



PFEIFER

The Art of Simplicity
Building with Tension Members

The Defiance of Gravity Pioneer: Pfeifer

It all started with the construction of the Olympic Stadium in Munich – suddenly tension members opened completely new architectural horizons and ways of construction. We have been involved in this development from the very beginning with cable systems for the first large cable structure of modern times. Today, around 50 years later, our sophisticated engineering know-how and our tension member products are part of over 50 stadium roofs and over 1,000 bridges worldwide.

Milestones of Pfeifer history 

Based on our extensive experience, we offer a comprehensive range of products and services. We can promise that together with our customers and partners, we always find efficient solutions for any challenges. These solutions are the measurement of our commitment and expertise. What is on your mind? We look forward to your inquiry!

Service and contact 
tensionmembers@pfeifer.de



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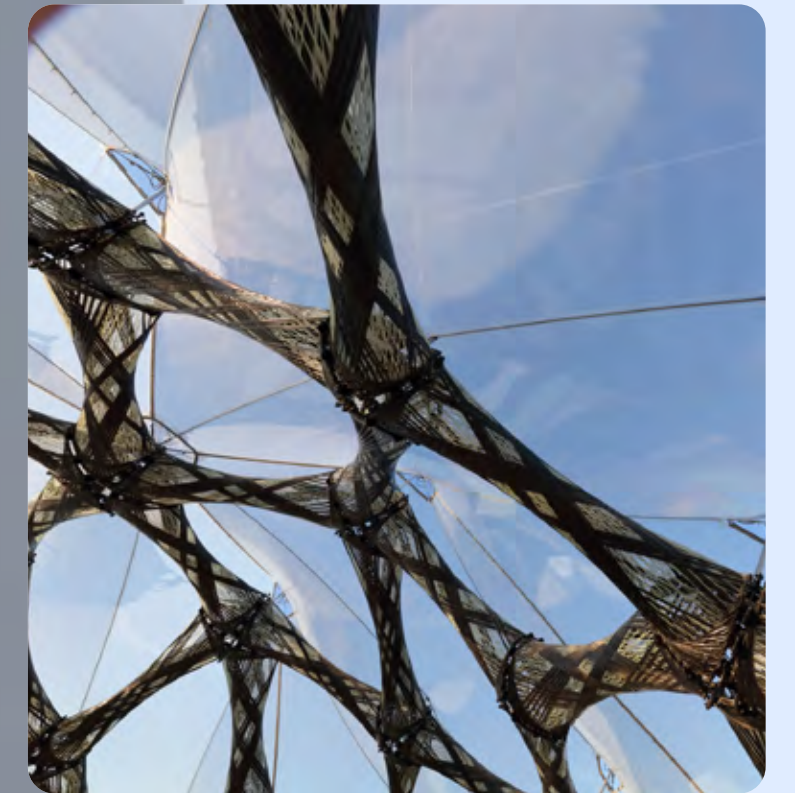
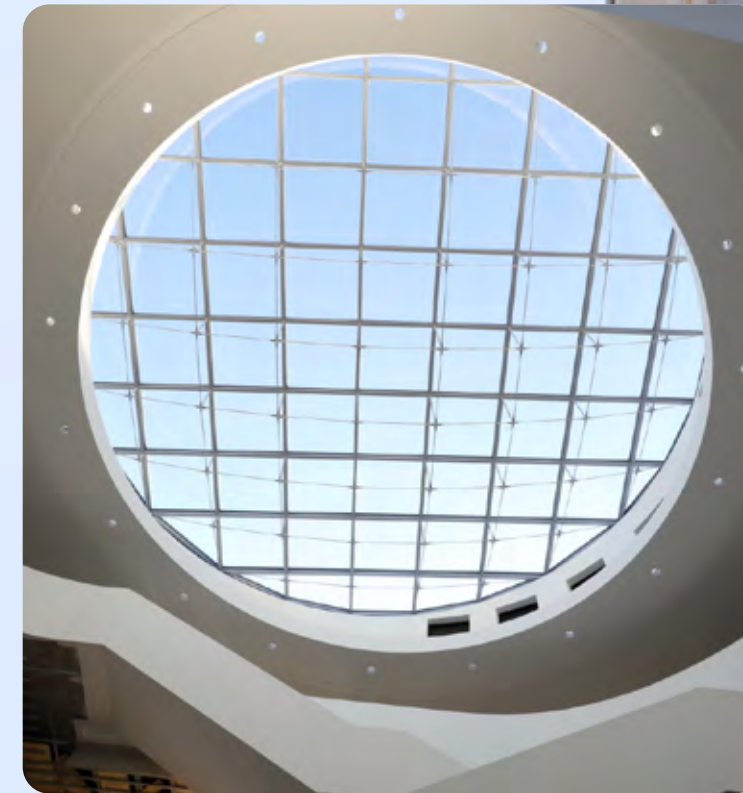


Less is More

Aesthetics Meets Economy




Lightweight stadium roofs, wide-span bridges or modern glass facades: structures with tension members are very minimalistic and have their own unique aesthetics. At the same time their economic advantages are very convincing as well as low material consumption, short construction times and long service life.

Building with tension members requires special skills and a lot of experience. At Pfeifer we have both – acquired in numerous successfully completed projects all over the world. We are happy to share our knowledge with you.





PFEIFER COMPLETE PACKAGE

- **Extensive tension member product portfolio**
Steel wire ropes, rods and accessories for various application 
- **UMIX – the modular system**
Cables and tension rods combined in one system – for maximum flexibility in a project design phase 
- **The innovative system: LOADSCAN®**
The unique smart solution for simple and precise measurement of forces in the pin using ultrasonic technology 

TECHNICAL ADVANTAGES

- Superior corrosion protection 
- Fire protection 
- European approvals

System Diversity Pfeifer Product Portfolio

From new buildings to the renovation of old buildings and the refurbishment of existing structures: Tension rod and cable systems are used in many applications. Our extensive product range offers an aesthetic and economical solution for every purpose and load case.

All Pfeifer product systems fulfill the highest currently valid requirements and are certified with the corresponding approvals in Germany and Europe. Our innovative modular system UMIK and LOADSCAN® tension monitoring pins complete the product range as a comprehensive overall package.

Pfeifer Product Portfolio 

Focus: Creating Values

Quality Made by Pfeifer

Tension members carry significant loads. They contribute to the safety of the entire construction. That means, that the quality of our products is the top priority for us. Development, production and testing require a special know-how and particular care. That's why we prefer to take care of this ourselves.

Throughout more than 400 years of business activity, we have developed our own specialized knowledge. All of Pfeifer production facilities from our headquarters in Memmingen (Germany) to other fabrication plants established a unique in-house production and testing capacity to ensure the excellence of our products.

Pfeifer – Quality Worldwide

Engineered quality: *Development and selection of our system components is performed exclusively by our most experienced engineers. They are responsible for choosing all parts and materials carefully and to ensure the quality required for Pfeifer products. Quality control of Pfeifer products continues through packing, transportation and installation on construction site, which is one of our most important tasks. The seal of quality: "Made by Pfeifer" is valid for our standard products portfolio as well as for ambitious custom solutions that we develop for individual project needs.*

Partnership at Equal Level

The Pfeifer Services

Special requirements demand special expertise and very special services. That is what you get at Pfeifer: an experienced and reliable partner. We offer a unique service and support for all questions about the application of tension members and help you in finding individual solutions for your special challenges.

Architects, engineers and contractors are confronted with safety-relevant and economic challenges daily. Pfeifer helps you to make the right decisions. Our engineers are aware of specific market conditions and they are prepared to meet all challenges of your project.

We emphasize a long-term partnership, as this is the foundation for a successful cooperation. A sound teamwork with all partners is the basis of finding the best possible solution to all project challenges. This cooperation usually remains after the completion of a project.

Our services for design assistance usually include
Consultation on constructive challenges, finding a workable solution together

Support during tender phase and preparation of specification

Our services for contractors include
the complete service and support from the first inquiry to maintenance

tensionmembers@pfeifer.de



The Aesthetics of Weightlessness

Tension Members in Operation

Full locked cable (PV)
with open spelter socket
connection with mast
gusset plate

Open spiral strand
cables with
connection of
hangers with suspension
cable via hanger
clamps

Open spiral strand
cables with
connection of
hangers with gusset
plates

Full locked cable (PV)
with adjustable open
spelter socket
connection to footing
anchor steel plate

Full locked cable (PV)
with adjustable open
spelter socket
type 710

Simply Unique UMIX System

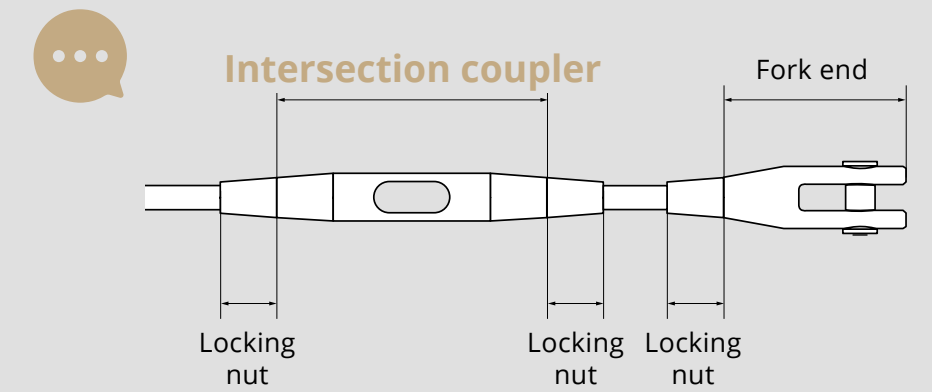
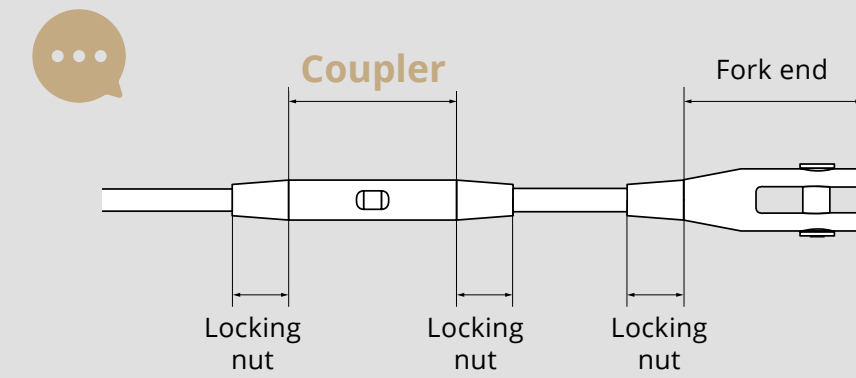
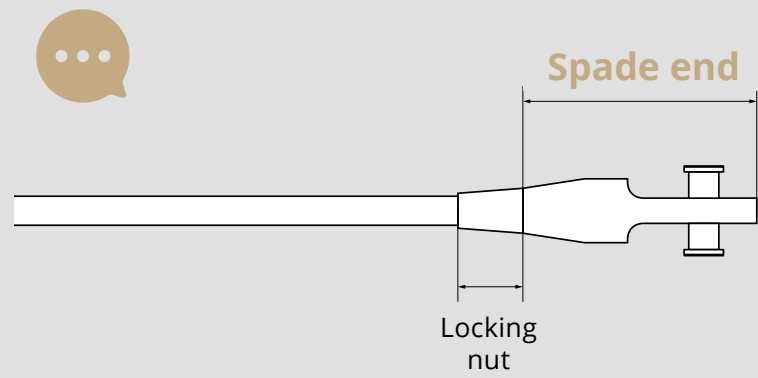
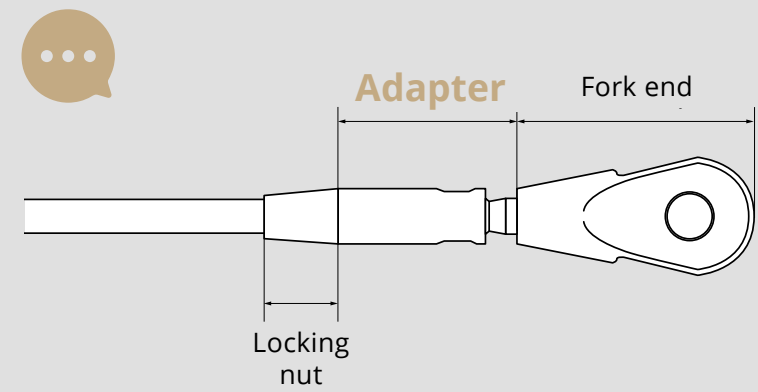
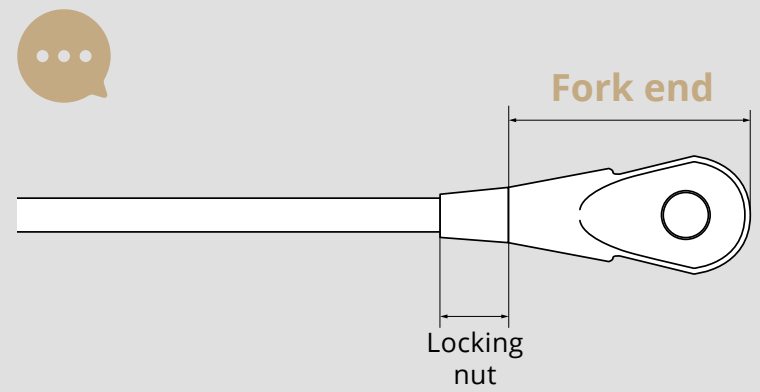
The Pfeifer UMIX-System: Tension rod system and cable members system united in one comprehensive and interchangeable arrangement. Everything fits together: Tension rods or open spiral strand cables, fork or spade ends, couplers – all UMIX components are compatible within the same system size. This gives you maximum flexibility in your design work.

Overview
UMIX System
Advantages 

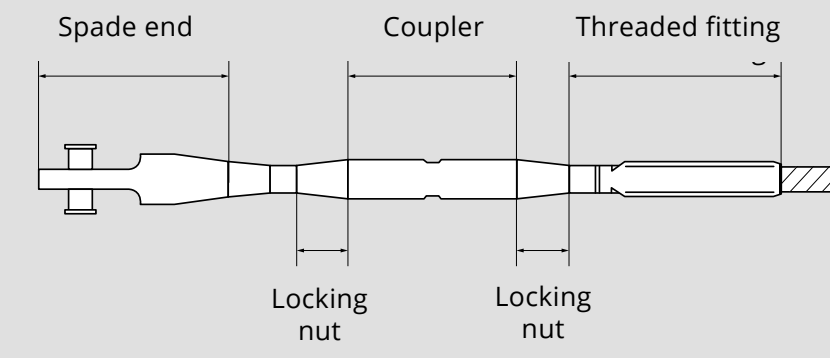
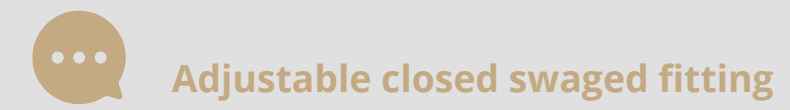
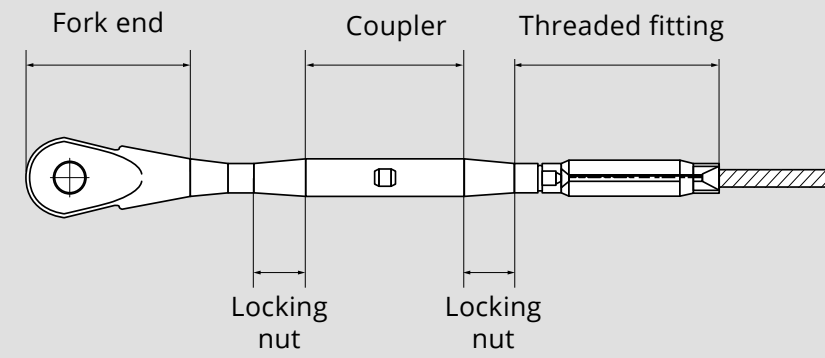
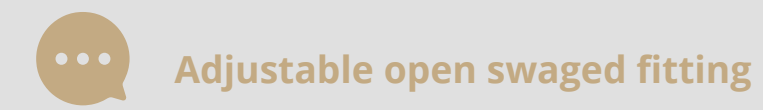
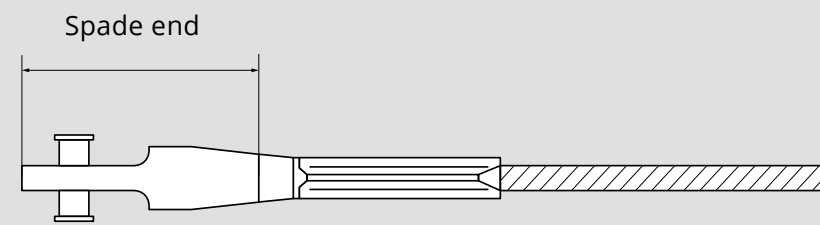
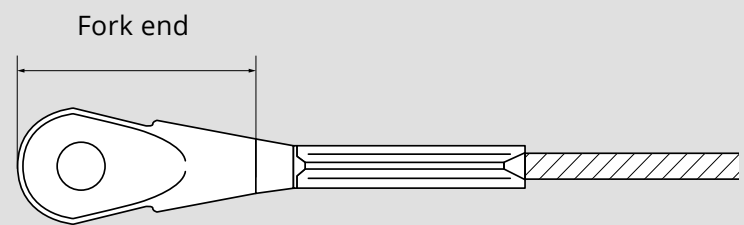


UMIX Components At a Glance

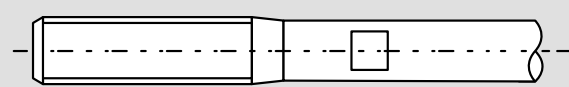
Tension Rod System



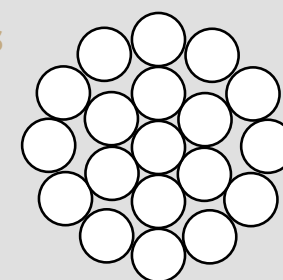
Cable System



Tension Rod



Open Spiral Strand Cables



Measuring the Forces

The LOADSCAN® Technology

Pfeifer's innovative LOADSCAN® technology allows for simple and precise load monitoring of any tension members. The method achieves a measurement accuracy of $\pm 2\%$ of the actual service load, and provides increased safety during the entire life cycle of construction.

Measurements are produced from integrated sensors in the connection components. The **pin** is calibrated against a known load cell. The **calibration curve** is stored in the memory of integrated chip.

The LOADSCAN® system allows **temporary load monitoring** at a specific point in time as well as a **permanent load monitoring** over the entire lifetime of a construction.

THE ADVANTAGES OF LOADSCAN® TECHNOLOGY

- Robust, durable system – without invasive work on the structure
- Quick setup for fast results – shortening of maintenance and inspection work
- Recording of dynamic loads – simplifies the inspection e.g. after earthquakes or accidents
- Permanent monitoring – enables a better understanding of the structure and provides info for conclusions, e.g. for maintenance work

LOADSCAN® in action

Protected at the Core

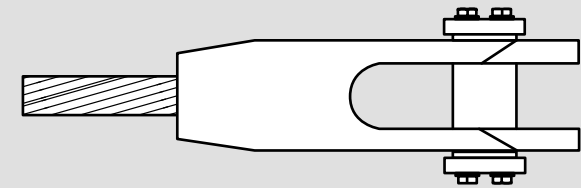
Full Locked Cables (PV)

Other than open spiral strand cables and tension rods, the tension member portfolio also includes full locked cables, as well as appropriate suitable connectors and end connections. The full locked cables with their larger nominal rope diameters, associated with their higher tensile force capacity are often used as suspension and stay cables in bridge construction.

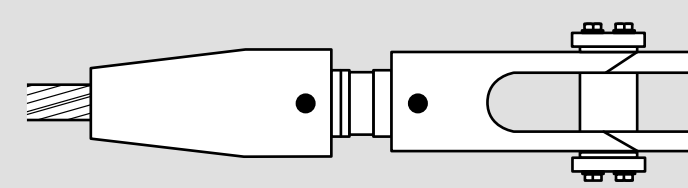
Overview of Applications and Advantages of Full Locked Cables

PV Components At a Glance

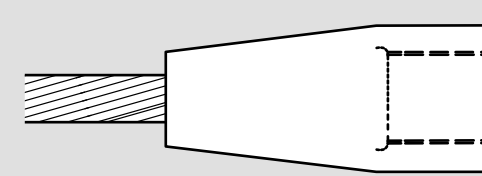
Open spelter socket
type 700



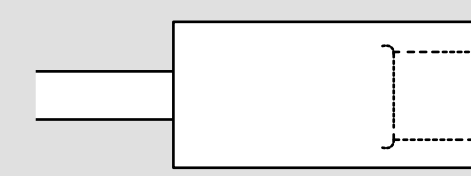
Adjustable open spelter socket
type 710



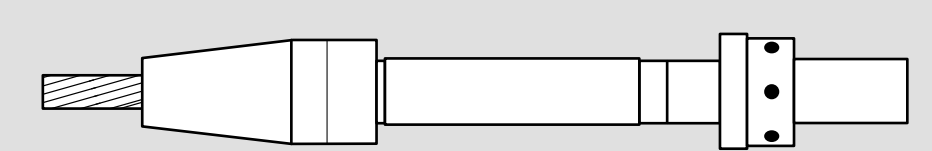
Conical socket with internal thread
type 800



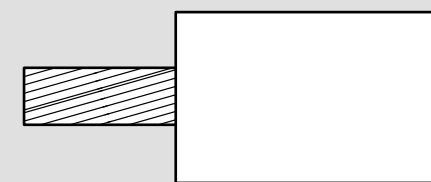
Cylindrical socket with internal
thread type 801



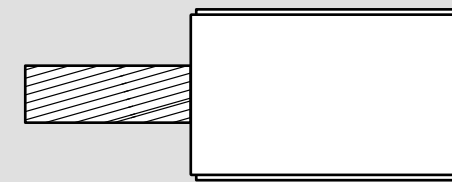
Spherical anchor
type 850



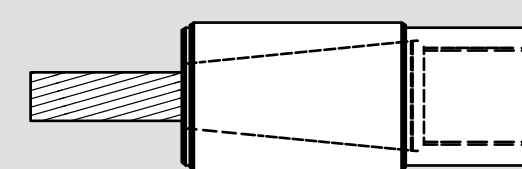
Cylindrical socket
type 811



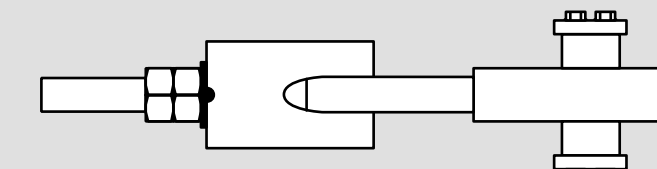
Cylindrical socket with external
thread type 812



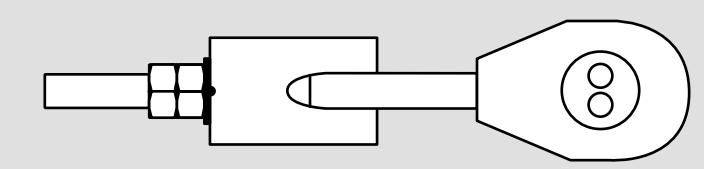
Cylindrical fitting with internal
and external thread type 810



Closed bridge socket
type 803



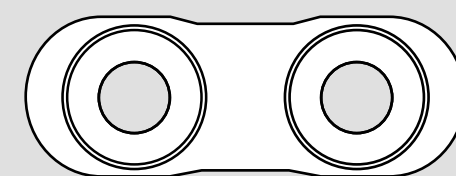
Open bridge socket
type 804



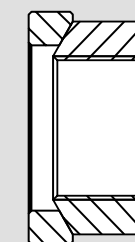
Threaded rod
type 840



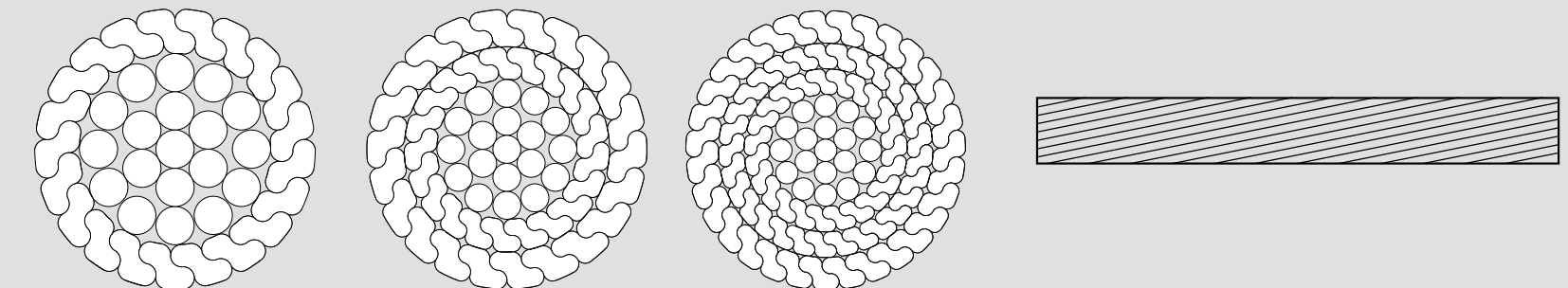
Connecting plate
type 742



Spherical nut and disk
type 813/814



Full locked cable (PV)



Further Thoughts Everything about Cables

Finding the best cable for any application – it is easy with Pfeifer's help. However, our service is much more than fabrication of cables. Pfeifer also offers solutions for packaging and transport, custom designed details, erection engineering, even the supply of specialized equipment required for cable installation and pre-tensioning. All of that is based on our outstanding know-how from over 400 years of experience.

- High quality of fully tested cables
- Customized connection points
- Pfeifer tensioning equipment
- Warehouse availability and short lead time
- Packing and transport



Everything at a Glance

Services for Building Contractors

In addition to providing outstanding products to our customer, we are also a reliable partner in offering the outstanding service. Pfeifer engineers will support you through all stages of the project – from early design stages, through tender documents preparation to erection and the maintenance. Our focus is always the best solution, and not the first that comes to mind.



Tender



Offer



Awarding



Inquiries



*Design
Workshop*



Delivery



*Installation
Support*



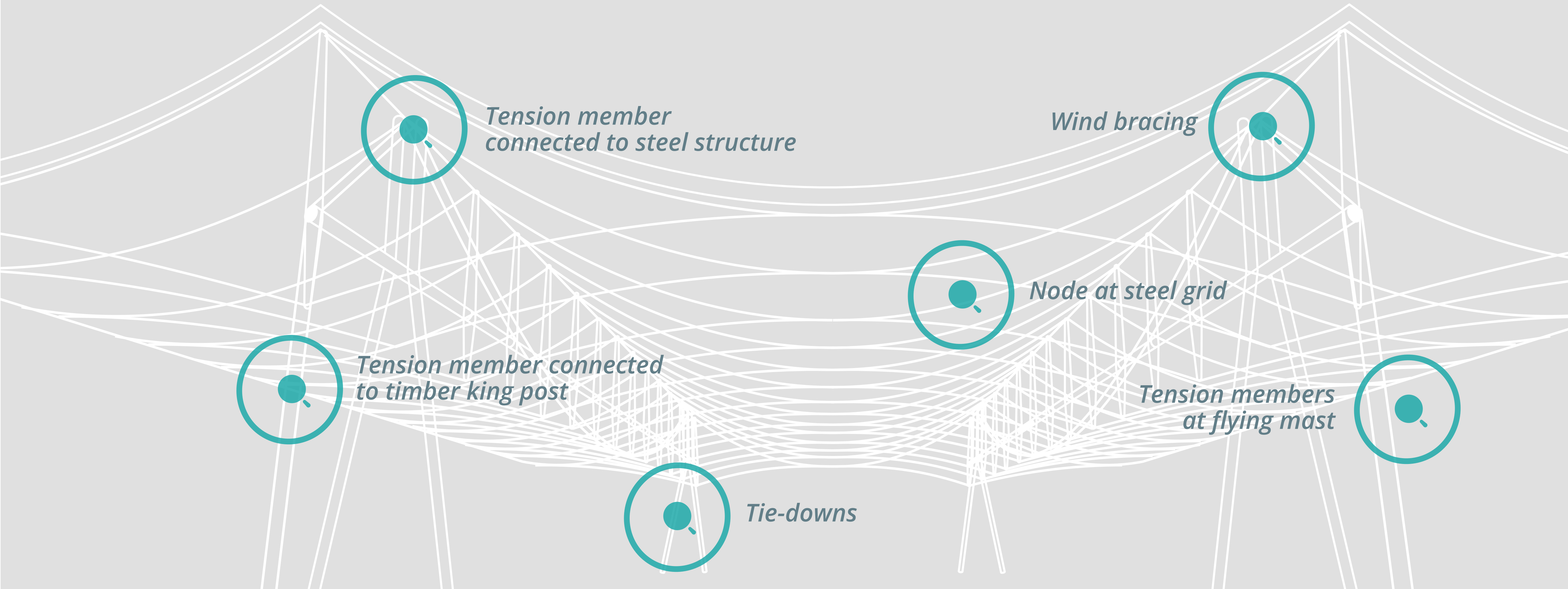
Inspection

Well Advised Services for Engineers, Architects and Designers



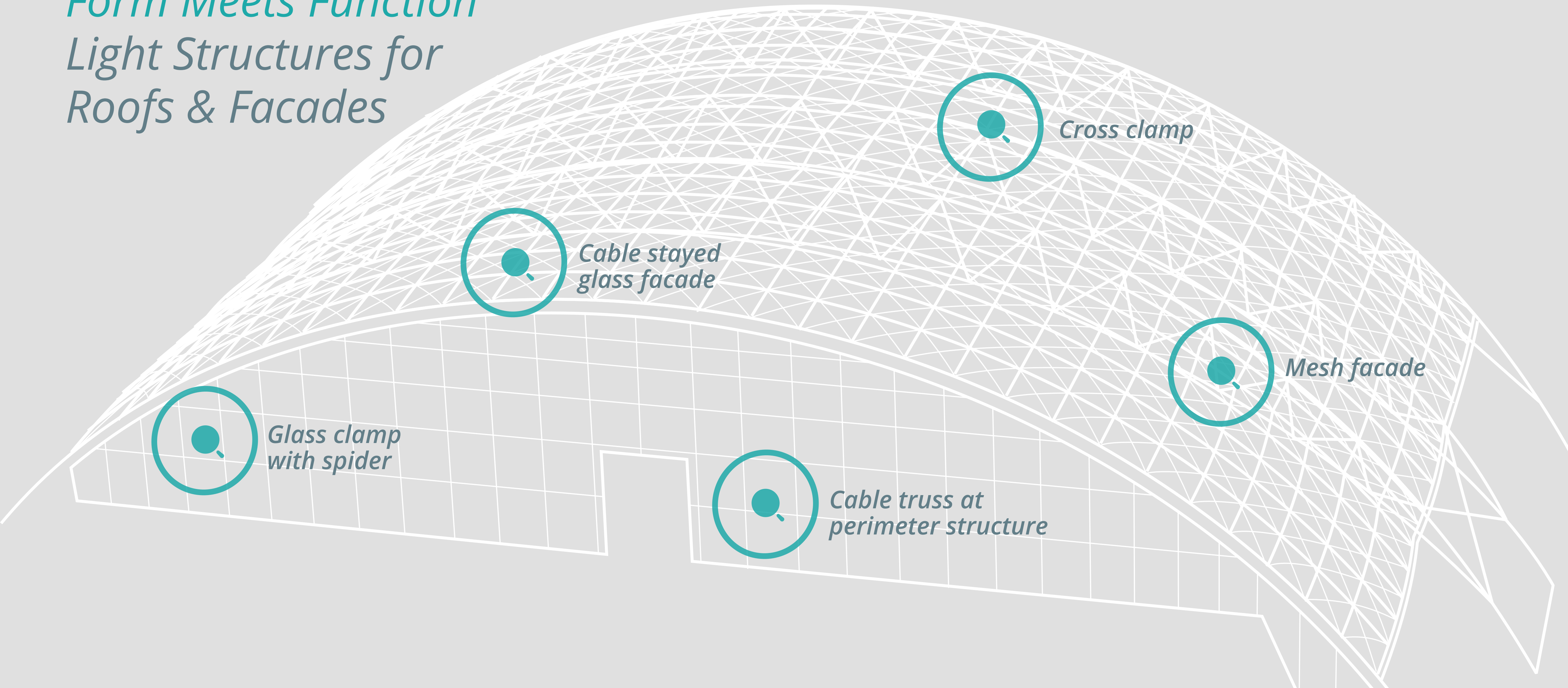
*Your creativity is our inspiration and our criteria.
You provide the ideas, we advise you on the implementation.
Our engineers understand your requirements and they
will select the right products and solutions for your design.
This is taking into account the required standards and codes,
and all within a realistic cost estimate.*

Closely Connected Typical Connections



Form Meets Function

Light Structures for Roofs & Facades



Selection Guide:

Step by Step to the Right Tension Member

All parts of the Pfeifer tension member system fit together. This makes the design process particularly flexible. With our selection guide, you can easily find the right components one step after another. Our engineers are available at every step, to support you and to find the best solution.

Step 1: Limit Tension

Check, whether the required limit tension force is met by appropriate UMIX or PV system.

Step 2: Size of Connection

Based on the system size, the dimensions for connection plates can be correctly selected and then manufactured.

Step 3: Tension Element Member and Material (not for PV Series)

Select the tension member and material according to the following criteria:

- **Stiffness:** Note the different modulus of elasticity of open spiral strand cables, full locked cables and rods
- **System length:** There is a minimum length for cables; rods are only useful up to a certain length due to handling and transportation
- **Corrosion protection:** Some environmental conditions (chlorine, salt water) require usage of stainless steel
- **Aesthetics:** Stainless steel allows a high-quality surface appearance
- **Geometric requirements:** consideration between cables and rods

Step 4: Adjustment Options

Define the required length adjustment options.

Step 5: Inquiry or Order

Now you know all the system specifications to inquire about tension members or to order it directly.

Questions & Contact: 
tensionmembers@pfeifer.de



Precisely Fitted Design Aid for Tensile Members

Pfeifer tension members are recognized worldwide for their high quality and easy handling. Pfeifer does not only produce to the highest standards, but also also delivers its products that fit perfectly into the structure, so that they can be installed quick and easily. Precisely pre-stretched. Precisely made to length. And optionally provided with fire protection. Please check whether Pfeifer products meet country-specific and project-specific requirements and specifications.





Contact us under:
tensionmembers@pfeifer.de 

Pre-Stretching

Every cable has to be pre-stretched, in order to measure the actual elastic elongation behavior, among other characteristics. During this multiple loading and unloading process, the individual wires of the cable bundle are re-aligned relative to each other in such a way that the ratio of applied load to cable elastic elongation becomes a linear function.




Cutting to Length

Accurate cutting to length requires that specific elongation properties are measured. In addition other important criteria need to be considered:

- The ratio of fabrication temperature  and design temperature
- Setting the poured cone  in a socket after cooling and during the initial loading
- Additional cable elongation  when applying clamps
- Cable creep 

Fire Protection

In most cases, a need for a fire protection system on any tension member should be considered with reference to the needs of the overall structure and the location of potential source of fire or elevated temperature. In case of doubt, final decisions on fire protection are subject to a fire model produced by an expert consultant. If any fire protection is required, the following points should be considered:

- Critical temperatures of the cable and its components 
- Minimum cable diameter 
- Aspects of building regulations 

Corrosion Protection

Some end fittings (swaged areas and inner threads) need an additional organic coating after assembly, in order to achieve permanent corrosion resistance.

Pre-Stressing of Tension Members

- Tension rods are normally not prestressed and are manufactured without spanner flats. Tightening by hand is normally sufficient.
- Cables are usually pre-tensioned during the initial installation, often with hydraulic devices. If any adjustment is required after initial installation, the threaded parts of any sockets have to be relieved of any loads.

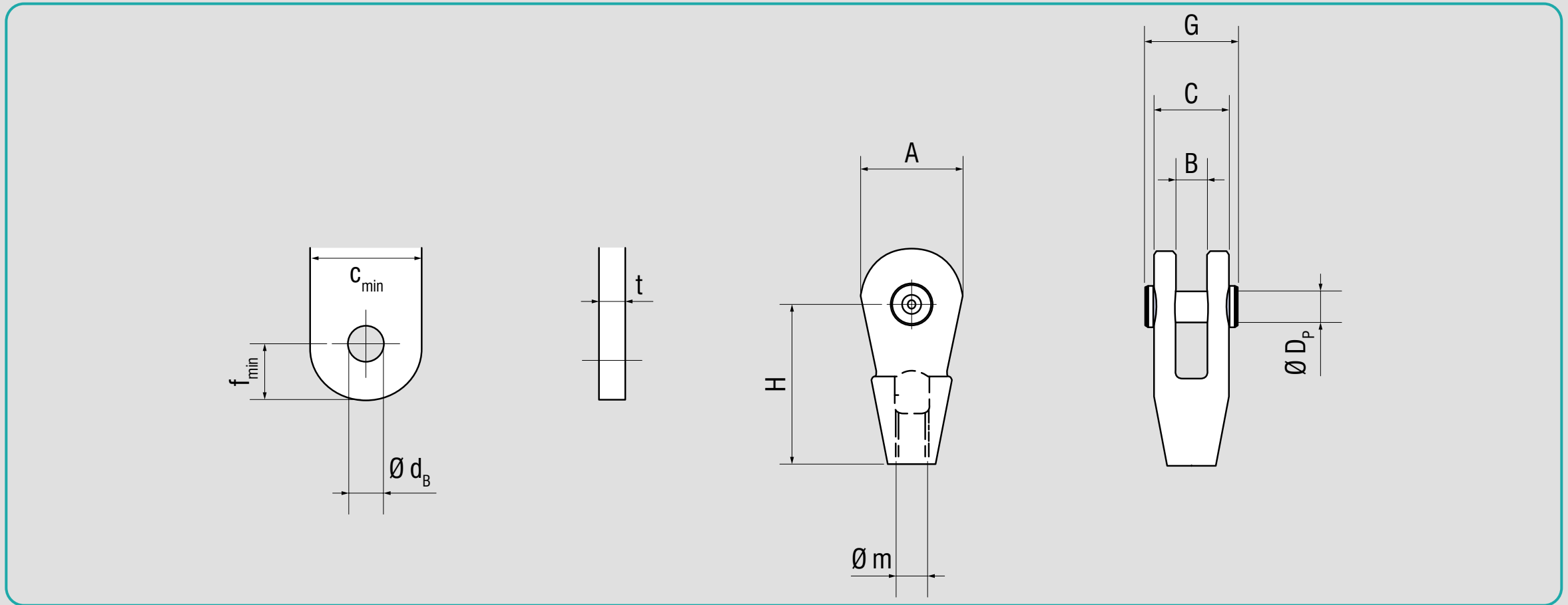


Datasheets

Fork End

Galvanized Systems:

Fatigue strength characteristics: $N = 2\,000\,000$ load cycles;
 $F_0 = 45\%$ ZBK (ZBK = characteristic breaking load of the tension rod systems);
 $\Delta\sigma = 105\text{ N/mm}^2$ (detail category of tension rod systems);
 exposure classes 1 to 4 according to DIN EN 1993-1-11
 (outdoor use, only axial stress, no bending))

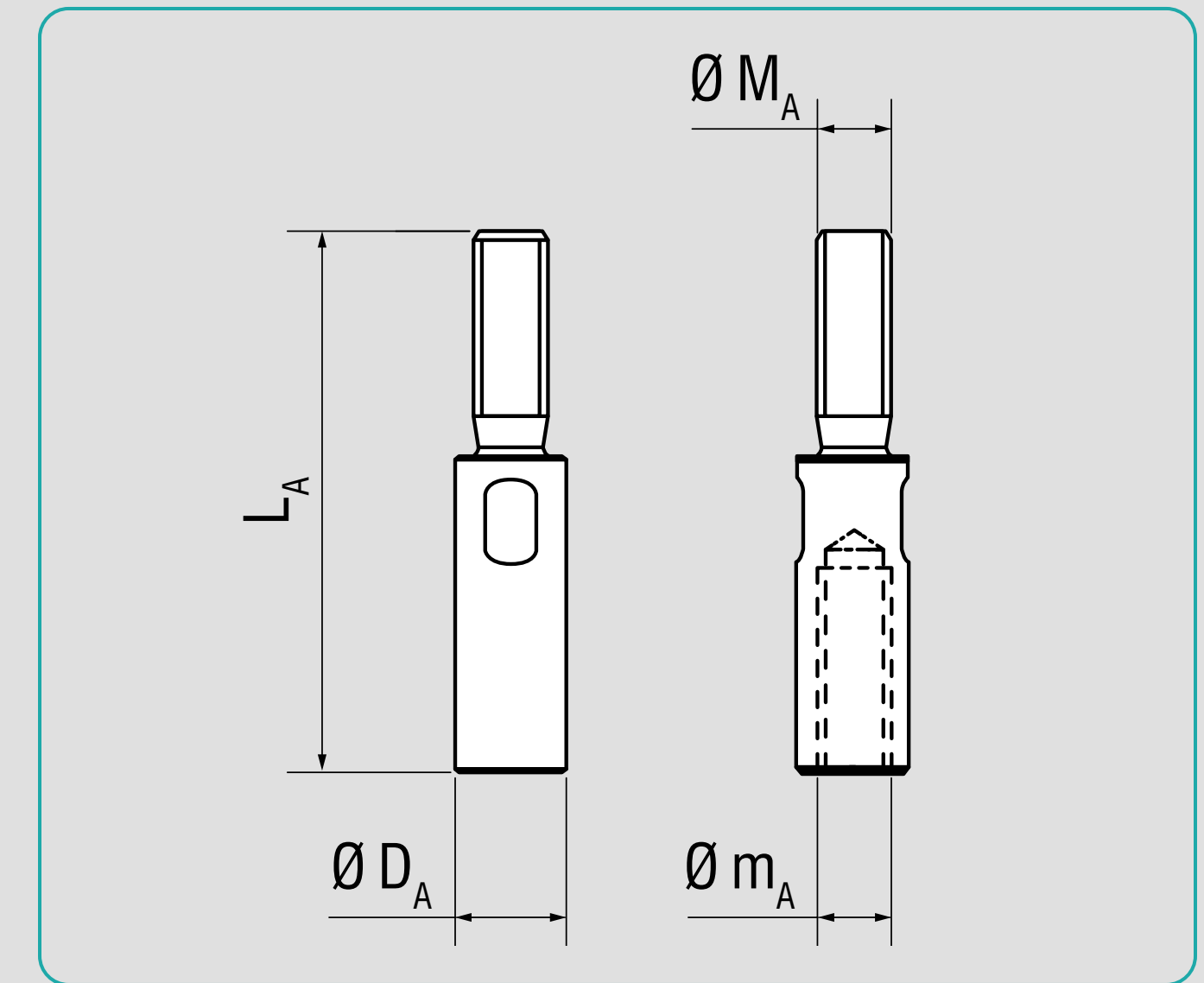


System size		008	010	012	014	016	020	024	027	030	036	042	048	052	056	060	064	070	080	090	100	110**	120**	
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753	898	1.037	1.207	1.367	1.663	2.220	2.857	3.574	4.371	5.249	
Unit weight	kg	0,1	0,2	0,3	0,5	0,7	1,3	2,2	3,2	4,4	7,2	10,5	15,4	19,1	23,7	29,2	35,3	46,1	69,7	103,2	146,5	199,3	257	
Fork end																								
Dimension	A	mm	26	32	39	47	53	66	77	88	98	115	133	151	162	176	187	200	220	257	289	325	367	400
Dimension	B	mm	10	12	14	17	18	23	23,5	23,5	28,5	28,5	34	39	45	45	50	50	55	65	75	80	91	101
Dimension	C	mm	21	25,6	31	36	40	51	56,5	61,5	70,5	79,5	94	108	121	126	138	144	157	181	210	233	258	283
Dimension	H	mm	40,5	50	60,5	73	80	100	120	134	147	174	201	227	235	252	269	286	314	356	406	453	498	540
Øm		mm	8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	90	100	110	120
Pin																								
Dimension	G	mm	29	34,5	40,5	45,5	52	65	70,5	78	90	99	116	130	144	149	166	172	187	215	244	273	300	325
ØD _p		mm	8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	92	106	118	129
Connection plate																								
C _{min} *		mm	25	31	38	45	53	66	78	88	98	115	135	153	163	175	186	199	217	254	288	321	371	394
Ød _B		mm	9	11	13,5	16	18	22	26	30	33	39	45	51	55	59	63	67	73	83	95	109	121	132
f _{min}		mm	14,5	17,5	21,5	26	29	35	42	48	53	62	72	82	88	95	100	107	117	133	152	174	193	210
t		mm	8	10	12	15	15	20	20	20	25	25	30	35	40	40	45	45	50	60	70	75	85	95

* for static load

** for galvanized system only

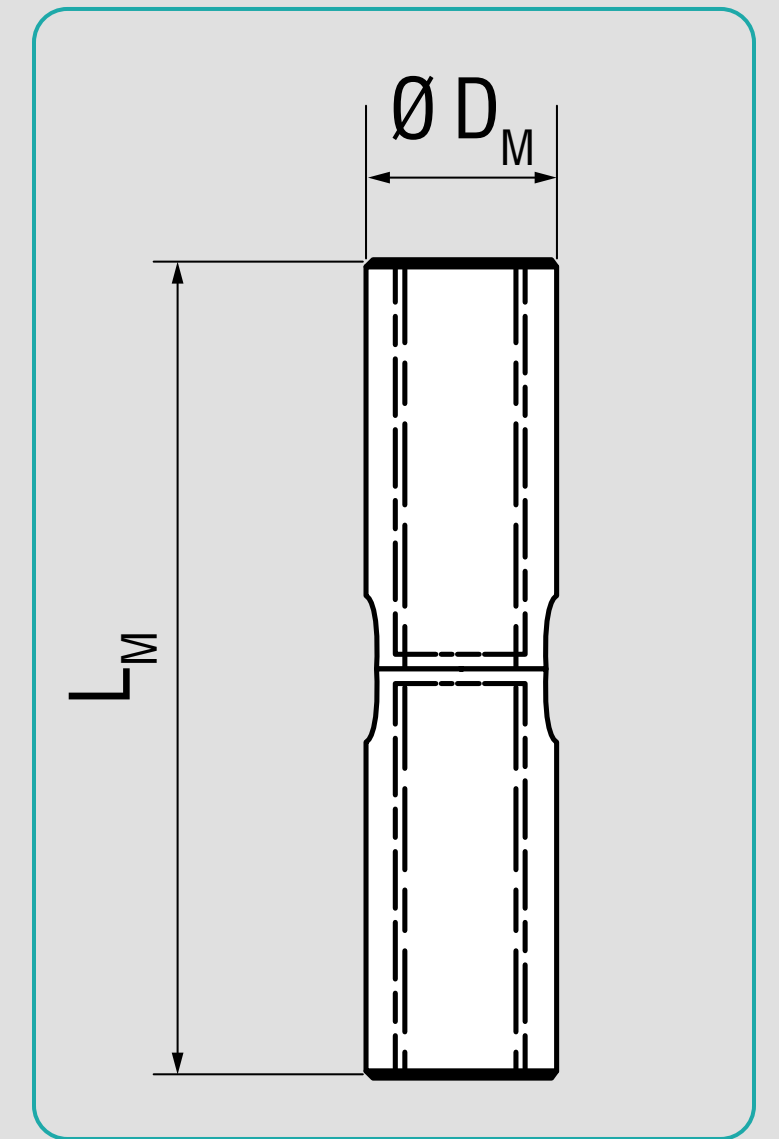
Adapter



System size		008	010	012	014	016	020	024	027	030	036	042	048	052	056	060	064	070	080	090	100	110*	120*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753	898	1.037	1.207	1.367	1.663	2.220	2.857	3.574	4.371	5.249
Unit weight	kg	0,03	0,06	0,1	0,16	0,22	0,44	0,76	1,1	1,5	2,2	3,6	5,4	6,7	8,3	9,9	12,5	16,5	24,6	35,2	47,9	62,8	81,3
Ø D _A	mm	12	15	18	21	24	30	36	40,5	45	54	63	72	78	84	90	96	105	120	135	150	165	180
Ø m _A	mm	8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	90	100	110	120
Ø M _A	mm	8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	90	100	110	120
L _A	mm	60	74	89	107	113,5	144	172	191	214	242	283	322	336	362	380	412	459	520	586	643	691	750

* for galvanized system only

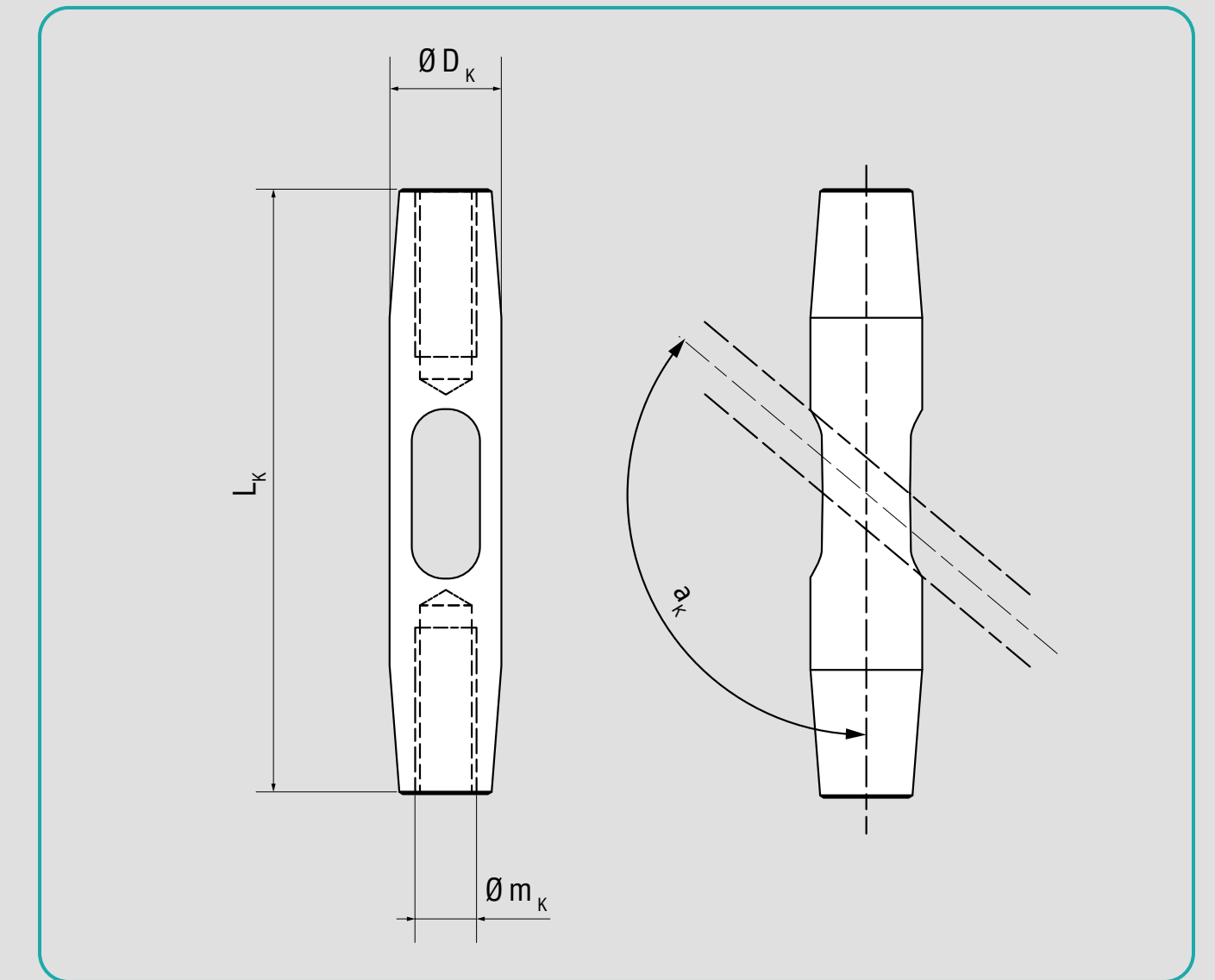
Coupler



System size		008	010	012	014	016	020	024	027	030	036	042	048	052	056	060	064	070	080	090	100	110*	120*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753	898	1.037	1.207	1.367	1.663	2.220	2.857	3.574	4.371	5.249
Unit weight	kg	0,03	0,1	0,1	0,2	0,2	0,5	0,8	1,1	1,6	2,2	3,6	5,4	5,6	7,2	8,7	10,5	13,8	20,5	29,5	40	52,7	68,1
L_M	mm	56	68	80	92	104	129	153	171	196	232	269	306	266	288	308	327	358	408	466	512	558	606
$\text{Ø}D_M$	mm	12	15	18	21	24	30	36	40,5	45	54	63	72	78	84	90	96	105	120	135	150	165	180

* for galvanized system only

Intersection Coupler



System size		008	010	012	014	016	020	024	027	030	036	042	048	052	056	060	064	070	080	090	100	110*	120*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753	898	1.037	1.207	1.367	1.663	2.220	2.857	3.574	4.371	5.249
Unit weight	kg	0,1	0,2	0,2	0,4	0,5	1	1,7	2,4	3,4	4,7	7,6	11,2	13,6	17,1	20,9	25,3	33,4	50	72,1	98,2	130,1	168,7
L_k	mm	86	106	126	149	162	203	241	271	300	332	389	443	460	497	534	563	614	704	800	884	968	1.055
$\varnothing m_k$	mm	8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	90	100	110	120
$\varnothing D_k$	mm	16	20	23	27	30	37	44	49	55	65	76	86	94	101	108	115	126	144	162	180	198	216
a_k max	°	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

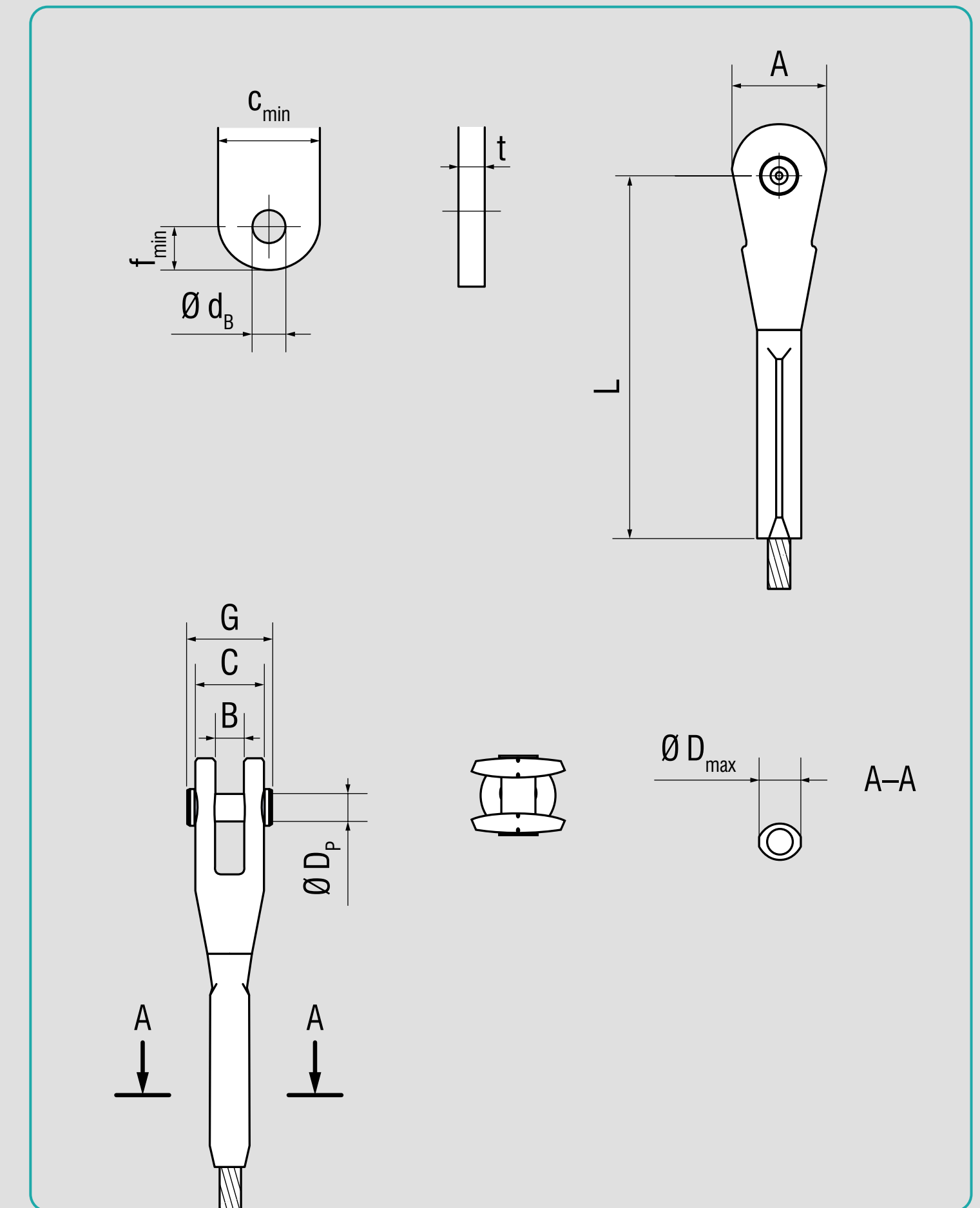
* for galvanized system only

Open Swaged Fitting

System size			008	010	012	014	016	020	024	027	030	036	042	048*
Limit tension		kN	19	30	43	59	80	125	180	235	286	417	573	753
Total length, galvanized system	L	mm	97	120	148	174	198	245	295	334	366	442	515	583
Total length, stainless steel system	L	mm	104	128,5	155	185	208	261	312	351	390	463	538	
Unit weight, galvanized system		kg	0,13	0,23	0,4	0,7	1	2	3,1	4,5	6,2	10,2	15,4	22,4
Unit weight, stainless steel system		kg	0,13	0,23	0,4	0,7	1	2	3,1	4,5	6,2	10,7	16,8	
Fork end														
Dimension	A	mm	26	32	39	47	53	66	77	88	98	115	133	151
Dimension	B	mm	10	12	14	17	18	23	23,5	23,5	28,5	28,5	34	39
Dimension	C	mm	21	25,6	31	36	40	51	56,5	61,5	70,5	79,5	94	108
Pin														
Dimension	G	mm	29	34,5	40,5	45,5	52	65	70,5	78	90	99	116	130
$\varnothing D_p$		mm	8	10	12	14	16	20	24	27	30	36	42	48
Connection plate														
C_{min}^{**}		mm	25	31	38	45	53	66	78	88	98	115	135	153
$\varnothing d_B$		mm	9	11	13,5	16	18	22	26	30	33	39	45	51
f_{min}		mm	14,5	17,5	21,5	26	29	35	42	48	53	62	72	82
t		mm	8	10	12	15	15	20	20	20	25	25	30	35
Fitting														
$\varnothing D_{max}$, galvanized system		mm	13	15	16	20	22	30	34	39	44	50	59	66
$\varnothing D_{max}$, stainless steel system		mm	13	15	17	20	24	30	34	40	44	55	65	

* for galvanized system only

** for static load

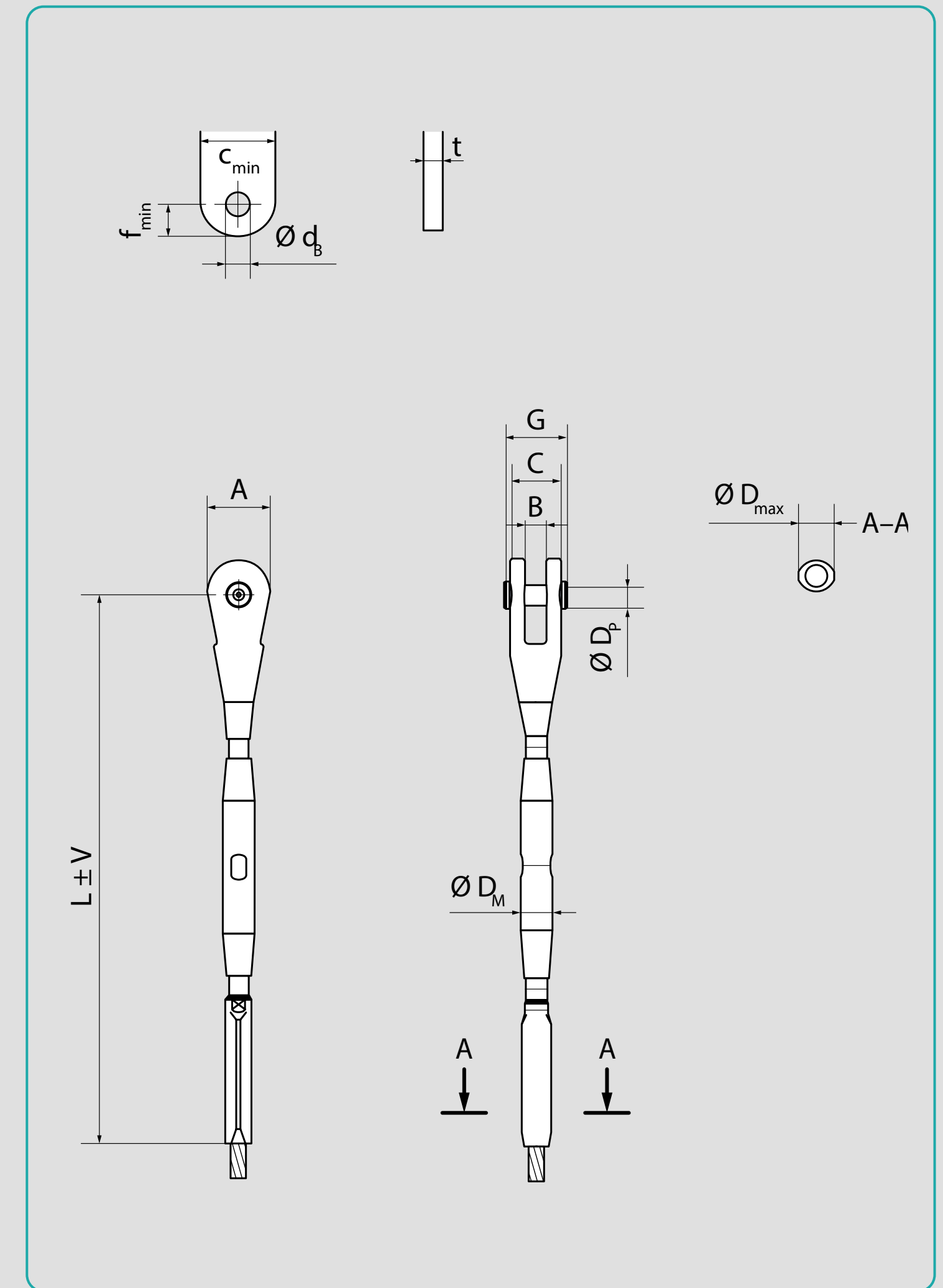


Adjustable Open Swaged Fitting

System size		008	010	012	014	016	020	024	027	030	036	042	048*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753
Total length, galvanized system	L mm	217	268	319	380	423	531	632	709,5	792	941	1.095	1.246
Total length, stainless steel system	L mm	225	275	327	389	434	544	646	725	813	967	1.123	
Unit weight, galvanized system	kg	0,2	0,4	0,7	1,1	1,6	3,2	5,2	7,5	10,4	16,7	25,8	37,9
Unit weight, stainless steel system	kg	0,2	0,4	0,7	1,1	1,6	3,2	5,2	7,5	10,4	16,7	25,8	
Take up	V mm	± 18	± 22	± 26	± 30	± 34	± 42	± 50	± 56	± 64	± 76	± 88	± 100
Fork end													
Dimension	A mm	26	32	39	47	53	66	77	88	98	115	133	151
Dimension	B mm	10	12	14	17	18	23	23,5	23,5	28,5	28,5	34	39
Dimension	C mm	21	25,6	31	36	40	51	56,5	61,5	70,5	79,5	94	108
Pin													
Dimension	G mm	29	34,5	40,5	45,5	52	65	70,5	78	90	99	116	130
$\varnothing D_p$	mm	8	10	12	14	16	20	24	27	30	36	42	48
Connection plate													
C_{min}^{**}	mm	25	31	38	45	53	66	78	88	98	115	135	153
$\varnothing d_B$	mm	9	11	13,5	16	18	22	26	30	33	39	45	51
f_{min}	mm	14,5	17,5	21,5	26	29	35	42	48	53	62	72	82
t	mm	8	10	12	15	15	20	20	20	25	25	30	35
Coupler													
$\varnothing D_M$	mm	12	15	18	21	24	30	36	40,5	45	54	63	72
Fitting													
$\varnothing D_{max}$, galvanized system	mm	13	15	16	20	22	30	34	39	44	50	59	66
$\varnothing D_{max}$, stainless steel system	mm	13	15	17	20	24	30	34	40	44	55	65	

* for galvanized system only

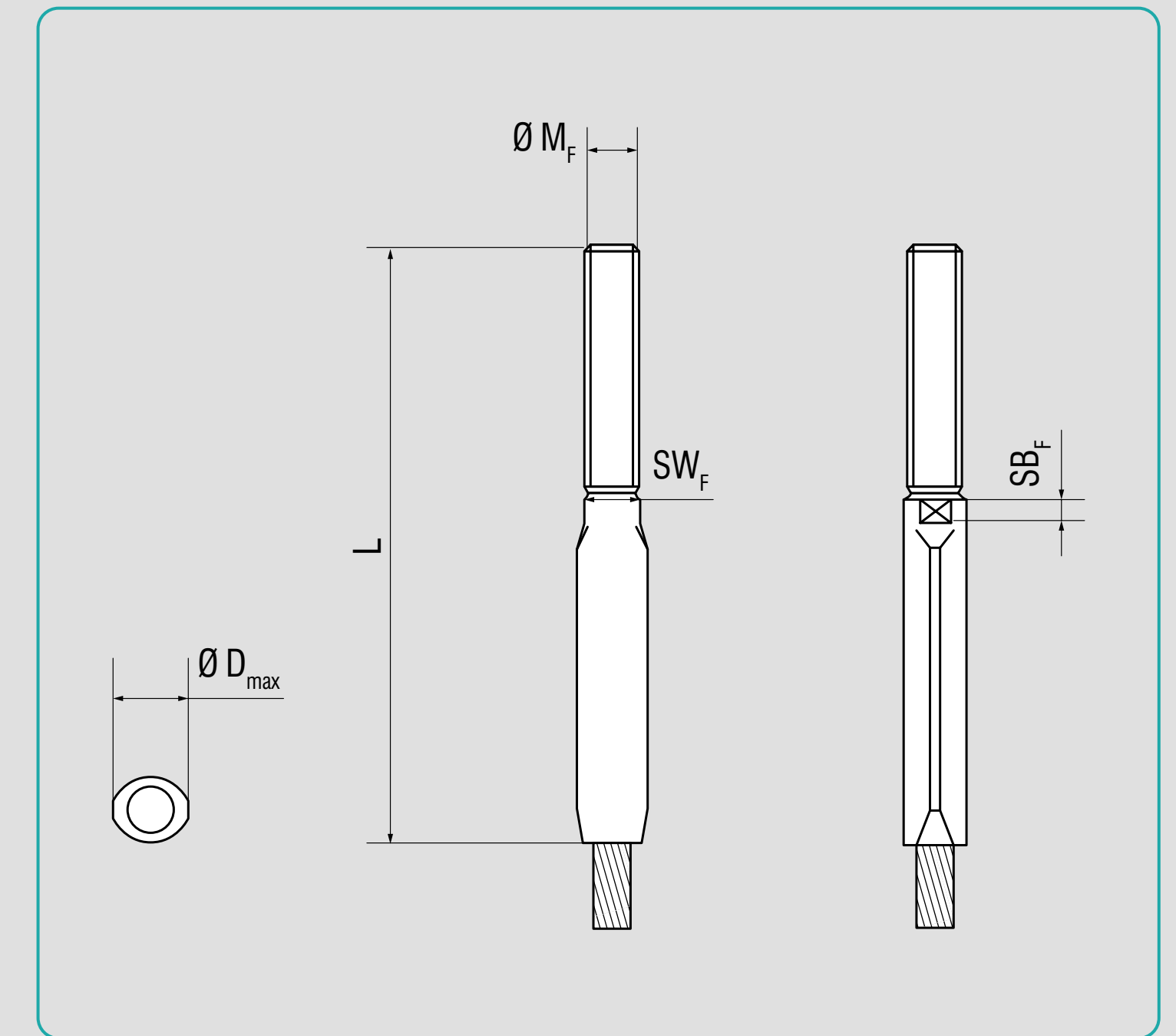
** for static load



Threaded Fitting

System size		008	010	012	014	016	020	024	027	030	036	042	048*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753
Unit weight	kg	0,05	0,1	0,2	0,3	0,4	0,7	1,2	1,7	2,3	3,7	6,1	8,8
Total length	L mm	99	123	147	175	197	248	295	333	370	442	517	589
$\varnothing M_F$	mm	8	10	12	14	16	20	24	27	30	36	42	48
SB_F	mm	2,5	4	5	6	7,5	10	11,5	12	12	16	18	21
SW_F	mm	9	11	12	15	17	23	27	30	34	39	47	52
Fitting													
$\varnothing D_{max}$, galvanized system	mm	13	15	16	20	22	30	34	39	44	50	59	66
$\varnothing D_{max}$, stainless steel system	mm	13	15	17	20	24	30	34	40	44	55	65	

* for galvanized system only



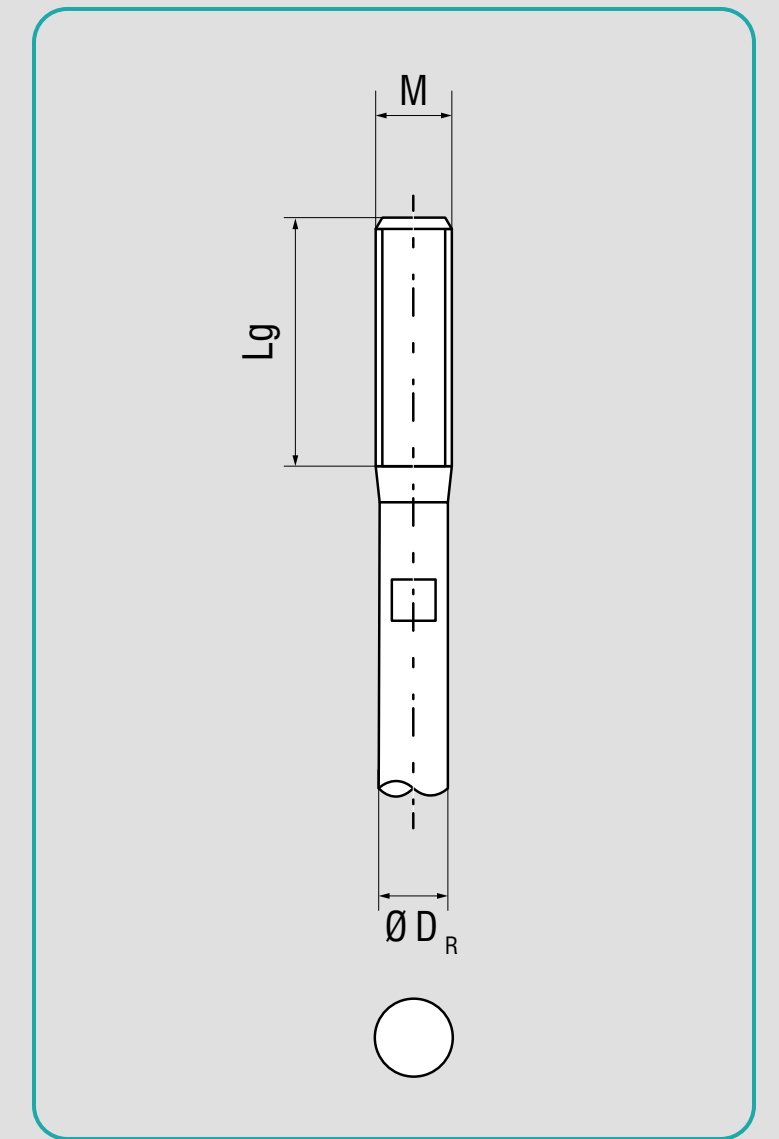
Tension Rod

Galvanized Systems: E-Modulus: 210 +/- 10 kN/mm²

Stainless Steel Systems: E-Modulus: 200 +/- 10 kN/mm²

Installation: Please note the installation manual.

Technical Details: Our systems are manufactured without spanner flats on rods, as a standard.



System size		008	010	012	014	016	020	024	027	030	036	042	048	052	056	060	064	070	080	090	100	110*	120*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753	898	1.037	1.207	1.367	1.663	2.220	2.857	3.574	4.371	5.249
Weight per meter	kg/m	0,3	0,5	0,7	1	1,4	2	3	3,9	4,8	6,7	9,4	12,5	14,8	16,7	19,3	22,2	26,9	35,6	45,6	56,8	69,3	83
M		8	10	12	14	16	20	24	27	30	36	42	48	52	56	60	64	70	80	90	100	110	120
ØD _R	mm	7	9	11	13	15	18	22	25	28	33	39	45	49	52	56	60	66	76	86	96	106	116
Lg	mm	26	33	39	48	51	65	78	88	97	116	136	155	157	169	181	193	212	241	275	303	331	360

* for galvanized system only

Open Spiral Strand Cables – GALFAN Coated and Stainless Steel

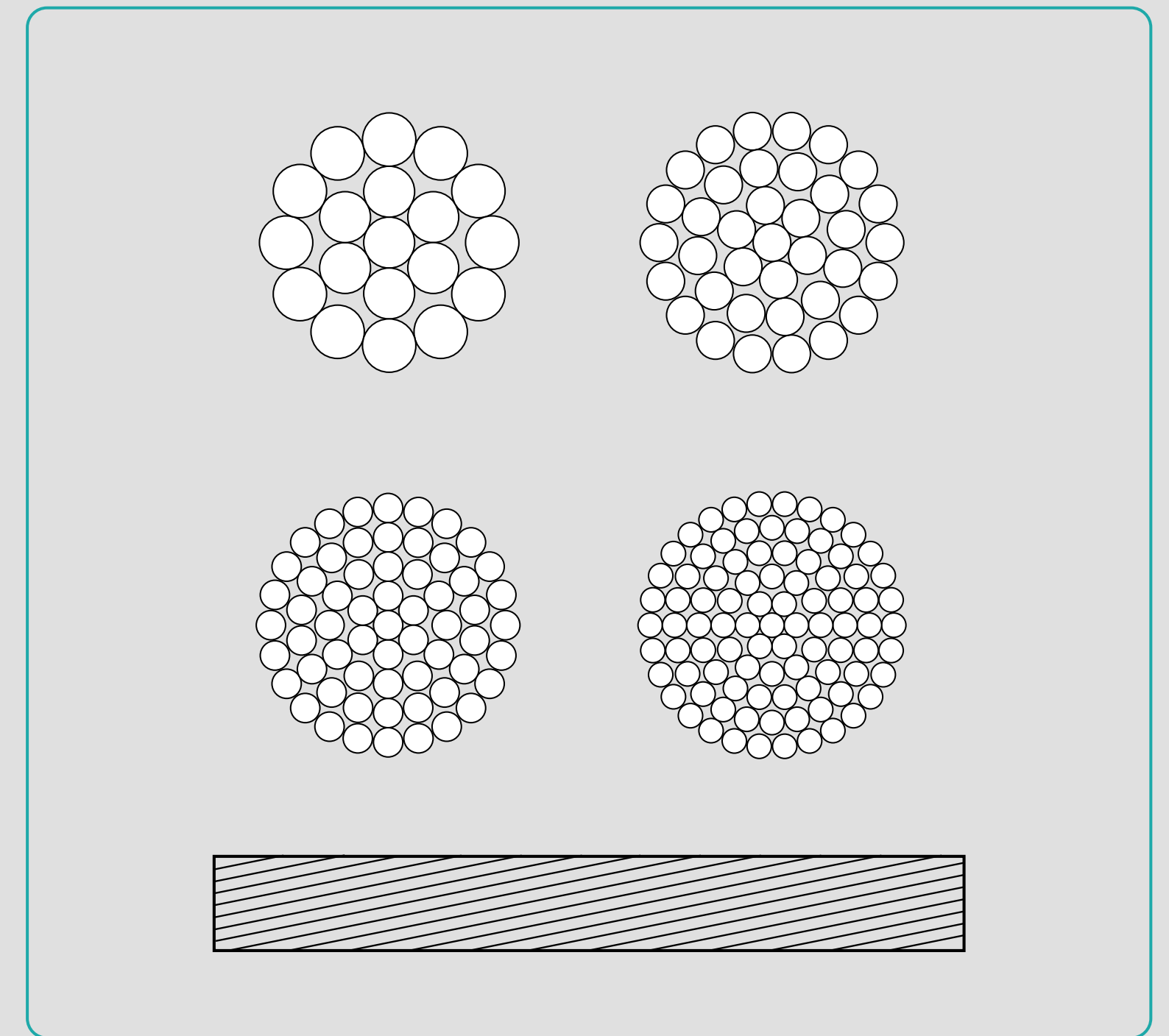
GALFAN cable: *E-Modulus: 160 +/- 10 kN/mm²*

Stainless steel cable: *E-Modulus: 130 +/- 10 kN/mm²*

Tolerance nom. strand diameter: + 3 %

System size		008	010	012	014	016	020	024	027	030	036	042	048*
Limit tension	kN	19	30	43	59	80	125	180	235	286	417	573	753
F_{min}	EC3 kN	30	47	68	93	126	198	284	371	452	659	904	1.189
$Z_{B,k}$	EC3 kN	28	44	65	89	120	188	270	352	430	626	859	1.129
GALFAN cable													
$\varnothing D_c$	mm	5,5	7	8,4	9,9	11,5	14,5	17,4	19,8	21,9	26,4	30,9	35,4
Metallic cross section	mm ²	19	30	43	60	81	126	182	235	288	419	575	753
Weight per meter GALFAN	kg/m	0,1	0,2	0,3	0,5	0,6	1	1,4	1,9	2,3	3,3	4,5	5,9
Stainless steel cable													
$\varnothing D_c$	mm	6,3	7,9	9,5	11,2	13	16,3	19,5	22,2	24,7	29,8	34,9	
Metallic cross section stainless steel	mm ²	24	38	55	77	103	160	235	306	377	545	751	
Weight per meter stainless steel	kg/m	0,2	0,3	0,4	0,6	0,8	1,3	1,8	2,3	2,9	4,2	5,7	

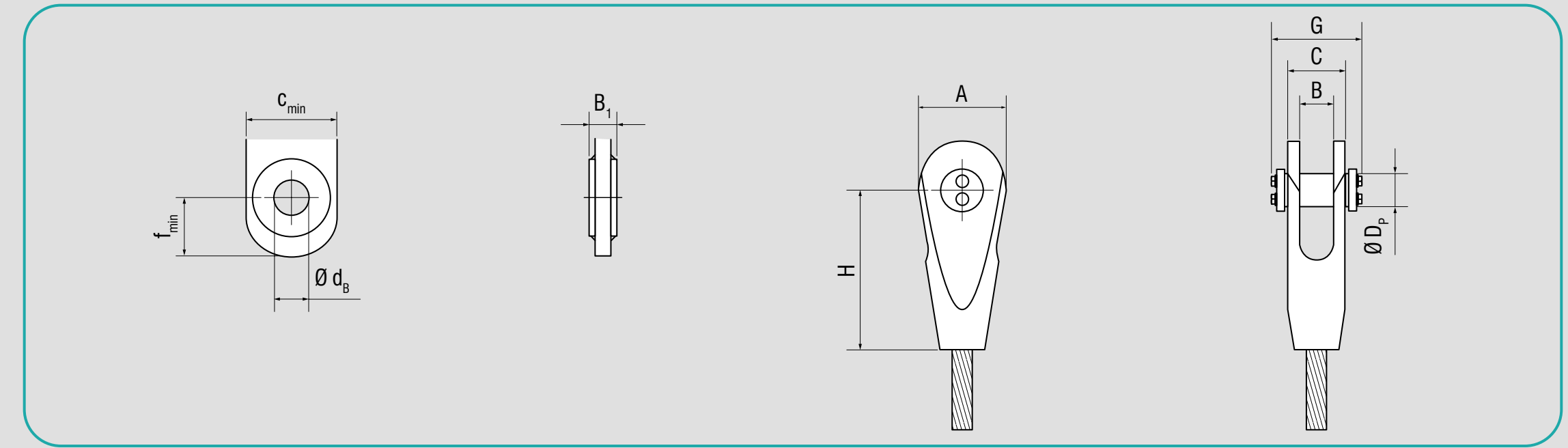
* for GALFAN cables only



Open Spelter Socket Type 700

CE European technical assessment:
 Part of ETA-11/0160 certificate
 Design: Subject to technical modifications
 Fatigue strength: Detail category of cables according to EN 1993-1-11: $\Delta\sigma_c = 150 \text{ N/mm}^2$ at $\gamma_{Mf} = 1,0$; $\sigma_o = 0,45 \times \sigma_{uk}$; $n = 2 \times 10^6$ number of cycles.
 The open spelter sockets type 700 meets the exposure classes 1 to 5 according to EN 1993-1-11.

Technical details:
 Dimensions without corrosion protection
 Total weight without socketing material
 Socketing according to technical approval ETA-11/0160

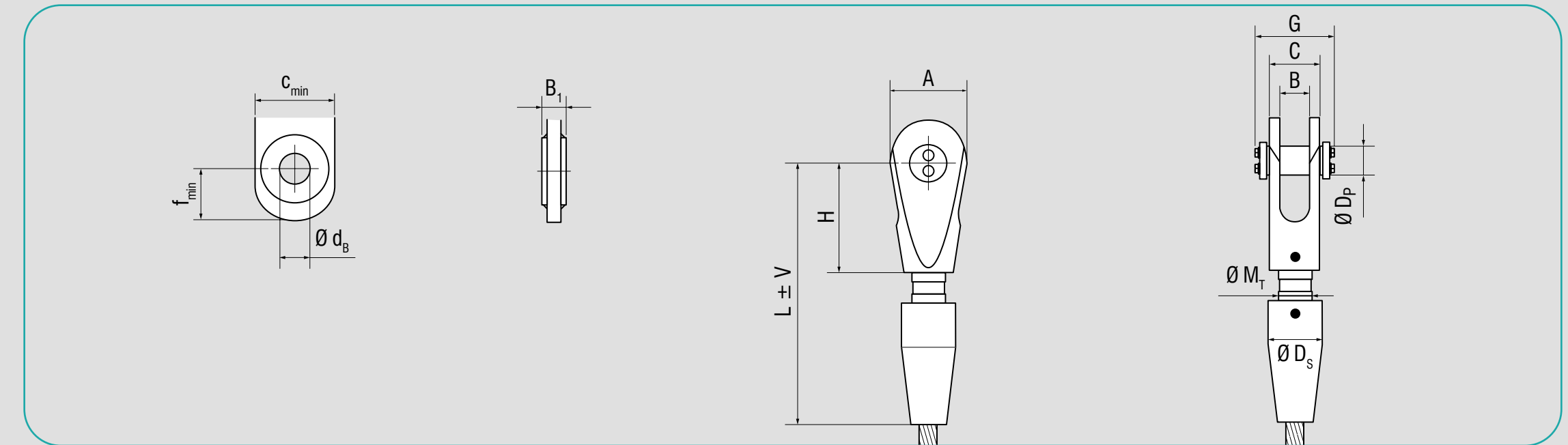


System size	PV	40	60	90	115	150	195	240	300	360	420	490	560	640	720	810	910	1.010	1.110	1.220	1.340	1.450	1.580	1.730	1.860	2.000	
Limit tension	kN	270	414	611	780	1.013	1.287	1.587	2.013	2.393	2.813	3.260	3.747	4.260	4.807	5.393	6.073	6.733	7.400	8.133	8.933	9.667	10.533	11.533	12.400	13.333	
Unit weight	kg	3,8	6,9	12	16,5	23,6	33,9	46,8	63	81	104	131	163	197	232	279	330	386	445	514	598	672	761	865	969	1.077	
Fork end																											
Dimension	A	mm	92	116	137	153	176	197	220	241	263	285	308	329	351	372	395	416	438	459	484	511	532	555	577	599	621
Dimension	B	mm	35	43	52	60	68	77	85	94	102	111	119	128	136	145	153	162	170	179	187	196	204	213	221	230	238
Dimension	C	mm	61	75	90	102	116	131	145	160	174	189	203	218	232	247	261	276	290	305	319	334	348	363	377	392	406
Dimension	H	mm	132	163	194	217	248	279	310	341	372	403	434	465	496	527	558	589	620	651	682	713	744	775	806	837	868
Pin																											
G	mm	108	128	152	168	183	213	227	257	273	306	321	346	367	382	406	432	457	474	498	513	527	542	577	592	607	
ØD _p	mm	39	44	54	59	64	73	83	88	98	108	118	128	138	142	153	162	172	182	187	202	207	217	227	237	247	
Connection plate																											
Ød _B	mm	42	47	57	62	67	76	86	91	101	111	121	131	141	145	156	165	175	185	190	205	210	220	230	240	250	
C _{min}	mm	110	120	140	155	180	200	220	240	270	300	320	340	370	390	420	440	470	500	540	570	600	630	670	690	700	
f _{min}	mm	62	75	90	100	110	120	140	150	170	185	200	215	235	245	260	275	290	310	320	340	350	365	385	400	415	
B ₁	mm	29	36	45	52	60	69	76	85	92	100	107	114	121	129	136	144	151	159	165	174	180	187	193	196	204	

Adjustable Open Spelter Socket Type 710

CE European technical assessment:
 Part of ETA-11/0160 certificate
 Design: Subject to technical modifications
 Fatigue strength: Detail category of cables according to
 EN 1993-1-11: $\Delta\sigma_c = 150 \text{ N/mm}^2$ at $\gamma_{Mf} = 1,0$; $\sigma_o = 0,45 \times \sigma_{uk}$;
 $n = 2 \times 10^6$ number of cycles. The open spelter sockets type 710
 meets the exposure classes 1 to 4 according EN 1993-1-11.

Technical Details:
 Dimensions without corrosion protection
 Total weight without socketing material
 Socketing according to technical approval
 ETA-11/0160



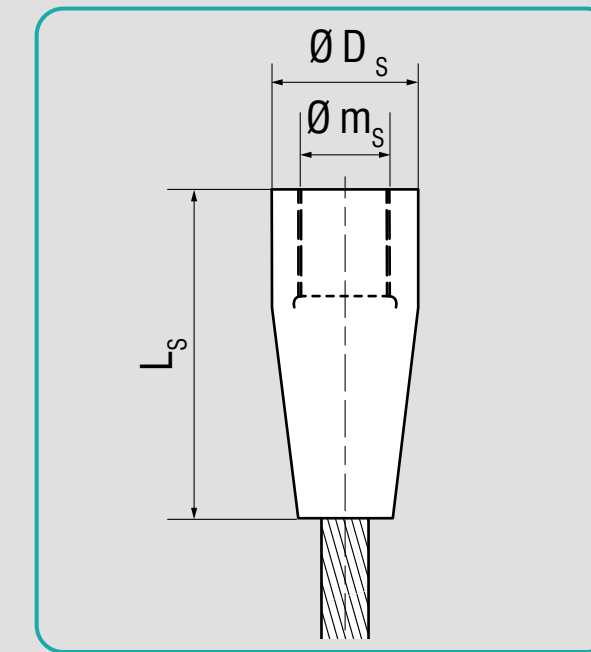
System size	PV	40	60	90	115	150	195	240	300	360	420	490	560	640	720	810	910	1.010	1.110	1.220	1.340	1.450	1.580	1.730	1.860	2.000	
Limit tension	kN	270	414	611	780	1.013	1.287	1.587	2.013	2.393	2.813	3.260	3.747	4.260	4.807	5.393	6.073	6.733	7.400	8.133	8.933	9.667	10.533	11.533	12.400	13.333	
Unit weight	kg	8,6	15	24,6	34,9	42,3	60	84	111	144	188	233	294	354	420	507	599	692	812	938	1.085	1.236	1.400	1.581	1.768	1.964	
Total length	L	mm	359	429	497	559	590	660	746	824	894	973	1.041	1.111	1.181	1.261	1.345	1.415	1.483	1.561	1.634	1.731	1.808	1.885	1.962	2.037	2.114
Take ups	V	mm	± 32	± 36	± 38	± 42	± 42	± 46	± 56	± 58	± 62	± 70	± 72	± 76	± 80	± 84	± 92	± 96	± 98	± 114	± 124	± 118	± 122	± 130	± 134	± 140	± 144
Fork end																											
Dimension	A	mm	92	116	137	153	176	197	220	241	263	285	308	329	351	372	395	416	438	459	484	511	532	555	577	599	621
Dimension	B	mm	35	43	52	60	68	77	85	94	102	111	119	128	136	145	153	162	170	179	187	196	204	213	221	230	238
Dimension	C	mm	61	75	90	102	116	131	145	160	174	189	203	218	232	247	261	276	290	305	319	334	348	363	377	392	406
Dimension	H	mm	132	163	194	217	248	279	310	341	372	403	434	465	496	527	558	589	620	651	682	713	744	775	806	837	868
Pin																											
G	mm	108	128	152	168	183	213	227	257	273	306	321	346	367	382	406	432	457	474	498	513	527	542	577	592	607	
ØD _p	mm	39	44	54	59	64	73	83	88	98	108	118	128	138	142	153	162	172	182	187	202	207	217	227	237	247	
Connection plate																											
Ød _B	mm	42	47	57	62	67	76	86	91	101	111	121	131	141	145	156	165	175	185	190	205	210	220	230	240	250	
C _{min}	mm	110	120	140	155	180	200	220	240	270	300	320	340	370	390	420	440	470	500	540	570	600	630	670	690	700	
f _{min}	mm	62	75	90	100	110	120	140	150	170	185	200	215	235	245	260	275	290	310	320	340	350	365	385	400	415	
B ₁	mm	29	36	45	52	60	69	76	85	92	100	107	114	121	129	136	144	151	159	165	174	180	187	193	196	204	
Threaded rod																											
ØM _T	mm	42	52	64	75	75	85	95	108	118	128	140	150	160	172	185	195	205	215	225	235	245	260	270	280	290	
Fitting																											
ØD _S	mm	80	95	110	125	125	140	155	170	185	205	220	235	250	265	280	295	310	330	345	360	380	395	410	425	440	



Conical Socket Type 800

CE European technical assessment:
 Part of ETA-11/0160 certificate
 Corrosion protection: hot-dip galvanized
 Design: Subject to technical modifications

Technical details:
 Dimensions without corrosion protection
 Total weight without socketing material
 Socketing according to technical approval
 ETA-11/0160



System size	PV	40	60	90	115	150	195	240	300	360	420	490	560	640	720	810	910	1.010	1.110	1.220	1.340	1.450	1.580	1.730	1.860	2.000
Limit tension	kN	270	414	611	780	1.013	1.287	1.587	2.013	2.393	2.813	3.260	3.747	4.260	4.807	5.393	6.073	6.733	7.400	8.133	8.933	9.667	10.533	11.533	12.400	13.333
Unit weight	kg	3,5	5,8	8,8	12,9	12,9	17,9	25	32	42	57	69	90	109	128	154	184	208	253	295	337	395	441	495	552	615
Total length	L_s mm	165	200	235	270	270	305	350	385	420	460	495	530	565	600	645	680	715	760	800	840	880	920	960	1.000	1.040
$\varnothing D_s$	mm	80	95	110	125	125	140	155	170	185	205	220	235	250	265	280	295	310	330	345	360	380	395	410	425	440
$\varnothing m_s$	mm	42	52	64	75	75	85	95	108	118	128	140	150	160	172	185	195	205	215	225	235	245	260	270	280	290

Full Locked Cables

European technical assessment:

Part of ETA-11/0160 certificate

Material: Unalloyed quality steel

Corrosion protection:

Inner layers: hot dip galvanized with inner filling

Outer layers: GALFAN coated without inner filling or equal

E-Modulus: 160 kN/mm² ± 10 kN/mm²

Tolerance nom. strand diameter: + 3 %

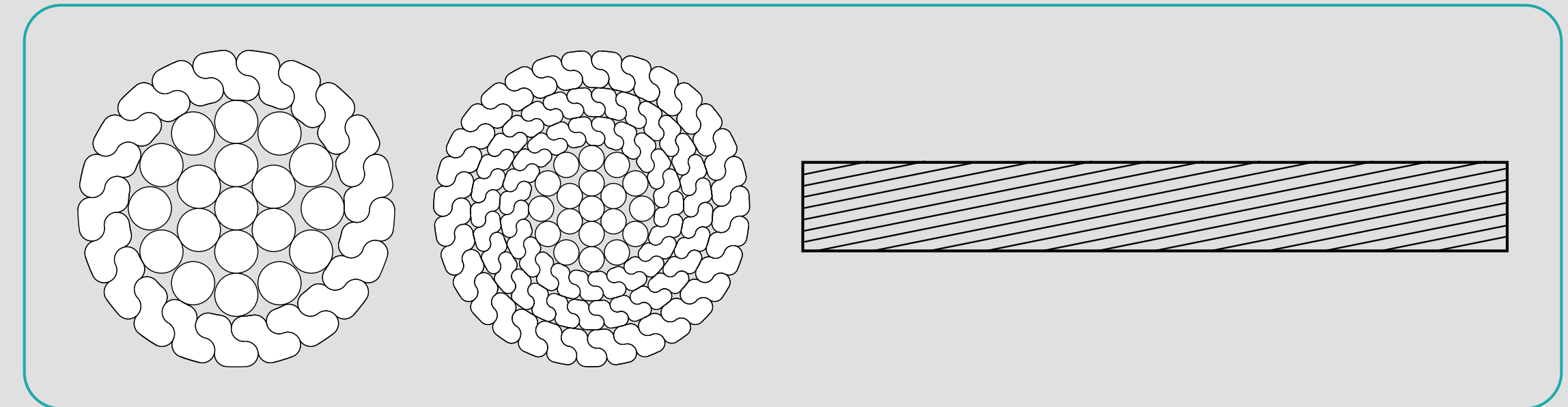
Design: Construction: VVS-1 = 1, VVS-2 = 2,

VVS-3 = 3 and more layers z-pofiled wires

Subject to technical modifications

Technical details:

Due to prestressing and / or adverse weather conditions innerfilling may escape to the surface.



System size	PV	40	60	90	115	150	195	240	300	360	420	490	560	640	720	810	910	1.010	1.110	1.220	1.340	1.450	1.580	1.730	1.860	2.000
Limit tension	kN	270	414	611	780	1.013	1.287	1.587	2.013	2.393	2.813	3.260	3.747	4.260	4.807	5.393	6.073	6.733	7.400	8.133	8.933	9.667	10.533	11.533	12.400	13.333
Charact. breaking load EC3	ZB,k kN	405	621	916	1.170	1.520	1.930	2.380	3.020	3.590	4.220	4.890	5.620	6.390	7.210	8.090	9.110	10.100	11.100	12.200	13.400	14.500	15.800	17.300	18.600	20.000
Nomin. strand diameter	mm	21	26	31	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140
Metallic cross section	mm ²	281	430	634	808	1.060	1.340	1.650	2.090	2.490	2.920	3.390	3.890	4.420	4.990	5.600	6.310	6.990	7.710	8.460	9.240	10.100	10.900	11.900	12.900	13.900
Weight per meter	kg/m	2,4	3,6	5,3	6,8	8,9	11,2	13,8	17,2	20,5	24,1	27,9	32,1	36,4	41,1	46,2	52	57,6	63,5	69,7	76,2	83,2	89,8	96,7	104,8	112,9

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