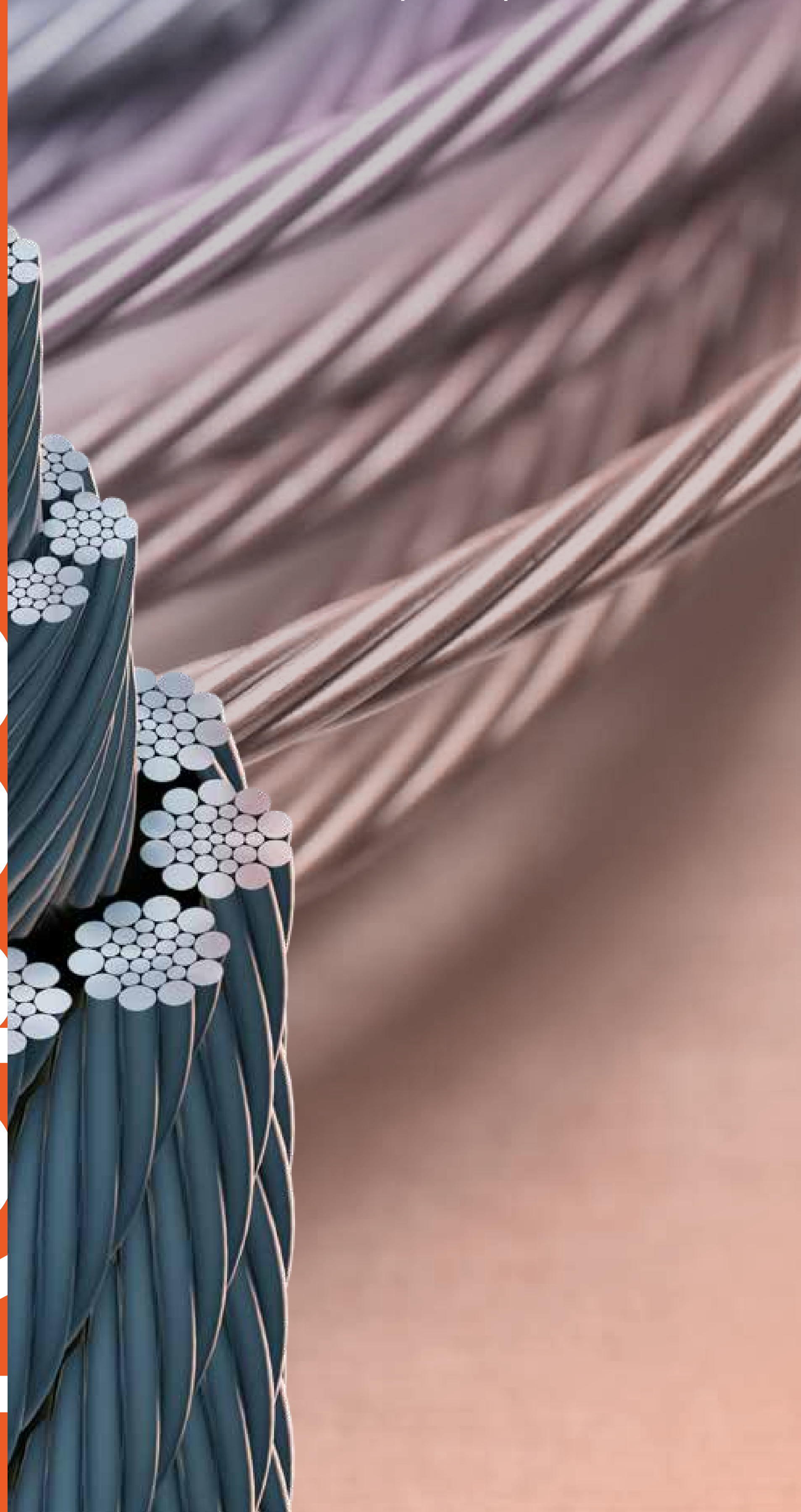
alps
wire rope corporation™

Elevator Ropes



alps
wire rope corporation™

elevator ropes by Alps™

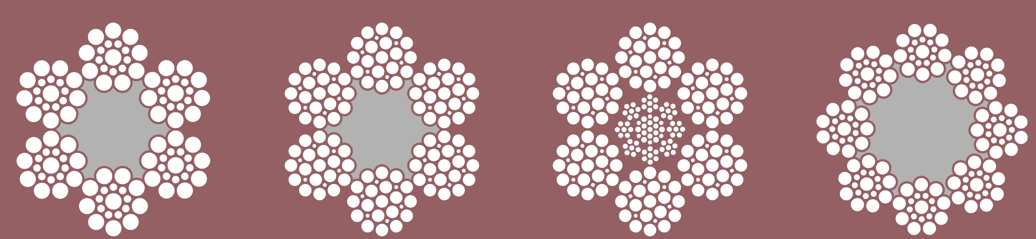
Alps Wire Rope Corporation has provided the most innovative products in North America since its founding 1968. Today Alps is the result of verope AG and Kiswire Ltd joining forces to offer the highest quality wire rope in the market.

www.alpswirerope.com

verope Kiswire

Contents

Low Rise Hoisting Ropes



Alps6 1S-EF

Alps6 2F-IF
Alps6 2F-TF
Alps6 2F-EF

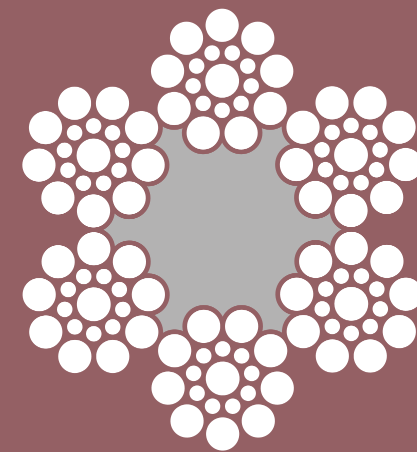
Alps6 2F-EI

AlpsXTRA8 1S IF
AlpsXTRA8 1S TF

Contents

Alps6 1S – EF

6x19 S – FC



Alps6 1S – EF

GRADE OPTIONS (N/mm²)
EHS (1770 / 1770)

PREFERRABLE
SHEAVE HARDNESS
240 – 270 HB

DIAMETER RANGE
1/4 – 1/2 inch

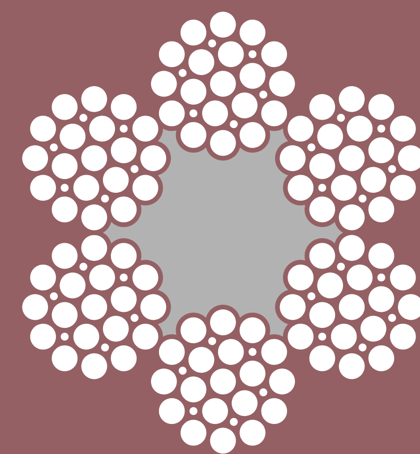
CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.41 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.18 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
PREFERRABLE FREQUENCE OF USE	≈ 2 times / hour
PREFERRABLE SPEED	< 6.56 ft / sec (2.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	54
DISCARD ACCORDING ROPE CLASS	6x19 General discard criteria according to ISO 4344:2004

Alps6 1S -		EF EHS (1770 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
1/4	6.35	5,200	23.1	0.10	0.149
5/16	7.94	8,100	36.0	0.16	0.238
	8	8,100	36.0	0.16	0.238
3/8	9.52	11,600	51.6	0.23	0.342
	10	12,900	57.4	0.24	0.361
7/16	11.11	15,700	69.8	0.30	0.440
	12	18,300	81.4	0.35	0.517
1/2	12.7	20,400	90.7	0.40	0.595

Alps6 1S – EF

Alps⁶ 2F – IF
Alps⁶ 2F – TF
Alps⁶ 2F – EF

6x25 Fi – FC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
Alps6 2F – IF	Iron (680 / 1770)	< 180 HB
Alps6 2F – TF	Traction (1180 / 1770)	170 – 200 HB
Alps6 2F – EF	EHS (1770 / 1770)	240 – 270 HB

DIAMETER RANGE
1/4 – 3/4 inch

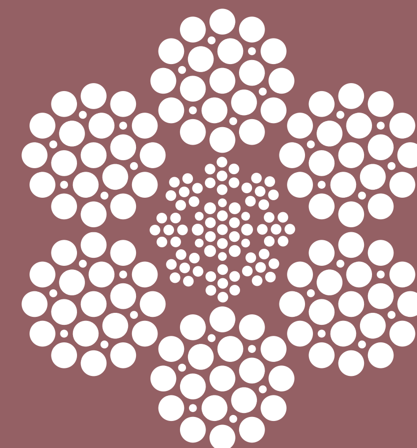
CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.41 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.18 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
PREFERRABLE FREQUENCE OF USE	≈ 2 times / hour
PREFERRABLE SPEED	< 6.56 ft / sec (2.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Filler
NUMBER OF OUTER WIRES PER STRAND	12
NUMBER OF OUTER WIRES TOTAL	72
DISCARD ACCORDING ROPE CLASS	6x19 General discard criteria according to ISO 4344:2004

Alps⁶ 2F -		IF Iron (680 / 1770)		TF Traction (1180/ 1770)		EF EHS (1770 / 1770)			
Diameter		Minimum Breaking Force (MBL)						Calculated mass	
in	mm	lb	kN	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	2,200	9.8	3,600	16.0	5,200	23.1	0.10	0.149
5/16	7.94	3,200	14.2	5,600	24.9	8,100	36.0	0.16	0.238
	8	3,200	14.2	5,600	24.9	8,100	36.0	0.16	0.240
3/8	9.52	5,000	22.2	8,200	36.5	11,600	51.6	0.23	0.342
	10	5,500	24.5	9,100	40.5	12,900	57.4	0.25	0.376
7/16	11.11	6,400	28.5	11,000	48.9	15,700	69.8	0.31	0.461
	12	7,500	33.4	12,900	57.4	18,300	81.4	0.36	0.535
1/2	12.7	8,400	37.4	14,500	64.5	20,400	90.7	0.40	0.595
	14	10,200	45.4	17,600	78.3	24,800	110.3	0.49	0.728
9/16	14.3	10,600	47.2	18,500	82.3	25,700	114.3	0.51	0.759
5/8	15.9	12,800	56.9	23,000	102.3	31,600	140.6	0.63	0.938
	16	12,800	56.9	23,000	102.3	31,600	140.6	0.64	0.951
	18	16,200	72.1	28,600	127.2	40,400	179.7	0.81	1.204
3/4	19.1	18,200	81.0	32,000	142.3	45,200	201.1	0.90	1.339

Alps⁶ 2F – IF
Alps⁶ 2F – TF
Alps⁶ 2F – EF

Alps6 2F – EI

6x25 Fi – IWRC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
Alps6 2F – EI	EHS (1770 / 1770)	240 – 270 HB

DIAMETER RANGE
1/4 – 3/4 inch

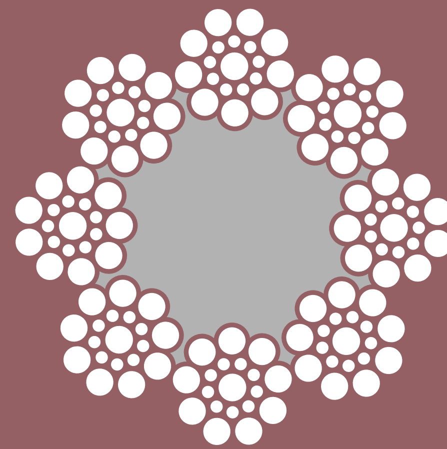
CORE	IWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.37 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.17 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.20 %
PREFERRABLE **FREQUENCE OF USE**	≈ 2 times / hour
PREFERRABLE **SPEED**	< 6.56 ft / sec (2.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Filler
NUMBER OF OUTER WIRES PER STRAND	12
NUMBER OF OUTER WIRES TOTAL	72
DISCARD ACCORDING ROPE CLASS	6x19 General discard criteria according to ISO 4344:2004

Alps6 2F -		EI EHS (1770 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
1/4	6.35	6137	27.3	0.114	0.169
5/16	7.94	9596	42.7	0.178	0.265
	8	9743	43.3	0.181	0.269
3/8	9.53	13809	61.4	0.256	0.381
	10	15224	67.7	0.283	0.421
7/16	11.1	18787	83.6	0.348	0.519
	12	20143	89.6	0.374	0.557
1/2	12.7	24549	109.2	0.456	0.68
	14	29832	132.7	0.554	0.83
9/16	14.3	31069	138.2	0.577	0.86
5/8	15.9	38487	171.2	0.715	1.064
	16	38982	173.4	0.724	1.077
	18	49323	219.4	0.916	1.363
3/4	19.1	55528	247.0	1.032	1.535

Alps6 2F – EI

AlpsXTRA⁸ 1S – IF
AlpsXTRA⁸ 1S – TF

8x19 S – FC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA8 1S – IF	Iron (680 / 1770)	< 180 HB
AlpsXTRA8 1S – TF	Traction (1180 / 1770)	170 – 200 HB

DIAMETER RANGE

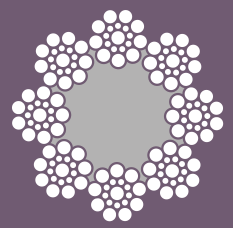
1/4 – 3/4 inch

CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.50 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.27 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
PREFERRABLE FREQUENCE OF USE	≈ 2 times / hour
PREFERRABLE SPEED	< 6.56 ft / sec (2.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Filler
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	72
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

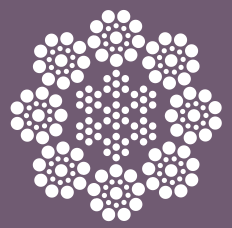
AlpsXTRA⁸ 1S -		IF Iron (680 / 1770)		TF Traction (1180 / 1770)			
Diameter		Minimum Breaking Force (MBL)				Calculated mass	
in	mm	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	1,800	8.0	3,600	16.0	0.09	0.134
5/16	7.94	2,900	12.9	5,600	24.9	0.14	0.208
	8	2,900	12.9	5,600	24.9	0.15	0.222
3/8	9.52	4,200	18.7	8,200	36.5	0.20	0.298
	10	4,700	20.9	9,100	40.5	0.23	0.347
	11	5,600	24.9	11,000	48.9	0.28	0.417
7/16	11.11	5,600	24.9	11,000	48.9	0.28	0.420
	12	6,500	28.9	12,900	57.4	0.33	0.490
1/2	12.7	7,200	32.0	14,500	64.5	0.36	0.536
	14	8,700	38.7	17,600	78.3	0.45	0.666
9/16	14.3	9,200	40.9	18,500	82.3	0.46	0.685
5/8	15.9	11,200	49.8	23,000	102.3	0.57	0.848
	16	11,200	49.8	23,000	102.3	0.60	0.888
	18	14,200	63.2	28,600	127.2	0.74	1.100
3/4	19.1	16,000	71.2	32,000	142.3	0.82	1.220

AlpsXTRA⁸ 1S – IF
AlpsXTRA⁸ 1S – TF

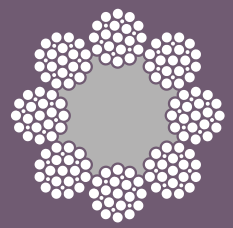
Mid Rise Hoisting Ropes



AlpsXTRA8 1S-EF
AlpsXTRA8 1S-D13F
AlpsXTRA8 1S-D15F



AlpsXTRA8 1S-TI
AlpsXTRA8 1S-EI

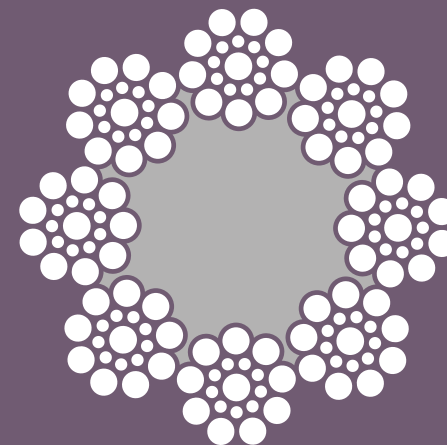


AlpsXTRA8 2F-IF
AlpsXTRA8 2F-TF

Contents

AlpsXTRA8 1S – EF
AlpsXTRA8 1S – D13F
AlpsXTRA8 1S – D15F

8x19 S - FC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA8 1S – EF	EHS (1770 / 1770)	240 – 270 HB
AlpsXTRA8 1S – D13F	Dual (1370 / 1770)	190 – 230 HB
AlpsXTRA8 1S – D15F	Dual (1570 / 1770)	220 – 250 HB

DIAMETER RANGE
1 / 4 – 3 / 4 inch

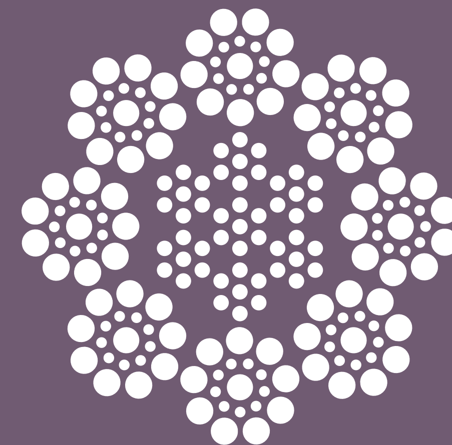
CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.50 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.27 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
PREFERRABLE FREQUENCE OF USE	≈ 5 times / hour
PREFERRABLE SPEED	< 9.84 ft / sec (3.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	72
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

AlpsXTRA8 1S -		EF EHS (1770 / 1770)		D13F Dual (1370 / 1770)		D15F Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)						Calculated mass	
in	mm	lb	kN	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	4,500	20.0	3,984	17.7	4,170	18.5	0,09	0,134
5/16	7.94	6,900	30.7	6,229	27.7	6,519	29.0	0,14	0,208
	8	6,900	30.7	6,316	28.1	6,608	29.4	0,15	0,222
3/8	9.52	9,900	44.0	8,964	39.9	9,382	41.7	0,20	0,298
	10	11,000	48.9	9,890	44.0	10,340	46.0	0,23	0,347
	11	13,500	60.1	11,958	53.2	12,520	55.7	0,28	0,417
7/16	11.11	13,500	60.1	12,196	54.3	12,764	56.8	0,28	0,420
	12	15,800	70.3	14,228	63.3	14,880	66.2	0,33	0,490
1/2	12.7	17,500	77.8	15,936	70.9	16,678	74.2	0,36	0,536
	14	20,200	89.9	19,353	86.1	20,275	90.2	0,45	0,666
9/16	14.3	21,100	93.9	20,176	89.8	21,116	93.9	0,46	0,685
5/8	15.9	27,200	121.0	24,901	110.8	26,060	115.9	0,57	0,848
	16	27,200	121.0	25,400	113.0	26,524	118.0	0,60	0,888
	18	34,700	154.4	31,919	142.0	33,492	149.0	0,74	1,100
3/4	19.1	38,900	173.0	35,857	159.5	37,526	166.9	0,82	1,220

AlpsXTRA8 1S – EF
AlpsXTRA8 1S – D13F
AlpsXTRA8 1S – D15F

AlpsXTRA8 1S – TI
AlpsXTRA8 1S – EI

8x19 S – IWRC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA8 1S – TI	Traction (1180 / 1770)	170 – 200 HB
AlpsXTRA8 1S – EI	EHS (1770 / 1770)	240 – 270 HB

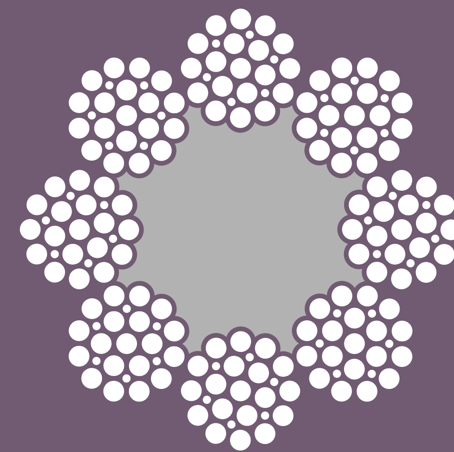
DIAMETER RANGE
1/4 – 22 inch

CORE	IWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.42 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.22 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.20%
PREFERRABLE FREQUENCE OF USE	≈ 5 times / hour
PREFERRABLE SPEED	< 9.84 ft / sec (3.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	54
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

AlpsXTRA8 1S -		TI Traction (1180 / 1770)		EI EHS (1770 / 1770)			
Diameter		Minimum Breaking Force (MBL)				Calculated mass	
in	mm	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	5,100	22.7	5,700	25.4	0.111	0.165
5/16	7.94	7,900	35.1	8,900	39.6	0.172	0.256
	8	8,040	35.8	9,055	40.3	0.175	0.261
3/8	9.52	11,400	50.7	12,900	57.4	0.247	0.368
	10	12,563	55.9	14,149	62.9	0.274	0.407
7/16	11.11	15,201	67.6	17,120	76.2	0.331	0.493
	12	15,500	69.0	17,500	77.9	0.337	0.501
1/2	12.7	18,091	80.5	20,375	90.6	0.394	0.587
	14	20,300	90.3	22,800	101.4	0.441	0.656
9/16	14.3	24,624	109.5	27,732	123.4	0.537	0.798
5/8	15.9	25,600	113.9	28,900	128.6	0.560	0.833
	16	31,700	141.0	35,700	158.8	0.692	1.030
	18	32,162	143.1	36,221	161.1	0.701	1.043
3/4	19.1	40,705	181.1	45,843	203.9	0.887	1.320
	22	45,600	202.9	51,400	228.7	0.998	1.485

AlpsXTRA8 1S – TI
AlpsXTRA8 1S – EI

AlpsXTRA^{8} 2F – IF
AlpsXTRA^{8} 2F – TF
AlpsXTRA^{8} 2F – EF
AlpsXTRA^{8} 2F – D13F
AlpsXTRA^{8} 2F – D15F



8x25 Fi – FC

	GRADE OPTIONS (N/mm^2)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA 8 2F – IF	IRON (680 / 1770)	< 180 HB
AlpsXTRA 8 2F – TF	Traction (1180 / 1770)	170 – 200 HB
AlpsXTRA 8 2F – EF	EHS (1770 / 1770)	240 – 270 HB
AlpsXTRA 8 2F – D13F	Dual 1370 / 1770	190 – 230 HB
AlpsXTRA 8 2F – D15F	Dual 1570 / 1770	220 – 250 HB

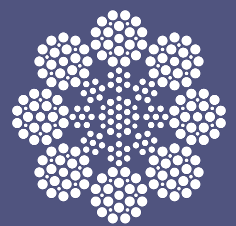
DIAMETER RANGE
1/4 – 3/4 inch

CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.50%
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.27 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
PREFERRABLE FREQUENCE OF USE	≈ 10 times / hour
PREFERRABLE SPEED	< 13.12 ft /sec (4.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Filler
NUMBER OF OUTER WIRES PER STRAND	12
NUMBER OF OUTER WIRES TOTAL	96
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

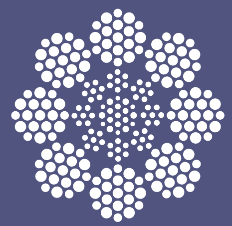
Alps XTRA^{8} 2F -		IF Iron (680 / 1770)		TF Traction (1180 / 1770)		EF EHS (1770 / 1770)		D13F Dual (1370 / 1770)		D15F Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)										Calculated mass	
in	mm	lb	kN	lb	kN	lb	kN	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	1,800	8.0	3,600	16.0	4,500	20.0	3,984	17.7	4,170	18.5	0.09	0.134
5/16	7.94	2,900	12.9	5,600	24.9	6,900	30.7	6,229	27.7	6,519	29.0	0.14	0.208
	8	2,900	12.9	5,600	24.9	6,900	30.7	6,316	28.1	6,608	29.4	0.15	0.222
3/8	9.52	4,200	18.7	8,200	36.5	9,900	44.0	8,964	39.9	9,382	41.7	0.20	0.298
	10	4,700	20.9	9,100	40.5	11,000	48.9	9,890	44.0	10,340	46.0	0.23	0.347
	11	5,600	24.9	11,000	48.9	13,500	60.1	11,958	53.2	12,520	55.7	0.28	0.417
7/16	11.1	5,600	24.9	11,000	48.9	13,500	60.1	12,196	54.3	12,764	56.8	0.28	0.420
	12	6,500	28.9	12,900	57.4	15,800	70.3	14,228	63.3	14,880	66.2	0.33	0.490
1/2	12.7	7,200	32.0	14,500	64.5	17,500	77.8	15,936	70.9	16,678	74.2	0.36	0.536
	14	8,700	38.7	17,600	78.3	20,200	89.9	19,353	86.1	20,275	90.2	0.45	0.666
9/16	14.3	9,200	40.9	18,500	82.3	21,100	93.9	20,176	89.8	21,116	93.9	0.46	0.685
5/8	15.9	11,200	49.8	23,000	102.3	27,200	121.0	24,901	110.8	26,060	115.9	0.57	0.848
	16	11,200	49.8	23,000	102.3	27,200	121.0	25,400	113.0	26,524	118.0	0.60	0.888
	18	14,200	63.2	28,600	127.2	34,700	154.4	31,919	142.0	33,492	149.0	0.74	1.100
3/4	19.1	16,000	71.2	32,000	142.3	38,900	173.0	35,857	159.5	37,526	166.9	0.82	1.220

AlpsXTRA^{8} 2F – IF
AlpsXTRA^{8} 2F – TF
AlpsXTRA^{8} 2F – EF
AlpsXTRA^{8} 2F – D13F
AlpsXTRA^{8} 2F – D15F

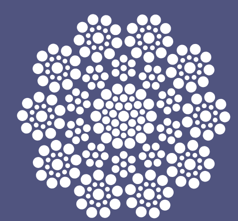
High Rise Hoisting Ropes



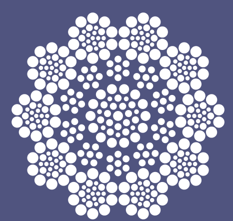
AlpsXTRA8 2F-D13I
AlpsXTRA8 2F-D15I



AlpsXTRA8 1W-D15I



AlpsULTRA10 1S-D15P

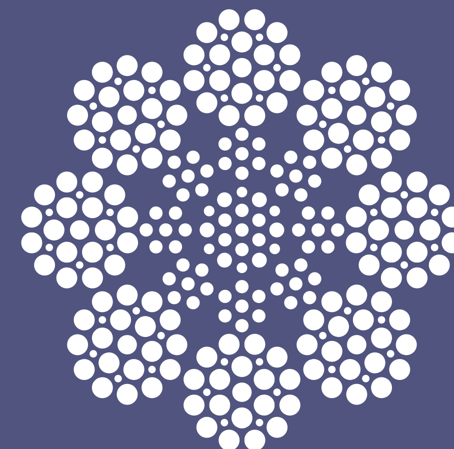


AlpsULTRA10 2W-D15P

Contents

AlpsXTRA8 2F – D13I
AlpsXTRA8 2F – D15I

8x25 Fi – IWRC



	GRADE OPTIONS (N/mm^2)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA 8 2F – D13I	Dual 1370 / 1770	190 – 230 HB
AlpsXTRA 8 2F – D15I	Dual 1570 / 1770	220 – 250 HB

DIAMETER RANGE
1/4 – 22 mm

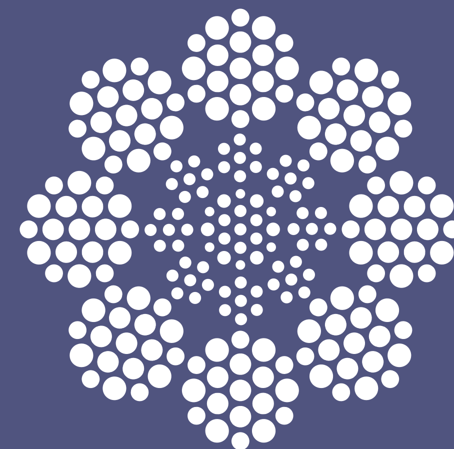
CORE	IWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.42 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.22 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.20 %
PREFERRABLE **FREQUENCE OF USE**	≈ 10 times / hour
PREFERRABLE **SPEED**	< 13.12 ft /sec (4.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Filler
NUMBER OF OUTER WIRES PER STRAND	12
NUMBER OF OUTER WIRES TOTAL	96
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

AlpsXTRA8 2F -		D13I Dual (1370 / 1770)		D15I Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)				Calculated mass	
in	mm	lb	kN	lb	kN	lb/ft	kg/m
1/4	6.35	5070	22.6	5404	24.0	0.11	0.164
5/16	7.94	7926	35.3	8450	37.6	0.17	0.256
	8	8047	35.8	8676	38.6	0.17	0.260
3/8	9.52	11406	50.7	12160	54.1	0.25	0.369
	10	12565	55.9	13374	59.5	0.27	0.407
	11	15195	67.6	16162	71.9	0.33	0.492
7/16	11.11	15518	69.0	16544	73.6	0.34	0.502
	12	18095	80.5	19241	85.6	0.39	0.586
1/2	12.7	20278	90.2	21618	96.2	0.44	0.656
	14	24726	110.0	26299	117.0	0.54	0.798
9/16	14.3	25673	114.2	27370	121.8	0.56	0.830
5/8	15.9	31684	141.0	33778	150.3	0.69	1.024
	16	32143	143.0	34166	152.0	0.70	1.040
	18	40685	181.0	43382	193.0	0.89	1.320
3/4	19.1	45626	203.0	48640	216.4	0.99	1.475
	22	60850	270.7	64871	288.6	1.32	1.967

AlpsXTRA8 2F – D13I
AlpsXTRA8 2F – D15I

AlpsXTRA⁸ 1W – D15I

8x19 W – IWRC



AlpsXTRA 8 1W – D15I	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
	Dual 1570 / 1770	220 – 250 HB

DIAMETER RANGE
6 – 10 mm

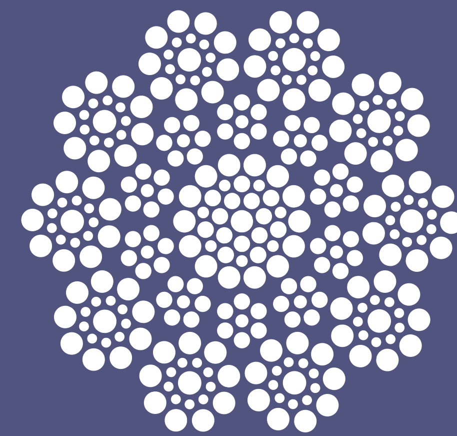
CORE	IWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.42 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.22 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.20 %
PREFERRABLE FREQUENCE OF USE	≈ 20 times / hour
PREFERRABLE SPEED	< 16.40 ft / sec (5.0 m / sec)
WRAP	Single Wrap
OUTER STRAND DESIGN	Warrington
NUMBER OF OUTER WIRES PER STRAND	12
NUMBER OF OUTER WIRES TOTAL	96
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

AlpsXTRA⁸ 1W -		D15I Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
	6	4810	21.4	0.08	0.123
1/4	6.35	5390	24.0	0.09	0.137
5/16	7.94	8427	37.5	0.14	0.215
	8	8542	38.0	0.17	0.260
	9	10834	48.2	0.22	0.330
3/8	9.53	12139	54.0	0.25	0.370
	10	13374	59.5	0.27	0.407

AlpsXTRA⁸ 1W – D15I

AlpsULTRA10 1S – D15P

10x19 S – PWRC



AlpsULTRA10 1S – D15P	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
	Dual 1570 / 1770	220 – 250 HB

DIAMETER RANGE

10 – 12 mm

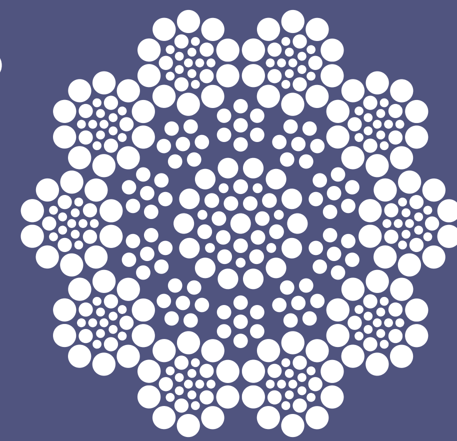
CORE	PWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.30 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.15 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.15 %
PREFERRABLE FREQUENCE OF USE	≈ 30 times / hour
PREFERRABLE SPEED	< 19.69 ft / sec (6.0 m / sec)
WRAP	Single Wrap or Double Wrap
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	90
DISCARD ACCORDING ROPE CLASS	10x19 General discard criteria according to ISO 4344:2004

AlpsULTRA10 1S -		D15P Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
	10	15,800	70.3	0.29	0.450
	11	19,100	85.0	0.35	0.540
7/16	11.1	19,494	86.7	0.37	0.551
	12	22,700	101.2	0.42	0.650

AlpsULTRA10 1S – D15P

AlpsULTRA10 2W – D15P

10x26 WS – PWRC



AlpsULTRA10 2W – D15P	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
	Dual 1570 / 1770	220 – 250 HB

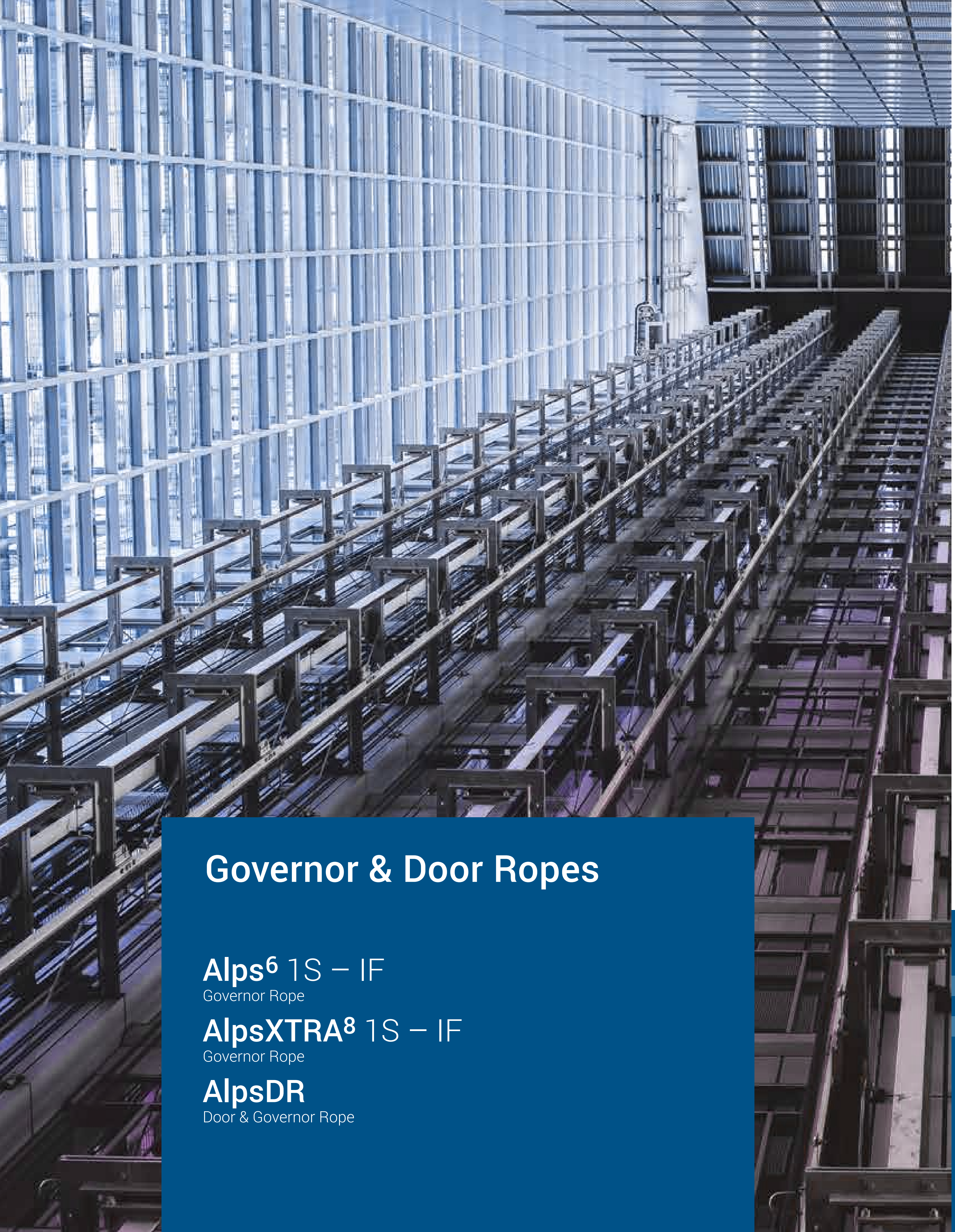
DIAMETER RANGE

13 – 22 mm

CORE	PWRC
TOTAL ELONGATION AT 10 % MBL	≈ 0.30 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.15 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.15 %
PREFERRABLE FREQUENCE OF USE	≈ 30 times / hour
PREFERRABLE SPEED	< 19.69 ft / sec (6.0 m / sec)
WRAP	Single Wrap or Double Wrap
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	10
NUMBER OF OUTER WIRES TOTAL	100
DISCARD ACCORDING ROPE CLASS	10x19 General discard criteria according to ISO 4344:2004

AlpsULTRA10 2W -		D15P Dual (1570 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
	13	26,700	118.8	0.51	0.790
	14	30,900	137.7	0.59	0.910
9/16	14.3	32,235	143.4	0.63	0.944
	15	35,500	158.1	0.68	1.050
5/8	15.9	39,782	177.0	0.77	1.165
	16	40,400	179.9	0.77	1.190
11/16	17.5	48,122	214.1	0.95	1.409
	18	51,100	227.7	0.98	1.510
	19	56,985	253.5	1.12	1.668
3/4	19.1	57,286	254.9	1.13	1.677
	20	63,100	281.1	1.20	1.880
	22	76,400	340.1	1.46	2.250

AlpsULTRA10 2W – D15P



Governor & Door Ropes

Alps⁶ 1S – IF
Governor Rope

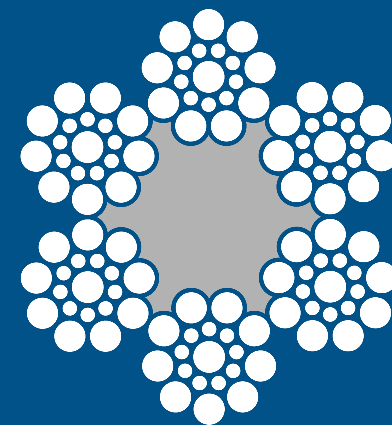
AlpsXTRA⁸ 1S – IF
Governor Rope

AlpsDR
Door & Governor Rope

Contents

Alps6 1S – IF

6x19 S – FC



Alps6 1S – IF	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
	Iron (680 / 1770)	< 180 HB

DIAMETER RANGE

6mm – 1/2 inch

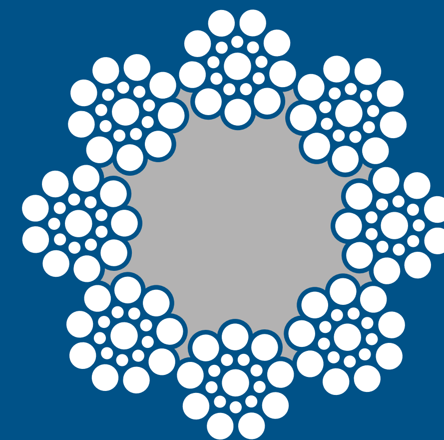
CORE	Fiber
TOTAL ELONGATION AT 10 % MBL	≈ 0.41 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.18%
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	54
DISCARD ACCORDING ROPE CLASS	6x19 General discard criteria according to ISO 4344:2004

Alps6 1S -		IF Iron (680 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
	6	1.872	8,3	0,09	0,140
1/4	6,35	2.200	9,8	0,10	0,149
5/16	7,94	3.200	14,2	0,16	0,238
	8	3.362	15,0	0,16	0,238
3/8	9,53	5.000	22,2	0,23	0,342
	10	5.195	23,1	0,24	0,361
7/16	11,1	6.400	28,5	0,30	0,440
	12	7.488	33,3	0,35	0,517
1/2	12,7	8.400	37,4	0,40	0,595

Alps6 1S – IF

AlpsXTRA8 1S – IF

8x19 FS – FC



	GRADE OPTIONS (N/mm²)	PREFERRABLE SHEAVE HARDNESS
AlpsXTRA 8 1S – IF	Iron (680 / 1770)	< 180 HB

DIAMETER RANGE
1/4 – 3/4 inch

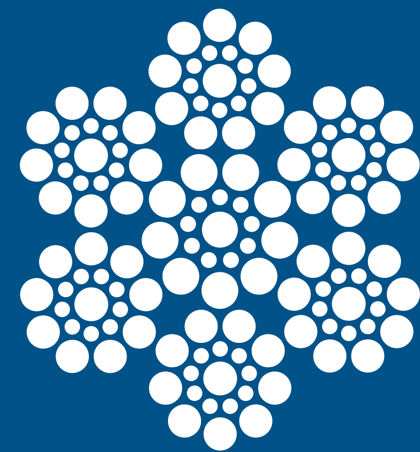
CORE	Seale
TOTAL ELONGATION AT 10 % MBL	≈ 0.50 %
CONSTRUCTIVE ELONGATION AFTER 10 % MBL	≈ 0.27 %
ELASTIC ELONGATION BETWEEN 2% AND 10 % LOAD	≈ 0.23 %
OUTER STRAND DESIGN	Seale
NUMBER OF OUTER WIRES PER STRAND	9
NUMBER OF OUTER WIRES TOTAL	72
DISCARD ACCORDING ROPE CLASS	8x19 General discard criteria according to ISO 4344:2004

AlpsXTRA8 1S -		IF Iron (680 / 1770)			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
1/4	6.35	1,800	8.0	0.09	0.134
5/16	7.94	2,900	12.9	0.14	0.208
	8	2,900	12.9	0.15	0.222
3/8	9.53	4,200	18.7	0.20	0.298
	10	4,700	20.9	0.23	0.347
	11	5,600	24.9	0.28	0.417
7/16	11.1	5,600	24.9	0.28	0.420
	12	6,500	28.9	0.33	0.490
1/2	12.7	7,200	32.0	0.36	0.536
	14	8,700	38.7	0.45	0.666
9/16	14.3	9,200	40.9	0.46	0.685
5/8	15.9	11,200	49.8	0.57	0.848
	16	11,200	49.8	0.60	0.888
	18	14,200	63.2	0.74	1.100
3/4	19.1	16,000	71.2	0.82	1.220

AlpsXTRA8 1S – IF

AlpsDr

7x19



AlpsDr

GRADE OPTIONS (N/mm²)
1960

PREFERRABLE
SHEAVE HARDNESS
< 180 HB

DIAMETER RANGE
3 mm – 1/4 inch

CORE	Steel
FINISH	Galvanized

AlpsDr		1960			
Diameter		Minimum Breaking Force (MBL)		Calculated mass	
in	mm	lb	kN	lb/ft	kg/m
	3.0	1,962	8.7	0.03	0.051
1/8	3.2	2,001	8.9	0.04	0.058
	4.0	3,488	15.5	0.06	0.091
	5.0	3,911	17.4	0.067	0.100
1/4	6.35	9,012	40.1	0.15	0.230

AlpsDr

Accessories

Elevator wire rope wedge sockets

Reeving splices

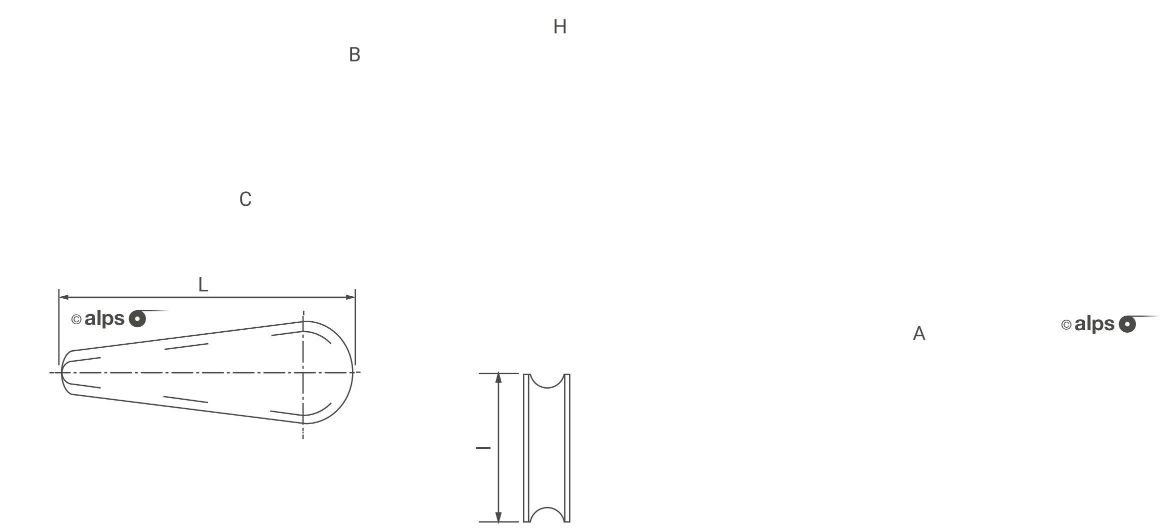
Lubricant

Contents

Elevator wire rope wedge sockets

WEDGE SOCKET ASSEMBLY SPECIFICATIONS

Part No.	Size	A	B	C	Nut Size	H
ELZ 14	1/4" – 5/16" (6 – 8 mm)	5"	12", 18", 24"	9.05"	M12	17", 23", 29"
ELZ 38	3/8" (10 mm)	6"	12", 18", 24"	9.05"	M14	17", 23", 29"
ELZ 12	7/16" – 1/2" (11 – 13 mm)	7.5"	12", 18", 24", 30", 36", 42"	9.05"	M20	18", 24", 30", 36", 42", 48"
ELZ 58	9/16" – 5/8" (14 – 16 mm)	7.5"	12", 18", 24", 30", 36", 42"	9.05"	M20	18", 24", 30", 36", 42", 48"
ELZ 34	11/16" – 3/4" (17.5 – 19 mm)	9"	12", 18", 24", 30", 36", 42"	9.05"	M24	19.5", 25.5", 31.5", 37.5", 43.5", 49.5"

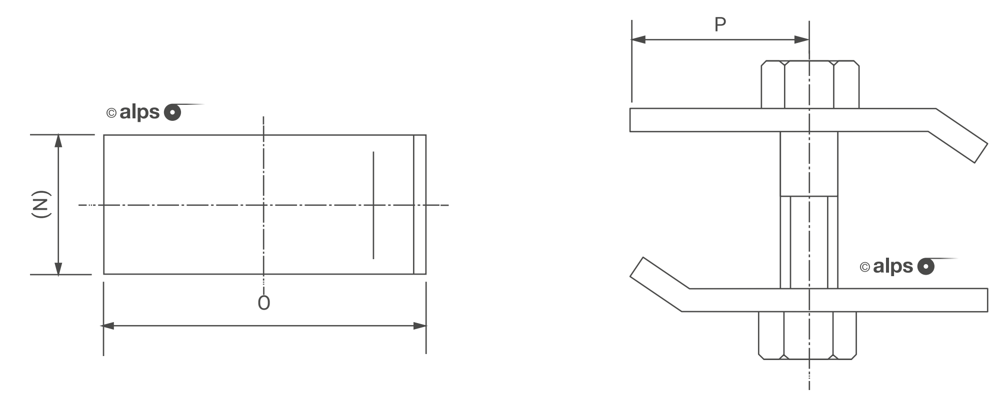


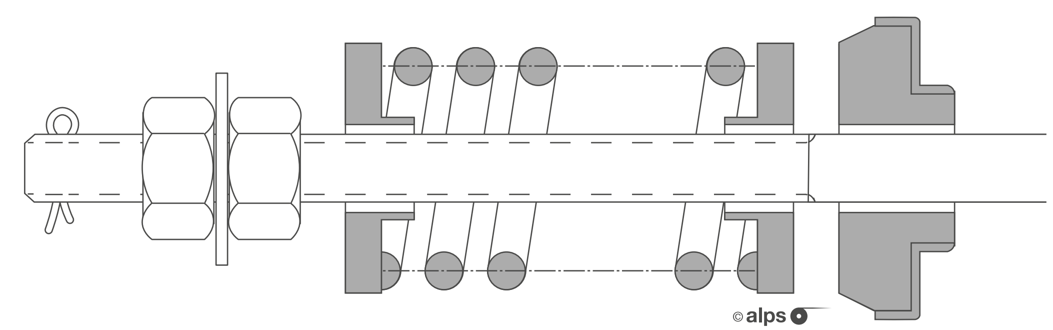
WEDGE INSERT SPECIFICATIONS

Part No.	Size	L	I	Color
EL ZZWW8	1/4" – 5/16" (6 – 8 mm)	3.25"	0.9"	White
EL ZZWW10	3/8" (10 mm)	3.75"	1.3"	Red
EL ZZWW13	7/16" – 1/2" (11 – 13 mm)	4"	1.6"	Blue
EL ZZWW16	9/16" – 5/8" (14 – 16 mm)	4.7"	1.3"	Yellow
EL ZZWW19	11/16" – 3/4" (17.5 – 19 mm)	5.5"	1.57"	Green

RETAINING CLIP SPECIFICATIONS

Part No.	Size	N	O	P	Nut Size	Balt Size
EL ZZWRC810	1/4" – 5/16" (6 – 8 mm)	1"	1.58"	9.05"	M6	M6 x 30 mm
EL ZZWRC1316	7/16" – 5/8" (10 mm)	1"	1.84"	9.05"	M6	M6 x 35 mm
EL ZZWRC19	11/16" – 3/4" (17.5 – 19 mm)	1"	2.14"	9.05"	M6	M6 x 40 mm



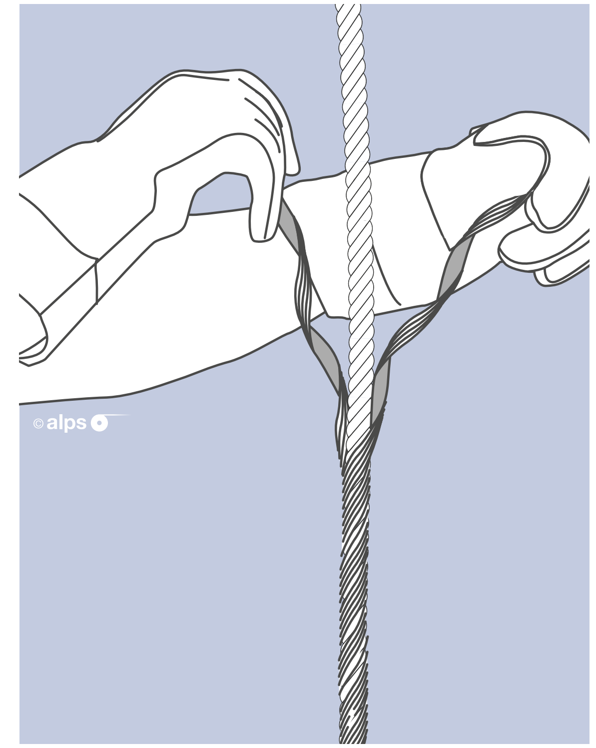


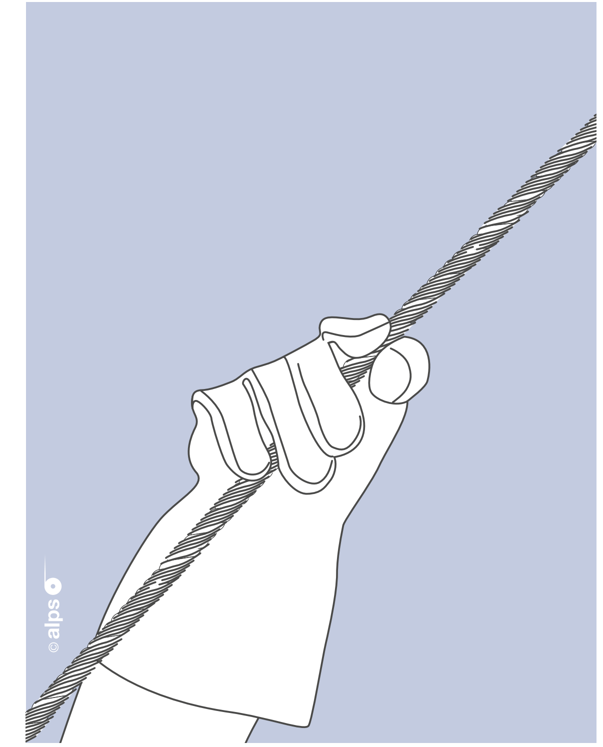
SPRING ISOLATION BUSHING ASSEMBLIES

Part No.	Size
EL ZZWS10	3/8" (10 mm)
EL ZZWS13	7/16" – 1/2" (11 – 13 mm)
EL ZZWS19	11/16" – 3/4" (17.5 – 19 mm)

Reeving splices

Reeving splices are an inexpensive, disposable device used in elevator repairs to aid passing married ropes over pulleys and sheaves.





REEVING SPLICE SPECIFICATIONS

	Wire Rope				Units	wt/lb
	Size		Mean Diameter			
Catalog Nr.	in	mm	in	mm	Per Carton	
RS-2102	5/16	8	0.312	8.0	50	30
RS-2103	3/8	9	0.375	9.5	50	30
RS-2104	1/2	11	0.4375	11.0	50	30
RS-2105	1/2	12	0.500	12.7	10	8
RS-2106	9/16	14	0.5625	14.2	10	9
RS-2107	5/8	15	0.625	15.8	10	13
RS-2108	11/16	17	0.6875	17.4	10	17
RS-2109	3/4	19	0.750	19.0	10	18
RS-2110	13/16	20	0.8125	20.6	10	24
RS-2111	7/8	22	0.875	22.2	10	28
RS-2112	1	25	1.00	25.4	10	41

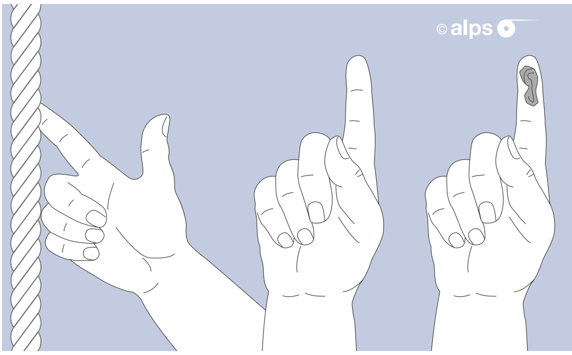
	Length			Overall Diameter	
Catalog Nr.	in	mm	Number of subsets	in	mm
RS-2102	19	483	3	0.415	10.54
RS-2103	22	558	3	0.477	12.11
RS-2104	25	635	4	0.539	13.71
RS-2105	29	736	3	0.640	16.25
RS-2106	32	812	4	0.702	17.83
RS-2107	36	914	3	0.797	20.24
RS-2108	40	1016	3	0.887	22.52
RS-2109	42	1066	3	0.950	24.13
RS-2110	46	1168	3	1.036	26.31
RS-2111	50	1270	3	1.113	28.27
RS-2112	56	1422	4	1.238	31.44

Lubricant

LUBRICATION AND RE-LUBRICATION

In ropes, there is friction between wires, strands and fiber cores. All these combinations need lubrication to assure an appropriate friction behavior and a good rope-lifetime. New ropes are lubricated during the production process.

A long period of time between production and installation, as well as incorrect storage conditions, can lead to dry strands and cores.

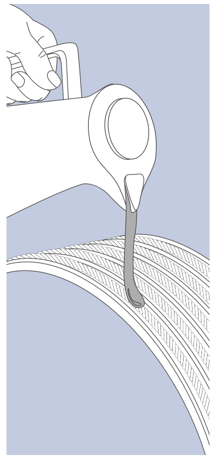


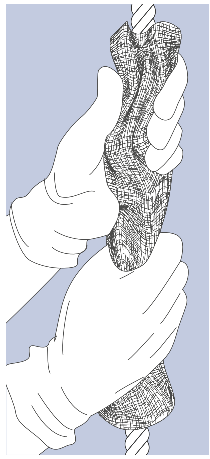
- Upon installation, new ropes must be checked for sufficient lubrication
- If necessary, new ropes must be re-lubricated to assure rope function from the start of the operation and a long rope-lifetime!
- Periodically ropes in service must be re-lubricated

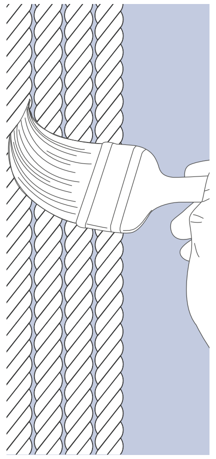
Re-lubrication is necessary to prevent rope damages from rouging and corrosion.

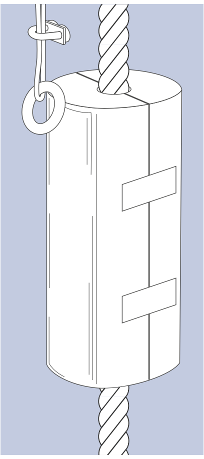
Elevator ropes shall be lubricated and re-lubricated at least once a year or every 250'000 starts. A simple and practical option is to touch the rope and then check the finger for lubricant.

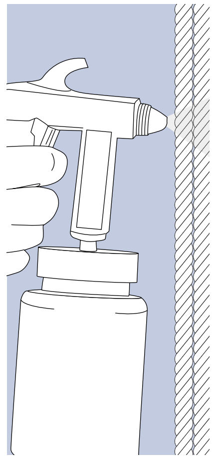
Ropes should not be lubricated in these ways:


Pouring


Swabbing


Brushing


Continuous bath


Spraying

The amount of lubricant applied this way is out of control. Over-lubrication will lead to dangerous slippage and pollution of the machine room.

Ropes should be lubricated the correct way:
Lubricant is pumped from a canister to a rope lubrication device. Equal and controlled distribution of lubricant to the ropes is ensured.

This type of lubrication does not need any action for a longer period of time. Brushes are mounted to each lubricant can. The can is under pressure and slowly presses the lubricant through the brushes to the ropes. The

amount of lubricant can be set with the timer on the back side of each can. Timing can be chosen between 1 and 12 months. Automated rope lubrication is easy and safe.

Our product supports customers for problem-free rope lubrication and long service life span of the ropes.

LUBRICANT QUANTITY

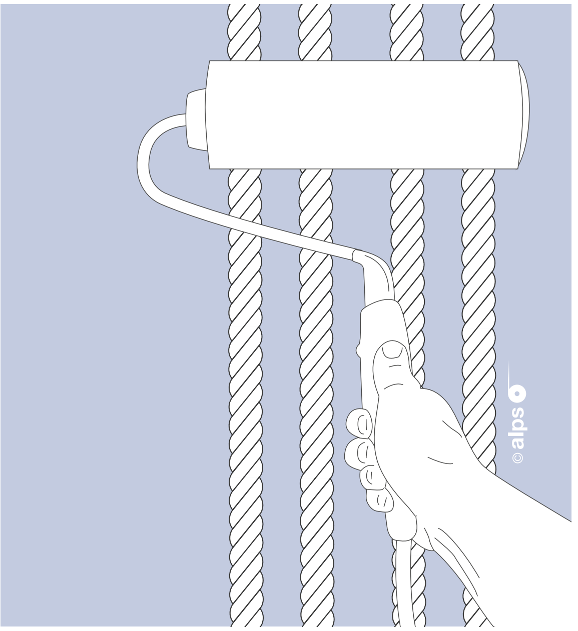
The amount needed for elevator ropes depends a lot on the installation and environment.

Influences, such as high elevator frequency, shaft temperature or draft from ventilation must be considered.

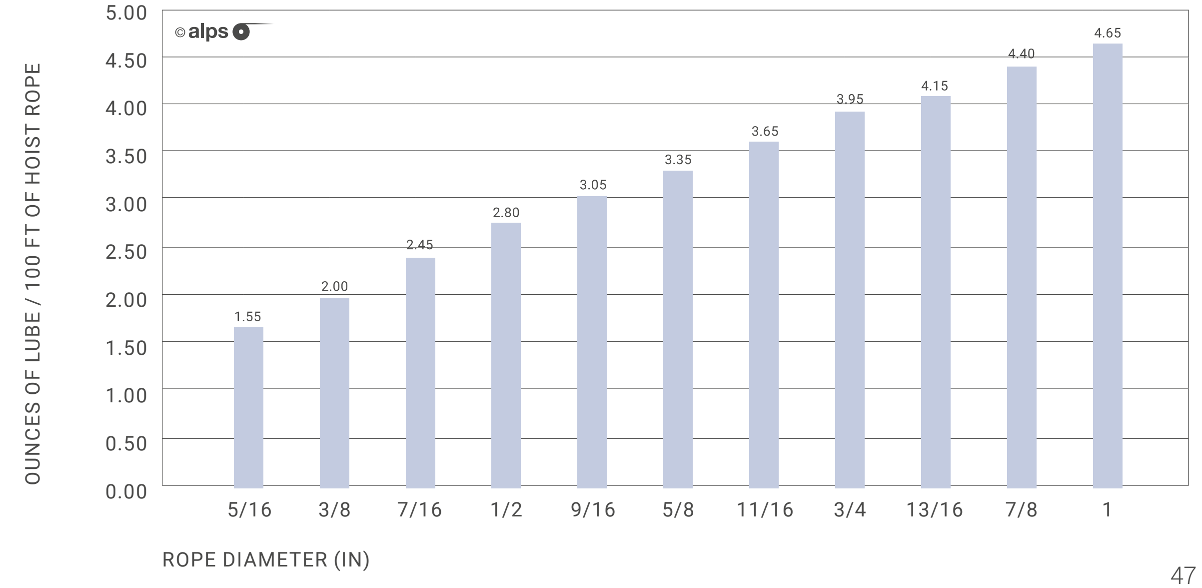
Lubricant should be compatible with the originally applied product by the manufacturer. Lubricant must be free of acids and alkalis. Lubricant should hold a high film strength and some anti-corrosion additives. The lubricant's viscosity should be capable of penetrating the interstices between wires under operating conditions. Intrusion of lubricant is supported due to capillarity within the rope parts. Lubricant should offer good adhesion with a friction coefficient of μ 0.09 [-] for the material pair steel/cast iron.

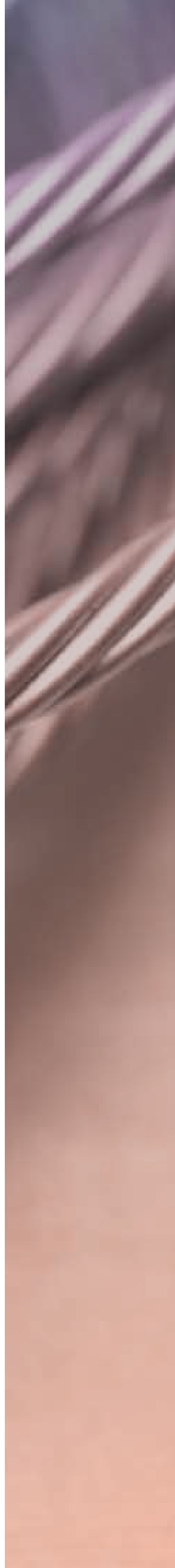
Lubrication of elevator ropes is a demanding compromise
Lubricant for elevator ropes should sufficiently lubricate between the rope parts such as wires, strands and rope core. At the same time, it should provide good adhesion between rope and sheave.

AlpsLube 60™ supports all the lubrication requirements.



This chart is only a guideline to determine the amounts of **ounces** of lubricant **per** rope diameter and **100 ft** of rope length.





Product code key

Alps⁶ 2F – TF

- **Outer strands** (6)
- **Wires per strand** (25)
- **Core** (Fiber)
- **Grade** (Traction)
- **Construction** (Filler)

AlpsXTRA⁸ 1S – EI

- **Outer strands** (8)
- **Wires per strand** (19)
- **Core** (IWRC)
- **Grade** (EHS)
- **Construction** (Seale)

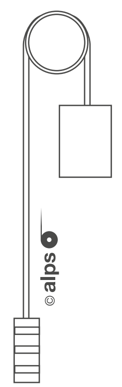
Contents

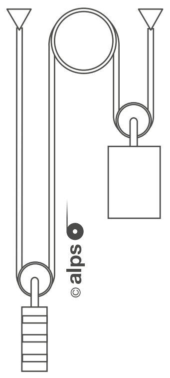
AlpsELEC

ESTIMATED ROPE LIFE CALCULATION SOFTWARE

The **determination of the life expectancy** of an elevator rope system is a reasonably complex process due to diverse factors that affect such a system. AlpsELEC is a **computer program** designed to help the elevator professionals **select the best rope** for any application and **determine the lifetime** of the wire rope. Based on many years of technical experience in the elevator market, **Alps developed a powerful tool available to all Alps rope users.**

Elevator Rope Types

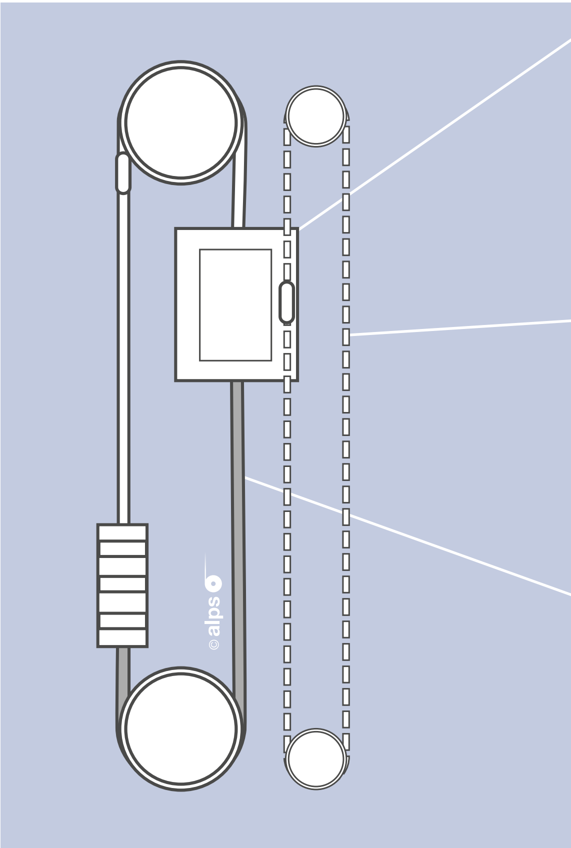




HOIST ROPES

In **1:1 installations** hoist ropes are fixed on the top of the car and counterweight and run over the drive sheave.

In **2:1 installations** hoist ropes are fixed on the top of the elevator shaft and run over pullies fixed on the elevator and counterweight top.



DOOR OPERATING ROPES

Elevator doors on each floor and in the car are driven by a motor **moving the door operating ropes**.

GOVERNOR ROPES

This type of rope initiates the **emergency brake** system in case of uncontrolled speed downwards. It is a safety part.

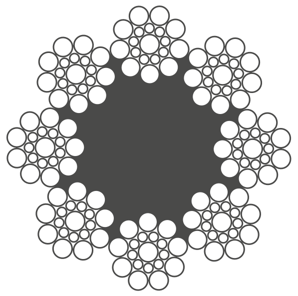
COMPENSATING ROPES

In **higher installations** this type of rope compensates the weight of the hoist ropes and is fixed below cabin and **counterweight running over a deviation sheave** in the bottom of the elevator shaft.

Hoist ropes and cores

The **center** of each stranded rope is called the **core**. This is made from **fiber or metal** wire. Combinations of the materials mentioned are also possible.

The core has a **supporting function**. It takes over all **pressure forces** directed against the center of the rope and prevents the strands from touching each other. Hoist ropes used for elevators are:



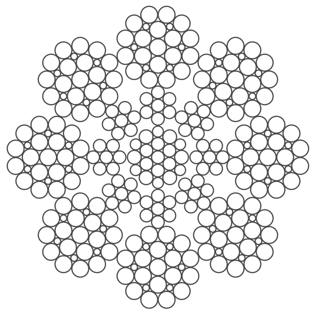
FIBER CORE ROPES

Hemp cores
- Natural fiber
- Unstable and soft
- Unsuitable for elevator ropes

Poly Propylene (PP) cores
- Man-made fiber
- Stable, firm, precise
- Not heat resistant
- Not for elevator hoist ropes

Sisal cores
- Natural fiber
- Stable and firm
- Heat resistant
- Best material for hoist fiber cores

Fiber core ropes can be used up to 80 m and 3 – 4 m/s.

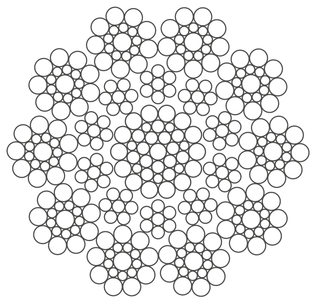


FULL STEEL ROPES
8 OR 9 OUTER STRANDS

Steel core in form of a strand
- Can be used for max. 6 outer strands

Independent wire rope core (IWRC)
- Can be used for 8 or more strands

IWRC ropes with 8 or 9 outer strands can be used up to 400 m and 5 – 8 m/s.



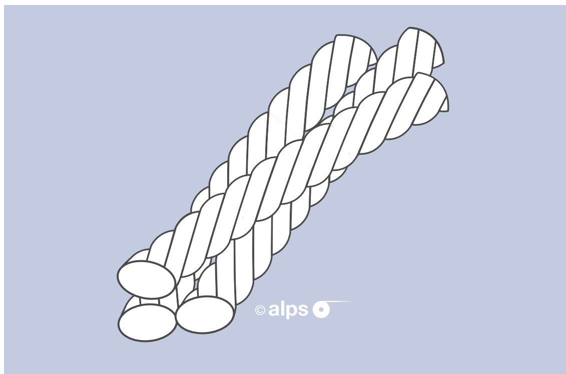
SPECIAL FULL STEEL ROPES
10 OUTER STRANDS

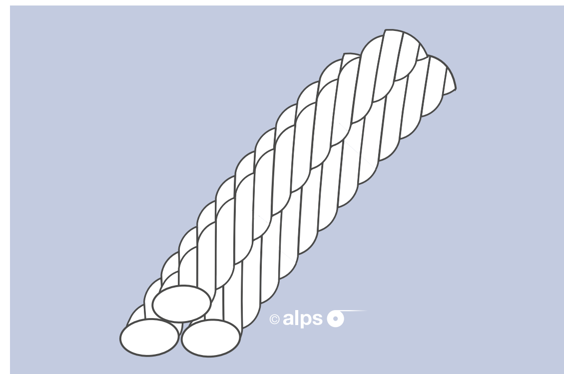
Independent wire rope core (IWRC)

IWRC ropes with 10 outer strands can be used for > 400 m and > 8 m/s.

Lay types

In elevators you find different types of rope.





STANDARD LAY

Strands lay on each other with **high point pressure**. Strands of all layers are in different directions and lay lengths. Each layer requires a separate production run. A **poor fill-factor** results in diameter-reduction, elongation and in a **short service life**.

PARALLEL LAY

Strands lay on each other with **low line pressure**. Strands of all layers are in the same directions and lay lengths. All layers can be produced in one operation run. A good fill-factor results in a little diameter-reduction, low elongation and in a long service life. **Parallel laid ropes** are more **sensitive to untwisting** than standard laid ropes.

The use of parallel laid ropes is recommended for high rise installations.

Rope Design

PRE-FORMED ROPES

When the ropes are **preformed**, the strands are individually brought into their final helical shape immediately before the stranding point. This way strands **fit exactly** around the rope core. Ropes can be **cut without fixation** and strands remain in position. Also, **broken wires** do **not stick out of the rope** structure.

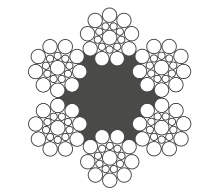
GOVERNOR ROPES

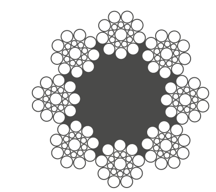
They are **not friction driven**. Governor ropes are fixed to the cabin and run in a loop over the overspeed governor on top of the shaft, a deviation sheave in the basement of the shaft and back to the car. **These ropes are moving the Governor rope sheave.** They are not friction driven. Due to little friction, they can contain man maid fiber cores, e.g.: Polypropylene (PP). **Governor ropes** stand out with a stable diameter and little elongation. For safety reasons only a small amount of lubricant is applied.

If the car descends **faster than it's designed** to, the **Governor rope is blocked**.

The blocked Governor rope initiates the brake system at the cabin. The brake-shoes clamp to the guide rail and the cabin comes to a stop.

In the US Governor ropes can be in **iron grade** (680 N/mm²). Diameters of Governor ropes are between **8 to 10, sometimes 12 mm**.

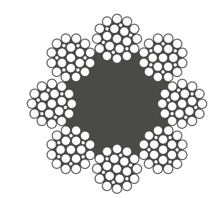


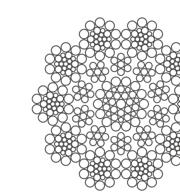


COMPENSATION ROPES

Drive sheaves need power and friction to move the weights of the car, passengers, hoist ropes and travelling cables. **Compensating ropes balance** the hoist rope weight. In addition, they reduce extreme sheave and rope wear, **increase** the **system performance** and riding comfort, and increase **hoist rope** and **sheave lifetime.** Using the same rope type for hoist and compensating ropes can avoid a rope mix-up in the field.

Single large diameter ropes or coated guided chains can be used to compensate hoist rope weights. The **use** of coated chains **is limited** to approx. **500 ft (150 m)** installation height and **690 ft / min (3.5 m / s).**

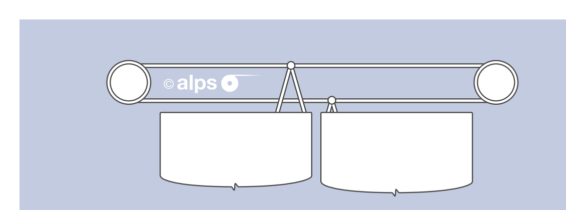


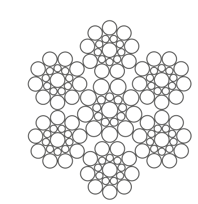


DOOR OPERATING ROPES

Door operating ropes are installed around two **small diameter pulleys** of which one is driven by a motor. The ropes are **fixed** to components moving the doors.

Ropes used for this high demanding operation are in a range of **1 / 8” (3.2 mm) to 3 / 16” (4.8 mm).** Constructions are **7x19 Seale** with zinc coated wires of **1960 N/mm²**.



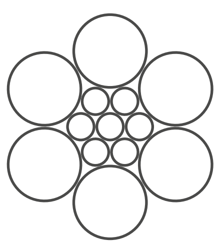


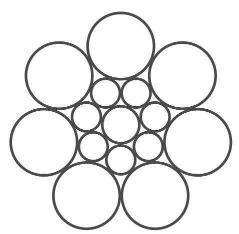
Strand constructions

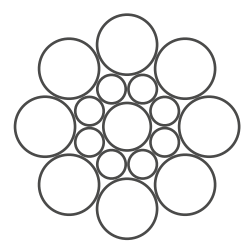
The **more wires** a construction has, the **more flexible** it is. **Thick outer wires** are suitable for exposure to **abrasion** or high transverse pressure; **thin outer wires** are more suitable for high numbers of **bends.**

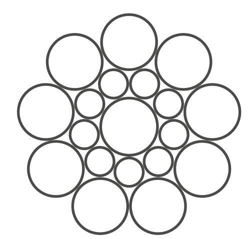
SEALE

Seale is one of the **most used** strand constructions for elevators. In 1885 Thomas Seale received a patent in the USA for this design. The **number of wires** is the same in **every layer**. Therefore, the wire diameter must be larger from layer to layer. Friction driven installations require large outer wires. **Crossing of wires is avoided** because all outer wires are placed in the grooves of the previous layer. This results in **linear contacts** between all wires. The **parallel** laid wires in the strands **provide** a very good filling factor and a **high breaking load**. Seale constructions should be used **up to** a diameter of **1/2"** (12.7 mm). If used for larger diameters the outer wire diameters are too large to provide good rope bending behavior.


1 + 6 + 6 = 13 Wires


1 + 7 + 7 = 15 Wires


1 + 8 + 8 = 17 Wires

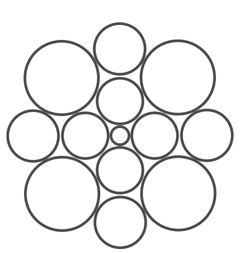

1 + 9 + 9 = 19 Wires

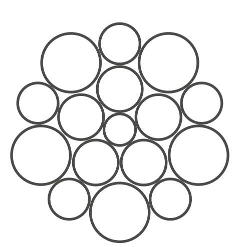
WARRINGTON

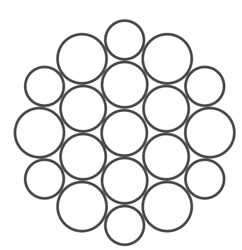
The wires of the **first layer** have the **same diameter**. There is a wire in each of the grooves in the first layer. Smaller diameter wires lie between these wires. The **contact** of all wires **are linear**.

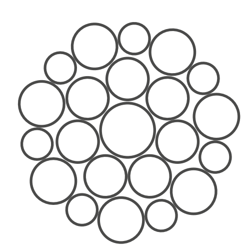
The outer wires of this construction are smaller than in the Seale construction of the same diameter. **Warrington** strands have a very **good filling factor.**

It is recommended to use this type of elevator rope for rope diameters **larger** than of **1/2"** (12.7 mm).


1 + 4 + (4 + 4) = 13 Wires


1 + 5 + (5 + 5) = 16 Wires

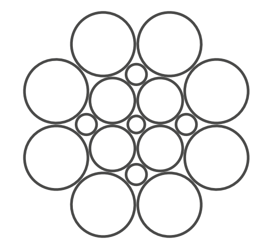

1 + 6 + (6 + 6) = 19 Wires

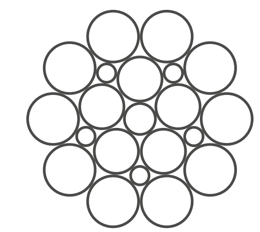

1 + 7 + (7 + 7) = 22 Wires

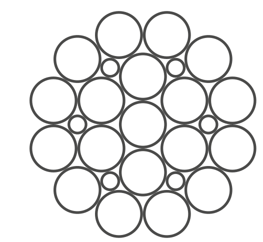
FILLER

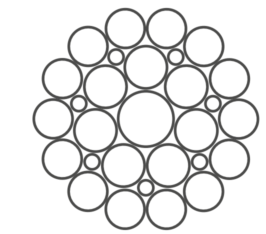
At least **three wire layers** have three **different** wire diameters, but the **same diameter** for each **wire layer**. The number of wires in the first layer and the filler layer is the same, that of the outer layer is twice as large. The **contact** of all wires **are linear**. In various countries, the cored wire is not taken into account in cross-section calculations.

Space between the inner and outer wire layer are **filled** with **small** diameter **wires**. This is what gives the construction its name. With the strand construction of **21 wires**, the outer wires are smaller than in Seale or Warrington constructions of the same diameter. Ropes with **filler strands** have a good **bending behavior**. They are very suitable for **large rope diameters**. Due to the small filler wire diameter, filler constructions are not recommended for small diameter ropes.


1 + 4 + 4F + 8 = 17 Wires
(1 + 4 + 8 = 13)


1 + 5 + 5F + 10 = 21 Wires
(1 + 5 + 10 = 16)


1 + 6 + 6F + 12 = 25 Wires
(1 + 6 + 12 = 19)


1 + 7 + 7F + 14 = 29 Wires
(1 + 7 + 14 = 22)

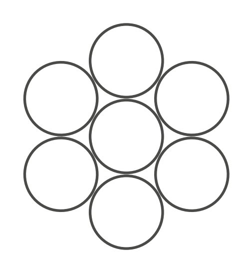
All above mentioned strands can be produced in a single production run. Due to parallel laid wires, there is line contact between all wires. This results in a good lifetime span.

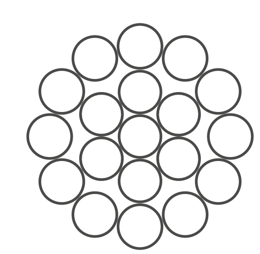
STANDARD

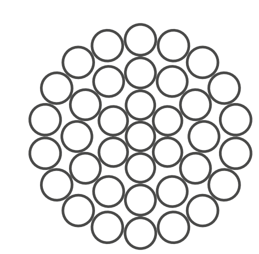
Except for the core wire, all wires have the **same diameter**. The number of wires **increases** by six with each additional layer. The wires of all layers **cross** the underlying layers at an acute angle. This leads to **point contacts**.

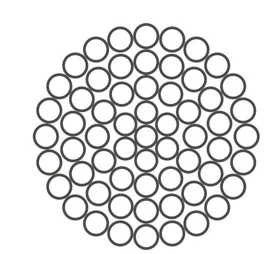
Therefore, the **life span** of ropes with standard laid strands is **shorter** than Seale, Warrington or Filler. Each wire layer requires an extra production run.

Ropes with standard strand constructions are **rarely used for elevators**.


1 + 6 = 7 Wires

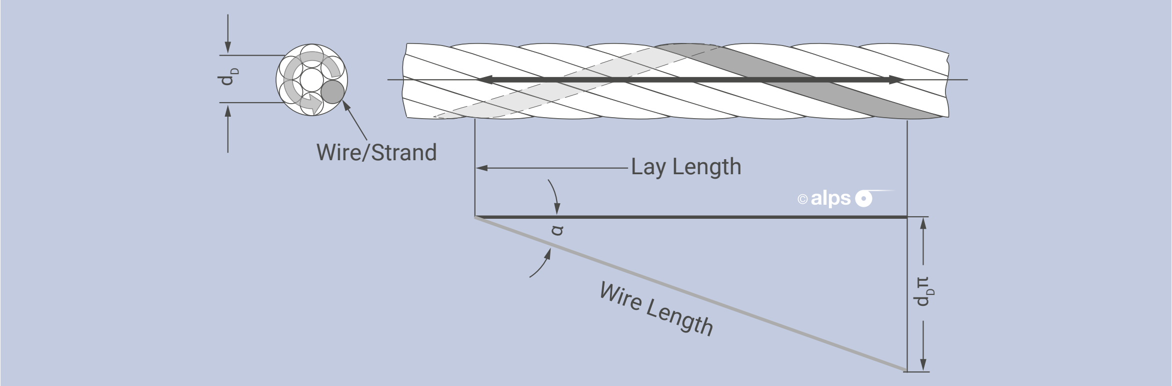

1 + 6 + 12 = 19 Wires


1 + 6 + 12 + 18 = 37 Wires


1 + 6 + 12 + 18 + 24 = 61 Wires

Lay length

The lay length is **one rotation** of the wire **around** the strand **center** or the strand around the rope center. **Wire** and **strand diameter** are in direct relation with strand or rope **lay lengths**.



None of these rope **parameters** can be changed **separately** as you can see in the design pictures next page.

Design and calculation

By design we understand the exact geometric definition of wires, strands and ropes. The **later use** of the rope **dictates the limits** of the design choice.

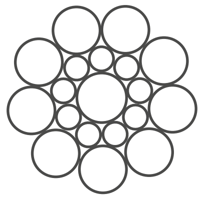
It is a great advantage for users if the rope designer knows the **conditions of use** as precisely as possible. This knowledge makes it easier to determine the **optimal rope type**, which can be expected to have trouble-free operation and a long service life. Thanks to the use of a **computer**, the necessary **geometric calculations** can be carried out **precisely**.

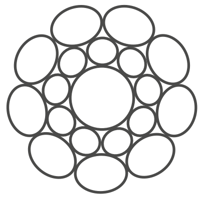
The **adjacent strands** / ropes are optimized and have the **same diameter**.

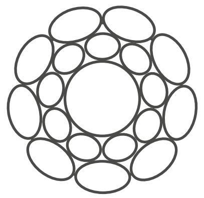
If the **lay length is changed**, while the construction remains the same, it is necessary to **adapt the wire / strand diameter**.

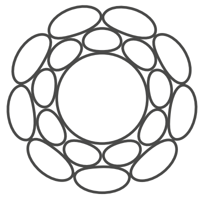
If the **lay length is changed,** wire / strand **diameters** must be adjusted.

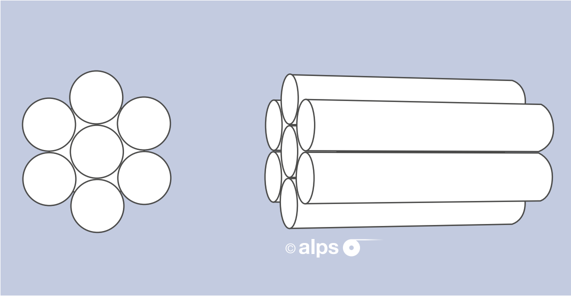
If wire / **strand diameters** are changed, the **lay lengths** must be adjusted.


Very long lay length


Normal lay length

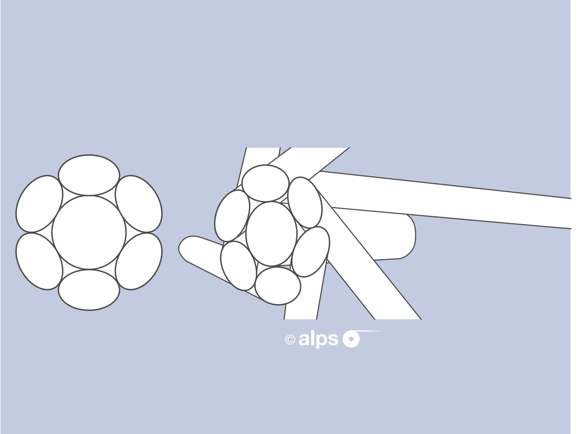

Short lay length


Very short lay length



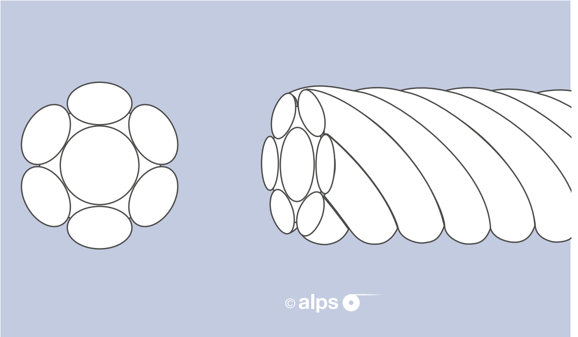
CIRCLE–MODEL

If **seven identical** cylinders are placed next to each other as in the arrangement shown, the simplest model of a strand / rope construction is created. It can be seen that all neighboring cylinders are in **contact** and that the **cross sections** are **circular** in shape.



ELLIPSIS–MODEL

If **six identical** cylinders are placed at an angle on a vertical one, **elliptical cross sections** result from the **inclined cylinders**. It can be seen that the cylinders require more circumferential space in an inclined position than in a vertical position. If the **middle** one is to touch the inclined cylinders, it must be **larger** in diameter. The **ellipse model** only approximates reality, although it is **more precise** than the **circle-model.** It is still widely used as a basis for calculations.



BENT–ELLIPSIS–MODEL

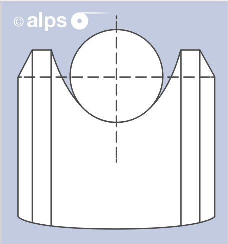
If **six identical** rods are bent around a cylinder, this **creates cross sections** in curved elliptical shapes. Since this model **corresponds to reality**, today's computer programs are based on this basis. The more precisely the calculation agrees with reality, the higher the quality of the basis for the construction.

Sheave groove shapes

There are four groove shapes in traction sheaves:

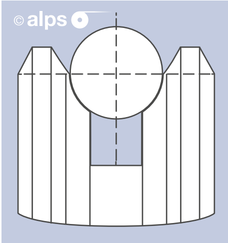
ROUND GROOVE

Round groove with undercut (also known as semicular groove)
The round groove offers the worst power transmission of all the groove types.



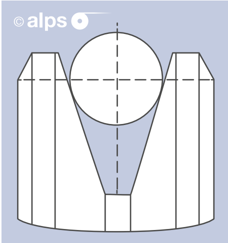
ROUND GROOVE WITH UNDERCUT

Round groove with undercut (also known as seat groove)
If a rectangular groove is pierced under the round or rope groove, it is referred to as an undercut. The round groove with undercut is the most common groove shape.



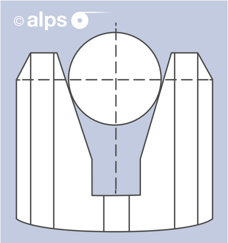
V–GROOVE

With the **V-groove** there is enormous transverse pressure on the rope cross-section, which is why the V-groove places the greatest strain on the rope.



V–GROOVE WITH UNDERCUT

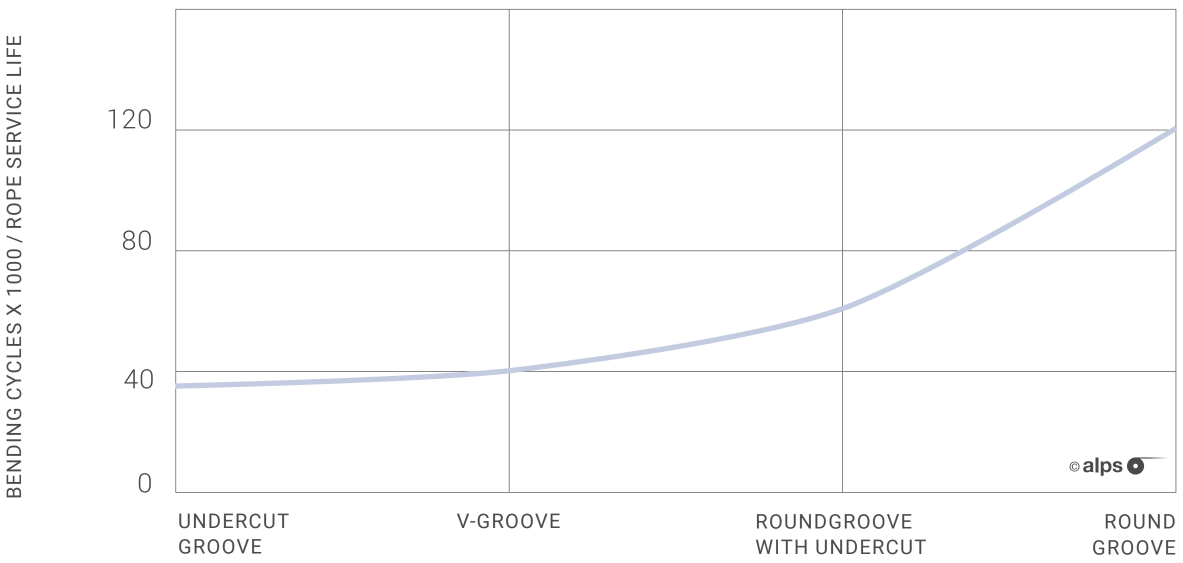
However, the **V-groove** offers the greatest driving ability but the shortest rope life span.



Depending on the **groove shape** used, the rope is **guided well** (round groove) **or pressed** into the groove (wedge groove). The guidance and the pressure are two factors that have a significant influence on the one hand the **traction capability** and on the other hand the **service life.**

The **stronger the undercut**, the **greater** the contact **pressure** and the greater the wear on the rope and the rope groove. The **undercut** angle, which is designated with an angle between the rope center point and the two transition points from the groove, is between a minimum of **70°** and a maximum of **105°.**

Groove profiles and impact on rope service life



Production

ROPE WIRE

The **raw material** for the wire production is **wire rod**. It is drawn to the required dimensions through drawing dies with graduated diameters. This process results in an increase in material strength and hardness. The required **final strength** is achieved through suitable measures, for example, **heat treatment** (patenting), number of drawing stages, etc. If necessary, rope wires are **galvanized** before or after the last drawing process.

ROPE CORE

Yarns made from synthetic or natural **fibers** are processed into strands, which are used individually as cores. Cores for **thicker ropes** consist of **several strands**. Production takes place in one operation on modern systems. If necessary, **yarns** should be impregnated with **lubricant** before processing. Inlays made of metal wires are strands or ropes.

ROPE STRANDS

Wires for elevator rope strands are between **0.1 mm** and **1.5 mm** in diameter. Delivery takes place in coils or on spools. Rope wire can be supplied directly on **machine spools**. This eliminates the need to rewind and cut to the required wire lengths.

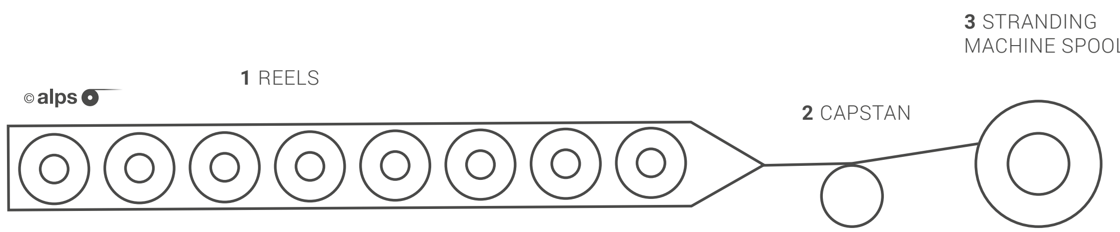
The number of wire spools required for the strand construction are inserted into the stranding machine.

The **stranding machine** consists of a **rotating part**, one or two capstans and the winding device.

The reels **1** are connected to the capstan **2** by a gear unit. The lay length is selected with the appropriate gear setting. The capstans pull the wires out of the rotor through hole-plate, die and post-forming device. The hole-plate arranges the different wire diameters according to the construction and they are brought together in the die.

If necessary, the **lubricant** is applied after the hole-plate. **Only at this point** it is possible to apply a **film of lubricant** to each wire.

In the post-forming device, the strand is given the shape it needs for further processing. The suitable stranding machine spool **3** takes up the finished strand.



ROPE

The **roping machine** is basically the **same** as the **stranding machine**. The difference lies in the smaller number and the larger capacity of the reels.

The capstan **2** pulls the strands through the preforming devices, giving them their final helical shape. They are brought together with the core inside the die. The rope receives its final shape in the post-forming device and is wound directly onto the master reel **3** after passing the capstan **2**.

Pretensioning

Offline Pretension process is applied to the rope to minimize constructional stretch.

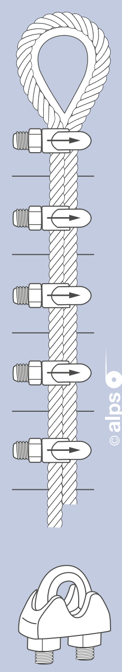
CONSTRUCTION PRESTRETCHED TABLE

Name	Construction	CONSTRUCTIVE ELONGATION AFTER 10% MBL	ELASTIC ELONGATION BETWEEN 2% AND 10% MBL	TOTAL ELONGATION UNDER 10% MBL
Alps6 1S – EF	6x19 S – FC	0.18%	0.23%	0.41%
Alps6 2F – IF	6x25 Fi – FC			
Alps6 2F – TF	6x25 Fi – FC			
Alps6 2F – EF	6x25 Fi – FC			
Alps6 2F – EI	6x25 Fi – IWRC	0.17%	0.20%	0.37%
AlpsXTRA8 1S – IF	8x19 S – FC	0.27%	0.23%	0.50%
AlpsXTRA8 1S – TF	8x19 S – FC			
AlpsXTRA8 1S – EF	8x19 S – FC			
AlpsXTRA8 1S – D13F	8x19 S – FC			
AlpsXTRA8 1S – D15F	8x19 S – FC			
AlpsXTRA8 1S – TI	8x19 S – IWRC	0.22%	0.20%	0.42%
AlpsXTRA8 1S – EI	8x19 S – IWRC			
AlpsXTRA8 2F – IF	8x25 Fi – FC			
AlpsXTRA8 2F – TF	8x25 Fi – FC			
AlpsXTRA8 2F – EF	8x25 Fi – FC			
AlpsXTRA8 2F – D13F	8x25 Fi – FC			
AlpsXTRA8 2F – D15F	8x25 Fi – FC			
AlpsXTRA8 1W – D15I	8x19 W – IWRC			
AlpsULTRA10 1S – D15P	10x19 S – PWRC	0.15%	0.15%	0.30%
AlpsULTRA10 2W – D15P	10x26 WS – PWRC			

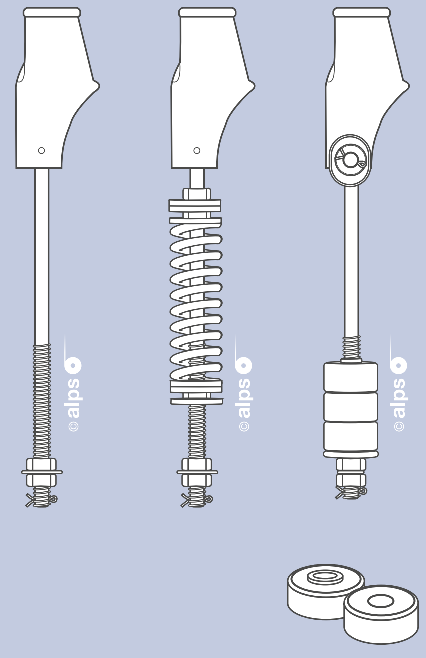
End fittings

There are detachable (reusable) and nondetachable (one time use) end fittings for ropes. Wedge sockets are also known as shackles.

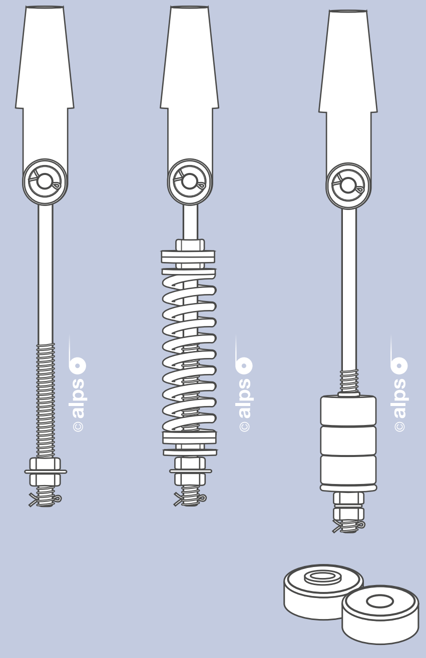
DETACHABLE FITTINGS



Clamp fitting with thimble



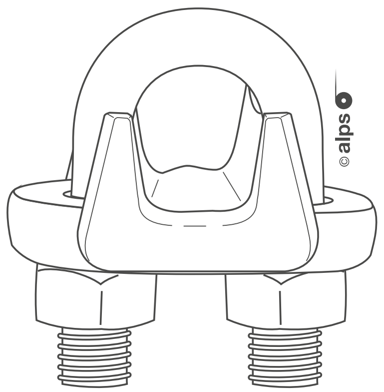
Wedge sockets asymmetric with spring and elastomer buffer



Wedge sockets symmetric with spring and elastomer buffer

CLAMP FITTINGS

The **bow-part** of the **clamp** always has to be placed on the rope **dead-end**. The load on the dead-end is **max. 50%** of the rope load. The flat part of the clamp imbeds the higher loaded parts of the rope. It is recommended to use **5 clamps** for a higher rope load. Elevator ropes have a high safety factor and therefore only a **max. load of approx. 10%** of the possible rope load. Fixing clamp fittings of elevator ropes with 3 clamps is sufficient. The **distance** between clamps is about **5 to 10 times** the rope **diameter**.



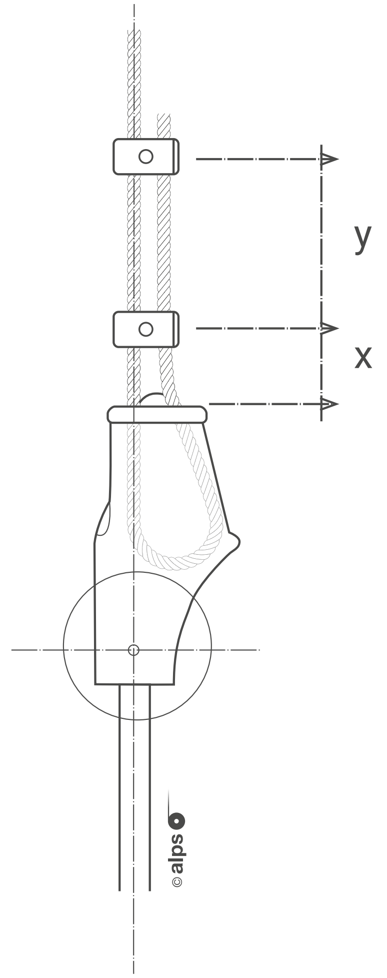
ASYMMETRIC WEDGE SOCKETS

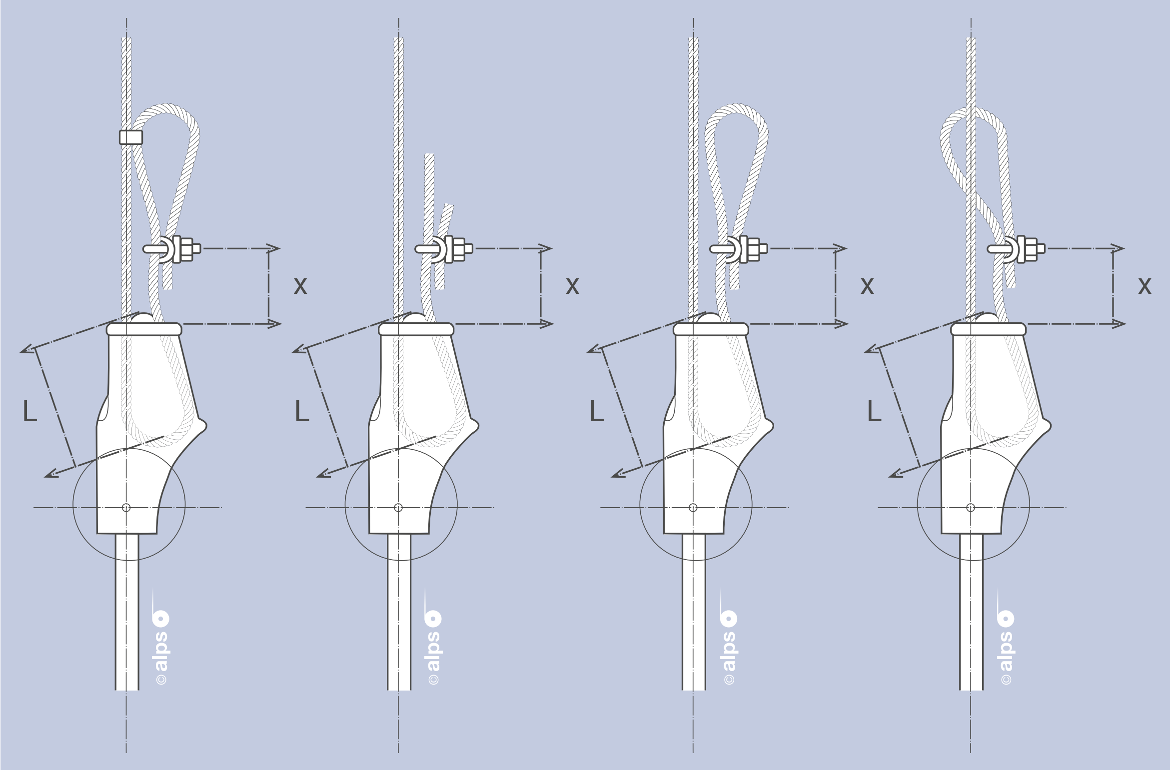
This type is very common in the US. The rope force goes in a **centric line** from the **rope** to the **fitting** and to the **final fixation** of the rope. The fixation is centric, even if it's called asymmetric.

The dead end is retained with **clamps** or with clips as shown in the picture. The **wedge** is being held back from falling out by these fixations in case of a lose rope situation. The dead end of the rope must come out on the asymmetric side of the wedge socket. **Incorrect** mounted wedge sockets lead to **rope damage**.

For clips the distance **y** is between **4" – 6"** (100 – 150 mm). For clips and clamps **x** is **0.75 times** the length of the wedge.

Below are some possibilities of how to retain the dead end with a clamp.



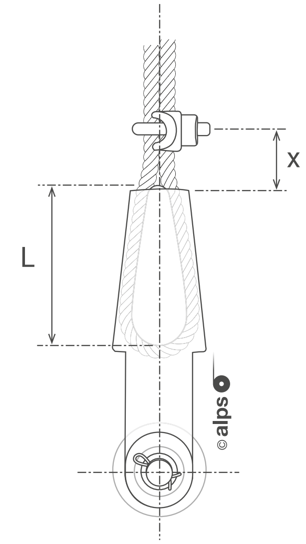


SYMMETRIC WEDGE

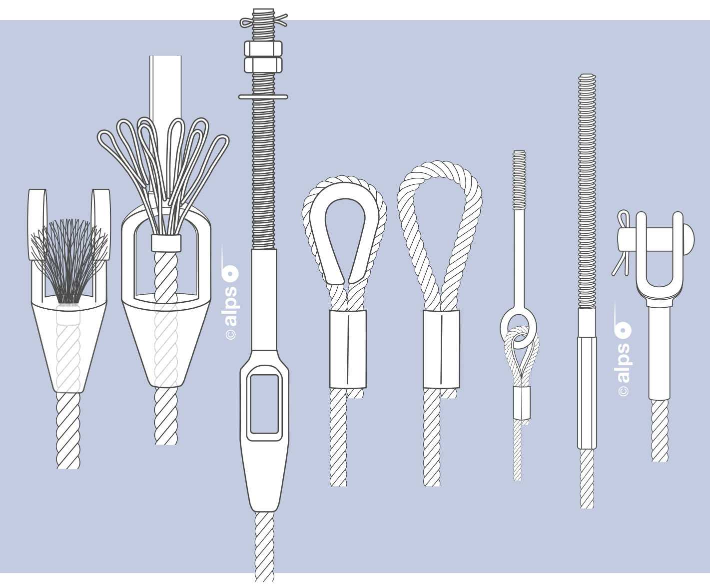
This type of shackle is popular in Europe and Asia. A **small eccentricity** between the rope and the fitting **does not reduce safety** or capacity of the **asymmetric wedge socket**.

The first clamp or clip should be fixed from the shackle at a distance of **0.75 L** (lengths of the wedge).

Other recommendations are similar to the asymmetric wedge socket.



UNDETACHABLE FITTINGS



Left to right:

Single open and closed spelter sockets

Closed spelter socket with additional screw part

Pressed loop with thimble

Pressed loop without thimble

Eyebolt pressed to loop with thimble

Swaged socket

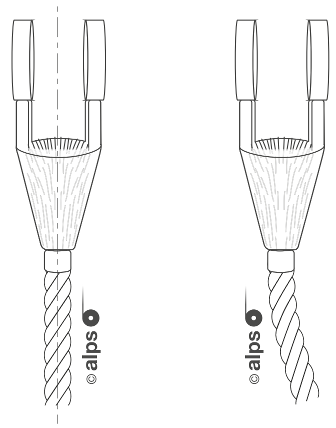
Swaged socket with shackle and bolt

SPELTER SOCKETS

The rope end is formed into a **broom** and pulled into the socket, which then is **filled** with metal or resin **socketing material**.

Before this process the rope and socket must be in a **vertical line**. Otherwise, highly tense and loose strands will be near the socket, resulting in an early rope damage in this area.

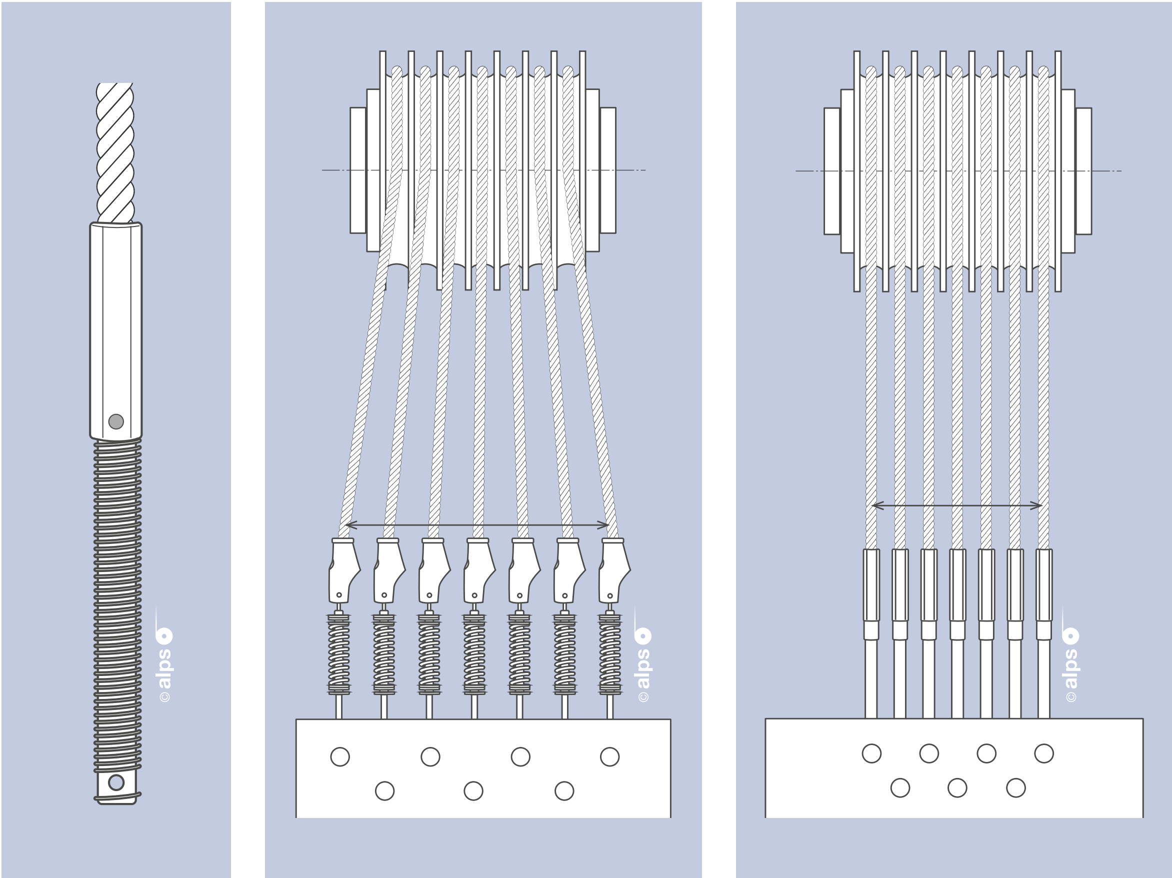
The pouring process must be done slowly to avoid bubbles inside the poured metal or resin.



SWAGED SOCKETS

Swaged sockets are mounted to **one end** of the hoist rope before **delivery to the site**. Expensive and demanding installation work is done in the plant. **Only one end** must be equipped with a **detachable** end fitting to pull the rope into the elevator installation. The ropes can be installed **easy and quick**, without the need of special tools.

A **control hole** allows to check the rope end position at all times. A **torsion lock hole** is applied near the end of the socket.



This type of end-fitting is applicable for all types of ropes. It is used in the **aircraft industry** for decades. Compared with the wedge socket, little space is needed for this fitting. That is important when the **cabin** arrives on the **top floor**.

Using **wedge sockets**, the ropes will enter the **sheave** in an angle and generate strong **friction** to ropes and sheave. This will always be on the same part of the rope length and result in a **short lifetime** of these rope parts as well as the sheave.

With **swaged sockets** there is no extra space needed. The whole rope set can run **parallel**, matching the **sheave grove distances** much better. Using swaged sockets, the **life span** of ropes and sheaves will be **much longer**.

Rope discard criteria

The discard of alps elevator ropes must always be according to ISO-4344 or other international standards.

Elevator ropes are complicated machine parts and are subject to a large number of outer influences such as:

Stress / Friction / Bending / Torsion / Temperature / Corrosion / Pressure / Dust / Humidity / Vibration - etc.

Additional influences to consider are:
Travel frequency / Maintenance / Lubrication / Equal tension / Installation condition - etc.

Discard criteria can be divided into 2 groups:

- Measurable discard criteria (defined by quantities in standards)
- Non-measurable discard criteria (to be judged by the expert).

Measurable discard criteria are:

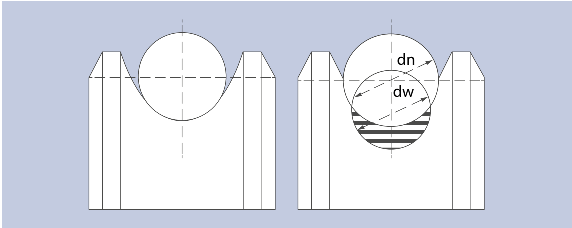
- Outer wire breaks
- Diameter reduction

Measurable discard criteria are specified in national, international and company standards. Make sure you use valid standards, wherever ropes are installed.

OUTER WIRE BREAKS

ACCORDING TO ISO-4344 ANNEX E	IMMEDIATE DISCARD			DISCARD OR RE-EXAMINATION WITHIN A CERTAIN INTERVAL FIXED BY AN EXPERT		
ROPE CLASS	6X19	8X19	10X19	6X19	8X19	10X19
AVERAGE NUMBER PER LAY LENGTH	> 24	> 30	> 34	> 12	> 15	> 17
PREDOMINANT NUMBER IN ONE OR TWO STRANDS PER LAY LENGTH	> 8	> 10	> 11	> 6	> 8	> 9
ADJACENT NUMBER IN ONE STRAND	> 4	> 4	> 6	4	4	6
VALLEY BREAKS PER LAY LENGTH	> 1	> 1	> 1	1	1	1

Diameter reduction:
According to ISO-4344 Annex E:
"Replacement should be considered if the diameter is reduced by **6% of the nominal rope diameter.**"



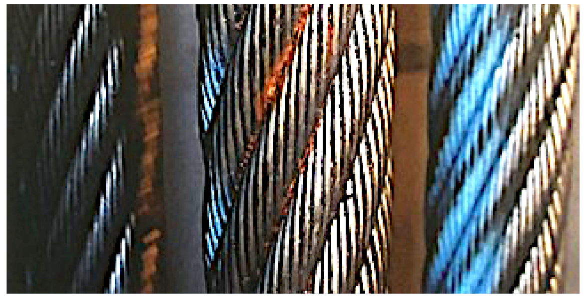
e.g.:
Ø 1/2'' (12.7mm) – min. Ø 0.471'' (11,9 mm)
Ø 1/4 ''(6.35mm) – min. Ø 0.235'' (5.96 mm)

In addition, ISO-4344 says:
"If unusual features are evident that might indicate the possibility of advanced internal deterioration, replacement of the ropes should be considered. EXAMPLE: **local reduction in diameter**."

Non-measurable discard criteria are:

- Corrosion
- Mechanical damage
- Rope deformation
- Excessive wear etc.

The discard criteria must be assessed by an expert.



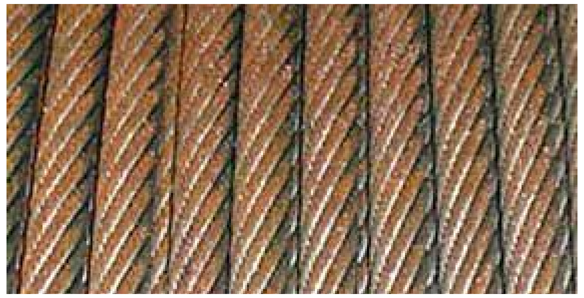
Corrosion:
Red paste or red metal parts between the strands are corrosion. Potential causes include:
- Insufficient lubrication
- Humidity and/or water penetration

Action needed:
- Analyze the red paste, metal parts and wires

If wires have a rough surface and show pitting:
- Replace the rope set

If wires have a smooth surface and no pitting:
- Clean rope from red paste/parts, re-lubricate and reduce inspection interval (observe!)

If the wire surface is rough, there might be serious corrosion.

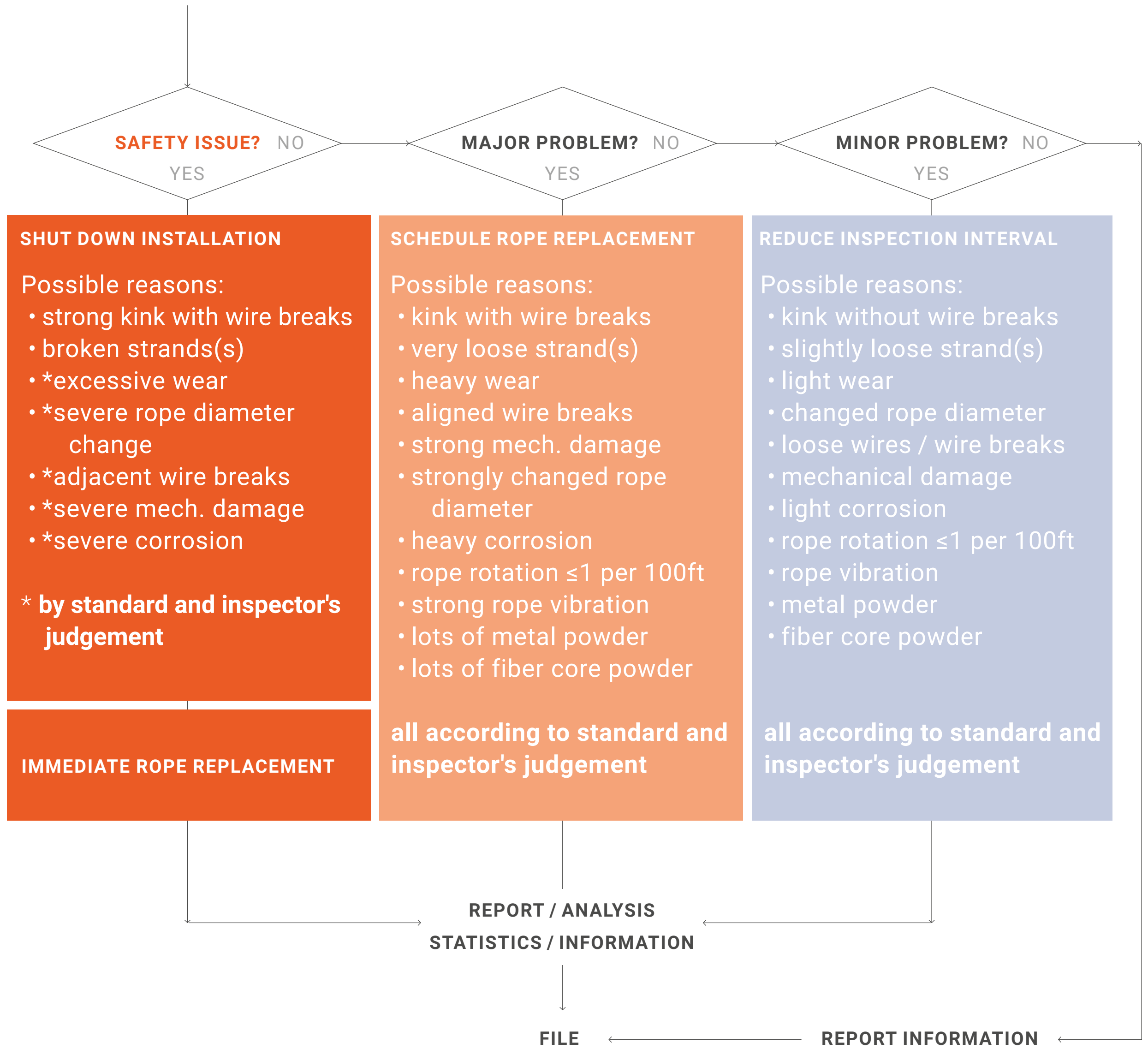


Rouging:
Rouge is a fine, iron oxide formed on the rope during operation due to fretting (abrasion). It gives the rope appearance of rustiness. The presence of rouge does not mean that wire rope is beginning to rust.

Causes:
- Insufficient lubrication
- Friction between strands (rope diameter reduction)

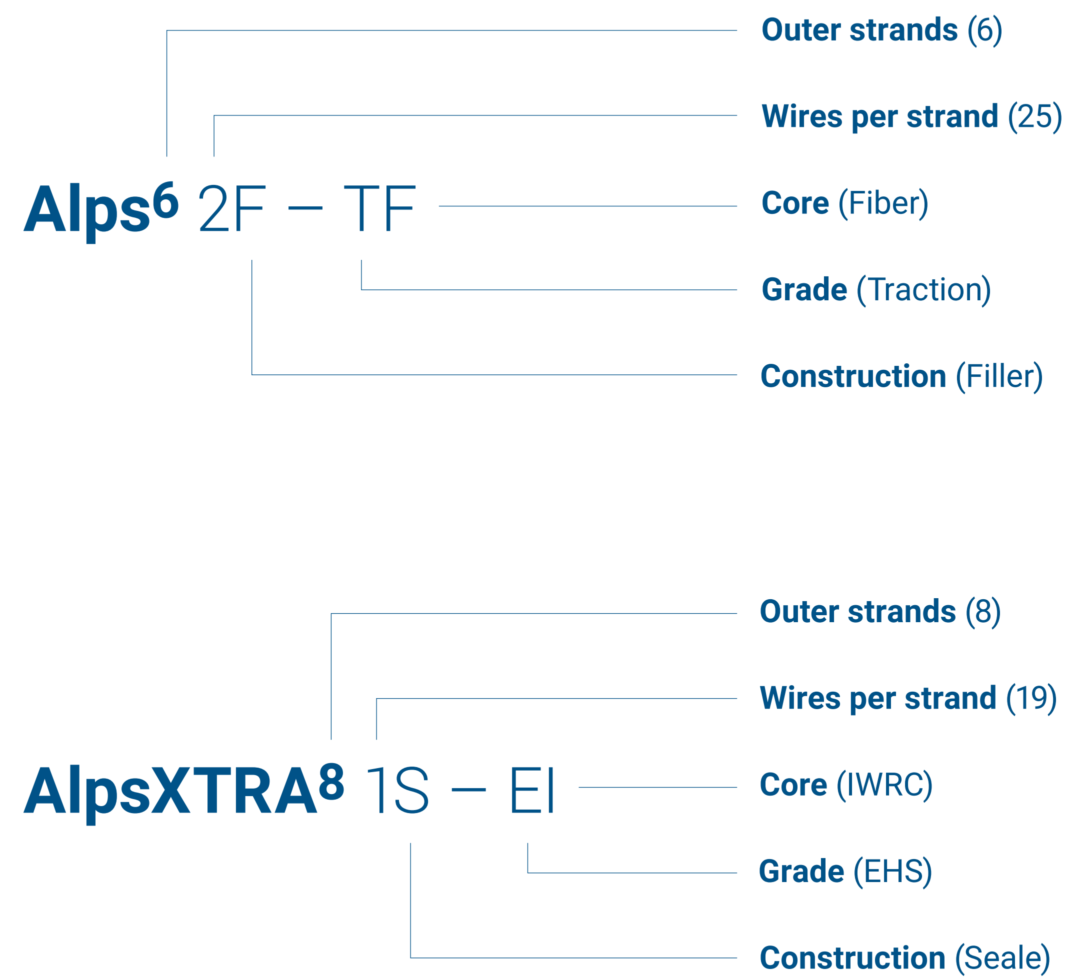
However, If the wire surface is smooth there is no serious corrosion.

Non-measurable discard criteria except for rope diameter and wire breaks



If only the damaged rope is replaced, the new rope will be larger in diameter and will carry more load. It will be under higher tension. Always replace the whole rope set.

Product code key



alps
wire rope corporation™
www.alpswirerope.com

alps
wire rope corporation™

Alps™ WIRE ROPE CORPORATION

MIDWEST (Headquarters)
2530 Production Drive
Saint Charles, IL 60174
(630) 893-3888

SOUTH
11550 Dumas Street
Houston, TX 77034
(713) 941-2068

NORTH EAST
1549 Bobali Drive, Suite C
Harrisburg, PA 17104
(717) 939-5757

www.alpswirerope.com

verope Kiswire

Alps™ is a joint venture of
verope AG and Kiswire Ltd.

EDITION OCTOBER 2021