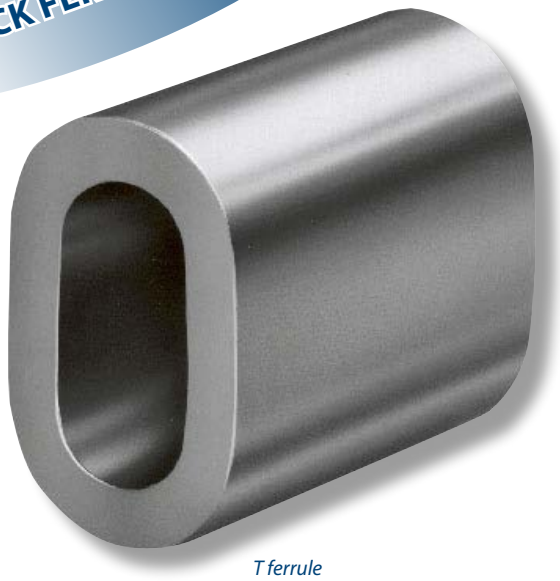


T ferrule

TKH ferrule

3.1 T AND TKH FERRULES EUROPEAN STANDARD SYSTEM – EN 13411-3

GENERAL DESCRIPTION

The aluminium ferrules, type T and type TKH correspond to the European standard for turnback ferrules (also known as ferrule secured eye terminations, FSET). The standard is EN 13411-3. The ferrule system is specified in Appendix 1. The ferrules are extruded seamlessly over mandrel and the aluminium alloy is EN AW-5051A according to EN 573-3. There is a conical ferrule called TK which is similar to the TKH but without the inspection hole. The TK ferrule does not comply with the EN standard. If used in any application the selection table is the same as for TKH. Special care has to be taken when using the TK ferrule due to lack of inspection hole.

APPLICATIONS

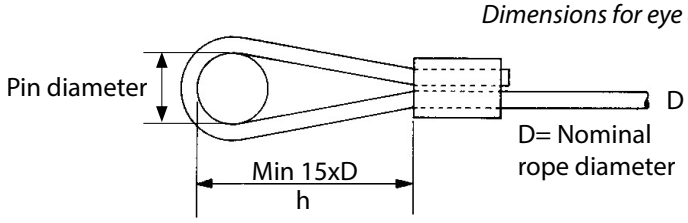
The aluminium ferrules are the most commonly used ferrules on the market today. They have a vast variety of applications, especially in the lifting gear industry. The T ferrules and TKH ferrules are thoroughly specified and very well defined for many different wire rope applications. Four different cases are tested and verified according to the standard, EN 13411-3. The ferrules can be used for fibre core single layer wire ropes, steel core single layer wire ropes, rotation resistant wire ropes and spiral strand ropes. Always use new wire ropes.

THE CORRECT SIZE OF THE SLING EYE

If a thimble is not used, the distance from the swaged ferrule to the inner bearing point of the soft eye must be at least 15 x the wire rope diameter (D), as per the figure. The width of the eye without load shall be approximately half its length. When using a pin or a hook, the minimum eye size should be verified with the formulas below.

h min. = 3 x pin diameter
h min. = 3 x hook width
Note! Eye size (h) must always be at least 15 x D

Dimensions for eye and pin



TO BE NOTED

The turnback ferrule system is easy to use. It is quick, safe and has proved itself to be totally reliable. It is also more efficient than most other swaging methods on the market and has been tested and verified according to type testing requirements. Only valid for up to 1960 grade wire rope.
TK ferrules do not correspond to standard mentioned above but have been tested and verified by Talurit (please follow our swaging instructions as per the technical data sheet).

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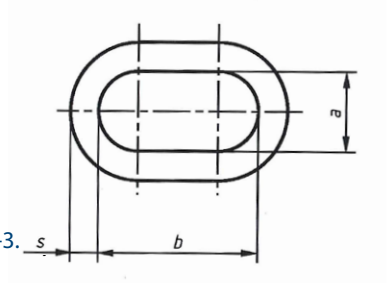
EUROPEAN STANDARD SYSTEM – EN 13411-3
Table of sizes for T and TKH ferrules (cylindrical part only)



The measurements of the standard ferrule are given from the table A.1 in the standard EN 13411-3.

Ferrule size number	Internal size				Wall thickness		Tolerable wall thickness difference	Length		Nominal weight of 1000 pieces[1)]
					Nominal	Deviation of average wall thickness from nominal thickness				
	a	tolerance	b	tolerance	s	$\bar{s} - s$	*u*	*l*	tolerance	kg
2,5	2,7	+ 0,2	5,4	+ 0,2	1,05	± 0,04	0,09	9	+ 0,2	0,499
3	3,3	0	6,6	0	1,25	± 0,04	0,12	11	- 0,5	0,843
3,5	3,8		7,6		1,5	± 0,05	0,13	13		1,32
4	4,4	+ 0,2	8,8	+ 0,2	1,7	± 0,05	0,15	14	+ 0,2	1,81
4,5	4,9	0	9,8	0	1,9	± 0,06	0,17	16	- 0,5	2,61
5	5,5		11,0		2,1	± 0,06	0,19	18		3,57
6	6,6		13,2		2,5	± 0,08	0,22	21	+ 0,2	5,86
6,5	7,2	± 0,15	14,4	± 0,15	2,7	± 0,08	0,24	23	- 0,5	7,55
7	7,8		15,6		2,9	± 0,09	0,26	25		9,53
8	8,8		17,6		3,3	± 0,10	0,29	28	+ 0,5	13,7
9	9,9	± 0,2	19,8	± 0,2	3,7	± 0,11	0,33	32	- 1	19,8
10	10,9		21,8		4,1	± 0,12	0,37	35		26,4
11	12,1		24,2		4,5	± 0,13	0,41	39	+ 0,5	35,8
12	13,2	± 0,3	26,4	± 0,3	4,9	± 0,15	0,44	42	- 1	45,8
13	14,2		28,4		5,4	± 0,16	0,48	46		59,7
14	15,3		30,6		5,8	± 0,17	0,52	49	+ 0,5	73,5
16	17,5	± 0,3	35	± 0,3	6,7	± 0,20	0,57	56	- 1	111
18	19,6		39,2		7,6	± 0,23	0,61	63		159
20	21,7	± 0,3	43,4	± 0,3	8,4	± 0,25	0,64	70	+ 0,7	217
22	24,3		48,6		9,2	± 0,28	0,67	77	- 1,5	292
24	26,4	± 0,4	52,8	± 0,4	10	± 0,30	0,70	84		376
26	28,5		57		10,9	± 0,32	0,74	91	+ 0,7	481
28	31	± 0,4	62	± 0,4	11,7	± 0,33	0,77	98	- 1,5	603
30	33,1		66,2		12,5	± 0,35	0,82	105		739
32	35,2		70,4		13,4	± 0,37	0,87	112	+ 0,7	897
34	37,8	± 0,4	75,6	± 0,4	14,2	± 0,38	0,92	119	- 1,5	1077
36	39,8		79,6		15	± 0,40	0,98	126		1275
38	41,9		83,8	± 0,4	15,8	± 0,41	1,03	133	+ 0,7	1503
40	44	± 0,4	88		16,6	± 0,43	1,08	140	- 1,5	1734
44	48,4		96,8	± 0,5	18,3	± 0,46	1,19	154		2314
48	52,8	± 0,4	105,6	± 0,5	20,0	± 0,5	1,3	168	+ 0,7	3010
52	57,2		114,4		21,6	± 0,54	1,4	182	- 1,5	3813
56	61,6	± 0,5	123,2	± 0,6	23,3	± 0,58	1,5	196		4772
60	66	± 0,5	132	± 0,6	25	± 0,63	1,6	210	+ 0,7 - 1,5	5880

[1)] Cylindrical ferrules, informative only

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FERRULE SELECTION ACCORDING TO EN 13411-3

T ferrule (T)
(aluminium)

T Konit with inspection hole (TKH)
(aluminium)

Please note that these instructions are only applicable to products produced and supplied by Talurit AB, Sweden and Gerro GmbH, Germany!

f = Fill factor, is the ratio between the sum of the nominal metallic cross-sectional areas of all the wires in the rope and the circumscribed area of the rope based on its nominal diameter.

C = Nominal metallic cross-sectional area factor of the rope $C = \frac{f \cdot \pi}{4}$

MATCHING WIRE ROPE TO FERRULE

Selection of the correct ferrule is to take account of:

-The measured rope diameter
-The rope type (and core)
-The nominal fill factor, f (or metallic cross-sectional area factor, C) of the rope. Very important for fibre core ropes!

Case 1

For **single layer** round strand ropes with **fibre core and cable-laid** ropes having a fill factor of at least 0,36 (C≥0,283) and max 0,45 (C≤0,353), a ferrule having a size / Code number equivalent to the measured rope diameter is to be selected from the table on next page.

Case 2

For **single layer** round strand ropes with fibre core and cable laid ropes having a filling factor greater than 0,45 (C>0,353) and for **single layer** round strand ropes with **metallic core and for rotation-resistant** round strand ropes having a **fill factor up to 0,62 (**C≤0,487), a ferrule having the next larger size / Code number than the measured rope diameter is to be selected from table on next page.

Case 3

For **single layer** round strand ropes with **metallic core and for rotation-resistant** round strand ropes and parallel-closed round strand ropes having a **fill factor greater than 0,62 and up to 0,78** (0,487<C≤0,613) the ferrule is to be selected from table on next page.

Case 4

For **spiral strand** rope having a **fill factor not greater than 0,78 (**C≤0,613), ferrules are to be selected having two size / Code numbers larger than the actual rope diameter from table on next page. Two ferrules spaced two rope diameters apart are to be used per termination. After pressing a space is to be maintained between the ferrules.

Applicable rope types and grade

Single layer, rotation resistant and parallel-closed stranded ropes confirming to EN 12385-4, stranded ropes conforming to EN 12385-5, spiral strand ropes conforming to EN 12385-10 and cable-laid ropes as specified in EN 13414-3.
The maximum rope grade is to be 1960. The types of rope lay shall be Ordinary or Lang lay.

For tensile grade up to and including 2160 we have an approved system called T-LOC. For higher and lower filling factor, please contact our Technical Department.

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TALURIT™ STANDARD SYSTEM – BASED ON EN 13411-3
Selection table for T and TKH ferrules

f = fill factor
C= Nominal metalic cross-sectional area factor of the wire rope

		Measured Wire Rope Diameter Range (mm)								Die Identification				
Ferrule size / Code No.		Case 1 Fill factor 0,36≤f≤0,45 0,283≤C≤0,353		Case 2 Fill factor f≤0,62 C≤0,487		Case 3 Fill factor 0,62<f≤0,78 0,487<C≤0,613		Case 4 Fill factor f≤0,78 C≤0,613		Dies marked	Diameter after pressing		Straight length, L, after pressing approx.	Required pressure approx. valid for T
T	TKH	Min	Max	Min	Max	Min	Max	Min	Max	T	mm	Tol	mm	kN
1*		0,9	1,1	0,8	1,0					1	3	+0,2	6,5	5
1,5*		1,2	1,6	1,1	1,4					1,5	3,8	0	8	10
2*		1,7	2,1	1,5	1,9					2	4		9	20
2,5		2,5	2,7	2,0	2,4					2,5	5		12	30
3		2,8	3,2	2,5	2,7					3	6		14	45
3,5		3,3	3,7	2,8	3,2					3,5	7		16	60
4		3,8	4,3	3,3	3,7					4	8		18	80
4,5		4,4	4,8	3,8	4,3					4,5	9		20	100
5		4,9	5,4	4,4	4,8			3,8	4,3	5	10		23	125
6		5,5	6,4	4,9	5,4			4,4	4,8	6	12	+0,4	27	180
6,5		6,5	6,9	5,5	6,4			4,9	5,4	6,5	13	0	29	210
7		7,0	7,4	6,5	6,9	6,0	6,4	5,5	6,4	7	14		32	250
8	8	7,5	8,4	7,0	7,4	6,5	6,9	6,5	6,9	8	16		36	320
9	9	8,5	9,5	7,5	8,4	7,0	7,9	7,0	7,4	9	18		40	410
10	10	9,6	10,5	8,5	9,5	8,0	8,9	7,5	8,4	10	20	+0,5	45	500
11	11	10,6	11,6	9,6	10,5	9,0	9,9	8,5	9,5	11	22	0	50	600
12	12	11,7	12,6	10,6	11,6	10,0	10,9	9,6	10,5	12	24		54	720
13	13	12,7	13,7	11,7	12,6	11,0	11,9	10,6	11,6	13	26		59	850
14	14	13,8	14,7	12,7	13,7	12,0	12,9	11,7	12,6	14	28	+0,7	63	1 000
16	16	14,8	16,8	13,8	14,7	13,0	13,9	12,7	13,7	16	32	0	72	1 300
18	18	16,9	18,9	14,8	16,8	14,0	15,9	13,8	14,7	18	36	+0,9	81	1 600
20	20	19,0	21,0	16,9	18,9	16,0	17,9	14,8	16,8	20	40	0	90	2 000
22	22	21,1	23,1	19,0	21,0	18,0	19,9	16,9	18,9	22	44		99	2 400
24	24	23,2	25,2	21,1	23,1	20,0	21,9	19,0	21,0	24	48	+1.1	108	2 900
26	26	25,3	27,3	23,2	25,2	22,0	23,9	21,1	23,1	26	52	0	117	3 400
28	28	27,4	29,4	25,3	27,3	24,0	25,9	23,2	25,2	28	56		126	3 900
30	30	29,5	31,5	27,4	29,4	26,0	27,9	25,3	27,3	30	60	+1,4	135	4 500
32	32	31,6	33,6	29,5	31,5	28,0	29,9	27,4	29,4	32	64	0	144	5 100
34	34	33,7	35,7	31,6	33,6	30,0	31,9	29,5	31,5	34	68		153	5 800
36	36	35,8	37,8	33,7	35,7	32,0	33,9	31,6	33,6	36	72	+1,6	162	6 500
38	38	37,9	39,9	35,8	37,8	34,0	35,9	33,7	35,7	38	76	0	171	7 200
40	40	40,0	42,0	37,9	39,9	36,0	37,9	35,8	37,8	40	80		180	8 000

* These sizes are not included in the EN 13411-3.

Table corresponds to EN 13411-3: 2004 + A1: 2008

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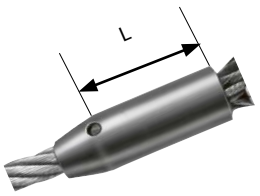
TALURIT™ STANDARD SYSTEM – BASED ON EN 13411-3
Selection table for T and TKH ferrules

Ferrule size / Code No.		Measured Wire Rope Diameter Range (mm)								Die Identification				
		Case 1 Fill factor 0,36≤f≤045 0,283≤C≤0,353		Case 2 Fill factor f≤0,62 C≤0,487		Case 3 Fill factor 0,62<f≤0,78 0,487<C≤0,613		Case 4 Fill factor f≤0,78 C≤0,613		Dies marked	Diameter after pressing		Straight length, L, after pressing approx.	Required pressure approx. valid for T
T	TKH	Min	Max	Min	Max	Min	Max	Min	Max	T	mm	Tol	mm	kN
42*	42*	42,1	44,1	38,4	40,3	37,0	38,9	36,8	38,9	42	84	+1,9	189	8 800
44	44	42,1	46,2	40,0	42,0	38,0	39,9	37,9	39,9	44	88	0	198	9 700
46*	46*	46,3	48,3	42,1	44,1	39,0	40,9	39,0	40,9	46	92		207	10 600
48	48	46,3	50,4	42,1	46,2	40,0	43,9	40,0	43,9	48	96		216	11 500
50*	50*	48,4	52,5	44,2	47,9	42,0	45,9	42,0	45,9	50	100		225	12 500
52	52	50,5	54,6	46,3	50,4	44,0	47,9	44,0	47,9	52	104	+2.1	234	13 500
54*	54*	52,6	56,7	48,0	51,7	46,0	49,9	46,0	48,9	54	108	0	243	14 600
56	56	54,7	58,8	50,5	54,6	48,0	51,9	48,0	50,4	56	112	+2.3	252	15 700
58*	58*	56,8	60,9	51,8	55,6	50,0	52,9	49,0	52,5	58	116	0	261	16 800
60	60	58,9	63,0	54,7	58,8	52,0	54,6	50,5	54,6	60	120	+2.4 0	270	18 000

***** These sizes are not included in the EN 13411-3.

Table corresponds to EN 13411-3: 2004 + A1: 2008



TKH ferrule (aluminium)

Ferrules: T and TKH have been validated according to EN 13411-3 regarding Ferrule Secured Eye Terminations and Ferrule Secured Endless slings.

Wire rope: Above table applies to new bright or galvanized single layer steel wire ropes with round strands and rope grade 1 570-1 960. Wire ropes shall conform to EN 12385-4, 5 and 10. The types of rope shall be Ordinary or Lang lay. For higher tensile grade we have an approved system called T-LOC. For higher and lower filling factor, please contact our Technical Department.
Note! Please refer to the TALURIT™ Ferrule Securing Instructions for further information.

Note! If the required pressure is higher than indicated in our tables or the length after swaging does not match our given after swage dimensions, then special care must be taken! This is an indication that something is wrong or not matching the parameters in our tables. All selection tables are recommendations built on test results, standard requirements and experience and must be seen as guidelines. There will always be cases where some specifications are different from what has been tested. Always contact our technical department for guidance.

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Rev. 2017-10-18

TALURIT™ SPLICING SYSTEM
Selection table for larger T ferrules

	Measured Wire Rope Diameter Range (mm)				Die identification				
Ferrule No.	Fill factor (f=0,40-0,45) Fibre Core (C= 0,314-0,353)		Fill factor (f=0,45-0,60) Fibre Core and Steel Core (C=0,353-0,471)		Dies marked	Diameter after pressing		Length after pressing approx.	Required pressure approx.
T	Min	Max	Min	Max	T	mm / Tol		mm	kN
62*	61,0	65,1	55,7	59,4	62	124	+1,8	282	19 200
66	65,2	69,3	59,5	63,2	66	132	0	300	22 000
70	69,4	73,5	63,3	67,1	70	140	+2,0	319	24 500
74*	73,6	77,7	67,2	70,9	74	148	0	337	27 000
78*	77,8	81,9	71,0	74,7	78	156		355	30 000
82*	82,0	86,1	74,8	78,6	82	164	+2,2	373	34 000
86	85,1	90,3	77,7	82,4	86	172	0	391	37 000
94	93,7	98,7	82,5	88,8	94 DAP 188	188		424	46 000
94	-	-	88,9	95,1	94 DAP 190	190		424	46 000
102	-	-	95,2	101,5	102 DAP 212	212	+ 2,5	464	55 000
102	-	-	101,6	106,8	102 DAP 214	214	0	464	55 000
116	-	-	106,9	114,0	116 DAP 232	232		529	67 000
116	-	-	114,1	120,0	116 DAP 235	235		529	67 000
128	-	-	120,1	126,0	128 DAP 257	257		583	80 000
128	-	-	127,0	133,5	128 DAP 260	260		583	80 000
152*	-	-	139,5	147,0	152 DAP 302	302		690	115 000
152*	-	-	152,0	160,0	152 DAP 308	308		690	115 000

* Available on request.

Please note that these instructions are only applicable to products produced and supplied by Talurit AB, Sweden and Gerro GmbH, Germany!

T ferrule (T) (aluminium)

f = Fill factor, is the ratio between the sum of the nominal metallic cross-sectional areas of all the wires in the rope and the circumscribed area of the rope based on its nominal diameter.

$$C = \frac{f \cdot \pi}{4}$$

C = Nominal metallic cross-sectional area factor of the rope

T ferrules: T ferrules above size 60 have been tested and validated according to TALURIT™ splicing system requirements. Please read our TALURIT™ Splicing Instructions carefully to secure a safe and correct swaging operation. For more information, please contact our technical department.

Wire rope: Above table applies to new bright or galvanized single layer steel wire ropes with round strands and rope grade 1 570 – 1 960. Wire ropes shall conform to EN 12385-4 and 5. The types of rope shall be Ordinary or Lang lay.
For higher tensile grade, there is a system called T-LOC. For higher and lower filling factor, please contact our Technical Department. Note! Please read our TALURIT™ Splicing Instructions carefully to secure a safe and correct swaging operation.

Swaging: IMPORTANT! For T ferrules larger than size 60 there is a special method for multi stage swaging! Always swage according to accurate instructions!
When swaging an assembly with a thimble, we recommend a larger distance between the ferrule and the top of the thimble, than specified in the standard.

Note! If the required pressure is higher than indicated in our tables or that the length after swaging does not match our given after swage dimensions, special care must be taken! This is an indication that something is wrong or not matching the parameters in our tables. All selection tables are recommendations built on test results, standard requirements and experience and must be seen as guidelines. There will always be cases where some specifications are different from what is proven. Always contact our technical department for guidance.

IMPORTANT!
For ferrules larger than size 60 there is a special method for multi stage swaging! Always swage according to accurate instructions!

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