LUXEMBOURG INSTITUTE FOR
LUXIB
BUILDING AND TECHNOLOGY
62, Avenue de la Liberté
1930 Luxembourg
info@luxib.lu - www.luxib.lu

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
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European Technical Assessment ETA-21/0536 of 31.07.2023

General Part

Technical Assessment Body issuing the European Technical Assessment: LUXEMBOURG INSTITUTE FOR BUILDING AND TECHNOLOGY	
Trade name of the construction product	**JAKOB TENSION COMPONENTS**
Product family to which the construction product belongs	Wire ropes with terminations
Manufacturer	Jakob AG Dorfstraße 34 3555 Trubschachen Switzerland
Manufacturing plant(s)	Jakob Manufacturing Plants (see control plan)
This European Technical Assessment contains	32 pages including 26 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 200001-00-0602 PREFABRICATED STEEL AND STAINLESS STEEL WIRE ROPES WITH END CONNECTORS

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Specific Part

1. Technical description of the product

The construction products are prefabricated tension components consisting of high-strength stainless steel wire ropes with swaged terminations and the trade name “JAKOB TENSION COMPONENTS”. The tension components are connected to each other or to separate terminations with outer threads by stainless steel threaded sleeves (turnbuckles).

The prefabricated high-strength wire ropes made of stainless steel consist of spiral strand ropes as well as the sockets. The wire ropes correspond to EN 10264-4:2012 and EN 10088-3:2014 as well as to the series of standards EN 12385[1]. The system comprises steel wire ropes with different rope constructions (1x19, 1x37, 6x7, 6x19 and 6x36) with diameter 1 mm to 26 mm. All threads are metric ISO threads M 4 to M 36 and and are carried out as right-hand or left-hand thread. Drawings of the steel wire rope system and the components as well as the essential dimensions of the components are given in the Annexes to this ETA.

In addition to the above-mentioned standards, the stainless steel wire ropes comply with the specifications in Annex B1 to B3.

Type of terminations and ancillaries are listed in Annexes C1 to C8 and are selected according to the application. For the product properties of the components of the terminations and ancillaries, the information in Annex B1 applies.

Drawing of the terminations with its components including the essential dimensions are given in the Annexes D1 to D13.

Other components such as locknuts or pin locks, which have no direct influence on the load-bearing capacity of the system, are also part of the system and are therefore included in the drawings (see Annexes D1 to D13).

Dimensions and tolerances not indicated in the Annexes shall correspond to the indications laid down in the technical documentation[2] to this European Technical Assessment.

Remark:
While EAD 200001-00-0602 uses the term “end connector” the standardization committee for EN 1993-1-11 agreed to use “termination”. This document uses the term “termination”.

[1] EN 12385-1:2002+A1:2008, EN 12385-2:2002+A1:2008, EN 12385-3:2004+A1:2008 and EN 12385-10:2003+A1:2008

[2] The technical documentation to this European Technical Assessment is deposited at LUXIB and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure is handed over to the approved bodies.

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The intended use comprises all typical structural applications of high-strength wire ropes made of stainless steel taking into account the national provisions of the Member State applicable for the location where the product is incorporated in the works.

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

The performances given in section 2 are only valid if the prefabricated high-strength stainless steel wire ropes with terminations are used in compliance with the specifications and conditions given in the Annexes.

According to EAD 200001-00-0602 a working life of the tension components of at least 25 years is assumed. The indications given on the working life cannot be interpreted as a guarantee given neither by the manufacturer nor by the Technical Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Characteristics of the product

3.1.1.1 Wire ropes

The wire ropes described in section 2 shall correspond to EN 10264-4:2012 as well as to the series of the standards EN 12385. In addition, the indications in section 3.1.1.2 as well as Annexes B1 to B3 shall be taken into account.

3.1.1.2 Terminations (fork heads, swaged terminations with threads and turnbuckles)

For the product characteristics of the terminations, the indications in Annex B1 apply. The dimensions shall correspond to the indications in Annexes C1 to C8. The threads shown in Annexes C1 and C8 are metric ISO threads M5 to M36.

3.1.1.3 Pins for fork terminations

The indications given in Annexes B1 and B3 apply.

3.1.1.3 Durability

With regard to durability the regulations given in EN 1993-1-11:2006, section 4 and EN 1090-2:2018 shall be observed.

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3.1.2 Performance

Essential characteristic	Performance
Breaking strength	F_{uk} see annex A
Modulus of deformation / elasticity	E_Q see annex B1

3.2 Safety in case of fire (BWR 2)

Steel wire ropes, terminations, ancillaries

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

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

4. General aspects relating to the performances of the construction product

4.1 Resistance to corrosion

For stainless steel components the rules given in EN 1993-1-4:2015 apply. The rules given in EN 1090-2:2018, EN ISO 12944: 2019 and EN ISO 12944: 2018 are taken into account.

4.2 Durability

The rules given in EN 1090-2:2018 and EN 1993-1-11: 2006 are taken into account.

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

In accordance with European Assessment Document EAD No. 200001-00-0602, the applicable European legal act is: 98/214/EC.

The system to be applied is: 2+

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with LUXIB.

Issued in Luxembourg on 31.07.2023 by Luxembourg Institute for Building and Technology

Thierry Kohnen

General Manager

Annex A

A.1 Assumptions concerning design

The design is carried out according to EN 1993-1-11:2006+AC:2009.

The design values of resistance given below are used for design.

The loading is static or quasi-static according to EN 1990:2002 without need of verification of fatigue relating to EN 1993-1-9:2005+AC:2009.

The dimensions, tolerances, material properties and minimum screw-in length stated in this European Technical Assessment are observed.

The wire ropes with sockets are to be used that no systematic bending occurs in the connecting parts.

The design is carried out by a designer of the structure experienced in the field of steel structures.

The characteristic breaking strength F_{uk} given in the Annexes A and C9 for JAKOB TENSION COMPONENTS applies to the ropes with terminations. The design tension resistance F_{Rd} is calculated with the respective nationally applicable partial safety factors as follows.

Design tension resistance of the wire ropes with terminations

The design value of the tension resistance F_{Rd} of the wire ropes including the terminations is determined as follows:

$$F_{Rd} = \min \begin{Bmatrix} F_{Rd,rope} \\ F_{t,Rd,thread} \end{Bmatrix}$$

Where:

$F_{Rd,rope} = F_{uk} / (1{,}5 \cdot \gamma_R)$ with: $F_{uk} = F_{min} \cdot k_e$
F_{min} see annex B2 to B3
$k_e = k_{e,min}$ see annex C1 to C8
$\gamma_R = 1.0$

Remark:
In case several components with steel wire ropes are combined, then the k_e value for which the smallest values result in relation to the tensile load capacity of the system is always decisive.

$F_{t,Rd,thread} = k_2 \cdot f_{ub} \cdot A_s / \gamma_{M2}$ with: $k_2 = 0.9$
f_{ub} see annex B1
A_s = stress cross section thread
$\gamma_{M2} = 1.25$

Remark:
In case several components with threads are combined, then the $F_{t,Rd,thread}$ value with the lowest value is always decisive.

General:

The value given for the partial safety factor γ_R is a minimum value, that means values $\gamma_R < 1.0$ are not allowed. It should be used in cases where no values or no unfavourable values are given in national regulations of the Member State where the wire ropes with sockets are used or in the respective National Annex to Eurocode 3.

For components that do not include a wire rope (e.g. turnbuckles etc.) the design values for the tension resistance are given in the Annexes. The connection components of the supporting structure are not part of the product (ETA) and are carried out by the designer of the structure.

A.2 Assumptions concerning installation

The installation is carried out such that the wire ropes with terminations are accessible for repair or maintenance at any time.

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

The responsible assembler attests by notation that all connections with threads were checked concerning the keeping of the minimum screw-in length given in the annexes.

The conformity of the installed wire ropes with sockets with the provisions of the European Technical Assessment is attested by the executing assembler.

A.3 Indications to the manufacturer

The manufacturer ensures that the information on the specific conditions is given to those who are concerned. This information may be given by reproduction of the European Technical Assessment.

In addition, all essential installation data shall be shown clearly on the package or on an enclosed instruction sheet, preferably using illustration(s).

To prevent confusion the wire ropes with sockets should be packaged and delivered as a complete unit.

Table 1: Minimum mechanical characteristics of stainless steel wires

Properties	High strength stainless steel wires
MinimumTensile Strength R_m	1570 MPa
Yield Strength $R_{p0,2}$	-
Minimum elongation at break	4 %

Table 2: Materials of terminations and ancillaries (materials partially with special requirements as per documentation deposited at LUXIB)

Name	Standard
X5CrNiMo17-12-2 (1.4401)	based on EN 10088-2:2014-12
X5CrNiMo17-12-2 (1.4401)	based on EN 10088-3:2014-12
X2CrNiMo17-12-2 (1.4404)	based on EN 10088-2:2014-12
X2CrNiMo17-12-2 (1.4404)	based on EN 10088-3:2014-12
AISI316	special requirements

Table 3: Reference values for modulus of elasticity E_Q for spiral ropes

Product code / rope construction / diameter of rope	Reference values for modulus of elasticity E_Q
10810 / 1x19 / 2,0 mm ≤ D < 22,0 mm	130 ±10 kN/mm²
10810 / 1x37 / D = 26,0 mm	120 ±10 kN/mm²

Table 4: Reference values for modulus of elasticity E_Q for stranded ropes

Product code / rope construction / diameter of rope	Reference Values for Modulus of Elasticity E_Q
10820 / 6x7 / 1,0 mm ≤ D < 8,0 mm	90 ±10 kN/mm²
10830 / 6x19 / 2,0 mm ≤ D ≤ 16,0 mm	90 ±10 kN/mm²
10830 / 6x36 / D = 20 mm	90 ±10 kN/mm²

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Table 5: Spiral ropes 1x19 / 1x37

Product code [-]	Nominal diameter D [mm]	Construction [-]	F_{min} (1) [kN]	$F_{R,d,rope}$ (2) [kN]
10810-0200	2	1x19	3.3	2.20
10810-0300	3	1x19	7.4	4.93
10810-0400	4	1x19	13.2	8.80
10810-0500	5	1x19	20.6	13.7
10810-0600	6	1x19	29.7	19.8
10810-0800	8	1x19	52.8	35.2
10810-1000	10	1x19	82.5	55.0
10810-1200	12	1x19	119.0	79.3
10810-1400	14	1x19	162.0	108.0
10810-1600	16	1x19	211.0	140.7
10810-1900	19	1x19	298.0	198.7
10810-2200	22	1x19	399.0	266.0
10810-2600	26	1x37	544.0	362.7

Table 6: Stranded ropes 6x7

Product code [-]	Nominal diameter D [mm]	Construction [-]	F_{min} (1) [kN]	$F_{R,d,rope}$ (2) [kN]
10820-0100	1	6x7	0.61	0.43
10820-0200	2	6x7	2.4	1.60
10820-0300	3	6x7	5.2	3.47
10820-0400	4	6x7	9.1	6.07
10820-0500	5	6x7	13.0	8.67
10820-0600	6	6x7	19.0	12.7
10820-0800	8	6x7	38.0	25.3

JAKOB TENSION COMPONENTS

Dimensions and characteristics of steel wire ropes
Spiral ropes 1x19 / 1x37, stranded ropes 6x7

Annex B2

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Table 7: Stranded ropes 6x19 / 6x36

Product code [-]	Nominal diameter D [mm]	Construction [-]	F_{min} (1) [kN]	$F_{R,d,rope}$ (2) [kN]
10830-0200	2	6x19	2.0	1.33
10830-0300	3	6x19	4.6	3.07
10830-0400	4	6x19	8.3	5.53
10830-0500	5	6x19	13.0	8.67
10830-0600	6	6x19	18.7	12.5
10830-0800	8	6x19	33.3	22.2
10830-1000	10	6x19	52.1	34.7
10830-1200	12	6x19	75.0	50.0
10830-1600	16	6x19	133.0	88.7
10830-2000	20	6x36	188.0	125.3

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of steel wire ropes Stranded ropes 6x19 / 6x36	**Annex B3**

Table 8: FORTE terminations (swaged, external thread) for spiral strand ropes 1x19 / 1x37

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
32850-0800	10810-0800	8	M12	0.87
32850-1000	10810-1000	10	M16	0.87
32850-1200	10810-1200	12	M20	0.87
32850-1400	10810-1400	14	M24	0.87
32850-1600	10810-1600	16	M24	0.87
32850-1900	10810-1900	19	M30	0.87
32850-2200	10810-2200	22	M30	0.87
32850-2600	10810-2600	26	M36	0.87

Remark: Terminations with left-hand threads have a product code starting with “32855”.

Table 9: FORTE terminations (clevis, internal thread, bolt)

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	$F_{t,Rd,thread}$ (3) [kN]
32817-0800	-	-	M8	15.8
32817-1000	-	-	M10	25.1
32817-1200	-	-	M12	34.6
32817-1600	-	-	M16	64.4
32817-2000	-	-	M20	100.5
32817-2400	-	-	M24	144.9
32817-3000	-	-	M30	230.2
32817-3600	-	-	M36	335.3

Remark: Terminations with left-hand threads have a product code starting with “32818”.
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JAKOB TENSION COMPONENTS	Annex C1
Dimensions and characteristics of FORTE terminations with threads Swaged termination, clevis with thread	

Table 10: FORTE turnbuckle (internal thread; left-hand / right-hand)

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	$F_{t,Rd,thread}$ (3) [kN]
32875-0800	-	-	M8	15.8
32875-1000	-	-	M10	25.1
32875-1200	-	-	M12	34.6
32875-1600	-	-	M16	64.4
32875-2000	-	-	M20	100.5
32875-2400	-	-	M24	144.9
32875-3000	-	-	M30	230.2
32875-3600	-	-	M36	335.3

Table 11: Clevis (clevis head, swaged, bolt) with spiral rope 1x19

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30981-0200	10810-0200	2	-	0.95
30981-0300	10810-0300	3	-	0.95
30981-0400	10810-0400	4	-	0.95
30981-0500	10810-0500	5	-	0.95
30981-0600	10810-0600	6	-	0.95

Table 12: Clevis (clevis head, swaged, bolt) with stranded rope 6x7

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30981-0200	10820-0200	2	-	0.92
30981-0300	10820-0300	3	-	0.92
30981-0400	10820-0400	4	-	0.92
30981-0500	10820-0500	5	-	0.79
30981-0600	10820-0600	6	-	0.95
30981-0800	10820-0800	8	-	0.95

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of swaged clevis with bolt Spiral ropes 1x19, stranded ropes 6x7	**Annex C3**

Table 13: Clevis (clevis head, swaged, bolt) with stranded rope 6x19 / 6x36

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30981-0200	10830-0200	2	-	0.94
30981-0300	10830-0300	3	-	0.94
30981-0400	10830-0400	4	-	0.94
30981-0500	10830-0500	5	-	0.94
30981-0600	10830-0600	6	-	0.94
30981-0800	10830-0800	8	-	0.94
30981-1000	10830-1000	10	-	0.94
30981-1200	10830-1200	12	-	0.94
30981-1600	10830-1600	16	-	0.94
30981-2000	10830-2000	20	-	0.94

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of swaged clevis with bolts Stranded ropes 6x19 / 6x36	**Annex C4**

Table 14: Clevis (external thread, bolt)

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	$F_{t,Rd,thread}$ (3) [kN]
30971-0500	-	-	M5	6.1
30971-0600	-	-	M6	8.7
30971-0601	-	-	M6	8.7
30971-0800	-	-	M8	15.8
30971-1000	-	-	M10	25.1
30971-1200	-	-	M12	34.6
30971-1600	-	-	M16	64.4
30971-2000	-	-	M20	100.5
30971-2400	-	-	M24	144.9
30971-3000	-	-	M30	230.2

Remark: Connectors with left-hand threads have a product code starting with “30972”

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of threaded clevis with bolts	**Annex C5**

Table 15a: Terminations (swaged, external thread) for spiral ropes 1x19

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30850-0200	10810-0200	2	M5	0.53
30850-0310	10810-0300	3	M6	0.53
30850-0410 M6	10810-0400	4	M6	0.53
30850-0410 M8	10810-0400	4	M8	0.53
30850-0510	10810-0500	5	M8	0.53
30850-0610	10810-0600	6	M10	0.53

Remark: Connectors with left-hand threads have a product code with “30855”.

Table 15b: Terminations (swaged, external thread) for spiral rope 1x19 – tension grid

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30850-171036	10810-0400	4	M8	0.77

Table 16: Terminations (swaged, external thread) for strand ropes 6x7

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30850-0100	10820-0100	1	M4	0.95
30850-0200	10820-0200	2	M5	0.95
30850-0300	10820-0300	3	M6	0.95
30850-0400 M6	10820-0400	4	M6	0.95
30850-0400 M8	10820-0400	4	M8	0.95
30850-0500	10820-0500	5	M8	0.95
30850-0600	10820-0600	6	M10	0.95
30850-0800	10820-0800	8	M12	0.95

Remark: Connectors with left-hand threads have a product code with “30855”.

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of swaged fittings with external threads Spiral ropes 1x19, stranded ropes 6x7	**Annex C6**

Table 17: Terminations (swaged, external thread) for strand ropes 6x19 / 6x36

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	k_e (1) [-]
30850-0200	10830-0200	2	M5	0.87
30850-0300	10830-0300	3	M6	0.87
30850-0400 M6	10830-0400	4	M6	0.87
30850-0400 M8	10830-0400	4	M8	0.87
30850-0500	10830-0500	5	M8	0.87
30850-0600	10830-0600	6	M10	0.87
30850-0810	10830-0800	8	M12	0.87
30850-1000	10830-1000	10	M16	0.87
30850-1200	10830-1200	12	M20	0.87
30850-1600	10830-1600	16	M24	0.87
30850-2000	10830-2000	20	M30	0.87

Remark: Connectors with left-hand threads have a product code with “30855”.

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of swaged fittings with external threads Stranded ropes 6x19 / 6x36	**Annex C7**

Table 18: Turnbuckle (internal thread; left-hand / right-hand)

Product code connector [-]	Product code rope [-]	Nominal diameter rope D [mm]	Thread size [-]	$F_{t,Rd,thread}$ (3) [kN]
30875-0400	-	-	M4	3.8
30875-0500	-	-	M5	6.1
30875-0600	-	-	M6	8.7
30875-0800	-	-	M8	15.8
30875-1000	-	-	M10	25.1
30875-1200	-	-	M12	34.6
30875-1600	-	-	M16	64.4
30875-2000	-	-	M20	100.5

Indices:

(1) Minimum breaking force of the rope according to EN 1993-1-11:2006+AC:2009, section 1.3.9

(2) $F_{R,d,rope}$ applies to the rope without considering the termination and is determined according to EN 1993-1-11:2006+AC:2009, section 6.2

(3) $F_{t,Rd,thread}$ applies to the thread according to EN 1993-1-8:2005+AC:2009, section 3.6.1

JAKOB TENSION COMPONENTS	
Dimensions and characteristics of turnbuckle	**Annex C8**

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32850 FORTE swaged external thread

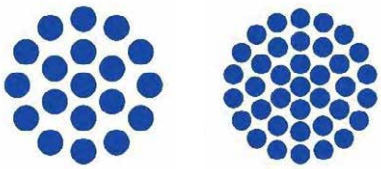
32817 FORTE Clevis

32875 FORTE turnbuckle

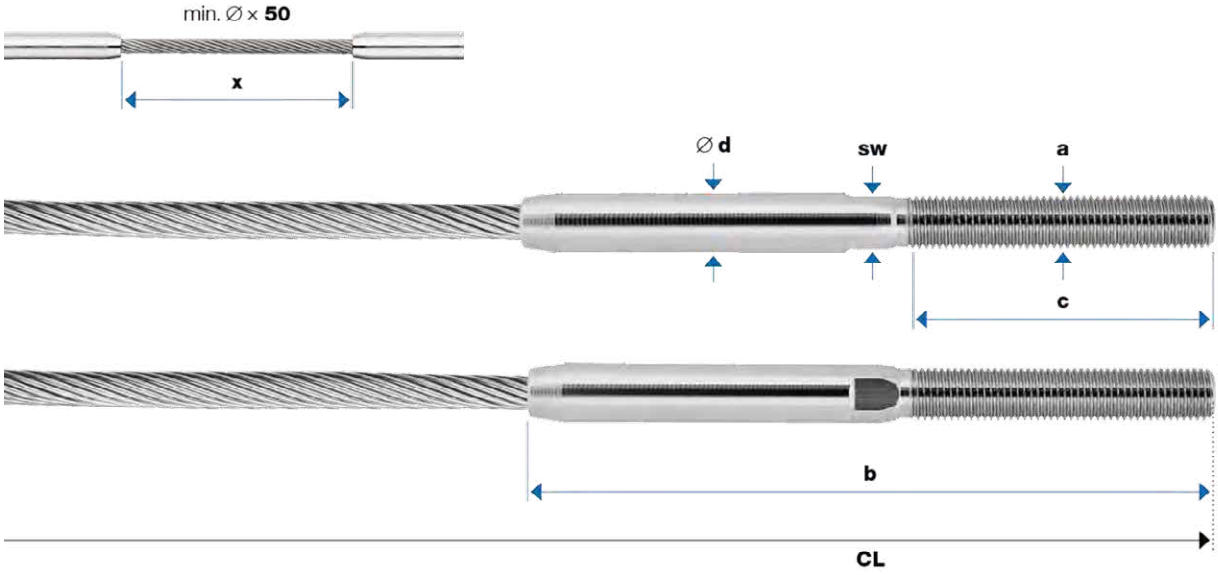
32881 FORTE swaged termination with clevis

32870 FORTE swaged termination with turnbuckle and clevis

Applicable spiral rope constructions



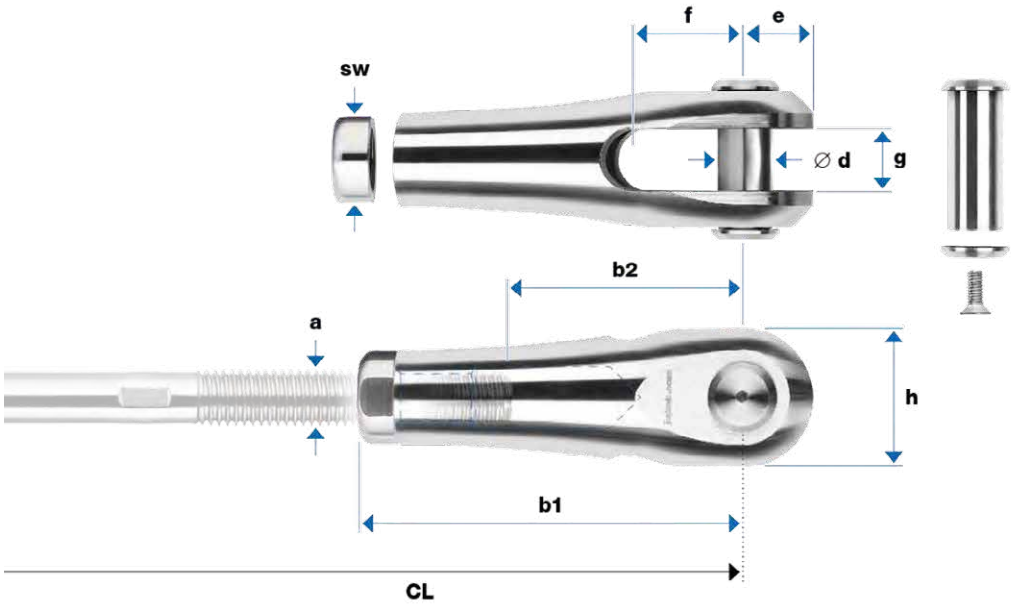
JAKOB TENSION COMPONENTS	Annex D1
Overview FORTE components	



Article-No. 32850-	**rope Ø** [mm]	**d** [mm]	**sw** [mm]	**a** [-]	**b** [mm]	**c** [mm]
0800-01 0800-011	8	16.1	9	M12	175 112	80 26
1000-01 1000-011	10	17.9	12	M16	205 140	90 34
1200-01 1200-011	12	21.4	15	M20	235 170	100 42
1400-01 1400-011	14	25.0	18	M24	282 197	120 50
1600-01 1600-011	16	28.2	18	M24	300 214	120 50
1900-01 1900-011	19	34.5	23	M30	362 258	150 61
2200-01 2200-011	22	40.5	23	M30	390 287	150 61
2600-01 2600-011	26	46.0	28	M36	420 320	160 74

Remark: Connectors with left-hand threads have a product code with “32855”.

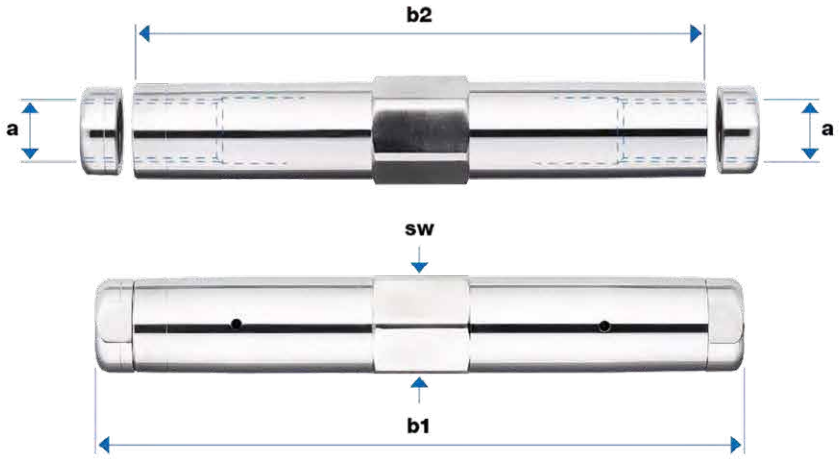
JAKOB TENSION COMPONENTS	**Annex D2**
32850 FORTE swaged external thread	



Article-No. 32817-	**a** [-]	**b1** [mm]	**b2** [mm]	**Ø d** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]	**sw** [mm]
0800-01	M8	54	29	8	11	12	9	20	13
1000-01	M10	68	38	10	13	17	11	25	17
1200-01	M12	88	52	12	15	24	14	31	19
1600-01	M16	112	65	16	20	30	18	40	25
2000-01	M20	140	81	20	24	38	22	48	30
2400-01	M24	174	103	25	29	47	26	58	35
3000-01	M30	211	125	32	38	60	32	75	45
3600-01	M36	255	181	36	45	65	38	90	52

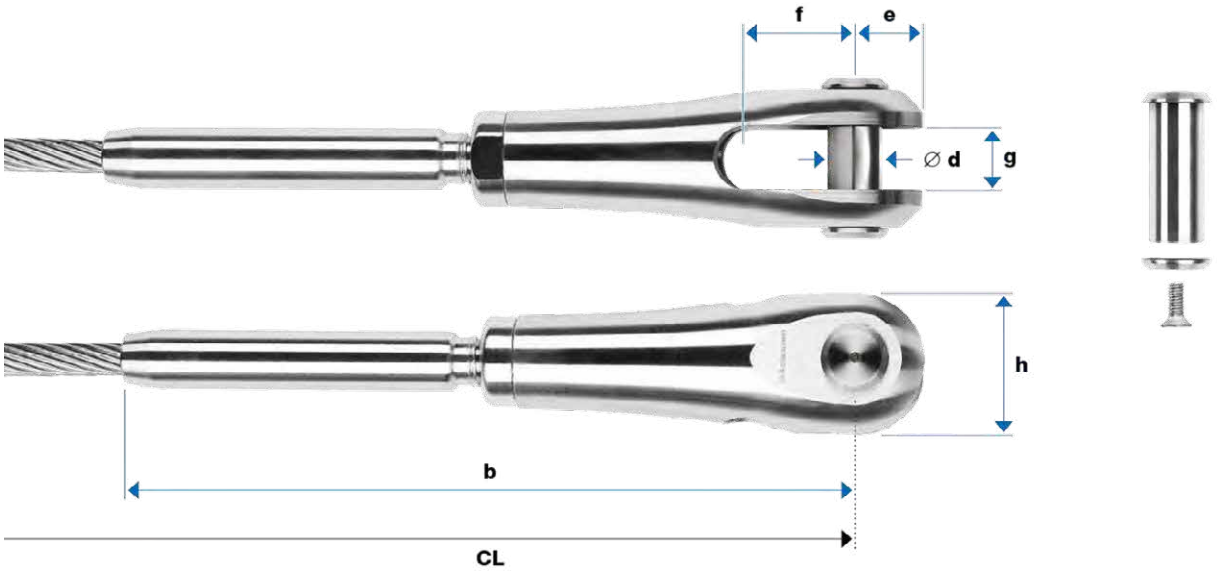
Remark: Connectors with left-hand threads have a product code with “32818”.

JAKOB TENSION COMPONENTS	**Annex D3**
32817 FORTE Clevis	



Article-No. 32875-	**a** [-]	**b1** [mm]	**b2** [mm]	**sw** [mm]
1200	M12	160	144	20
1600	M16	180	160	25
2000	M20	200	176	32
2400	M24	240	212	36
3000	M30	300	268	46
3600	M36	320	280	55

JAKOB TENSION COMPONENTS	**Annex D4**
32875 FORTE turnbuckle	

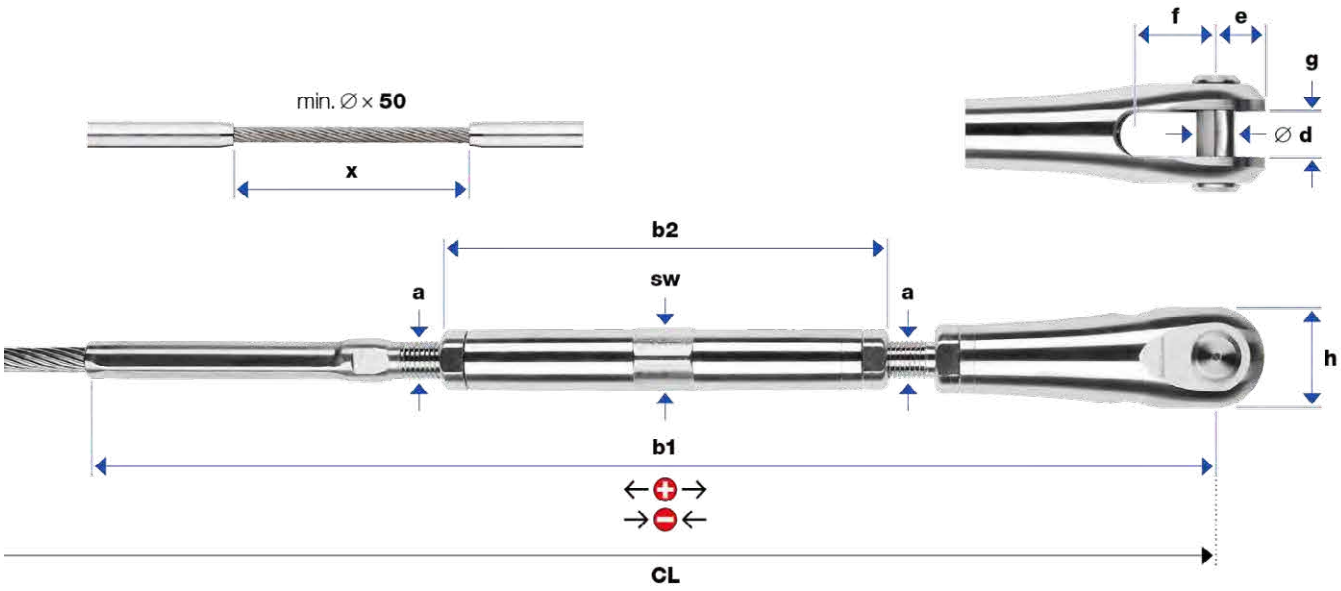


Article-No. 32881-	**rope Ø** [mm]	**thread** [-]	**b** [mm]	**Ø d** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]
0800-01	8	M12	174	12	15	24	14	31
1000-01	10	M16	218	16	20	30	18	40
1200-01	12	M20	268	20	24	38	22	48
1400-01	14	M24	321	25	29	47	26	58
1600-01	16	M24	338	25	29	47	26	58
1900-01	19	M30	408	32	38	60	32	75
2200-01	22	M30	437	32	38	60	32	75
2600-01	26	M36	501	36	45	65	38	90

JAKOB TENSION COMPONENTS

32881 FORTE swaged termination with clevis

Annex D5



Article-No. 32870-	**rope Ø** [mm]	**a** [-]	**b1** [mm]	**b2** [mm]	**Ø d** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]	**sw** [mm]	**x** [mm]	**+** [mm]	**-** [mm]
0800-01	8	M12	411	160	12	15	24	14	31	20	400	41	64
1000-01	10	M16	482	180	16	20	30	18	40	25	500	39	70
1200-01	12	M20	558	200	20	24	38	22	48	32	600	36	76
1400-01	14	M24	678	240	25	29	47	26	58	36	700	44	92
1600-01	16	M24	700	240	25	29	47	26	58	36	800	44	92
1900-01	19	M30	850	300	32	38	60	32	75	46	950	56	118
2200-01	22	M30	878	300	32	38	60	32	75	46	1100	56	118
2600-01	26	M36	971	320	36	45	65	38	90	55	1300	48	120

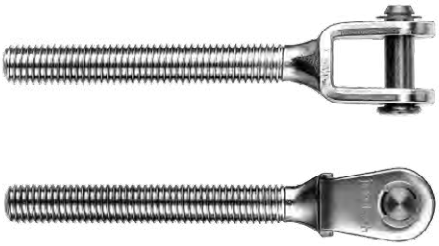
JAKOB TENSION COMPONENTS

32870 FORTE swaged termination with turnbuckle and clevis

Annex D6

30981 swaged clevis

30971 clevis with external thread

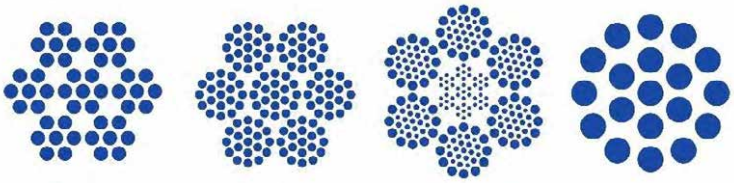


30850 swaged external thread termination

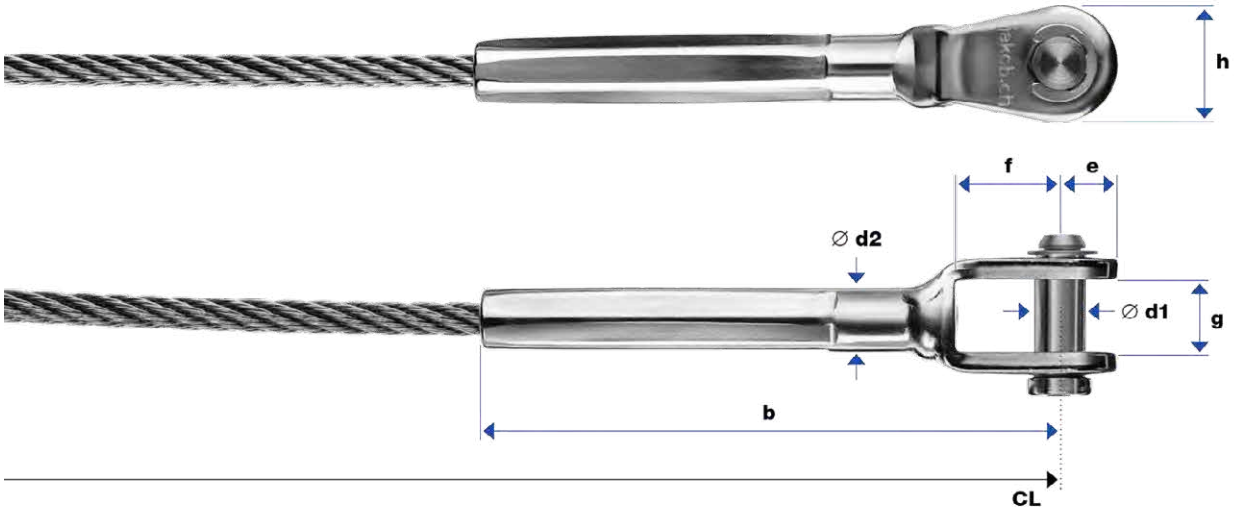
30875 turnbuckle

30970 swaged termination with turnbuckle and clevis

Applicable stranded rope and spiral rope constructions



JAKOB TENSION COMPONENTS	Annex D7
Overview basic components	

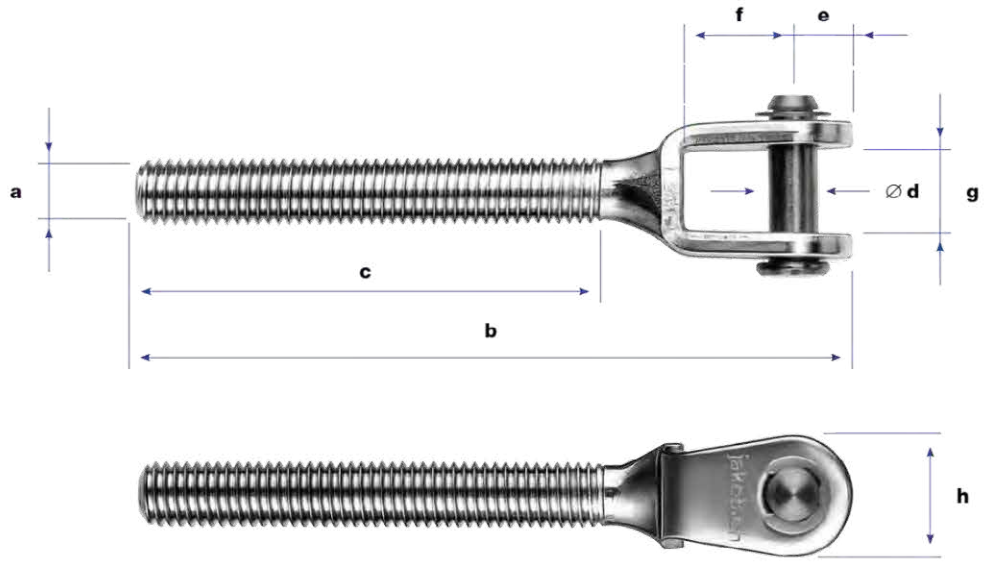


Article-No. 30981-	**rope Ø** [mm]	**b** [mm]	**Ø d1** [mm]	**Ø d2** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]
0200	2	40	5	5	7	10	8	13
0300	3	52	5	6	7	10	8	13
0400	4	63	7	7	11	15	10	18
0500	5	75	8	8	13	16	13	22
0600	6	95	10	10	15	20	13	25
0800	8	128	12	13	19	24	16	32
1000	10	170	14	18	23	32	22	38
1200	12	215	20	20	30	38	22	50
1600	16	263	25	27	38	45	28	65
2000	20	328	30	32	45	68	32	74

JAKOB TENSION COMPONENTS

30981 swaged clevis

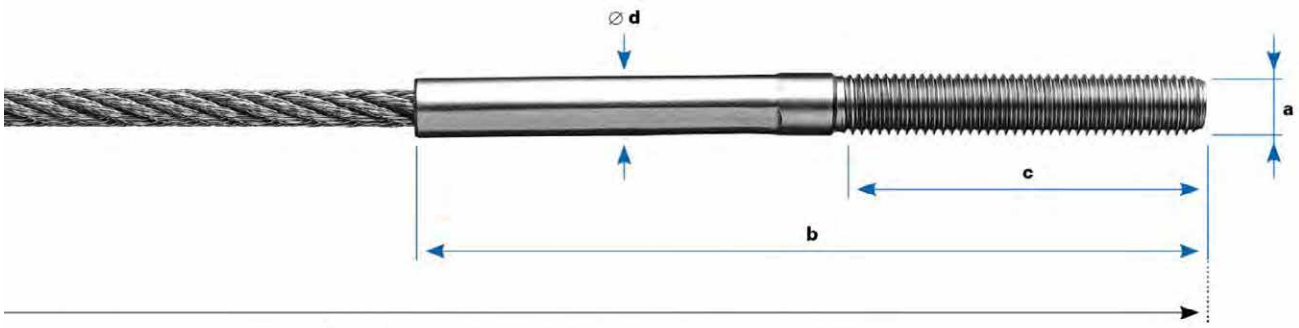
Annex D8



Article-No. 30971-	**a** [-]	**b** [mm]	**c** [mm]	**Ø d** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]
0500	M5	65	41	5	7	10	8	13
0600	M6	72	47	5	7	10	8	13
0601	M6	82	47	7	11	15	10	18
0800	M8	82	57	8	13	16	13	22
1000	M10	110	80	10	15	20	13	25
1200	M12	135	80	12	19	24	16	32
1600	M16	171	100	14	23	32	22	38
2000	M20	214	120	20	30	38	22	50
2400	M24	231	120	25	38	45	28	65
3000	M30	293	150	30	45	68	32	74

Remark: Connectors with left-hand threads have a product code with “30972”.

JAKOB TENSION COMPONENTS	**Annex D9**
30971 clevis with external thread	

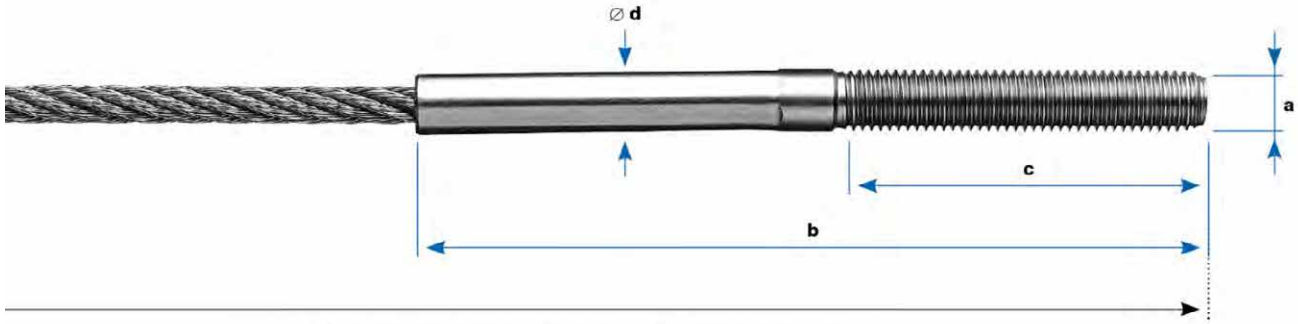


CL: Konfektionslänge / Longueur de confection / Assembly length

Article-No. 30850-	**rope Ø** [mm]	**a** [-]	**b** [mm]	**c** [mm]	**Ø d** [mm]
0100	1	M4	29	20	4
0200	2	M5	48 78	30 60	5
0300	3	M6	43 58 88	15 30 60	6
0400	4	M6	62 92	30 60	7
		M8	62 92 111	30 60 80	8
0500	5	M8	68 98 118	30 60 80	8
0600	6	M10	80 110 130	30 60 80	10
0800	8	M12	157 197	80 120	13
1000	10	M16	210	100	18
1200	12	M20	255	120	20
1600	16	M24	283	120	27
2000	20	M30	341	150	32

Remark: Connectors with left-hand threads have a product code with “30855”.

JAKOB TENSION COMPONENTS	**Annex D10**
30850 swaged external thread termination with stranded ropes	



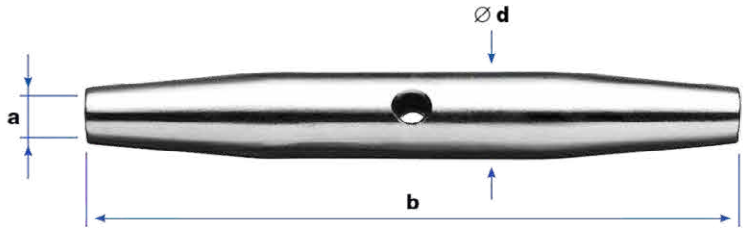
CL: Konfektionslänge / Longueur de confection / Assembly length

Article-No. 30850-	**rope Ø** [mm]	**a** [-]	**b** [mm]	**c** [mm]	**Ø d** [mm]
0410	4	M6	62 92	30 60	7
		M8	62 92 111	30 60 80	8
0510	5	M8	68 98 118	30 60 80	8
0610	6	M10	80 110 130	30 60 80	10
0810	8	M12	157 197	80 120	13

Article-No. 30850-	**rope Ø** [mm]	**a** [-]	**b** [mm]	**c** [mm]	**Ø d** [mm]
171036	4	M8	62 92 111	30 60 80	8

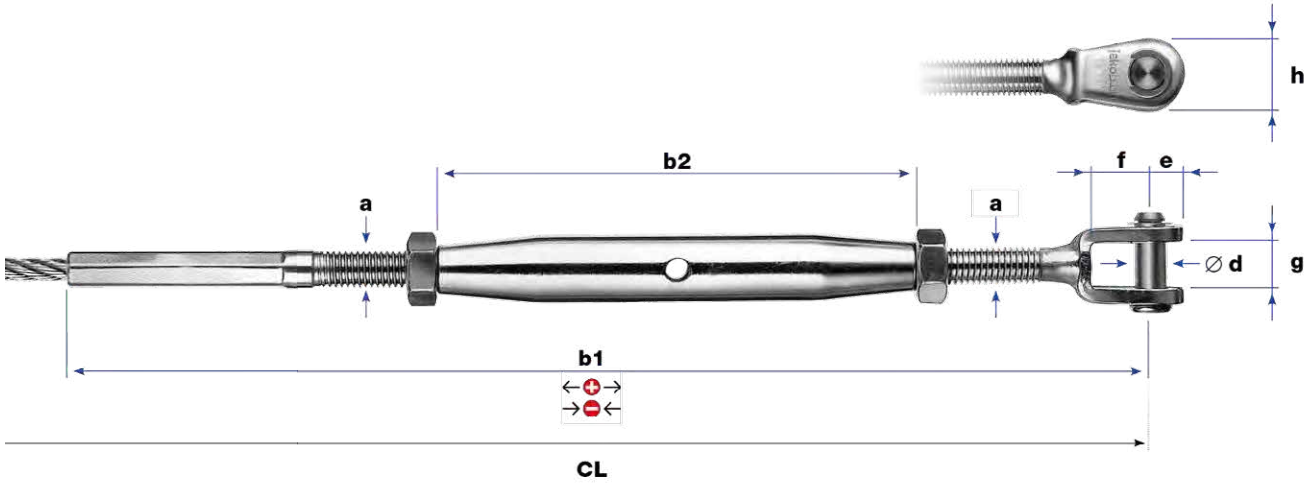
Remark: Connectors with left-hand threads have a product code with “30855”.

JAKOB TENSION COMPONENTS	**Annex D11**
30850 swaged external thread termination with spiral ropes	



Article-No. 30875-	**a** [-]	**b** [mm]	**Ø d** [mm]
0400	M4	45	7
0500	M5	80	8
0600	M6	92	10
0800	M8	112	13,5
1000	M10	120	17,2
1200	M12	150	21,5
1600	M16	190	26,9
2000	M20	220	33,7

JAKOB TENSION COMPONENTS	**Annex D12**
30875 turnbuckle	



Article-No. 30970-	**rope Ø** [mm]	**a** [-]	**b1** [mm]	**b2** [mm]	**Ø d** [mm]	**e** [mm]	**f** [mm]	**g** [mm]	**h** [mm]	**+** [mm]	**-** [mm]
0200	2	M5	178	80	5	7	10	8	13	26	34
0300	3	M6	207	92	5	7	10	8	13	22	44
0400	4	M6	211	92	7	11	15	10	18	22	44
0400-01	4	M8	233	112	8	13	16	13	22	26	52
0500	5	M8	239	112	8	13	16	13	22	26	52
0600	6	M10	269	120	10	15	20	13	25	20	54
0800	8	M12	355	150	12	19	24	16	32	34	70
1000	10	M16	458	190	14	23	32	22	38	42	84
1200	12	M20	554	220	20	30	38	22	50	50	98
1600	16	M24	570	212	25	38	45	28	65	46	94
2000	20	M30	707	268	30	45	68	32	74	60	118

JAKOB TENSION COMPONENTS

30970 swaged termination with turnbuckle and clevis

Annex D13