended minimum values. They should be used in cases where no values are given in national regulations of the Member State where the tension rod system is used or in the respective National Annex to Eurocode 3.

PFEIFER Tension Rod System UMIX PFEIFER Zugstabsystem UMIX	Annex E Anhang E
Design tension resistance Bemessungswert der Zugbeanspruchbarkeit	

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