



ZEN[®] Ferrule

Form A + B • according to EN 13411-3

Rope Ø mm nominal	Rope Ø mm measured min. max.		Ferrules according to EN 13411-3			
			single layer round strand ropes with fibre core and cable laid ropes	single layer round strand ropes with IWRC and rotation-resistant round strand ropes		spiral strands (2 ferrules)
			metallic cross sectional area factor C min. 0,283	C up to 0,487	C greater 0,487 up to 0,613	C max 0,613
2,5	2,5	2,7	2,5	3	-	-
3	2,8	3,2	3	3,5	-	-
3,5	3,3	3,7	3,5	4	-	-
4	3,8	4,3	4	4,5	-	5
4,5	4,4	4,8	4,5	5	-	6
5	4,9	5,4	5	6	-	6,5
-	5,5	5,9	6	6,5	-	7
6	6,0	6,4	6,5	7	7	8
6,5	6,5	6,9	7	8	8	9
7	7,0	7,4	8	9	9	10
-	7,5	7,9	9	10	10	11
8	8,0	8,4	10	11	11	12
-	8,5	8,9	11	12	12	13
9	9,0	9,5	12	13	13	14
-	9,6	9,9	13	14	14	16
10	10,0	10,5	14	16	16	18
-	10,6	10,9	16	18	18	20
11	11,0	11,6	18	20	20	22
-	11,7	11,9	20	22	22	24
12	12,0	12,6	22	24	24	26
-	12,7	12,9	24	26	26	28
13	13,0	13,7	26	28	28	30
-	13,8	13,9	28	30	30	32
14	14,0	14,7	30	32	32	34
-	14,8	15,9	32	34	34	36
16	16,0	16,8	34	36	36	38
-	16,9	17,9	36	38	38	40
18	18,0	18,9	38	40	40	44
-	19,0	19,9	40	44	44	48
20	20,0	21,0	44	48	48	52
-	21,1	21,9	48	52	52	56
22	22,0	23,1	52	56	56	60
-	23,2	23,9	56	60	-	-
24	24,0	25,2	60	-	-	-
-	25,3	25,9	-	-	-	-
26	26,0	27,3	-	-	-	-
-	27,4	27,9	-	-	-	-
28	28,0	29,4	-	-	-	-
-	29,5	29,9	-	-	-	-
30	30,0	31,5	-	-	-	-
-	31,6	31,9	-	-	-	-
32	32,0	33,6	-	-	-	-
-	33,7	33,9	-	-	-	-
34	34,0	35,7	-	-	-	-
-	35,8	35,9	-	-	-	-
36	36,0	37,8	-	-	-	-
-	37,9	37,9	-	-	-	-
38	38,0	39,9	-	-	-	-
40	40,0	42,0	-	-	-	-
-	42,1	43,9	-	-	-	-
44	44,0	46,2	-	-	-	-
-	46,3	47,9	-	-	-	-
48	48,0	50,4	-	-	-	-
-	50,5	51,9	-	-	-	-
52	52,0	54,6	-	-	-	-
-	54,7	55,9	-	-	-	-
56	56,0	58,8	-	-	-	-
-	58,9	59,9	-	-	-	-
60	60,0	63,0	-	-	-	-

Remark: To convert fill factor f (DIN 3093) to metallic cross sectional area factor C (EN 13411-3) multiply f by 0,7854

Splicing instructions for our ZEN[®] ferrules (Form A +B) according to EN 13411-3

1. Allocation ferrule to wire rope

Select the appropriate ferrule according to our splicing table. Wire rope constructions with a metallic cross-sectional area factor of less than 0,283 should not be used. These splicing instructions work for wire rope constructions according to EN 12385-4. Wire rope constructions with a tensile grade above 1960 N/mm² should not be used.

2. Preparation of the rope end

Ensure that the rope remains in lay after cutting and that no impurities (adhesive tape, etc.) will be within the pressed ferrule.

3. Selection of swaging dies

ZEN[®] Form A should be swaged in our Cylindrical or Universal dies. ZEN[®] Form B should only be swaged in our specially marked rounded dies. Ensure that the ferrule code No. and the No. of your swaging die set correspond.

4. Installation and condition of the tooling

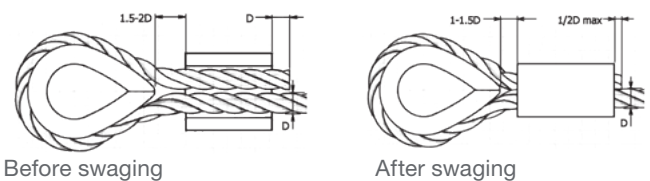
Swaging die faces with corresponding numbers need to be precisely aligned in the die pocket. Dies with worn out cutting edges do no longer assure an accurate swaging procedure according to EN 13411-3 and should be removed from service. Numbers must be on the same side and polished sides shall contact the die pocket.

5. Swaging procedure

The procedure shall be carried out by a competent person trained in ferrule securing. Ferrules code ZEN[®] 4,5 and higher need to be swaged in hydraulic presses. Smaller sizes might as well be swaged with our hand swaging tools.

- Feed the wire rope through the ferrule in order to provide the required eye. Return the rope end and form the loop. If no thimble is fitted, the distance from the ferrule to the bearing-point should be at least 15 times the rope diameter.
- The rope diameter D should be the guide value of how far the dead end of the rope should protrude out of the ferrule before swaging. This needs to be checked after each swaging procedure and adjusted if necessary, according to the type of wire rope, tensile grade and diameter.
- For satisfactory results you need to first clean and then lubricate the die bore with mineral grease (no oil we suggest our Splice Glide grease) before each swaging procedure.
- Place the ferrule centered and ensure that it is truly vertical within the die bore.
- All ferrules shall be swaged in one step.
- Stop pressing immediately when the die faces meet. Do not repress 'flash' back into splice.

- For thimbles without points the gap between the thimble end and the pressed ferrule should be about 1,5 time the wire rope diameter D. For thimbles with points the gap should be 1 time the wire rope diameter D.
- After swaging the rope 'dead' end for form A + B should protrude from the pressed ferrule by up to half a rope diameter. For ropes that are severed by annealing process, ensure that the annealed rope portion remains outside the ferrule after pressing.



6. Ferrules after Swaging

On completion of swaging operation, resultant 'flash' must be removed. Swaging dies in good condition permit to either break the 'flash' off by hand or with a small hammer. Any residual edge may be filed or otherwise smoothed.

Every pressed ferrule needs to be checked for correct dimensions and position of the 'dead' rope end.

The temperature limits when used with a fibre core wire rope are -40° to +100° C

The temperature limits when used with a steel core wire rope are -40° to +150° C

7. Marking the ferrule

If the Ferrule secured Eye Termination (FSET) forms part of a wire rope assembly other than a sling:

- the ferrule shall be legibly and indelibly marked with the FSET manufacturer's name, symbol or mark.
- the assembly shall be legibly and durably marked with the traceability code identifying the assembly with the certificate in 7.2. of EN 13411-3.

For FSET forming part of a sling you will find further details in the standard EN 13414-1.

8. Remark

Our ferrule-secured system is in accordance with the type testing procedure of EN 13411-3 point 5.1.2. for steel wire ropes defined in EN 12385-4.

Ferrule secured eye terminations should be removed from service if badly distorted or if body is showing cracks or heavy wear.

Aluminium Ferrules outside of EN 13411-3 (Form A+B)

Ferrule No.	Rope Ø mm				Swaging Die No.	Pressed Ferrule Ø mm
	Fibre core		IWRC			
	min.	max.	min.	max.		
1	0,9	1	0,5	0,8	1	2
1,5	1,1	1,5	0,9	1,1	1,5	3
2	1,6	2	1,2	1,6	2	4