

DETAN ROD SYSTEMS

Technical Product Information





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Leviat is the new name of CRH's construction accessories companies worldwide.

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DETAN Rod systems for exceptional applications

Reference: EXPO 2015 – World Exposition, Milan, Italy

The German pavilion is a forerunner when it comes to environmental protection, alternative energy and food for the future. The architectural design is an impressive depiction of the German geographic and agricultural landscape.

The DETAN Rod system meets the highest aesthetic, technical and quality demanded for the

construction of the German Pavilion. The filigree tensile and pressure bars discreetly combine both function and aesthetics to form a pleasing architectural ensemble.

The unusual shape presented a challenge for the tensile and pressure rod systems used for bracing and tensioning structure.

The resulting structure is a filigree frame of steel rods and bars with a white paint finish, covered with textile to form a stylised leaf roof.

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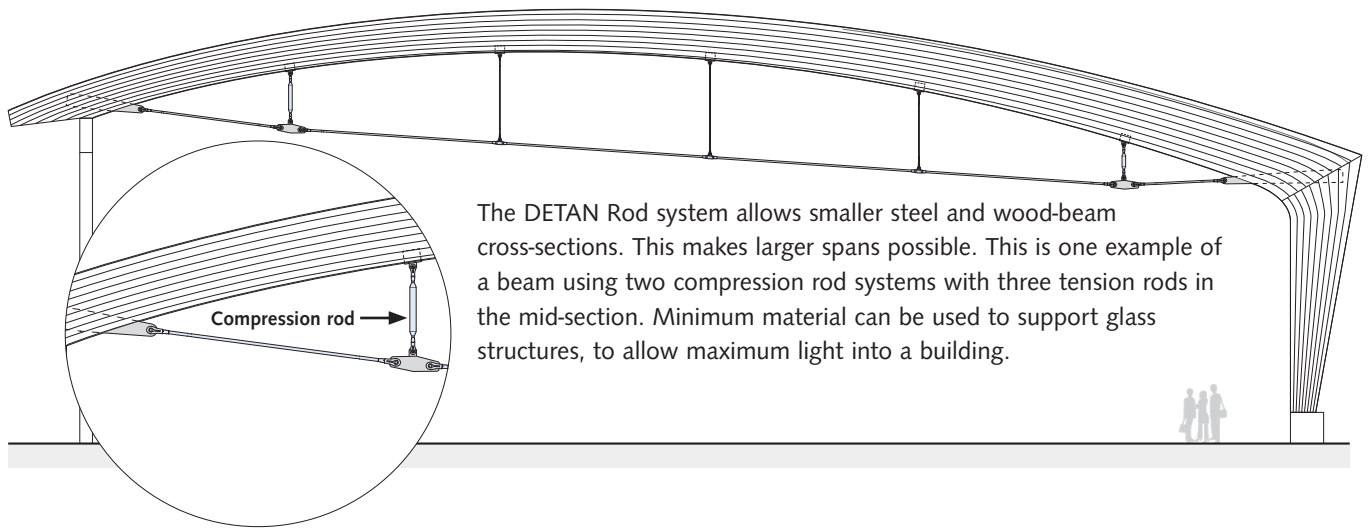
DETAN ROD SYSTEMS Applications

Application – examples

The DETAN Tension and compression rod systems are a perfect match, both structurally and aesthetically. DETAN is suitable for use in all types of bracing applications. To complement the DETAN range we offer a wide selection

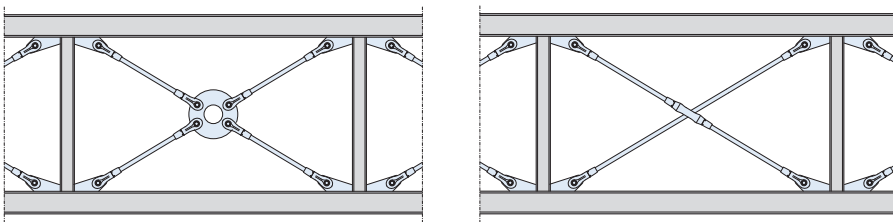
of services and accessories, for example, anchor discs and cross couplers and providing construction detailing and assistance for further possible applications.

Bracing under beams



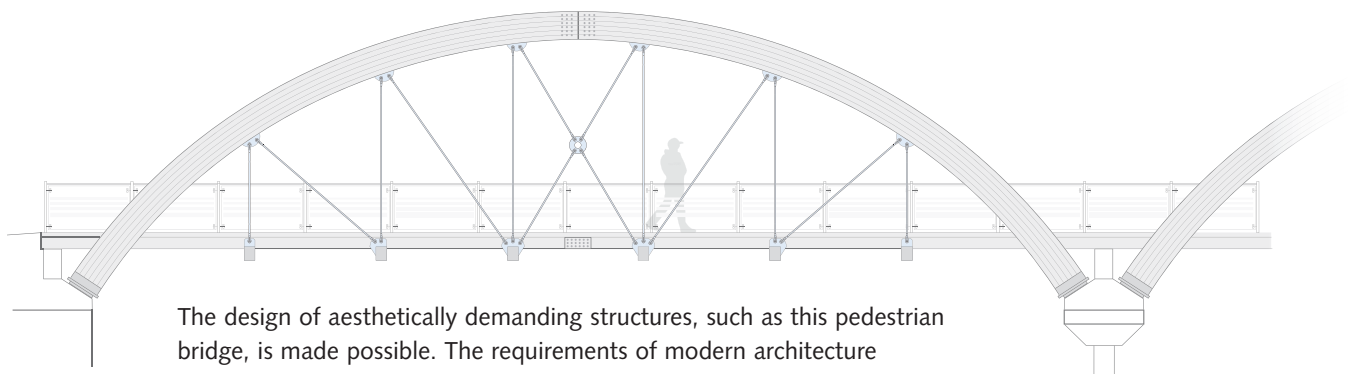
The DETAN Rod system allows smaller steel and wood-beam cross-sections. This makes larger spans possible. This is one example of a beam using two compression rod systems with three tension rods in the mid-section. Minimum material can be used to support glass structures, to allow maximum light into a building.

Stiffeners and Bracings



Statically required wind-bracing in roofs and walls can be aesthetically designed as a visual focus-point using the tension rod system. Cross bracing is possible either with a cross coupler or an anchor disc.

Suspensions



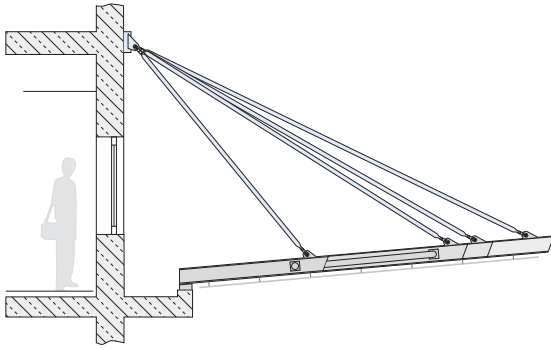
The design of aesthetically demanding structures, such as this pedestrian bridge, is made possible. The requirements of modern architecture complement the static requirements perfectly.

DETAN ROD SYSTEMS

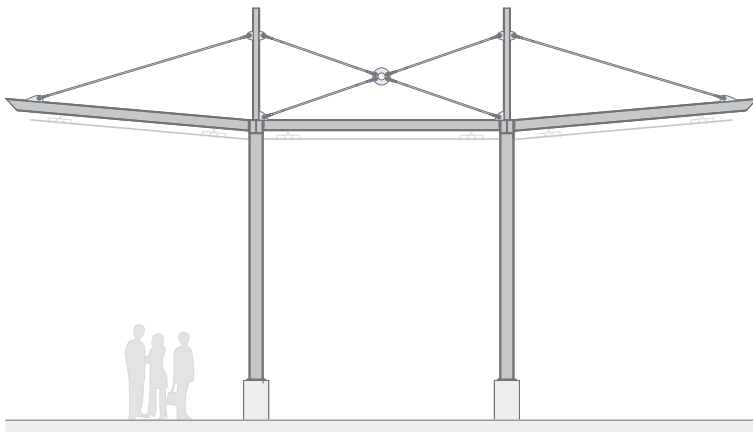
Applications

Application — examples

Canopy suspensions



The DETAN System allows bracings to be designed using a minimum of obtrusive structural elements, leaving them almost invisible. Statically required elements are simultaneously used as design elements. The visually, unobtrusive bracing elements give the whole structure an overall lightness. Applications are suspended canopies in all types of commercial and industrial projects. The DETAN Rod system is suitable for tension and compression loads.



Back-braced glass-façades



The DETAN Rod system allows filigree support structures for glass-façades to be realized.

DETAN ROD SYSTEMS

DETAN as a Design Element

Reference



The DETAN Rod system was used as a visual, creative design element in this project.

The effect is an elegant, aesthetic structure.

DETAN fits perfectly into the architectural concept and significantly contributes to the overall style.

Project:
Manchester Civil
Justice Centre,
England, UK

DETAN ROD SYSTEMS

DETAN as a Design Element

Reference



Cross bracings provide a futuristic, lightweight construction.

For structural reasons, DETAN Tension rods run diagonally across the glazed façade.

The filigree DETAN system is perfectly integrated, emphasizing the fascinating overall impression of the building.

Project:
The Sage, Gateshead,
England, UK

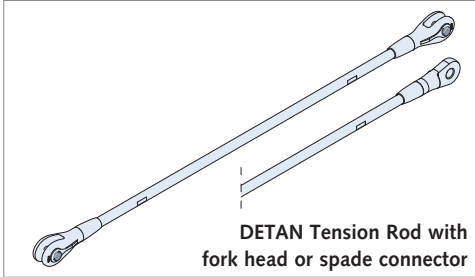
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DETAN ROD SYSTEMS

System Overview

DETAN Tension rod system

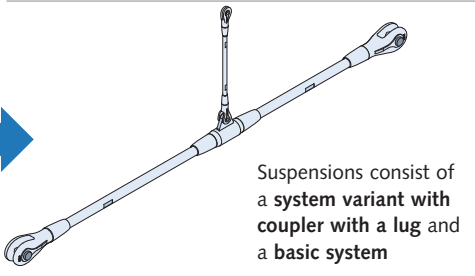
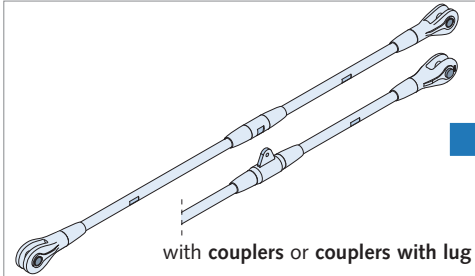
Basic system:



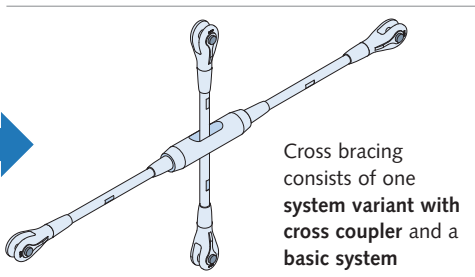
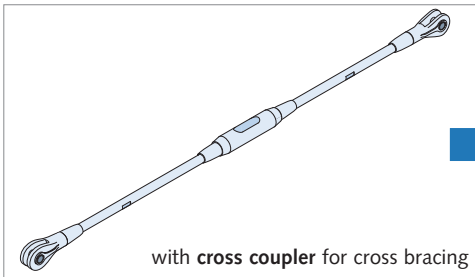
Ordering procedure → page 11
 Load capacity, system dimensions and materials:
 Steel → pages 14-15
 Stainless steel → pages 16-17

! The DETAN Rod systems are only approved for predominantly static loads.

System variants:

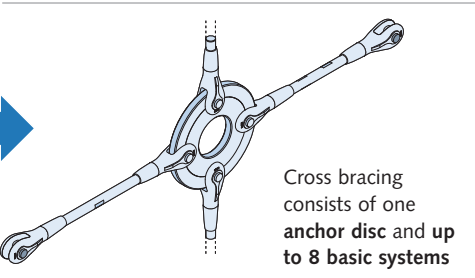
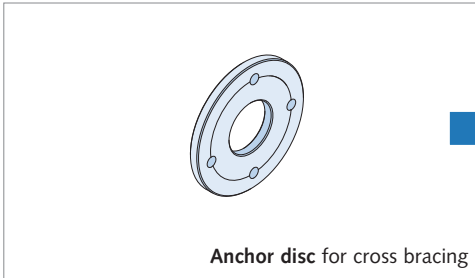


Ordering example → page 11
 Load capacity, system dimensions and materials:
 Steel → pages 14-15
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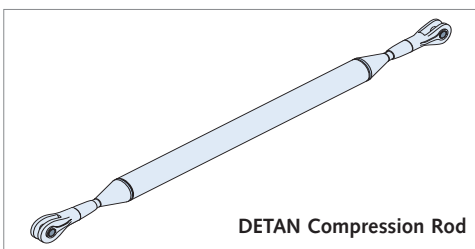
Ordering example → page 12
 Load capacity, system dimensions and materials:
 Steel → pages 14-15
 Stainless steel → pages 16-17

Cross bracing:



Ordering example → page 13
 Load capacity, system dimensions and materials:
 Steel → pages 14-15
 Stainless steel → pages 16-17

DETAN Compression rod system



Ordering example → page 18
 Load capacity, system dimensions and materials → pages 18-20

Pretensioning unit



More information → pages 25-26

DETAN ROD SYSTEMS

Product Range Overview: DETAN Tension Rod System

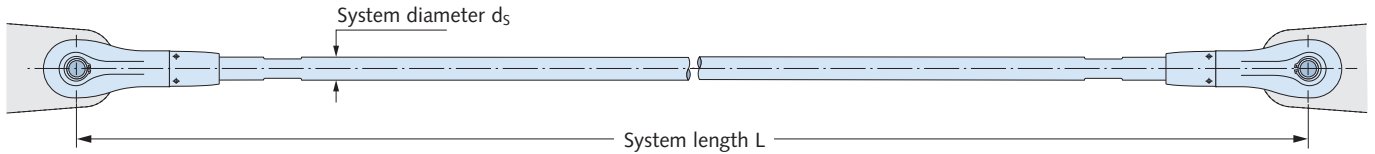
Ordering procedure

Example order: Tension rod system, DETAN-S, $d_s = 30$ mm, $L = 4500$ mm FV, 1 coupler

Product / DETAN System/ system diameter d_s / system length L / specification

Abbreviations:
WB = mill finish
FV = HDG = hot-dip galvanized

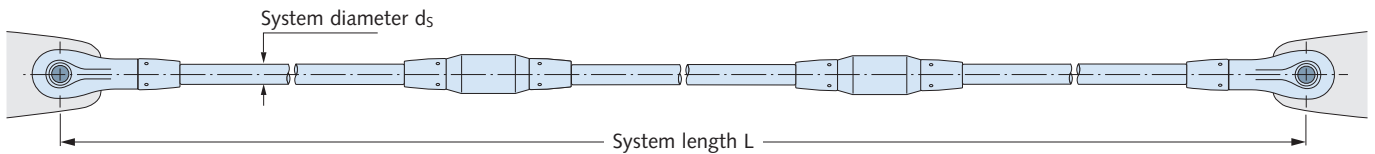
Basic system



Ordering example (material steel HDG): Tension rod system, DETAN-S, $d_s = 52$ mm, $L = 3620$ mm FV

System variants

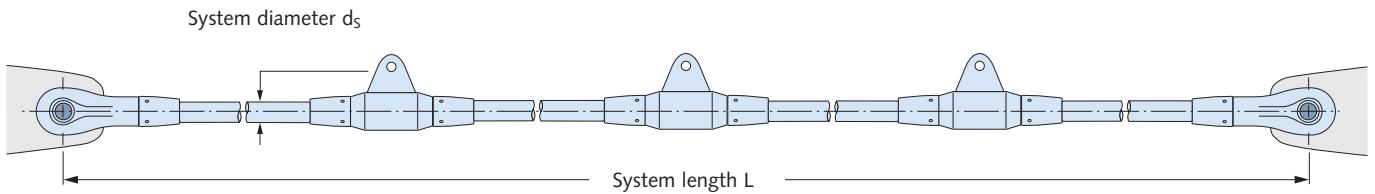
with coupler:



Ordering example (stainless steel): Tension rod system, DETAN-E, $d_s = 24$ mm, $L = 11200$ mm, 2 couplers

Note: Maximum 5 couplers are possible.

coupler with lug:



Ordering example (material steel HDG): Tension rod system, DETAN-S, $d_s = 30$ mm, $L = 34000$ mm FV, 3 couplers with lug

System DETAN-S, European Technical Assessment ETA-05/0207

System diameter d_s [mm]	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Available minimum system length L [mm]																
Rod hot-dip galvanized	250	310	360	440	520	560	600	700	810	940	990	1050	1160	1480	1640	1810
Available maximum system length L with <u>one</u> rod [mm]																
Rod hot-dip galvanized	6060	6070	12080	12100	12120	12140	12140	12170	12220	12260	12270	12290	12320	15430	15480	15530

System DETAN-E, European Technical Assessment ETA-11/0311

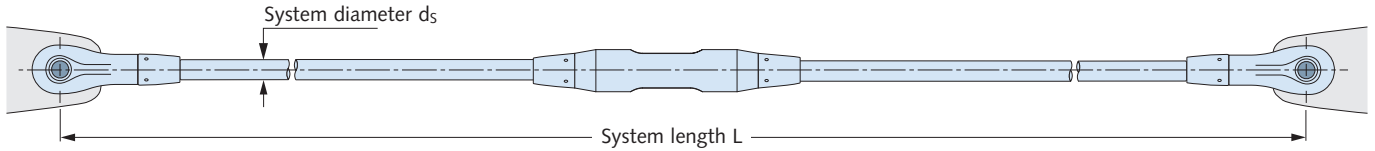
System diameter d_s [mm]	6	8	10	12	16	20	24	27	30
Available minimum system length L [mm]									
Polished	190	210	250	310	360	440	520	560	600
Available maximum system length L with <u>one</u> rod [mm]									
Polished	3040	6050	6060	6070	6080	6100	6120	6140	6140

DETAN ROD SYSTEMS

Product Range Overview: DETAN Tension Rod System

System variants

Cross coupler for cross bracing:



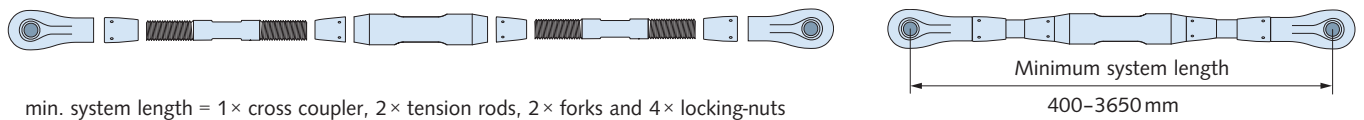
Ordering example (material steel HDG): Tension rod system, DETAN-S, $d_s = 30$ mm, $L = 5600$ mm FV, 1 cross coupler

DETAN-S und DETAN-E System dimensions

System - Ø d_s [mm]	6	8	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Reduction for 2 × fork	44	51	60	73	85	107	128	140	148	179	220	264	277	290	324	432	482	532
O_m	10.5	12.5	15.0	18.5	22.5	27.0	34.0	37.5	42.5	51.0	55.0	62.5	70.5	77.5	85.0	115.0	130.0	155.0
L_{km}	70	85	100	120	142	166	200	222	242	284	310	348	400	440	478	631	710	830
min. system length	400	450	550	650	750	900	1050	1150	1200	1400	1600	1850	2000	2100	2300	2950	3250	3650

spanner flats are available with bars from 700 mm in length

Minimal system length



min. system length = 1 × cross coupler, 2 × tension rods, 2 × forks and 4 × locking-nuts

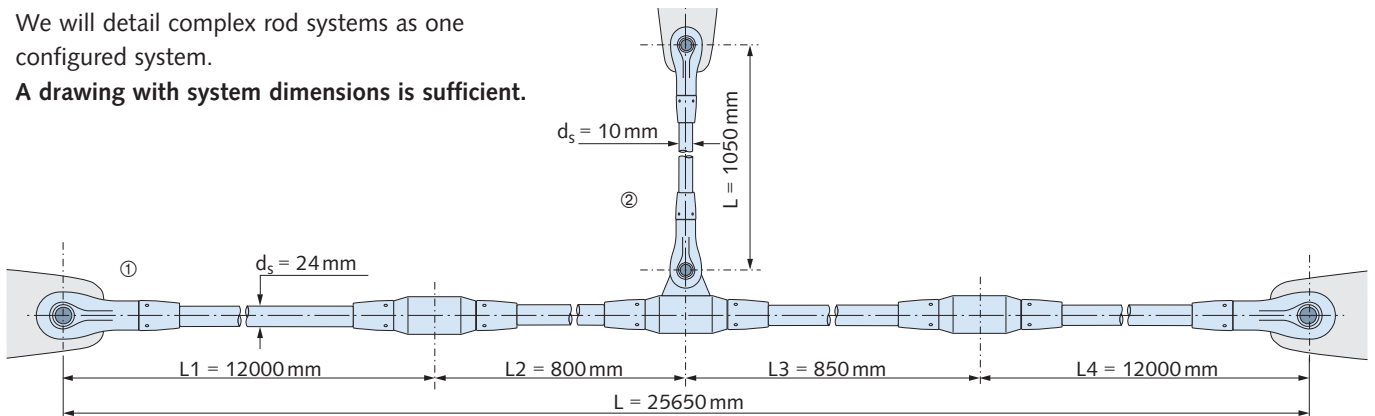
System variant with asymmetric distribution of couplers

Order with specification of system length L:

We calculate the rod lengths and minimum and maximum system length. The couplers are distributed symmetrically. If an asymmetric distribution of the couplers is required, a drawing with all necessary measurements must be included. Alternatively, order using our dimensioning software, see page 23.

We will detail complex rod systems as one configured system.

A drawing with system dimensions is sufficient.



Ordering example:

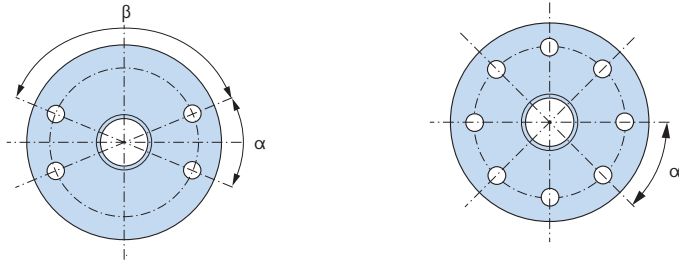
- ① Tension Rod System, DETAN-S, $d_s = 24$ mm, system length according to drawing, WB, couplers according to drawing
- ② Tension Rod System, DETAN-S, $d_s = 10$ mm, system length $L = 1050$ mm WB

DETAN ROD SYSTEMS

Product Range Overview: Cross Bracings, DETAN Compression Rod System

Cross bracings

Anchor disc



Note:

- maximum 8 tension rod connections are possible
- connecting angle $\alpha_{\min} = 40^\circ$

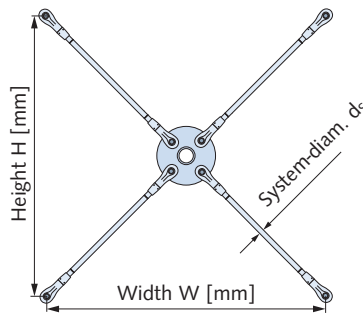
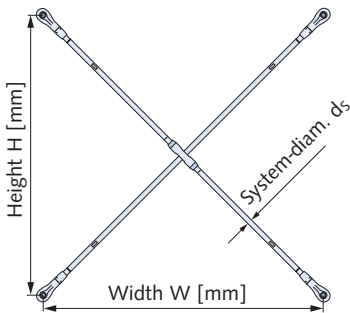
1. Ordering example (material steel): Anchor disc, DETAN-S, $d_s = 42$ mm, 4 holes drilled $\alpha = 40^\circ$, $\beta = 140^\circ$ (see drawing), FV
2. Ordering example (material stainless steel): Anchor disc, DETAN-E, $d_s = 24$ mm, 8 holes drilled $\alpha = 45^\circ$ (see drawing)

System DETAN-S, European Technical Assessment ETA-05/0207

System diameter d_s [mm]	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
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System DETAN-E, European Technical Assessment ETA-11/0311

System diameter d_s [mm]	6	8	10	12	16	20	24	27	30
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Alternatively, please enquiries for **complete systems** with bracings as cross couplers or as anchor disks. **A drawing with system dimensions is sufficient.**

Set articles and individual components

	• Tension rod (specify rod length separately)		• Pin
	• Fork connection set: Fork, locking-nuts, pins, circlips, sealing kit ①, left-hand thread		• Locking nut, left-hand thread
	• Fork connection set: Fork, locking-nuts, pins, circlips, sealing kit ①, right-hand thread		• Locking nut, right-hand thread
	• Coupler set: coupler + 2 locking-nuts, sealing kit ①		• Flat seal
	• Coupler set with lug: coupler with lug + 2 locking-nuts, sealing kit ①		• Round seal
	• Cross coupler set: cross coupler + 2 locking-nuts, sealing kit ①		• Circlip for one fork
	• Spanner		• Coupler, with lug
			• Coupler, without lug
			• Fork, left-hand thread
			• Fork, right-hand thread
			• Cross coupler

① Stainless steel variant is without sealing kit
European Technical Assessment is only valid when using components as a complete system

1. Ordering example: Connection set, DETAN-S, $d_s = 20$ mm, left-hand thread, FV
2. Ordering example: Tension rod, DETAN-E, $d_s = 10$ mm, $L = 500$ mm, thread length left = 120 mm, thread length right = 150 mm

DETAN ROD SYSTEMS

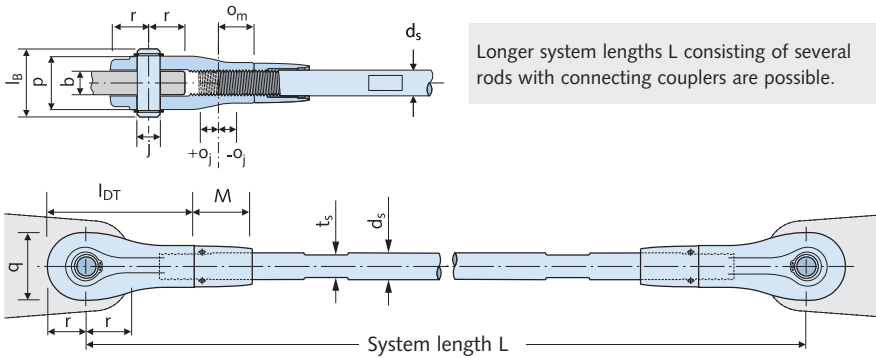
System DETAN-S, European Technical Assessment ETA-05/0207

System components — materials and finish								
		Tension rod			Fork		Couplers, locking-nuts	Anchor disc
System diameter d_s [mm]		10-12	16-76	85-95	10-12	16-95	10-95	10-95
Material		S355J2	S520	S470	S355J2	G20 Mn5+QT	S355J2/S235JR	S355J2
Finish	FV	hot-dip galvanized			hot-dip galvanized		hot-dip galvanized	hot-dip galvanized
	WB	mill finish			hot-dip galvanized		hot-dip galvanized	hot-dip galvanized

System load capacities; system- and available rod lengths; material specification, steel strength grade S355 (diameter d_s 10-12) or S470/S520																
System diameter d_s [mm]	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
System load capacities																
Load capacity $F_{t,R,d}$ [kN]	21.3	30.94	81.22	126.9	182.7	238.1	290.6	423.4	581.1	763.7	911.3	1052.4	1224.5	2016.2	2493.7	3161.6
Available minimum system length L [mm]																
mill finish, hot-dip galvanized	250	310	360	440	520	560	600	700	810	940	990	1050	1160	1480	1640	1810
Available maximum system length with one rod [mm]																
mill finish, hot-dip galvanized	6060	6070	12080	12100	12120	12140	12140	12170	12220	12260	12270	12290	12320	15430	15480	15530
Available maximum rod length L [mm]																
mill finish, hot-dip galvanized	6000		12000										15000			

In accordance with ETA-05/0207 the partial safety value for the table above are assumed as $\gamma_{M0} = 1.0$ and $\gamma_{M2} = 1.25$
 Design load $F_{t,R,d}$ according to annex B11 of ETA-05/0207. The load capacities in this table were determined on the basis of different available material strengths. The up to 15% higher design values can be achieved with strength class S520. The design values of all strength classes can be found in annex B11 of ETA-05/0207.

Fork



System dimensions [mm], materials — see table above																	
System diameter	d_s	10	12	16	20	24	27	30	36	42	48	52	56	60	76 ①	85 ①	95 ①
Fork length	L_{DT}	60	73	89	110	133	147	160	192	225	265	285	305	335	460	520	580
Pin length	l_B	28	32	44	52	60	65	72	84	97	111	119	130	139	180	202	229
Fork width	p	20	24	33	40	46	51	57	68	79	90	98	107	116	146	166	189
Fork height	q	26	31	41	51	61	69	75	90	105	119	125	137	146	196	216	236
Thread depth	o_m	15.0	18.5	22.5	27.0	34.0	37.5	42.5	51.0	55.0	62.5	70.5	77.5	85.0	115	130	155
Screw adjustment range	o_j	5.0	6.5	7.5	8.0	11.0	12.5	12.5	14.0	15.0	17.5	20.0	22.5	25.0	39	45	60
Length locking nut	M	24.5	37.0	41.0	50.0	58.0	63.0	64.0	72.0	83.0	91.0	98.0	105	112	148	165	205
Tension rod		Spanner width t_s												Hook spanner ②			
		8	10	14	18	21	24	27	32	36	41	46	50	55	90/6	90/6	155/6
Locking-nuts	Use soft touch pliers	With hook spanner															
		25-28	30-32	34-36	40-42	45-50	52-55	68-75	68-75	80-90	80-90	80-90	80-90	155/8	155/8	230/10	

① Delivery time on request.

② When using a chain tensioner instead of a hook spanner we recommend protecting the rod surface against damage (also applies to the couplers).

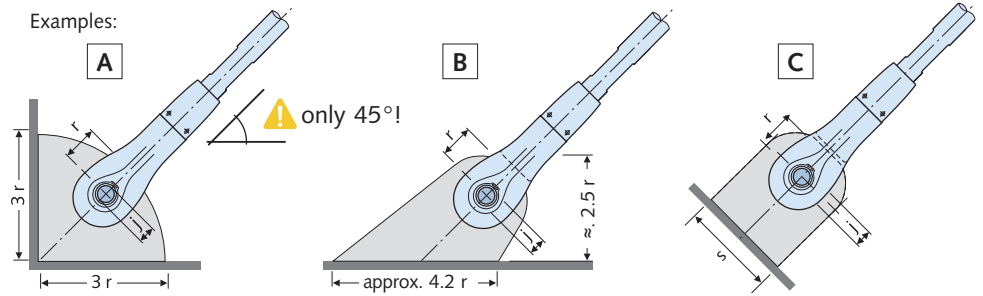
Corrosion protection: rod thread hot-dip galvanized. Fork threads sealed with stoppers. Also see page 22 for sealing system

DETAN ROD SYSTEMS

System DETAN-S, European Technical Assessment ETA-05/0207

Connecting plates

The load transfer from the rod system into the plates is considered as verified if the dimensions in the table have been observed.
Plates are not included in the scope of delivery.



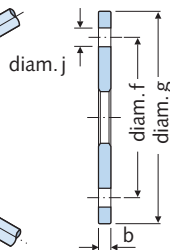
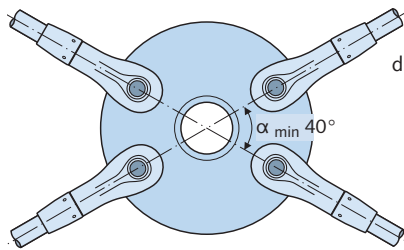
Note: A can only be used when simultaneously using the circular anchor disc at 45°, see page 21.

Dimensions [mm]; Material – minimum qualities for diameter 10-12, steel strength grade S235JR; or for diameter 16-95, steel strength grade S355J2																	
System diameter	d_s	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Thickness conn. plate	b	8	10	15	18	20	22	25	30	35	40	45	50	55	65	75	85
Hole diameter for pin	j	9.5	11.5	15.5	19.5	23.5	26.5	29.5	33.5	41	47	49	53	57	76	86	96
Hole position	r	15	18	24	29	35	39	43	51	60	70	76	83	88	129	149	159
Minimum width	s	28	33	41	53	66	76	83	97	117	134	143	152	162	222	248	281

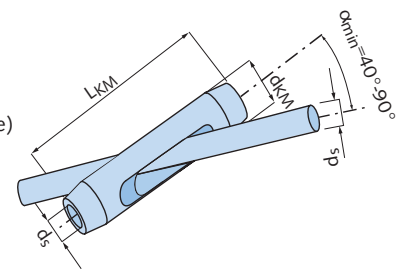
Cross bracing

Option 1: Anchor disc, Standard K40 (smallest connecting angle $\alpha_{min} = 40^\circ$)

Example: Anchor disc with 4 tension rods (max. of 8 rod connections per disc)



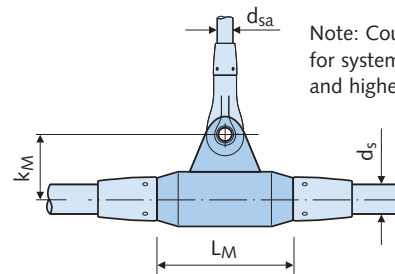
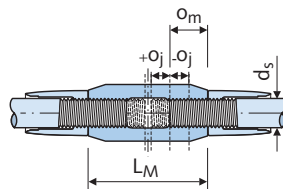
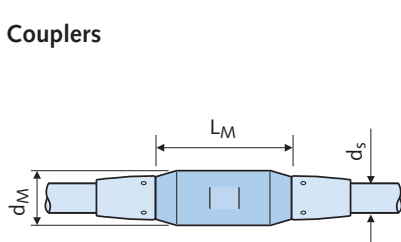
Option 2: Cross coupler (connecting angle $\alpha = 40^\circ - 90^\circ$)



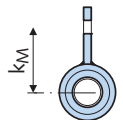
Anchor disc – Dimensions [mm]; material specification, steel strength grade S355J2, hot-dip galvanized																	
System diameter	d_s	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Diameter of outer holes	f	90	110	140	180	210	240	260	310	360	420	450	490	520	702	777	832
Outer anchor disc - diam.	g	120	146	186	238	280	318	346	412	480	558	600	652	692	960	1075	1150

Cross coupler – Dimensions [mm]; material specification, steel strength grade S355J2, hot-dip galvanized																	
System diameter	d_s	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Coupler length	L_{KM}	100	120	142	166	200	222	242	284	310	348	400	440	478	631	710	830
Coupler diameter	d_{KM}	20	24	32	39	46	52	57	70	80	93	101	112	120	154	173	194

Couplers



Note: Coupler with lug only for system diameter 12 mm and higher.



Dimensions [mm]; material specification, steel strength grade S355J2, hot-dip galvanized																	
System diameter	d_s	10	12	16	20	24	27	30	36	42	48	52	56	60	76	85	95
Coupler length	L_M	40	50	62	78	94	104	120	140	158	180	195	210	245	328	370	450
Coupler diameter	d_M	20	22	28	35	42	47	53	64	75	87	93	98	104	155	180	195
Thread depth	o_m	15.0	18.5	22.5	27.0	34.0	37.5	42.5	51.0	55.0	62.5	70.5	77.5	85.0	115	130	155
Screw adjustment range	o_j	5.0	6.5	7.5	8.0	11.0	12.5	12.5	14.0	15.0	17.5	20.0	22.5	25.0	39	45	60
Suspension system diam.	d_{sa}	-	10	10	10	10	10	10	10	10	12	12	12	12	12	16	16
Offset of suspension hole	k_M	-	28.0	31.0	44.5	48.0	50.5	57.5	72.0	86.5	98.5	111.5	124.5	137.0	140.0	150.0	157.5
Hook spanner size	-	-	-	-	-	-	-	-	-	-	-	-	-	-	155/8	230/10	230/10

DETAN ROD SYSTEMS

System DETAN-E in Stainless Steel, European Technical Assessment ETA-11/0311

System components – material and design					
	Tension rod ②	Fork ②	Couplers ③, locking-nuts ④	Pins ②, circlips ①	Anchor disc ④
System diameter d_s [mm]	6-30	6-30	6-30	6-30	6-30
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Finish	polished	polished	polished	polished	polished
① circlips according to DIN 471, stainless steel 1.4568/1.4568			③ stainless steel material, strength grade S355		
② stainless steel material, strength grade S460			④ stainless steel material, strength grade S235		
Stainless steel acc. to ETA 11/0311, annex B2 corresponds to corrosion resistance class (CRC) III acc. to EN 1993 1-4					

Note: When using DETAN-E the effects of corrosion for various ambient conditions must be verified by the design engineer for each separate case.

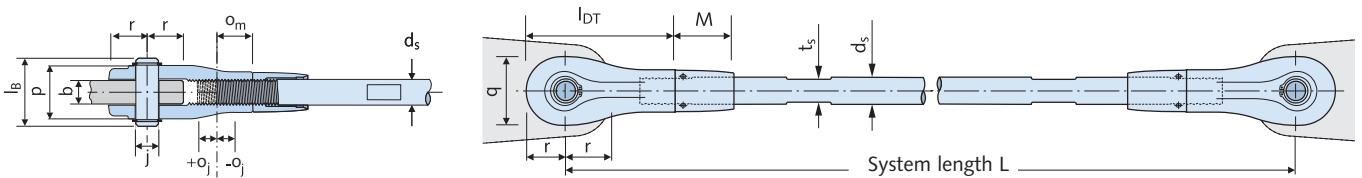
Load capacities, system and available rod lengths, stainless steel									
System diameter d_s [mm]	6	8	10	12	16	20	24	27	30
System load capacities									
Load capacity $F_{t,R,d}$ [kN] ⑤	9.42	17.13	27.14	39.44	73.32	114.6	165.0	215.0	262.4
Available minimum system length L [mm]									
Polished	190	210	250	310	360	440	520	560	600
Available maximum system length with <u>one</u> rod [mm] ⑥									
Polished	3040	6050	6060	6070	6080	6100	6120	6140	6140
Available maximum rod length L [mm]									
Polished	3000		6000						

In accordance with ETA-11/0311 the partial safety value for the table above are assumed as $\gamma_{M0} = 1.1$ and $\gamma_{M2} = 1.25$. If other partial safety factors are to be applied the load capacities have to be calculated according to ETA 11/0311.

⑤ N_{RD} : Design load according to ETA 11/0311, annex B10.

⑥ Longer system lengths L consisting of several rods with connecting couplers are possible!

Fork



System dimensions [mm]; materials, see table above										
System diameter	d_s	6	8	10	12	16	20	24	27	30
Fork length	L_{DT}	42	50	60	73	89	110	133	147	160
Pin length	l_B	18	22	28	32	42	50	58	63	70
Fork width	p	12	16	21	24	33	40	46	51	57
Fork height	q	17	21	26	31	41	51	61	69	75
Thread depth	o_m	10.5	12.5	15.0	18.5	22.5	27.0	34.0	37.5	42.5
Screw adjustment range	o_j	4.5	4.5	5.0	6.5	7.5	8.0	11.0	12.5	12.5
Length locking nut	M	17.5	20.0	24.5	37.0	41.0	50.0	58.0	63.0	64.0
Tension rod assembly: Spanner width	t_s	5	6	8	10	14	18	21	24	27
Locking nut assembly: Hook spanner size		Use soft-touch pliers				25-28	30-32	34-36	40-42	45-50
Edge distance	r	→ see table on page 17 for dimensions of connecting plates								
Pin hole diameter	j									
Thickness of connection plate	b									

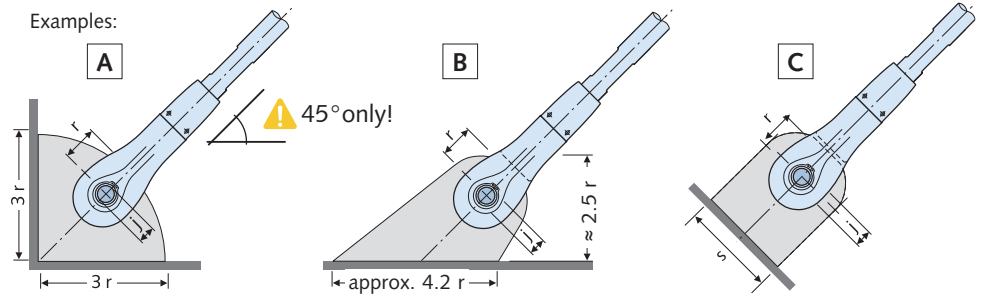
DETAN ROD SYSTEMS

System DETAN-E in Stainless Steel, European Technical Assessment ETA-11/0311

Connecting plates

The load transfer from the rod system into the connection plates is considered as verified if the dimensions in the table have been observed.

Connection plates are not included in the scope of delivery.



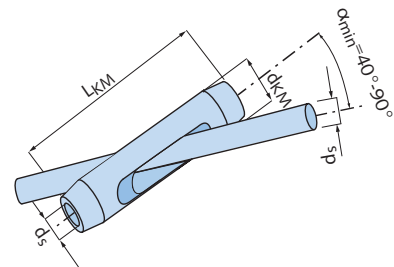
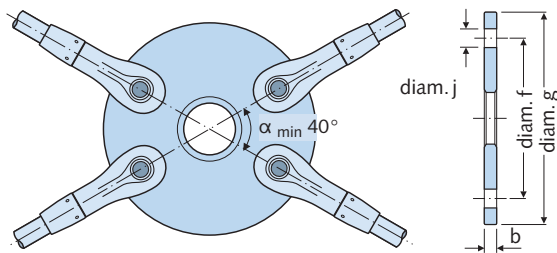
Note: A only possible when simultaneously using the circular anchor disc at 45°, see page 21.

Dimensions [mm]; material — minimum qualities: Stainless steel, strength grade S235										
System diameter	d_s	6	8	10	12	16	20	24	27	30
Thickness conn. plate	b	6	8	10	12	16	20	22	25	30
Hole diameter for pin	j	6.5	7.5	9.5	11.5	14.5	18.5	21.5	24.5	26.5
Hole position	r	9	12	15	18	24	29	35	39	43
Minimum width	s	17	21	26	31	41	51	61	69	75

Cross bracing

Option 1: **Anchor disc**, Standard K40 (smallest connecting angle $\alpha_{min} = 40^\circ$) Example: Anchor disc with 4 tension rods (maximum 8 tension rod connections per disc)

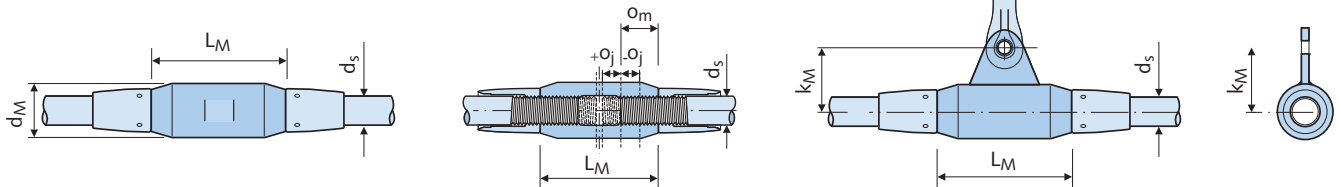
Option 2: **Cross coupler** (connecting angle $\alpha = 40^\circ-90^\circ$)



Anchor disc: measurements [mm]; material: Stainless steel, strength grade S235									
System diameter d_s	6	8	10	12	16	20	24	27	30
Outer hole diameter	f	55	75	90	110	140	180	210	240
Outer anchor disc diameter	g	73	99	120	146	186	238	280	318

Cross coupler: measurements [mm]; material: Stainless steel, strength grade S355									
System diameter d_s	6	8	10	12	16	20	24	27	30
Coupler length	L_{KM}	70	80	100	120	142	166	200	222
Coupler diameter	d_{KM}	14	17	20	24	32	39	46	52

Couplers



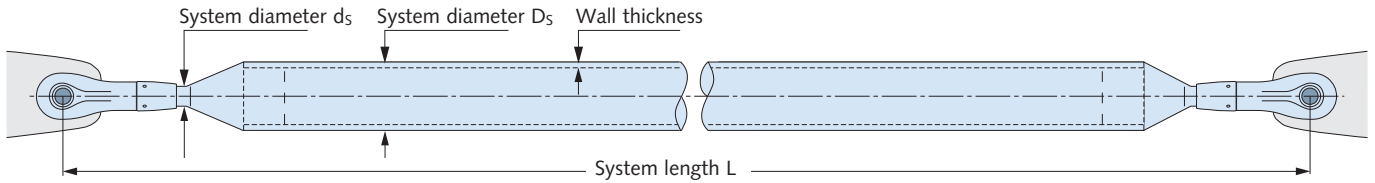
Dimensions [mm]; material, stainless steel, strength grade S355										
System diameter	d_s	6	8	10	12	16	20	24	27	30
Coupler length	L_M	34	40	40	50	62	78	94	104	120
Coupler diameter	d_M	12	15	20	22	28	35	42	47	53
Thread depth	o_m	10.5	12.5	15.0	18.5	22.5	27.0	34.0	37.5	42.5
Screw adjustment range	o_j	4.5	4.5	5.0	6.5	7.5	8.0	11.0	12.5	12.5
Suspension system diam.	d_{sa}	-	-	-	6	6	8	8	10	10
Offset, suspension hole	k_M	-	-	-	27.5	33.0	37.0	44.0	50.5	57.5

DETAN ROD SYSTEMS

Product Range Overview: DETAN Compression Rod System

DETAN Compression rod

To complement the DETAN Tension rod system we also offer compression rods, which can be incorporated technically and aesthetically perfect into a system. Compression rods consist of larger diameter tubes, which are tapered at each end allowing standard DETAN Fork heads to be used.



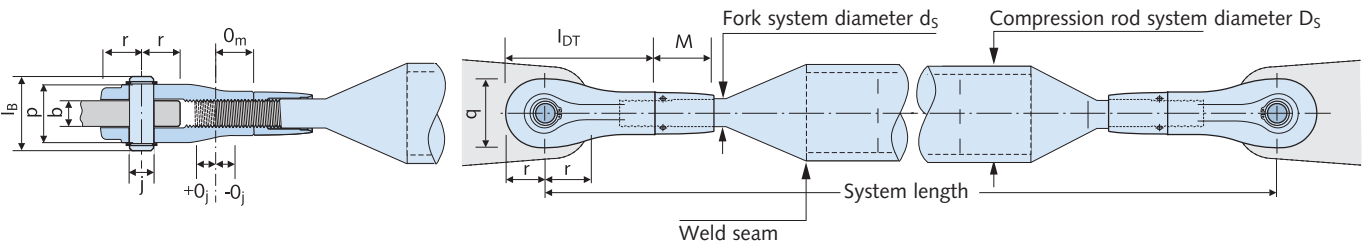
Ordering example: Compression rod system, DETAN-S, $D_s = 42$ mm, $L = 2000$ mm, fork connector $d_s = 16$ mm

Rod cross-sections — examples / recommended configurations							
System - $\varnothing D_s$ [mm]	42	54	60	76	89	114	139
Rod diameter	42.4	54.0	60.3	76.1	88.9	114.3	139.7
Wall thickness	2.6	2.6	2.9	2.9	3.2	3.6	4.0

Other rod dimensions are also available.
Please contact us for further information.

! Static calculation of compression rods is required for individual projects. A free DETAN Calculation program is available. Contact us if you require assistance. An enquiry with drawings, system dimensions and static verification is also possible.

System components and materials



All fork and connecting plate system dimensions; see page 14–15 (steel), 16–17 (stainless steel)

Compression rod in steel			
	Compression rod	Fork	Locking nut
System diameter D_s [mm]	42-139/according to statics calculations	according to statics calculations	see fork
Material	S355J2	G20 Mn5+QT	S235JR
Finish	FV	hot-dip galvanized	hot-dip galvanized
	WB	mill finish	hot-dip galvanized

Compression rod in stainless steel			
	Compression rod	Fork	Locking nut
System diameter D_s [mm]	42-139/according to statics calculations	according to statics calculations	see fork
Material	S235	S460	S235
Finish	stainless steel ①	stainless steel ①	stainless steel ①

① Stainless steel corresponds to corrosion protection class III as in German approval no. Z-30.3-6.

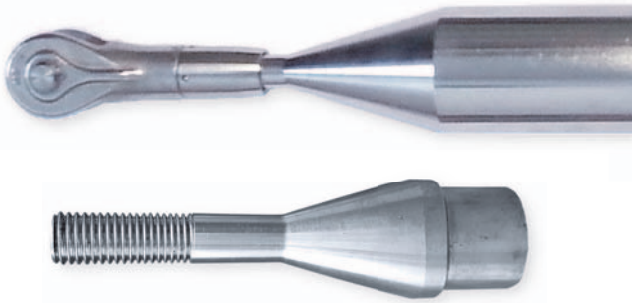
! **Note:** The design engineer is responsible for verifying the corrosion resistance is suitable for the various ambient conditions in each individual case when using DETAN-E.

DETAN ROD SYSTEMS

DETAN Compression Rod System

System assembly

Length adjustment at the forks.
 The cone (with thread) is inserted in the rod and secured with a continuous weld.
 Available as a custom piece with at least one fork.



Duplex-coatings

Custom colour design: Powder coating

Two criteria can be met with a protective powder coating:
 Free architectural design using colour with simultaneous improvement of the corrosion protection.
 The coatings can be applied by a certified coating specialist.

Duplex-coating (Hot-dip galvanized + paint coating or powder coating) according to EN ISO 12944-5.



Safety instructions and installation information

See page 21 for assembly and safety instructions. More information for DETAN Rod systems assembly can be found in the installation instruction INST_DT.



Scan the QR to download the assembly instructions as a pdf file or go to, www.halfen.com/products/tension-rod-systems/detan-rod-system/product-information



Scan the QR code for an installation video or go to,

www.halfen.com/service/videos/tension-rod-systems



Fire protection

There are reactive fire protection systems for steel elements with round profiles approved by the German Institute of Construction Engineering (DIBt, Deutsches Institut für Bautechnik) on the market. We can gladly put you in touch with the supplier of such systems.

Downloads and information about the fire protection system HENSOTHERM® 421 KS by Rudolf Hensel GmbH, are available on the website at www.rudolf-hensel.de/421KS.



BRANDSCHUTZSYSTEME

DETAN ROD SYSTEMS

Couplers and Compression Rods

DETAN Cross couplers



Cross coupler with a minimal cross angle of 40°



Cross-bracing with a cross coupler

The DETAN Cross coupler is an alternative to the anchor disc cross coupler. The new cross coupler can be used for minimum crossing angles. The cross coupler can be used instead of the anchor disc and 4 fork heads. In both cases the same load capacity is guaranteed. The new cross coupler is also available in two finishes.

- hot-dip galvanized steel
- stainless steel

The DETAN Cross couplers are elegant solutions and allow contactless crossing of tension rods in the same plane. Other advantages are the moderate costs compared to an anchor disc solution and the easy installation.

DETAN Compression rods



Bracing between an exterior steel column and an interior steel beam



Compression system connected to a welded plate

The DETAN Rod system is an intelligent system combining tension and compression rods. To complement the DETAN Rod system we also supply compression rods that integrate perfect both visually and technically into the system. To blend in and to match the tension rods the compression rods taper towards the rod-ends. This allows use of the same design of fork and locking-nuts to give a uniform design. The concept is especially convincing as the forks are suitable for compression as well as for tension loads. This combination of tension and compression rods is therefore technically very beneficial.

As with the DETAN-S and DETAN-E the compression rods are also available in steel and stainless steel. In addition to standard pipe profiles we also provide other pipe cross-sections and special solutions.

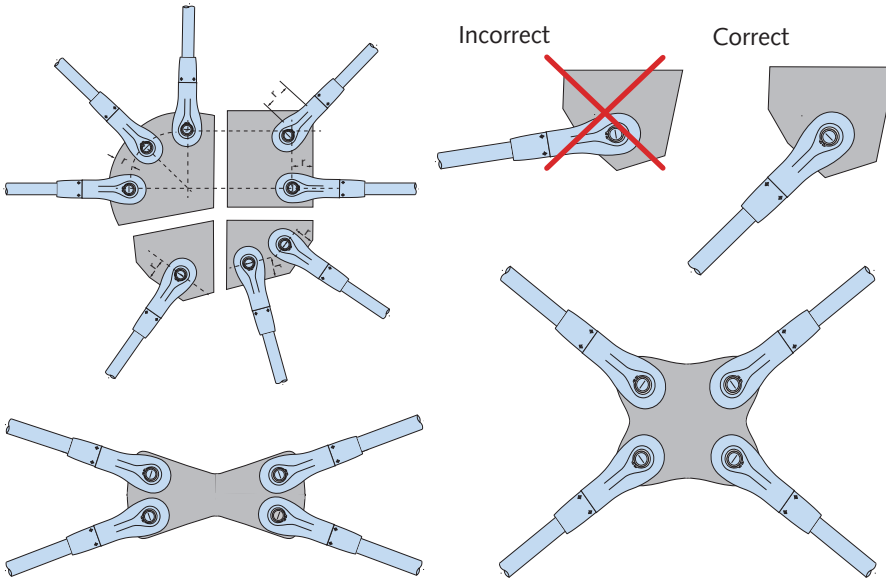
The compression rod systems are pre-assembled with our standard forks and locking-nuts.

DETAN ROD SYSTEMS

Connection plates and Installation

Examples – Connection plates and anchor discs

Connection plates



The connecting elements shown here are only examples of our custom solutions illustrating possible shapes of connecting plates. These steel plates are not standard products. Drawings are always required for enquiries and estimates.

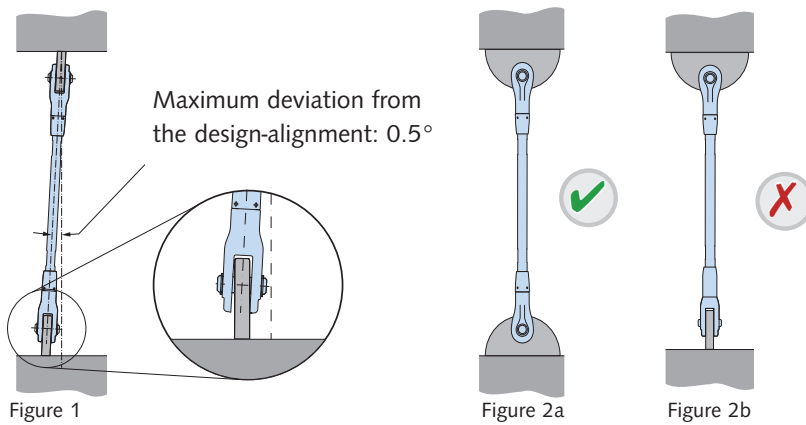
HALFEN Universal connection

A Technical Product Information pdf document can be downloaded here:



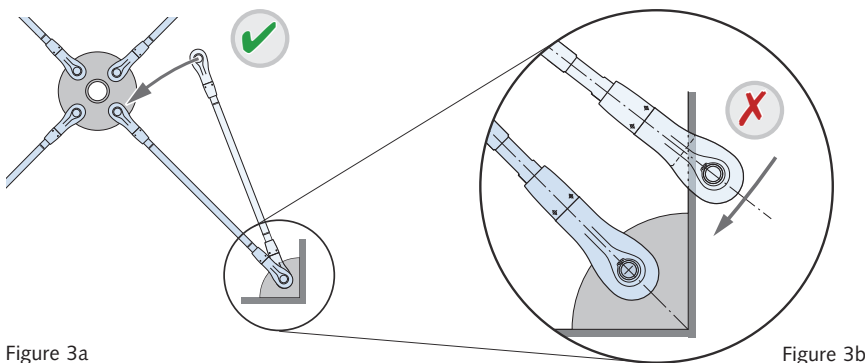
[www.halfen.com/products/reinforcement-systems/HUC Universal connection](http://www.halfen.com/products/reinforcement-systems/HUC%20Universal%20connection)

Installation and safety notes



Forks must be **correctly aligned** and positioned in the **same plane** (Figure 1 and 2a) to ensure that the tension system is not subjected to bending.

To ensure the rod can be installed, one fork end of the rod **must be able to swing into place**; this may not always be possible (see figure 3b). An **anchor disk** must be used in this case, to allow correct installation (see figure 3a).



! Prior to installation all DETAN Rod system components must be checked for damage. Damaged components must not be used.

i More information can be found in the installation instruction **INST_DT** (see page 19)

DETAN ROD SYSTEMS

The Advantages at a Glance

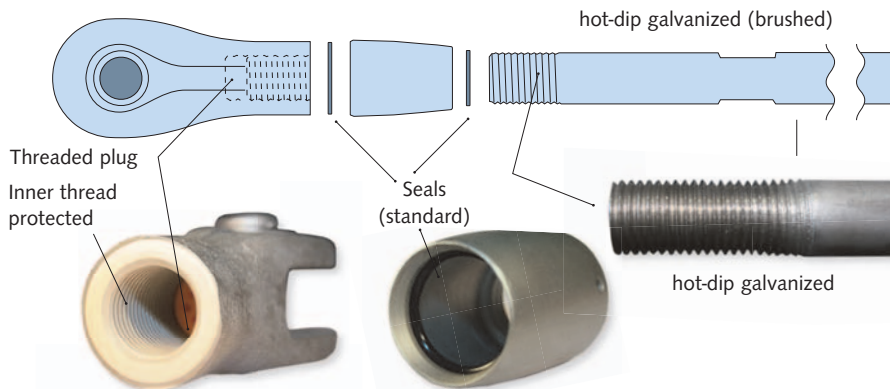
Corrosion protection

The DETAN Rod systems offer high protection against corrosion, especially for vulnerable parts of the system, e.g. the threads.

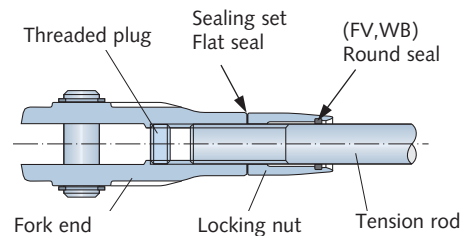
The forks and locking-nuts are hot-dip galvanized to ensure durable top-quality protection against corrosion as well as to ensure good mechanical resistance.

Reliable and durable

- tension rods are completely hot-dip galvanized after production
- no danger of hydrogen embrittlement
- no flaking zinc
- large spanner flats ensure that rod can be properly tightened
- forks and locking-nuts are hot-dip galvanized
- threads are corrosion protected
- threads are additionally protected against humidity and contamination
- sealing-sets as standard for rods with diameter 16 mm or larger



Sealing systems for system-component (for tension and compressure rods) = effective protection against humidity and contamination



All forks are delivered with a threaded cap inserted to protect the thread as standard. The caps are colour-coded to help identify the thread direction:
Yellow = right-hand thread,
Blue = left-hand thread.
 A special sealing system is provided as standard for additional protection

for all rod diameters larger 16 mm. We recommend sealing the outer joint of the locking-nuts on-site with a durable elastic silicone suitable for outdoor application. In general, all connecting couplers smaller than M16 should always be sealed using suitable silicone sealant.

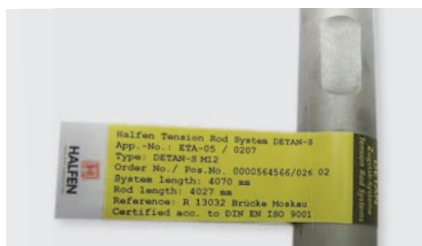
Optimal on-site logistics



Rod marked with system information

Avoid mix-ups on-site with system specific rod marking

- all rods are clearly marked with contract and customer specific data (order and rod position number, rod length, system size)
- standard for systems diameter 16 – 60 mm (DETAN-S)



Label with product-specific data

Easy and customer-friendly labels with specific information

- includes product-specific information, e.g. system length, system diameter
- exact identification and sorting with item position numbers
- optimized and efficient on-site logistics
- customer specified information possible: Project-data, e.g. floor numbers or node position

DETAN ROD SYSTEMS

DETAN Design Software

Certified quality

Pre-assembled delivery

The DETAN Rod systems up to and including 60 mm diameter will be delivered pre-assembled. (76 mm diameter rods and larger are delivered in separate components). Larger system elements will be separated at the couplers as required to enable delivery.

Economic and time saving

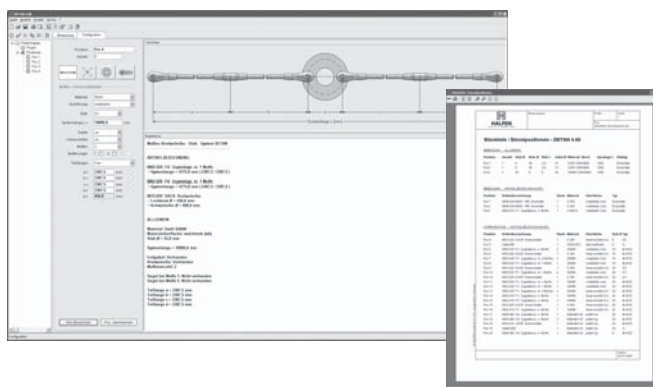
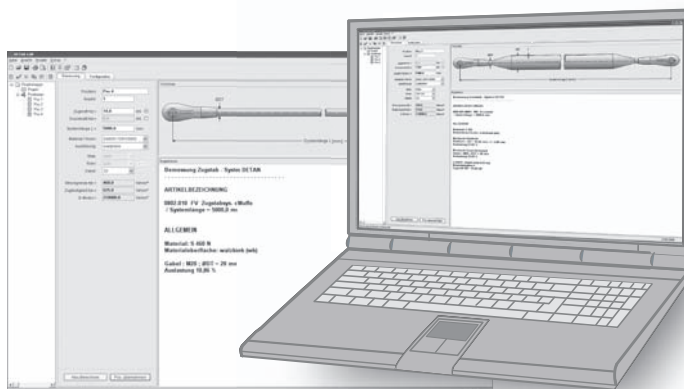
- › no further on-site assembly required
- › no danger of mix-ups
- › pre-assembled to system length $L + o_j$ → see pages 12 and 14
- › free movement of threads ensured
- › easy online forms available for tender request, or use the order forms attached → see pages 28-29



DETAN Design software

The DETAN design software:
Structural calculation and planning tool
in one programme.

- › user-friendly programme interface
- › structural calculation:
tension rod system design according to ETA Assessment, compression rod system design according to EC3 and ETA Assessment
- › various material options and finishes
- › planning and ordering of custom solutions and standards
- › dimension results are used to generate item lists with individual positions listed in a print-out
- › up-to-date versions of the calculation program available on the internet in German, English, French, Polish, Dutch, Czech, Italian, Spanish, Portuguese, Magyar and Slovenian

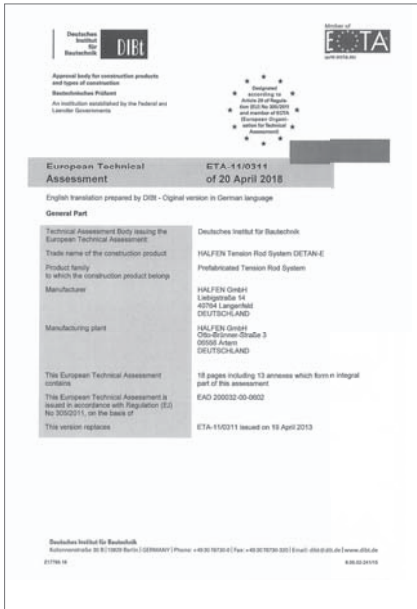


www.halfen.com/Downloads/Software-CAD/Dimensioning Software/DETAN

DETAN ROD SYSTEMS

European Technical Assessment

ETA-European Technical Assessment – a reliable base for structural design



DETAN-E

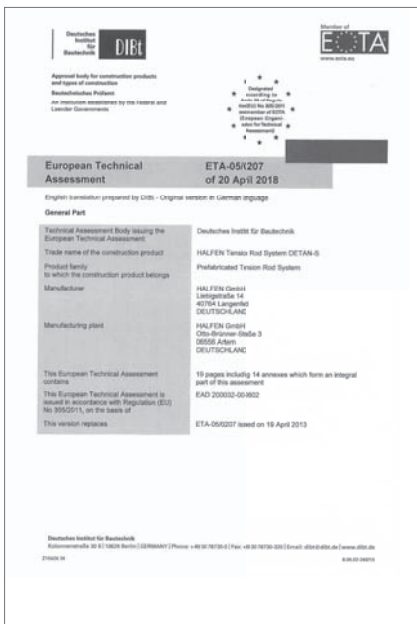
- European Technical Assessment ETA-11/0311
- CE marking

European Technical Assessment for DETAN-E

- tension rod system DETAN-E in stainless steel with European Technical Assessment ETA-11/0311
- permanent quality and production monitoring by a supervisory institution
- CE marking recognized in all European Union countries
- 25% higher loads compared to strength class S355 due to the higher tensile strength of the tension rods
- design of allowable loads considering country-specific coefficients γ_{M0} and γ_{M2} (NAD) using the DETAN software
- minimum requirements (strength class 235) for building-site connection plates facilitates simple procurement
- EU wide, standardised design concept
- no national approvals or certificates required
- cross couplers are a cost effective alternative to anchor discs for cross bracings

Design of compression rods

- compression rods are regulated in the ETA
- dimensioning of DETAN-E compression rods in stainless steel strength class 235, according to Eurocode 3 (EN1993-1-4)



DETAN-S

- European Technical Assessment ETA-05/0207
- CE marking



DETAN approvals available on the internet:
www.halfen.com/Products/Tension rod system/DETAN Rod System/Product information

Assessment for DETAN-S

- tension rod system DETAN-S with European Technical Assessment ETA-05/0207
- up to 15% higher load capacities with the additional S470 and S520 strength classes which are included in the new ETA; compared with strength class S460
- CE marking recognized in all European Union countries
- design of allowable loads considering country-specific coefficients γ_{M0} and γ_{M2} (NAD) using the DETAN software
- EU wide standardised design concept
- no national approvals or certificates required
- cross couplers are a cost effective alternative to anchor discs for cross bracing

Design of compression rods

- compression rods are regulated in the ETA
- dimensioning of DETAN-S compression rods from tube material, strength class S355, according to Eurocode 3 (EN1993-1-1)

DETAN ROD SYSTEMS

DETAN Pretension Unit

DETAN Pretension unit – Advantages and basics

The exact application of pretension for system diameters 30 and larger can be difficult, therefore additional tools such as hydraulic jacks become necessary.

The HALFEN Pretension unit for use with DETAN Rod systems from M30 to M60 provides an effective solution with load transfer using a threaded-plate preventing damages to the rod surface.

Additional advantages

- › the system is optimised for DETAN Rods
- › extra lightweight aluminium design for simple assembly
- › targeted hydraulic application for tension up to 425 kN
- › no power-source needed
- › the high-quality galvanized surface is protected by special load transfer plates



- › simple control of load application with a calibrated manometer
- › additional control using optional extensometer, even after load application (if previously gauge-marked)
- › functional, simple & robust



Applying pretension

If pretensioning a system is intended then special couplers, special thread lengths and locking-nuts are required. These cannot be retrofitted and must therefore be taken into consideration at the planning stage.

Our technical support team is available to assist in any enquires. Contact information can be found at the back of this catalogue.

To apply pretension, special pretension units are available from our technical support team. The necessary rod force is converted into the required hydraulic pressure and then applied using the DETAN Pretension unit.

Pretension check

If the rod was previously gauge-marked, the pretension force can be controlled using an extensometer.

This system can be used during, as well as after load application.

This allows load control using hydraulic pressure as well as monitoring direct rod strain.

Similar to the DETAN Pretension unit this device is easy to use, is robust and also requires no power-source.



DETAN ROD SYSTEMS

DETAN Pretension Unit

Assembly of the pretension unit



Easy to attach and to operate

To avoid possible damage to the rod surface load transfer is via threaded plates. The hydraulic-system is attached in front and behind the coupler. The hydraulic jacks temporarily relieve the strain on the coupler, allowing the coupler to be easily turned by hand. When reaching the desired pressure, the hydraulic unit is released and removed. After release the coupler

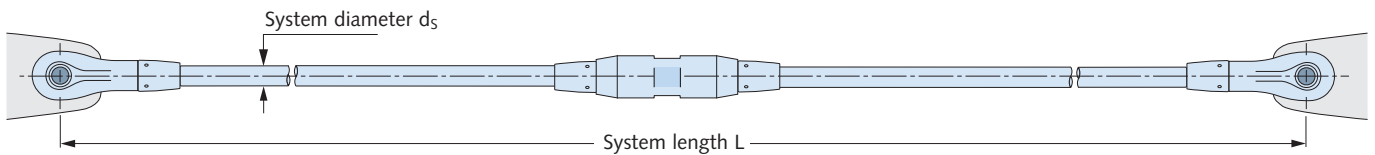
takes the load.

To ensure that the maximum recommended load has been reached the required hydraulic pressure is needed. Please refer to the table below. Alternatively the load can be checked using an extensometer.

A detailed assembly instruction is available on the Internet: [www.halfen.com/Service/Brochures/Installation instructions/DETAN](http://www.halfen.com/Service/Brochures/Installation%20instructions/DETAN)

System variations

with pretension coupler:



Ordering example (material steel): Tension rod system, DETAN-S, $d_s = 30\text{ mm}$, $L = 5600\text{ mm}$ FV, 1 pretension coupler

System load capacities, system lengths and available rod lengths

System diameter d_s [mm]	30	36	42	48	52	56	60
Cross-section A [mm ²]	707	1018	1385	1810	2124	2463	2827
Thread length o [mm]	105	118	126	139	176	188	195
Available min. system length with coupler L [mm]	1076	1244	1440	1652	1758	1866	2056
Load capacity $N_{R,d}$ [kN]	290.6	423.4	581.1	763.7	911.3	1052.4	1224.5

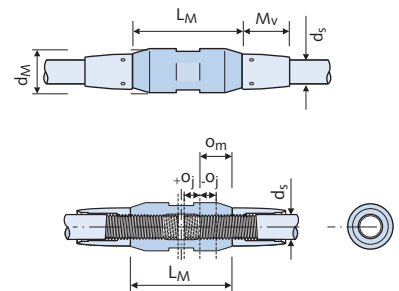
Pretension table for DETAN Rod system S (some values are rounded)

Max. recommended pretension ^① [kN]	N	116	169	232	305	365	421	425 ^②
Hydraulic pressure [bar]	p	190	277	380	500	596	688	695
Strain [% _e]	ϵ	0.78	0.79	0.80	0.80	0.82	0.81	0.72
Stress [N/mm ²]	σ	164	166	168	169	172	171	150
Elongation [$\mu\text{m}/10\text{ cm}$]	Δl	78	79	80	80	82	81	72

① Maximum recommended pretension without precise verification $\pm 40\%$ of $N_{R,d}$. ② Maximum hydraulic pressure at approx. 700 bar

Pretension coupler (all dimensions in [mm])

System diameter d_s	30	36	42	48	52	56	60
Coupler length L_M	120	140	158	180	195	210	245
Coupler diameter d_M	53	64	75	87	93	98	104
Locking nut length M_V	99	107	118	126	158	165	172
Coupler assembly SW	46	55	65	75	80	85	90
Tension rod assembly	Spanner width t_s						
	27	32	36	41	46	50	55
Locking nut assembly	Hook spanner size						
	45-50	52-55	68-75	68-75	80-90	80-90	80-90

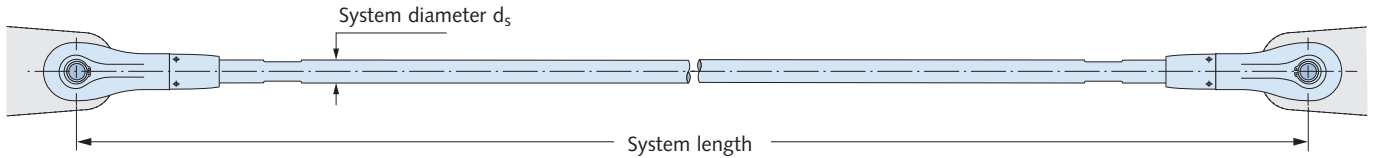


DETAN ROD SYSTEMS

Planning Help

Tender specification – examples

HALFEN Tension rod system DETAN-E



HALFEN Tension rod system type DETAN-E made of stainless steel, corrosion resistance class (CRC) III according to EN 1993-1-4: 2006, consisting of 1 right-hand threaded fork, 1 left-hand thread fork, plus 1 tension rod including 2 pins, 4 circlips and 2 DT-E nuts,

with European Technical Assessment ETA 11/0311, pre-assembled and product-specific-labelled tension rod system, type DETAN-E, d_s , L

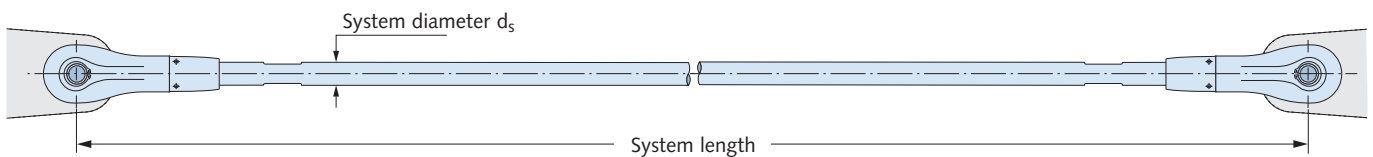
with

d_s = system-diameter [mm] (6 / 8 / 10 / 12 / 16 / 20 / 24 / 27 / 30)

L = system-length [mm] (from bolt-axis/to bolt-axis),

or equivalent; deliver and install according to the manufacturer's installation instructions. Includes welding the connector plates according to the specifications provided by the planner.

HALFEN Tension rod system DETAN-S ...



HALFEN Tension rod system type DETAN-S, consisting of 1 right-hand threaded fork, 1 left-hand threaded fork, plus 1 tension rod including 2 pins, 4 circlips and 2 DT-S nuts,

with European Technical Assessment ETA 05/0207, pre-assembled and product-specific-labelled tension rod system, type DETAN-S $d_s = 30$, L, F

with


d_s = system-diameter [mm] (10 / 12 / 16 / 20 / 24 / 27 / 30 / 36 / 42 / 48 / 52 / 56 / 60 / 76 / 85 / 95)

L = system-length [mm] (from bolt-axis/to bolt-axis),

F = (material FV /WB) for hot-dip galvanized or mill finished surface

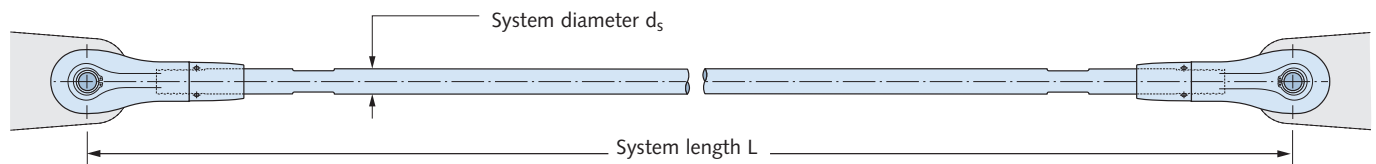
completely hot-dip galvanized finish (alternative; mill finished tension rod), or equivalent; deliver and install according to the manufacturer's installation instructions. Includes welding the connector plates according to the specifications provided by the planner.

DETAN ROD SYSTEMS
Planning Help

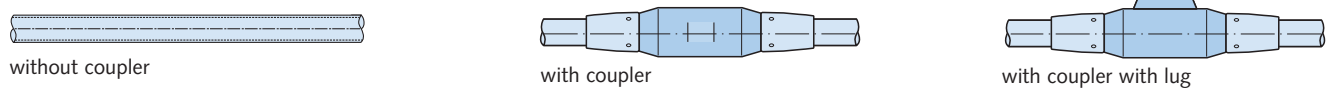
	<p align="center">CHECKLIST DETAN Tension rod system</p>	Product field : DETAN Tension rod systems
		Form no.: CHK-F-DT-001-E

Customer: _____ Contact name: _____
 Customer address: _____
 Phone.: _____ Fax: _____ email: _____
 Project: _____ Project address: _____
 Date: _____ Customer no.: _____ Enquiry Estimate Order

Tension rod system



Design variants:





Choice of material:

DETAN-S - FV (hot-dip galvanized)
 ETA-05/0207; EN1993

DETAN-S - WB (mill finish)
 ETA-05/0207; EN1993

DETAN-E (Stainless steel)
 ETA-11/0311; EN1993


Item	No.	d_s [mm]	$Z_{Ed,max}$ ② [kN]	L [mm]		Quantity			Material choice		
									mill finish	hot-dip galvanized	Stainless steel
<i>Example</i>	3	30		5600		x	2			x	

①: Number of couplers in one system length
 ②: maximum tension load required if diameter is unknown

Please send the completed form to us by email to es.det.halfen.de@leviat.com.
 Please contact us for an estimate.

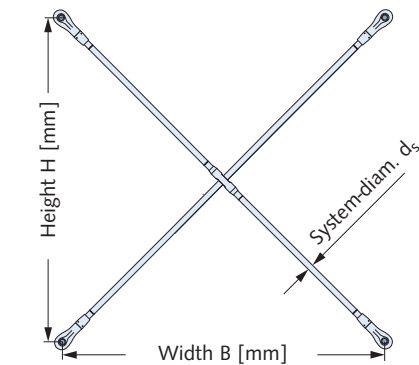
DETAN ROD SYSTEMS

Planning Help

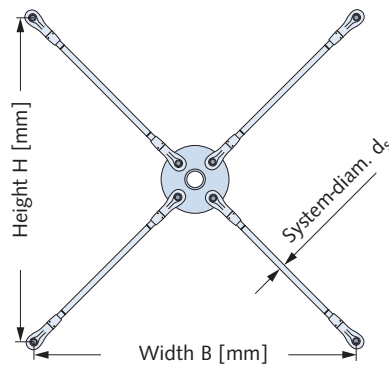
	CHECKLIST DETAN Cross bracings	Product field: DETAN Tension rod systems
		Form no.: CHK-F-DT-002-D

Customer: _____ Contact name: _____
 Customer address: _____
 Phone: _____ Fax: _____ email: _____
 Project: _____ Project address: _____
 Date: _____ Customer no.: _____ Enquiry Estimate Order

Cross bracing



with cross coupler ②



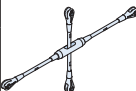
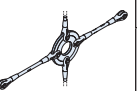
with anchor disc ②

Choice of material:

DETAN-S - FV (hot-dip galvanized)
ETA-05/0207; EN1993

DETAN-S - WB (mill finish)
ETA-05/0207; EN1993

DETAN-E (Stainless steel)
ETA-11/0311; EN1993

Item	Quantity	ds [mm]	Z _{Ed,max} ① [kN]	B [mm]	H [mm]			Material choice		
								mill finish	hot-dip galvanized	Stainless steel
<i>Example</i>	3	30		5600	4200	x		x		

①: maximum tension load required if diameter is unknown
 ②: smallest installation angle $\alpha = 40^\circ$

More order forms are available at:
www.halfen.com/Products/Tension rod system/Order form
 Information about DETAN Dimensioning software → page 23

Please send the completed form to us by email to es.det.halfen.de@leviat.com. Please contact us for an estimate.



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