

ELLIS

Holding Power



Electrical Products



Holding Power

HOLDING POWER
– TRIED, TESTED,
TRUSTED AND
RELIED UPON

We are widely recognised as a global leader in the design and manufacture of safety critical electrical cable cleats and fixing solutions.

- ▶ Our products are used by customers in over 50 countries to protect the electrical supply to vital operations and ensure systems keep running safely and securely in the event of a short circuit.
- ▶ Our products are specified and installed across a broad spectrum of industries and installation types, from nuclear power plants to oil rigs, city centre substations to major rail, road and air transport infrastructure projects.
- ▶ Our in-house engineering capabilities allow for constant product development, innovation and the creation of bespoke solutions for individual project specifications.
- ▶ Our manufacturing headquarters in North Yorkshire, England are ISO 9001, 14001 and 45001 certified and all our cable cleats are manufactured to IEC61914 and short circuit tested as standard prior to being brought to the market. We also offer project specific short circuit testing.
- ▶ Our brand is built upon a culture of trust and integrity, and our reputation reflects this.
- ▶ We are an equal opportunities employer and are committed to reducing our environmental impact and carbon footprint in every aspect of our business.

Our Cable cleats are compliant with the requirement of London Underground Standard 1-085, Product Register No. 361.

Cert no. 21876

12	Alpha™
14	Vulcan+™
16	Vulcan+™ Quad
18	Vulcan+™ Twist Foot
20	Emperor™ Single
22	Emperor™ Trefoil
24	Emperor™ Quad
26	Emperor™ Twist Foot
28	Flexi-Strap™
30	Protect™
32	Trident®
34	Trident® with Spacer
36	Colossus™
38	Centaur®
40	Centaur® Trefoil
42	Centaur® Intermediate Strap
44	Cable Guide Clamp™
46	Atlas™
48	No Bolts Cleat™
50	Solus Clamp™
52	1A Cable Clamps
54	2A Cable Clamps
56	1F Cable Clamps
58	2F+ Cable Clamps
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GRAPH BELOW IS FOR TREFOIL ONLY



ALPHA™
Light duty Compact



TRIDENT®
Light duty Polymeric



VULCAN+™
Standard duty
Compact Stainless
steel

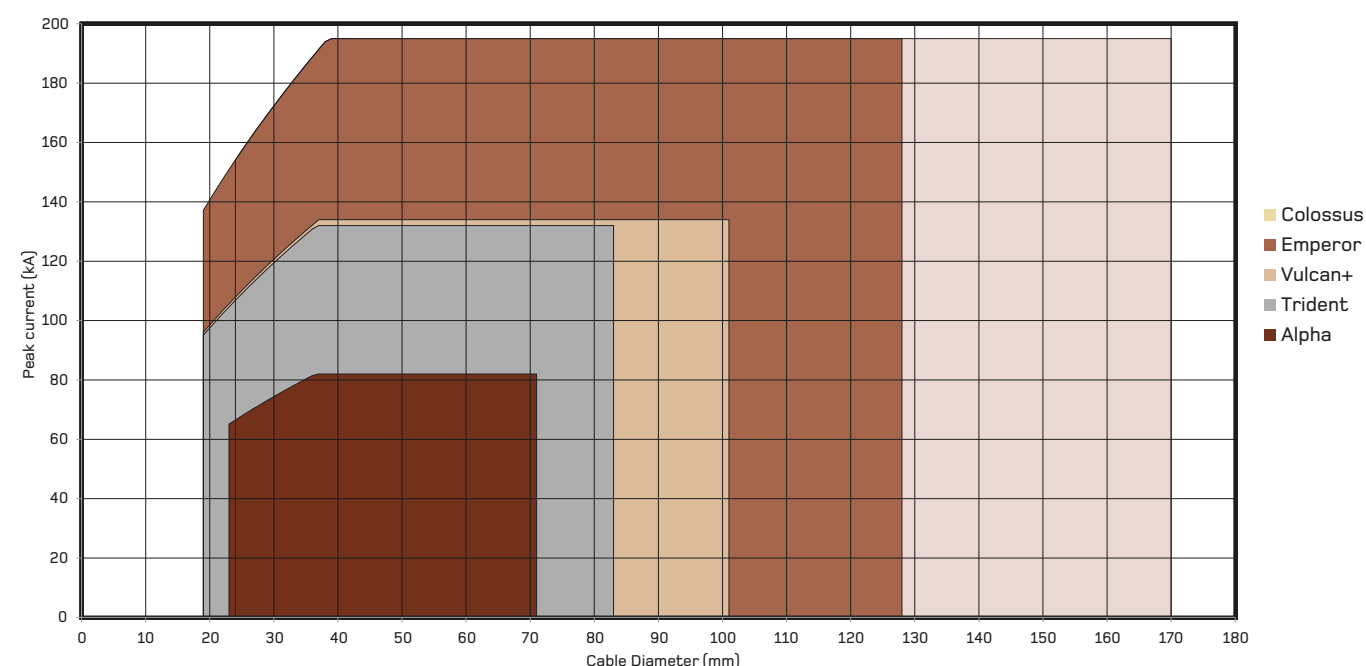


EMPEROR™
Heavy duty Compact
Stainless steel

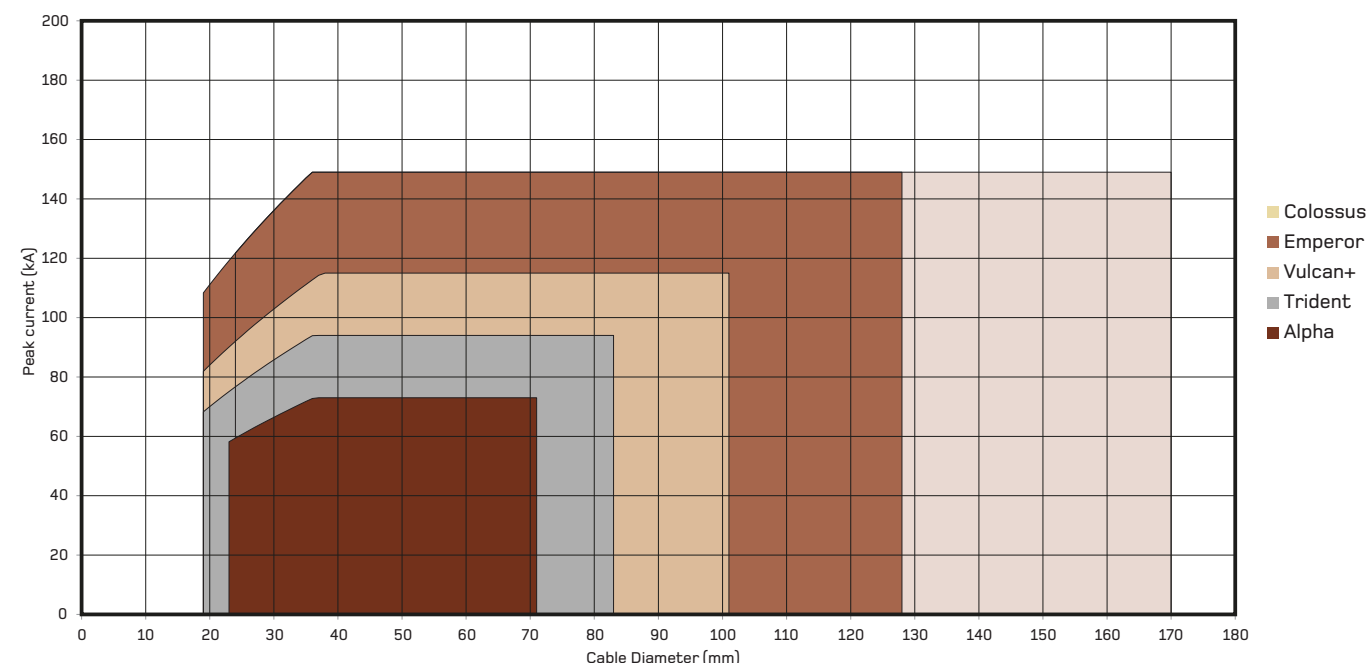


COLOSSUS™
Heavy duty Compact
Polymeric and
Stainless steel

ELLIS CLEAT RANGE. CLEATS SPACED AT 300MM



ELLIS CLEAT RANGE. CLEATS SPACED AT 600MM



The above graphs can be used to provide a general indication of relative cleat strengths, for accurate cleat specification refer to the Ellis online calculator or black book. Also check product datasheets for actual short circuit test results.

WORLDWIDE DISTRIBUTORS

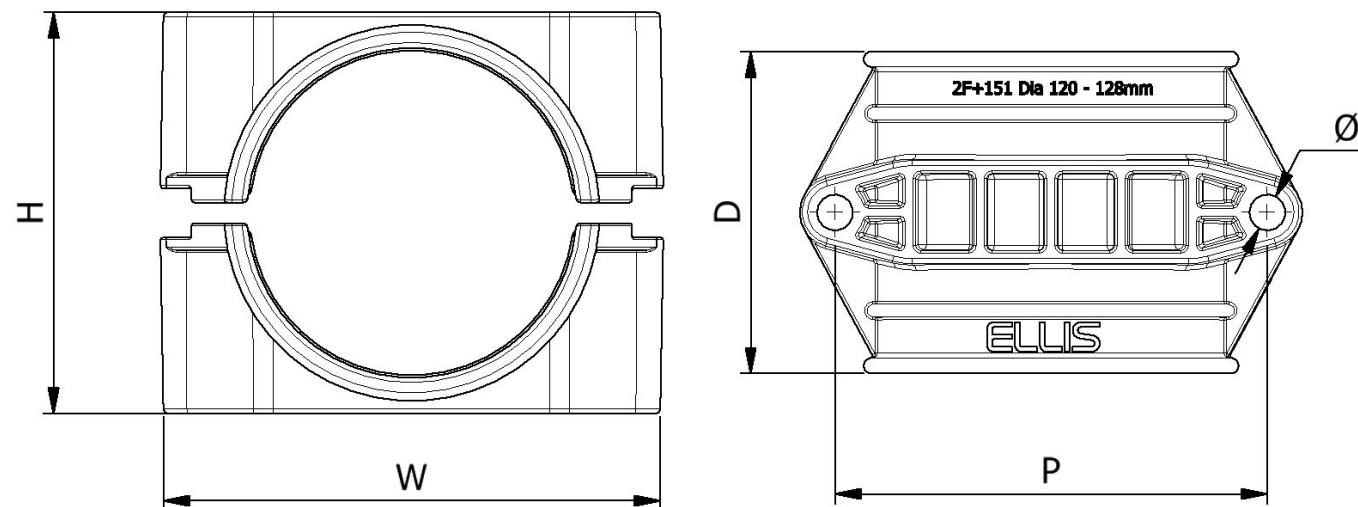


Ellis is represented by a network of International distributors, providing our customers with local and knowledgeable support.

TECHNICAL ADVANTAGES

REFINED DESIGN AND EASE OF USE

All our products are designed in house. Our Design team use the latest CAD and FEA software to develop and refine designs to meet and exceed industry requirements. Following manufacture of the products our design team build the short circuit testing rigs. This important step allows them to see first-hand how easy the products are to install and implement any design changes required to further improve the product.



CUSTOMER SPECIFIC DESIGNS

At Ellis Patents we understand that different markets and varying situations demand different product solutions. As problem solving engineers and a leading manufacturer of cable cleats we thrive on new challenges. When our standard product range isn't quite what you need, we can design, develop test and manufacture project specific, bespoke products to suit your specific requirements. We call this the Ellis Innovation Hub.



SAFETY IS OUR PRIORITY

All of our cleats are tested in line with the international standard IEC 61914. Each product goes through six individual tests including short circuit testing in order to meet the requirements of this standard.

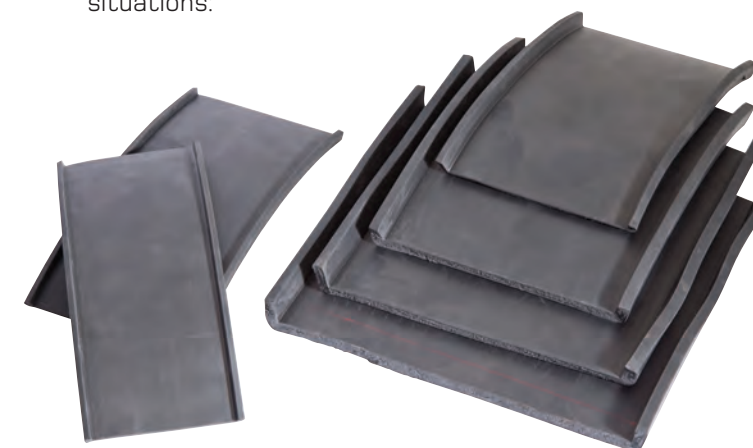
LONG TERM UV TESTING

In addition to the tests carried out to meet IEC 61914 we also carry out long term UV testing. This allows us to confidently recommend products that will be suitable for outdoor applications. Ellis products are designed with an allowance for this degradation over time to ensure they are still within acceptable safety limits even at the end of their design life.



USE OF LINERS

A number of Ellis products are available with the option of liners. Liners are project and product specific and can be useful in the following situations:



- ▶ VIBRATION DAMPING.
- ▶ PROVIDES A COMPLIANT SURFACE FOR CABLES THAT HAVE A SENSITIVE OUTER SHEATH.
- ▶ THE LINERS HELP ABSORB DIMENSIONAL CHANGES CAUSED BY CHANGES IN TEMPERATURE OR OPERATIONAL LOAD.



FIXING SOLUTIONS

Ellis supply a variety of fixings and our team are happy to help you select the correct type for your chosen product and installation.

MECHANICAL STRENGTH VS DYNAMIC STRENGTH

The international cable cleat standard IEC 61914 (Annex B) includes a formula to calculate the force between two conductors during a fault. If the strength of a particular cable cleat is known, the optimum spacing of the cable cleat along the cable can be calculated in order to restrain the force created by the fault.

The strength of a cable cleat is often determined using a mechanical tensile test (tensile to failure), the results may be misleading because the force is applied in a slow and controlled manner which does not replicate fault conditions. In a short circuit fault the forces are applied almost instantaneously and oscillate in every direction. Experience shows that a cable cleat that survives a mechanical tensile test at a given force will not necessarily survive a short circuit test, even if forces are the same.

Consider the properties of glass; immensely strong under tension but subject to brittle failure when impacted.

The preferred method of selection is based on a short circuit test.

CALCULATION OF CLEAT SPACING AND SELECTION OF CLEAT TYPE

Where the system peak fault current and the cable diameter are known the following formula, taken from the international standard (IEC 61914), can be used to calculate the forces between two conductors in the event of a three phase fault.

Where:

F_t = force in Newton/metre (N/m)

I_p = peak short-circuit current in kiloamp (kA)

S = distance between the centrelines of the conductors in metres (m)

Once F_t in N/m has been determined then the force for each potential cleat can be calculated.

Metric ladder typically has rungs at 300mm intervals, so cleat spacing is usually a multiple of this distance. So, $F_t \times 0.3$ gives the force a cleat will see if spaced at 300mm, $F_t \times 0.6$ for 600mm etc.

$F_t \times$ cleat spacing can then be compared to the cable cleat resistance to electromechanical force and then the cleat type and spacing can be selected.

Please refer to the Ellis Patents Black Book for more examples and information on the calculation of cable cleat spacing. Alternatively Ellis also provide an online cleat calculator to simplify selection:

www.ellispatents.co.uk/cleat-calculator/

$$F_t = \frac{0.17 \times I_p^2}{S}$$

CABLE CLEAT RESISTANCE TO ELECTROMECHANICAL FORCE

CLEAT TYPE	CLEAT SPACING		300mm		600, 900, 1200mm	
	Strength (N)	SC Level (kA)	Strength (N)	SC Level (kA)	Strength (N)	SC Level (kA)
Alpha	9,500	82	15,000	73		
Vulcan+ Trefoil, Protect and SD Flexi-strap	25,000	134	36,000	115		
Emperor Trefoil, Colossus and HD Flexi-strap	51,000	195	63,000	149		
Trident	24,500	132	25,000	94		
Trident with insert	11,400	106	-	-		
Solus GFN	11,000	164	-	-		
Solus LSF	10,000	157	-	-		

ALWAYS REMEMBER

Whole job cost should always be considered as costs can often be reduced by using a stronger, more expensive cable cleat at a wider spacing than a cheaper option at more regular intervals.

The values in the above table are based on short circuit tests carried out by Ellis, the numbers have been rounded and as such can be used as a guide to cleat selection, for detailed numbers please refer to the individual product datasheets. Test report results are detailed on individual product data sheets and are available on request. At 300mm spacing significantly more force is transmitted to the cleat by the cable compared to 600mm spacing and above.

CLEAT SELECTION QUESTIONS

CABLE DIAMETER

Cable diameter is critical to selecting the appropriate product. Cables have a tolerance that affects the diameter. This should be considered to ensure the cleat selected will still fit the cable even if the cable arrives on site at the limits of its size range.

MAX PEAK SHORT CIRCUIT CURRENT

Knowing the maximum peak short circuit current as specified by the system designer allows the appropriate cleat and spacing to be selected. The calculation formula uses peak current, however this is often unavailable with a Root Mean Square (RMS) value given instead. The ratio of peak to RMS short circuit fault current is dependent on the electrical characteristics of an installation and Ellis recommend the conversion factor used is 2.5, this is taken from IEC 62271 - High voltage switchgear. Dependant on the system a lower value can be used, IEC 61439-1 Low voltage switchgear and control gear assemblies is commonly referred to, which uses the multiples in the table.

RMS value of SC current (kA)	Multiple
$10 < I \leq 20$	2
$20 < I \leq 50$	2.1
$50 < I$	2.2

CABLE ARRANGEMENT

Cables are generally laid side by side or in trefoil formation. For accurate SC levels to be calculated the layout is required. Knowing the formation allows the correct style of cleat to be selected. Triplex is a variant of trefoil cable formation where the cables are twisted together. This can present a challenge for cleating. To remedy this Ellis offer a triplex cable surround.

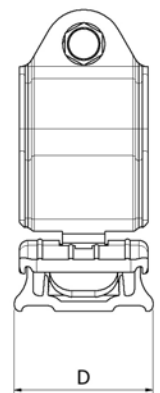
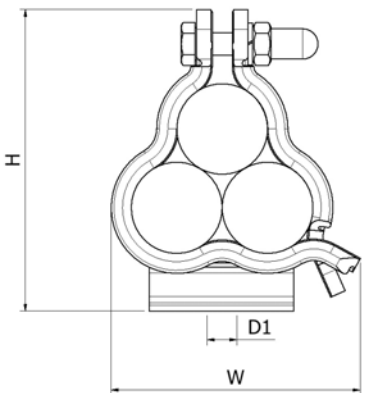
ALPHA

Aluminium Trefoil Cleats

- ▶ 6000 SERIES ALUMINIUM FRAME
- ▶ ZINC PLATED STEEL M8 CLOSURE FIXINGS
- ▶ POLYESTER COATED FRAMES ARE AVAILABLE ON REQUEST
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ ABS APPROVED AND UL LISTED



PART NO. ALUMINIUM BASE	PART NO. POLYMER BASE	CABLE RANGE TREFOIL		DIMENSIONS (mm)				WEIGHT (g)
		MIN Ø (mm)	MAX Ø (mm)	W	H	D	FIXING HOLES (D1)	
ALP01-AN0	ALP01-AN1	23.2	25.1	76	93	48.5	1 x M10	168
ALP02-AN0	ALP02-AN1	25.1	27.1	79	96	48.5	1 x M10	178
ALP03-AN0	ALP03-AN1	27.1	29.3	82	101	48.5	1 x M10	185
ALP04-AN0	ALP04-AN1	29.3	31.7	86	105	48.5	1 x M10	195
ALP05-AN0	ALP05-AN1	31.7	34.2	91	110	48.5	1 x M10	205
ALP06-AN0	ALP06-AN1	34.2	37.0	96	116	48.5	1 x M10	217
ALP07-AN0	ALP07-AN1	37.0	40.0	101	121	48.5	1 x M10	229
ALP08-AN0	ALP08-AN1	40.0	43.2	106	127	48.5	1 x M10	241
ALP09-AN0	ALP09-AN1	43.2	46.7	113	134	48.5	1 x M10	255
ALP10-AN0	ALP10-AN1	46.7	50.5	119	141	48.5	1 x M10	272
ALP11-AN0	ALP11-AN1	50.5	54.6	127	148	48.5	1 x M10	288
ALP12-AN0	ALP12-AN1	54.6	59.0	135	156	48.5	1 x M10	307
ALP13-AN0	ALP13-AN1	59.0	63.8	144	165	48.5	1 x M10	327
ALP14-AN0	ALP14-AN1	63.8	69.0	153	175	48.5	1 x M10	348
ALP15-AN0	ALP15-AN1	69.0	74.6	163	186	48.5	1 x M10	372



ALUMINIUM BASE

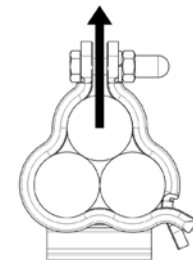


POLYMER BASE
(WITH POLYESTER COATED FRAME)

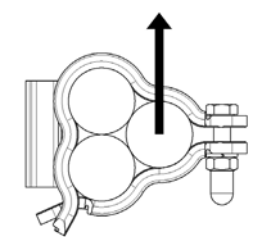
TESTING SUMMARY

Alpha Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.1, 6.1.3	METALLIC / COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1	XENON ARC METHOD A	PASS APPLICABLE TO POWDER COATED AND POLYMER BASE OPTIONS
CORROSION RESISTANCE	6.5.2	REFER TO ELLIS	REFER TO ELLIS
IMPACT RATING	6.3.5,	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 500N VERTICAL - 500N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	82kA (REPORT No. PDL-18.184) CABLE OD = Ø35mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	73.4kA (REPORT No. PDL-18.122.2) CABLE OD= Ø36mm



LATERAL LOAD
'VERTICAL' DIRECTION



LATERAL LOAD
'HORIZONTAL' DIRECTION



LONDON UNDERGROUND
Alpha Cable Cleats are compliant with the requirements of LUL-1085. Product register number 360.

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

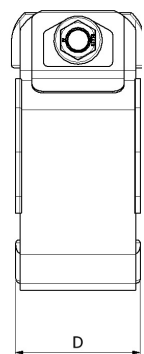
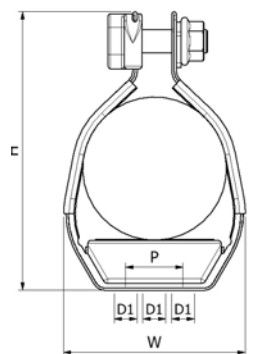
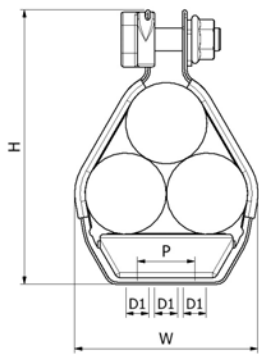
VULCAN+™

Standard Duty Stainless Steel Cable Cleat
For Cables In Single Or Trefoil Formation

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ CAPTIVE CLOSURE FIXINGS FOR FAST INSTALL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ ABS AND DNV TYPE APPROVED AND ALSO UL LISTED



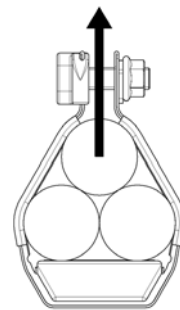
PART NO.	CABLE RANGE TREFOIL		CABLE RANGE SINGLE		DIMENSIONS (mm)					WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	FIXING HOLES (D1)	
VRT+00B	-	-	18	28	64	93	54	N/A	1 x M10	280
VRT+00A	15	18	26	30	64	93	54	N/A	1 x M10	287
VRT+00	19	24	30	42	60	93	54	N/A	1 x M10	251
VRT+01	23	28	38	50	63	98	54	N/A	1 x M10	258
VRT+02	27	32	43	58	72	106	54	N/A	1 x M10	269
VRT+03	30	35	49	64	79	112	54	N/A	1 x M10	279
VRT+04	33	38	55	70	85	118	54	N/A	1 x M10	284
VRT+05	36	42	58	75	96	125	54	N/A	1 x M10	319
VRT+06	40	46	63	84	105	133	54	N/A	1 x M10	331
VRT+07	44	50	73	90	112	140	54	N/A	1 x M10	372
VRT+08	48	55	83	100	121	149	54	N/A	1 x M10	405
VRT+09	51	58	86	104	126	154	54	N/A	1 x M10	411
VRT+10	55	62	88	110	134	162	54	50	3 x M10	442
VRT+11	59	66	90	115	143	170	54	50	3 x M10	453
VRT+12	63	70	100	125	152	177	54	50	3 x M10	460
VRT+13	67	74	107	132	161	185	54	75	3 x M10	524
VRT+14	71	78	120	145	169	192	54	75	3 x M10	536
VRT+15	74	82	125	150	176	199	54	75	3 x M10	542
VRT+16	77	85	132	153	183	205	54	75	3 x M10	544
VRT+17	81	89	136	156	190	216	54	75	3 x M10	618
VRT+18	85	93	139	159	200	225	54	75	3 x M10	628
VRT+19	89	97	142	162	200	235	54	75	3 x M10	637
VRT+20	93	101	160	170	215	240	54	75	3 x M10	646



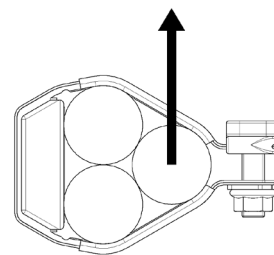
TESTING SUMMARY

Vulcan+ Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.4	HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	150N - TREFOIL 110N - SINGLE
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 200N VERTICAL - 650N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	134kA (REPORT No. PDL-18.122.1) CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	115kA (REPORT No. PDL-16.164.3) CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT) SINGLE FORMATION	135kA (REPORT No. PDL-22.079.04) CABLE OD= Ø36mm PHASE SPACING = 125mm



LATERAL LOAD
'VERTICAL' DIRECTION



LATERAL LOAD
'HORIZONTAL' DIRECTION



Conduit & Cable Hardware 4CG8 with
AH-2 & wet locations. Listed sizes:
VRT+00 to VRT+18.

LONDON UNDERGROUND
Vulcan+ Cable Cleats are compliant
with the requirements of LUL-1085.
Product register number 361.

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

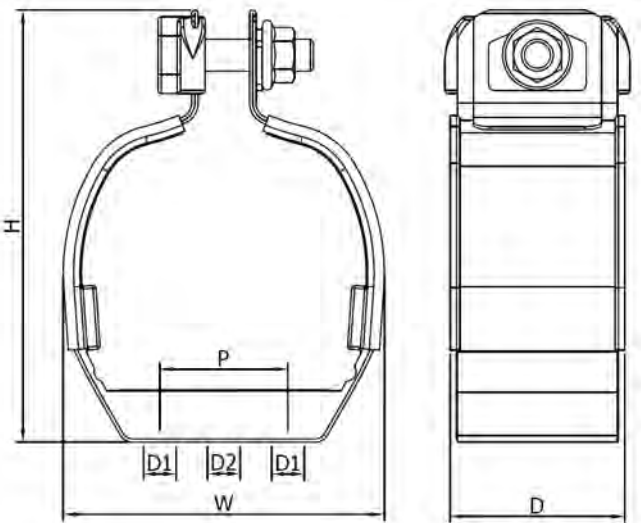
VULCAN+™ QUAD

Standard Duty Stainless Steel Cable
Cleat For Cables In Quad Formation

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ CAPTIVE CLOSURE FIXINGS FOR FAST INSTALL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ ABS APPROVED AND ALSO UL LISTED



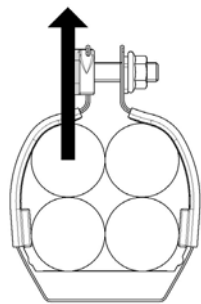
PART NO.	CABLE RANGE		DIMENSIONS (mm)					WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	FIXING HOLES (D1)	
VRQ+00C	10	13	63	93	54	N/A	1 x M10	287
VRQ+00B	13	18	67	97	54	N/A	1 x M10	280
VRQ+00A	18	20	70	106	54	N/A	1 x M10	291
VRQ+00	19	23	74	113	54	N/A	1 x M10	317
VRQ+01	23	25	68	110	54	N/A	1 x M10	284
VRQ+02	26	27	70	113	54	N/A	1 x M10	286
VRQ+03	28	31	78	128	54	N/A	1 x M10	318
VRQ+03A	31	35	90	138	54	N/A	1 x M10	326
VRQ+04	35	42	103	148	54	N/A	1 x M10	378
VRQ+05	43	47	120	165	54	N/A	1 x M10	452
VRQ+06	48	50	121	170	54	N/A	1 x M10	467
VRQ+07	51	57	140	190	54	50	3 x M10	523
VRQ+08	58	63	150	200	54	50	3 x M10	541
VRQ+09	64	70	170	218	54	75	3 x M10	581



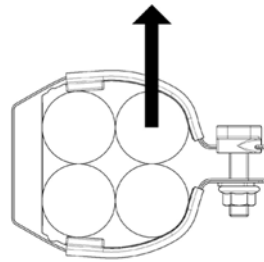
TESTING SUMMARY

Vulcan+ Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.4	HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	100
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 100N VERTICAL - 350N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	134kA (REPORT No. PDL-22.079.03) CABLE OD= Ø36mm (VRQ+)



LATERAL LOAD
'VERTICAL' DIRECTION



LATERAL LOAD
'HORIZONTAL' DIRECTION



Conduit & cable hardware 4CG8 with
AH-2 & wet locations. Listed sizes:
VRQ+01 to VRQ+09.

LONDON UNDERGROUND
Vulcan+ Cable Cleats are compliant
with the requirements of LUL-1085.
Product register number 361.

VULCAN+™ TWIST FOOT

Standard Duty Stainless Steel Cable Cleat for Cables in Single, Trefoil or Quad Formation with the added benefit of a Twist Foot Base

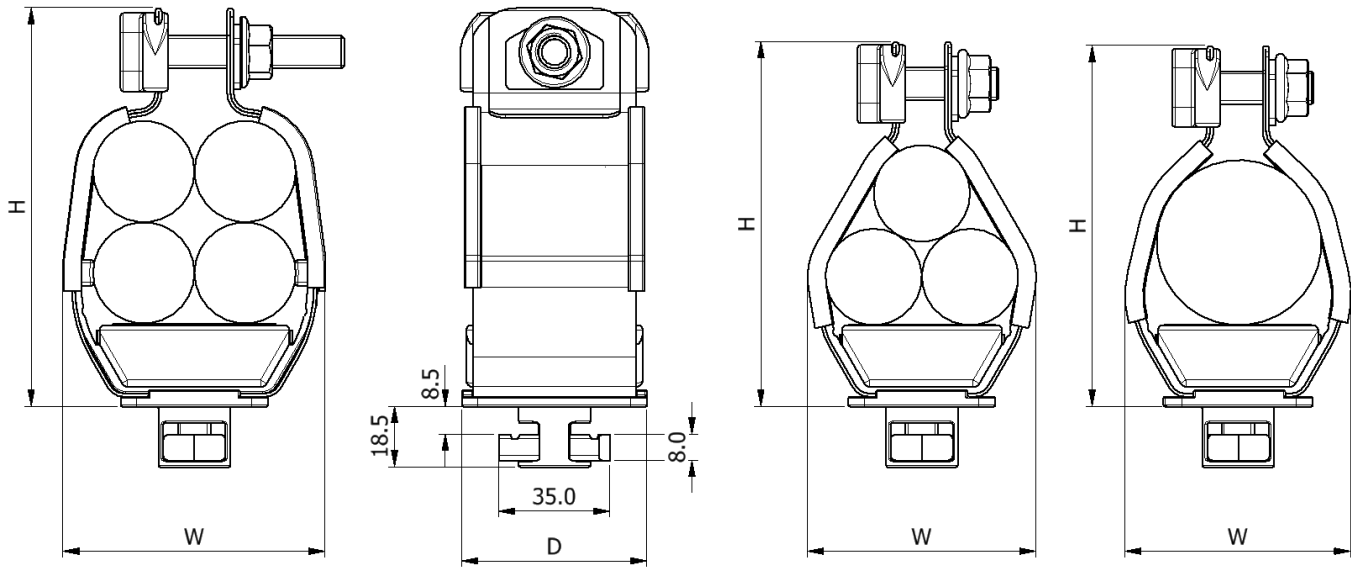
- ▶ BASE FIXING KIT DESIGNED FOR FAST INSTALL ON 41X41 AND 41X21 UNISTRUT CHANNEL/LADDER
- ▶ CLEAT COMES WITH ALL FIXINGS IN PLACE READY FOR INSTALL, NO EXTRA FIXINGS ARE REQUIRED ON SITE
- ▶ FIXING KIT CAN BE SUPPLIED IN A4 STAINLESS STEEL, GALVANISED STEEL OR ZINC PLATED STEEL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914 - REFER TO VRT+ DATA SHEETS



VRT+ TWIST FOOT FOR TREFOIL AND SINGLE

PART NO.	CABLE RANGE TREFOIL		CABLE RANGE SINGLE		DIMENSIONS (mm)			WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	MIN Ø (mm)	MAX Ø (mm)	W	H	D	
VRT+00BTFM10-X	-	-	18	28	64	96	54	330
VRT+00ATFM10-X	15	18	26	30	64	96	54	337
VRT+00TFM10-X	19	24	30	42	60	96	54	301
VRT+01TFM10-X	23	28	38	50	63	102	54	308
VRT+02TFM10-X	27	32	43	58	72	109	54	319
VRT+03TFM10-X	30	35	49	64	79	115	54	329
VRT+04TFM10-X	33	38	55	70	85	121	54	334
VRT+05TFM10-X	36	42	58	75	96	128	54	369
VRT+06TFM10-X	40	46	63	84	105	137	54	381
VRT+07TFM10-X	44	50	73	90	112	143	54	441
VRT+08TFM10-X	48	55	83	100	121	152	54	455
VRT+09TFM10-X	51	58	86	104	126	158	54	461
VRT+10TFM10-X	55	62	88	110	134	166	54	492
VRT+11TFM10-X	59	66	90	115	143	174	54	503
VRT+12TFM10-X	63	70	100	125	152	181	54	510
VRT+13TTFM10-X	67	74	107	132	161	188	70	574
VRT+14TTFM10-X	71	78	120	145	169	195	70	586
VRT+15TTFM10-X	74	82	125	150	176	199	70	592
VRT+16TTFM10-X	77	85	132	153	183	208	70	594
VRT+17TTFM10-X	81	89	136	156	190	219	70	668
VRT+18TTFM10-X	85	93	139	159	200	228	70	678
VRT+19TTFM10-X	89	97	142	162	200	238	70	687
VRT+20TTFM10-X	93	101	160	170	215	243	70	696

Patent No. UK Patent GB 236 1029



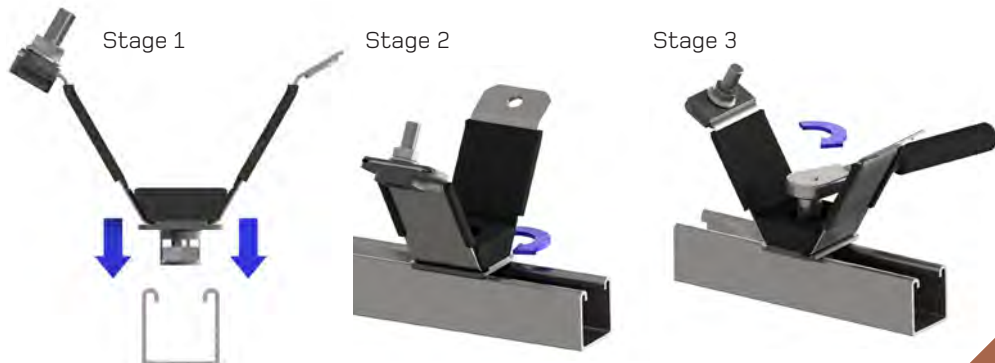
VRQ+ TWIST FOOT FOR QUAD

PART NO.	CABLE RANGE QUAD		DIMENSIONS (mm)			WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	
VRQ+00CTFM10-X	10	13	63	96	54	337
VRQ+00BTFM10-X	13	18	67	100	54	330
VRQ+00ATFM10-X	18	20	70	109	54	341
VRQ+00TFM10-X	19	25	74	116	54	367
VRQ+01TFM10-X	23	25	68	113	54	334
VRQ+02TFM10-X	26	27	70	116	54	336
VRQ+03TFM10-X	28	31	78	131	54	368
VRQ+03ATFM10-X	31	35	90	141	54	400
VRQ+04TFM10-X	35	42	103	151	54	428
VRQ+05TFM10-X	43	47	120	166	54	502
VRQ+06TFM10-X	48	50	121	173	54	517
VRQ+07TFM10-X	51	57	140	193	54	573
VRQ+08TFM10-X	58	63	150	203	54	591
VRQ+09TFM10-X	64	70	170	221	54	631

'X' DENOTES FIXING MATERIAL, OPTIONS ARE AS FOLLOWS:

4 = A4 STAINLESS STEEL
G = GALVANISED STEEL
Z = ZINC PLATED STEEL

E.G A VRT+04 WITH STAINLESS STEEL TWIST FOOT FIXINGS BECOMES: VRT+04TFM10-4



This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

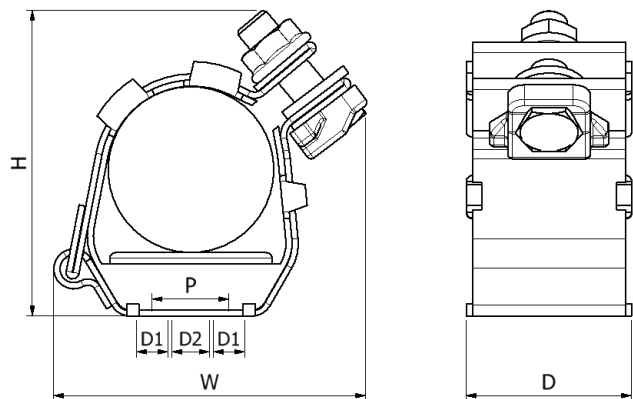
EMPEROR™ SINGLE

Heavy Duty Stainless Steel Cable
Cleat For Single Cables

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ CAPTIVE CLOSURE FIXINGS FOR FAST INSTALL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ ABS, DNV, UL AND LUL APPROVED



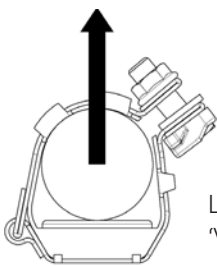
PART NO.	CABLE RANGE		DIMENSIONS (mm)				FIXING HOLES (D1 & D2)	WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P		
ES32-39	32	39	91	89	54	25	2 x M10 + 1 x M12	450
ES37-45	37	45	96	93	54	25	2 x M10 + 1 x M12	470
ES44-52	44	52	99	98	54	25	2 x M10 + 1 x M12	480
ES51-59	51	59	103	102	54	25	2 x M10 + 1 x M12	490
ES58-66	58	66	109	101	54	25	2 x M10 + 1 x M12	500
ES65-73	65	73	111	103	54	25	2 x M10 + 1 x M12	510
ES73-85	73	85	135	112	54	50	2 x M10 + 1 x M12	640
ES84-94	84	94	135	135	54	50	2 x M10 + 1 x M12	660
ES94-118	94	118	160	150	54	50	2 x M10 + 1 x M12	710
ES118-130	118	130	175	160	54	75	2 x M10 + 1 x M12	900
ES127-150	127	150	180	180	54	75	2 x M10 + 1 x M12	940



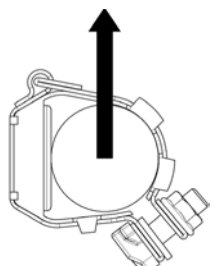
TESTING SUMMARY

Emperor Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS ≥16% CHROMIUM
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	250
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 650N VERTICAL -1000N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	193KA (REPORT NO. PDL-22.079.05) CABLE OD= Ø35MM PHASE SPACING = 125MM
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	9.5.2, 9.5.3	CLEATS AT 600MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	150KA (REPORT NO. PDL22.159.1) CABLE OD = Ø30MM PHASE SPACING = 125MM



LATERAL LOAD
'VERTICAL' DIRECTION



LATERAL LOAD
'HORIZONTAL' DIRECTION



Conduit & cable hardware 4CG8
with AH-2 & wet locations. Listed sizes:
ES32-39 to ES94-118.

LONDON UNDERGROUND
Emperor Cable Cleats are compliant
with the requirements of LUL-1085.
Product register number 362.

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

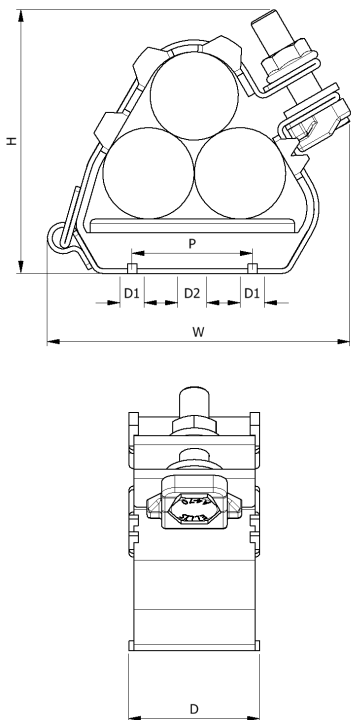
EMPEROR™ TREFOIL

Heavy Duty Stainless Steel Cable Cleat
For Cables In Trefoil Formation

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ CAPTIVE CLOSURE FIXINGS FOR FAST INSTALL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ ABS, DNV, UL AND LUL APPROVED



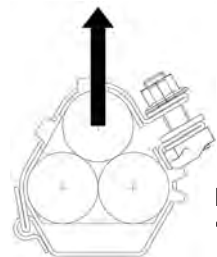
PART NO.	CABLE RANGE		DIMENSIONS (mm)					WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	FIXING HOLES (D1 & D2)	
ER19-23	19	23	96	83	54	25	2 x M10 + 1 x M12	425
ER23-28	23	28	96	83	54	25	2 x M10 + 1 x M12	425
ER27-32	27	32	97	88	54	25	2 x M10 + 1 x M12	440
ER30-35	30	35	99	91	54	25	2 x M10 + 1 x M12	445
ER33-38	33	38	103	95	54	25	2 x M10 + 1 x M12	460
ER36-42	36	42	124	100	54	50	2 x M10 + 1 x M12	600
ER40-46	40	46	125	106	54	50	2 x M10 + 1 x M12	605
ER44-50	44	50	130	117	54	50	2 x M10 + 1 x M12	630
ER48-55	48	55	132	121	54	50	2 x M10 + 1 x M12	641
ER51-58	51	58	136	128	54	50	2 x M10 + 1 x M12	650
ER55-62	55	62	160	135	54	75	2 x M10 + 1 x M12	810
ER59-66	59	66	163	143	54	75	2 x M10 + 1 x M12	825
ER63-70	63	70	166	151	54	75	2 x M10 + 1 x M12	850
ER67-74	67	74	169	158	54	75	2 x M10 + 1 x M12	850
ER71-78	71	78	172	165	54	75	2 x M10 + 1 x M12	890
ER74-82	74	82	177	171	54	75	2 x M10 + 1 x M12	890
ER77-85	77	85	183	177	54	75	2 x M10 + 1 x M12	905
ER82-88	82	88	191	187	54	75	2 x M10 + 1 x M12	820
ER88-96	88	96	207	203	54	75	2 x M10 + 1 x M12	890
ER96-103	96	103	221	218	54	75	2 x M10 + 1 x M12	940
ER103-111	103	111	237	235	54	75	2 x M10 + 1 x M12	950
ER111-119	111	119	253	250	54	75	2 x M10 + 1 x M12	1010
ER119-128	119	128	265	275	54	75	2 x M10 + 1 x M12	1220



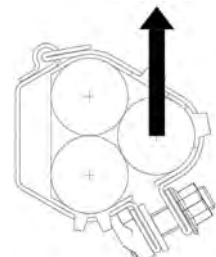
TESTING SUMMARY

Emperor Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	400
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 650N VERTICAL -1000N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	195kA (REPORT No. PDL-09.098.2) CABLE OD= Ø38mm (IEC 61914:2009)
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	149kA (REPORT No. PDL-17.137.4) CABLE OD= Ø36mm



LATERAL LOAD
'VERTICAL' DIRECTION



LATERAL LOAD
'HORIZONTAL' DIRECTION



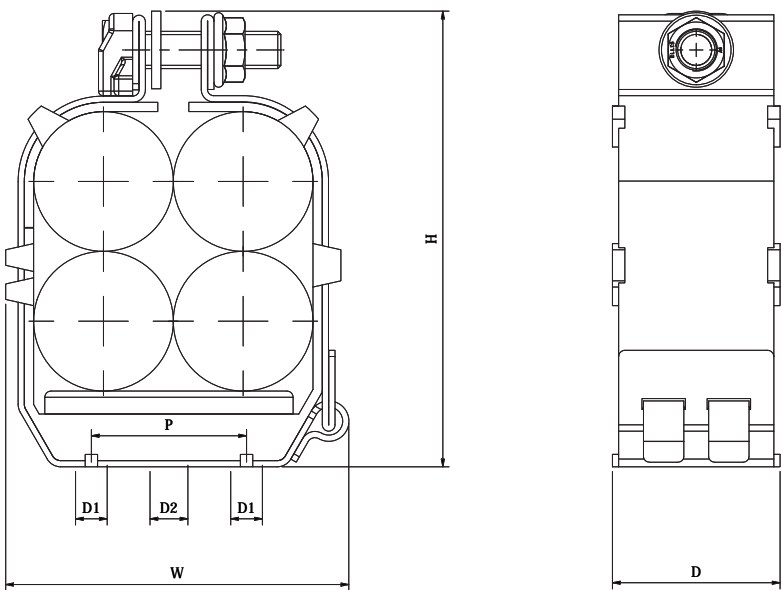
Conduit & cable hardware 4CG8 with
AH-2 & wet locations. Listed sizes:
ER19-23 to ER82-88.

LONDON UNDERGROUND
Emperor Cable Cleats are compliant
with the requirements of LUL-1085.
Product register number 362.

EMPEROR™ QUAD

Patent No. UK Patent GB 233 9237

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ CAPTIVE CLOSURE FIXINGS FOR FAST INSTALL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914

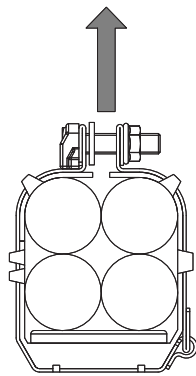


PART NO.	CABLE RANGE		DIMENSIONS (mm)				FIXING HOLES (D1 & D2)	WEIGHT (g)
	MIN ϕ (mm)	MAX ϕ (mm)	W	H	D	P		
EQ19-24	19	24	78.5	107	54	25	2 x M10 + 1 x M12	552
EQ24-28	24	28	78.5	107	54	25	2 x M10 + 1 x M12	423
EQ26-30	26	30	79	113	54	25	2 x M10 + 1 x M12	451
EQ31-36	31	36	92	133	54	25	2 x M10 + 1 x M12	620
EQ36-40	36	40	92	133	54	25	2 x M10 + 1 x M12	495
EQ40-45	40	45	111	147	54	50	2 x M10 + 1 x M12	773
EQ44-49	44	49	111	147	54	50	2 x M10 + 1 x M12	684

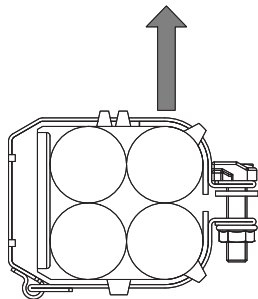
TESTING SUMMARY

Emperor Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used:

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
CORROSION RESISTANCE	6.5.2.3	OUTDOOR	316L STAINLESS STEEL HAS \geq 16% CHROMIUM
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.1	APPLICATION TIME \geq 30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	300N
LATERAL LOAD RATING	6.4.2, 9.3.1	NEWTONS (N)	HORIZONTAL - 650N VERTICAL -1000N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	171kA (REPORT No. PDL-23.122.05) CABLE OD= ϕ 36mm (IEC 61914:2009)
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	149kA (REPORT No. PDL-17.137.4*) CABLE OD= ϕ 36mm



LATERAL LOAD
'VERTICAL' DIRECTION

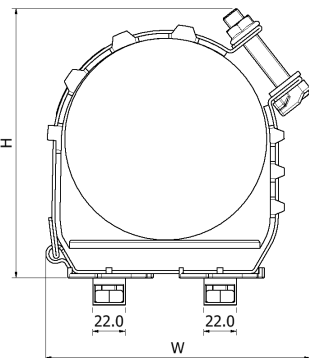


LATERAL LOAD
'HORIZONTAL' DIRECTION

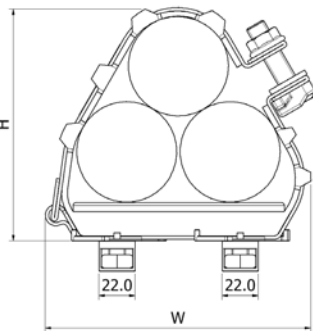
EMPEROR™ TWIST FOOT

Heavy Duty Stainless Steel Cable Cleat

- ▶ BASE FIXING KIT DESIGNED FOR FAST INSTALL ON 41X41 AND 41X21 UNISTRUT CHANNEL/LADDER
- ▶ CLEAT COMES WITH ALL FIXINGS IN PLACE READY FOR INSTALL, NO EXTRA FIXINGS ARE REQUIRED ON SITE
- ▶ FIXING KIT CAN BE SUPPLIED IN A4 STAINLESS STEEL, GALVANISED STEEL OR ZINC PLATED STEEL
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914 - REFER TO EMPEROR QUAD DATA SHEET
- ▶ AVAILABLE FOR CABLE INSTALLATIONS IN SINGLE, TREFOIL AND QUAD FORMATION

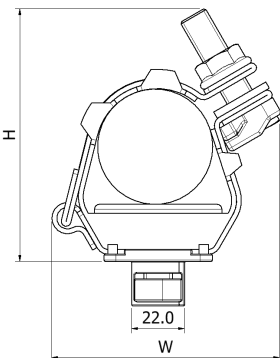


TWIN FIX TWIST FOOT:
ES118-130 TO ES127-150

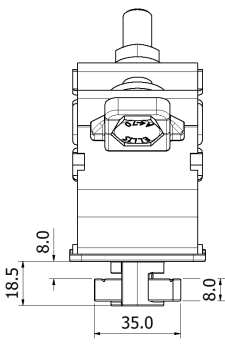


TWIN FIX TWIST FOOT:
ER55-62 TO ER119-128

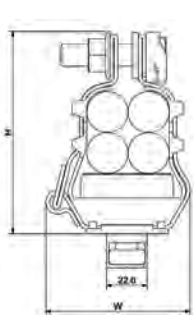
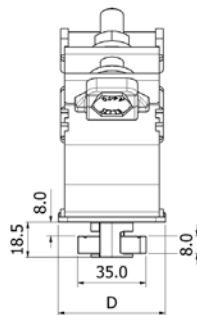
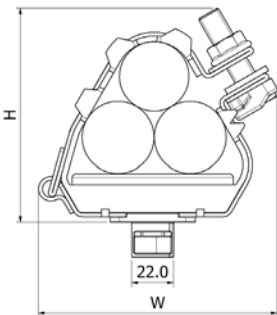
TWIN FIX TWIST FOOT OPTIONS AVAILABLE FOR BOTH SINGLE AND TREFOIL FORMATIONS FOR LARGER CABLES



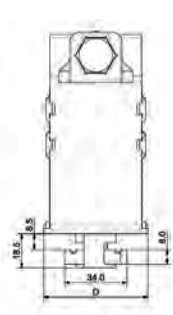
SINGLE FIX TWIST FOOT:
ES32-39 TO ES94-118



SINGLE FIX TWIST FOOT:
ER19-23 TO ER51-58



SINGLE FIX TWIST FOOT:
EQ19 TO EQ49



PART NO.	CABLE RANGE		DIMENSIONS (mm)			WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	
ES32-39TFM12-X	32	39	91	92	54	500
ES37-45TFM12-X	37	45	96	96	54	520
ES44-52TFM12-X	44	52	99	101	54	530
ES51-59TFM12-X	51	59	103	105	54	540
ES58-66TFM12-X	58	66	109	104	54	550
ES65-73TFM12-X	65	73	111	106	54	560
ES73-85TFM12-X	73	85	135	115	54	690
ES84-94TFM12-X	84	94	135	138	54	710
ES94-118TFM12-X	94	118	160	153	54	760
ES118-130TTFM10-X	118	130	175	163	70	1000
ES127-150TTFM10-X	127	150	180	183	70	1040

PART NO.	CABLE RANGE		DIMENSIONS (mm)			WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	
ER19-23TFM12-X	19	23	96	86	54	475
ER23-28TFM12-X	23	28	96	86	54	475
ER27-32TFM12-X	27	32	97	91	54	490
ER30-35TFM12-X	30	35	99	94	54	495
ER33-38TFM12-X	33	38	103	98	54	510
ER36-42TFM12-X	36	42	124	103	54	660
ER40-46TFM12-X	40	46	125	109	54	655
ER44-50TFM12-X	44	50	130	120	54	680
ER48-55TFM12-X	48	55	132	124	54	690
ER51-58TFM12-X	51	58	136	131	54	700
ER55-62TTFM10-X	55	62	160	138	70	810
ER59-66TTFM10-X	59	66	163	146	70	825
ER63-70TTFM10-X	63	70	166	154	70	950
ER67-74TTFM10-X	67	74	169	161	70	950
ER71-78TTFM10-X	71	78	172	168	70	990
ER74-82TTFM10-X	74	82	177	174	70	990
ER77-85TTFM10-X	77	85	183	180	70	1005
ER82-88TTFM10-X	82	88	191	190	70	920
ER88-96TTFM10-X	88	96	207	206	70	990
ER96-103TTFM10-X	96	103	221	221	70	1040
ER103-111TTFM10-X	103	111	237	238	70	1050
ER111-119TTFM10-X	111	119	253	253	70	1110
ER119-128TTFM10-X	119	128	265	278	70	1320

PART NO.	CABLE RANGE		DIMENSIONS (mm)			WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D0	
EQ19-24TFM12-X	19	24	78.5	110	54	628
EQ24-28TFM12-X	24	28	78.5	110	54	499
EQ26-30TFM12-X	26	30	79	116	54	527
EQ31-36TFM12-X	31	36	92	136	54	696
EQ36-40TFM12-X	36	40	92	136	54	571
EQ40-45TFM12-X	40	45	111	150	54	849
EQ44-49TFM12-X	44	49	111	150	54	760

X DENOTES FIXING MATERIAL, OPTIONS ARE AS FOLLOWS:

4 = A4 STAINLESS STEEL
G = GALVANISED STEEL
Z = ZINC PLATED STEEL

E.G A EQ19-24 WITH STAINLESS STEEL TWIST FOOT FIXINGS BECOMES: EQ19-24TFM12-4

INSTALLATION OVERVIEW



1) Lower the cleat through the gap in the channel.



2) Once lowered twist the cleat 90°.



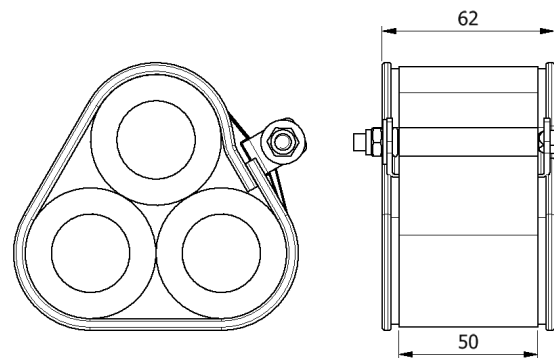
3) Tighten the M10 bolt in the base of the cleat.

FLEXI-STRAP™

Intermediate Short-circuit Strap
Patent No. UK Patent GB 252 6331



- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ HEAVY DUTY AND STANDARD DUTY OPTIONS AVAILABLE TO SUIT DIFFERENT SHORT CIRCUIT CONDITIONS
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ STRAPS CAN BE USED BETWEEN CLEATS TO REDUCE THE TOTAL AMOUNT OF FIXED CLEATS WHILST ENSURING ADEQUATE SHORT CIRCUIT PROTECTION



STANDARD DUTY SUITABLE FOR USE WITH VULCAN+ CLEATS

PART NO.	CABLE RANGE		WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	
FS24-34SDL	24	34	190
FS30-41SDL	30	41	195
FS37-47SDL	37	47	224
FS43-54SDL	43	54	260
FS50-60SDL	50	60	273
FS56-67SDL	56	67	303
FS63-73SDL	63	73	324
FS69-80SDL	69	80	347
FS72-85SDL	72	85	364
FS82-95SDL	82	95	398
FS92-105SDL	92	105	431
FS102-115SDL	102	115	452
FS112-125SDL	112	125	499
FS122-135SDL	122	135	532
FS132-145SDL	132	145	550

HEAVY DUTY SUITABLE FOR USE WITH EMPEROR CLEATS

PART NO.	CABLE RANGE		WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	
FS24-34HDL	24	34	219
FS30-41HDL	30	41	243
FS37-47HDL	37	47	268
FS43-54HDL	43	54	313
FS50-60HDL	50	60	344
FS56-67HDL	56	67	353
FS63-73HDL	63	73	391
FS69-80HDL	69	80	433
FS72-85HDL	72	85	438
FS82-95HDL	82	95	483
FS92-105HDL	92	105	523
FS102-115HDL	102	115	568
FS112-125HDL	112	125	633
FS122-135HDL	122	135	675
FS132-145HDL	132	145	719

TESTING SUMMARY

Flexi-Straps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA (STANDARD DUTY)	TEST DATA (HEAVY DUTY)
CLEAT TYPE	6.1.3	COMPOSITE	N/A	N/A
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60	-40 to +60
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.5	VERY HEAVY	PASS	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS	PASS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	134kA (REPORT No. PDL-18.122.3) CABLE OD= Ø36mm	-
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	114kA (REPORT No. PDL-18.122.4) CABLE OD= Ø36mm	156kA (REPORT No. ZKU-15-204) CABLE OD= Ø38mm (IEC 61914:2009)

INSTALLATION INFORMATION:

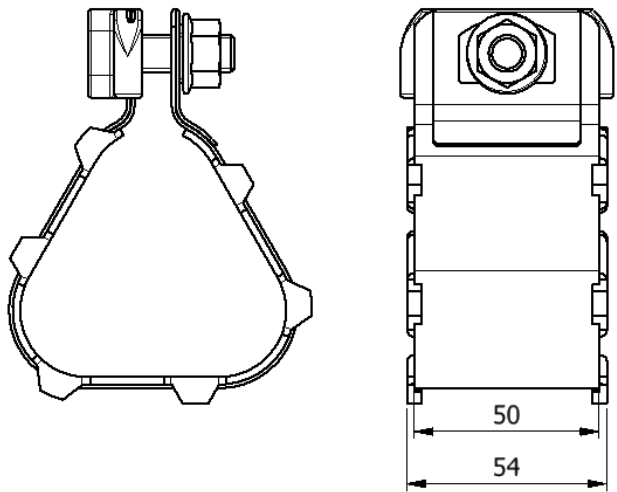
Flexi-Strap is installed by wrapping multiple layers of stainless steel strip around the cable. It is tightened and locked in place using a patented buckle and spindle design. Standard duty straps are wrapped twice around the cables and heavy duty straps are wrapped three times. For more information please refer to the product installation instructions or alternatively the videos section of our website.

A special drive socket to turn the spindle is supplied with every 50 straps ordered, the socket can attach to a standard 1/4" or 6mm ratchet handle. Drive sockets can be ordered separately using the part number FS-T001-4; Although the FS-T001-4 can speed up installation, standard tools also can be used.

PROTECT™

Retention Strap
UK Design Reg No. 355854

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC LINER PROTECTS CABLE SHEATH
- ▶ SUITABLE FOR USE IN BETWEEN VULCAN+ CLEATS, REDUCING THE AMOUNT OF FIXED CLEATS WHILST ENSURING SHORT CIRCUIT PROTECTION
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ FOR STRAP SIZE DETAILS CONTACT ELLIS

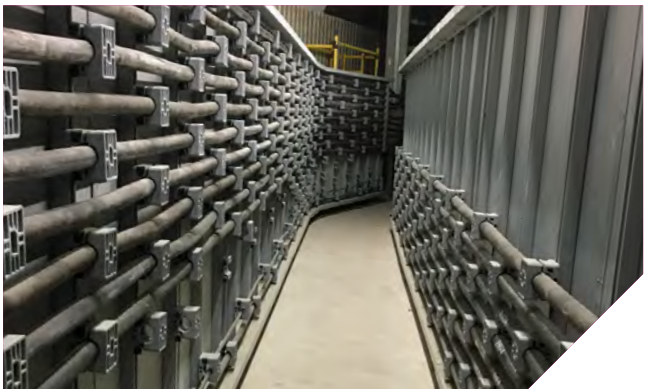


TESTING SUMMARY

Protect has been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	N/A
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.5	-	REFER TO ELLIS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	133kA (REPORT No. PDL-18.071) CABLE OD= Ø36mm

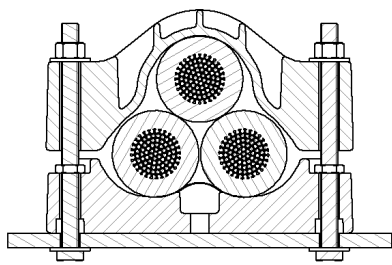
This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.



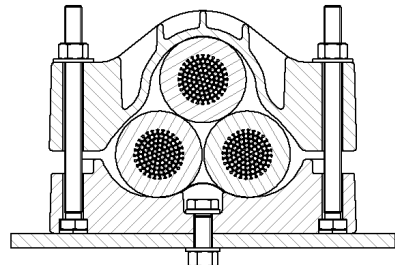


- ▶ MANUFACTURED AS STANDARD IN A HIGH STRENGTH LSF GLASS FILLED NYLON
- ▶ SINGLE OR TWO BOLT CLEAT FIXING OPTIONS
- ▶ SHAPING OF THE CLEAT ENSURES CABLES ARE HELD IN A TREFOIL FORMATION ACROSS THE RANGE
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ FIXINGS ARE NOT SUPPLIED AS STANDARD BUT CAN BE PROVIDED ON REQUEST

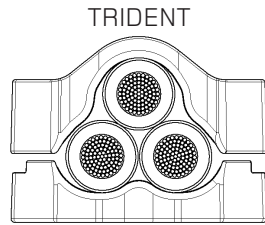
GFN PART NO.	LSF PART NO.	CABLE RANGE		DIMENSIONS (mm)					GFN WEIGHT (g)	LSF WEIGHT (g)
		MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	F		
TR24-29GFN	TR24-29LSF	24	29	122	91	77	92.5	M10	360	288
TR27-32GFN	TR27-32LSF	27	32	126	95	77	98.5	M10	370	296
TR30-36GFN	TR30-36LSF	30	36	134	104	77	104.5	M10	383	306
TR34-41GFN	TR34-41LSF	34	41	144	112	77	114.5	M10	485	388
TR39-47GFN	TR39-47LSF	39	47	156	124	77	125	M12	568	454
TR45-54GFN	TR45-54LSF	45	54	172	138	77	145	M12	666	533
TR52-62GFN	TR52-62LSF	52	62	190	153	77	160	M12	793	634
TR60-72GFN	TR60-72LSF	60	72	215	177	98	182	M12	1100	880
TR69-83GFN	TR69-83LSF	69	83	238	198	98	205	M12	1300	1040



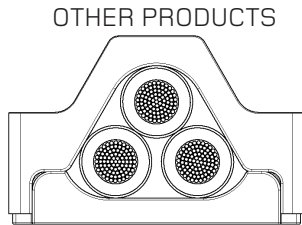
FIXING OPTION 1: 2 x M10/M12 FIXINGS



FIXING OPTION 2: 1 x M12 FIXING

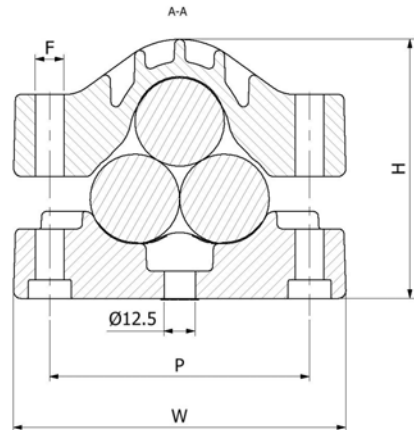
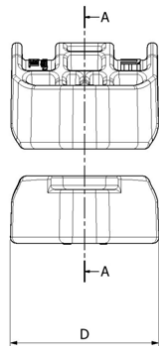


TRIDENT



OTHER PRODUCTS

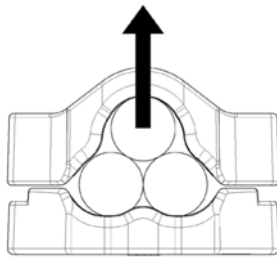
SHAPING OF THE TRIDENT CLAMPS ENSURES CABLES ARE MAINTAINED IN A TRUE TREFOIL FORMATION ACROSS ITS RANGE-TAKE, UNLIKE SIMILAR POLYMERIC CLAMPS ON THE MARKET. UNEQUAL TREFOIL FORMATIONS CAN CAUSE ADDITIONAL VOLTAGE DROP.



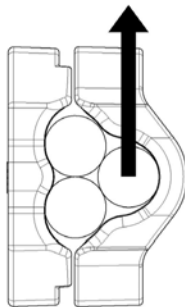
TESTING SUMMARY

Trident Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA	
CLEAT TYPE	6.1.2	NON-METALLIC	-	
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +120	-60 to +60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS	
CORROSION RESISTANCE	6.5.2	N/A	N/A	
IMPACT RATING	6.3.5	VERY HEAVY	PASS	HEAVY
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS	
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	1100	1500
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 2,250N VERTICAL - 2,250N	
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	134kA (REPORT No. PDL-18.071.6) CABLE OD= Ø36mm	121kA (REPORT No. PDL-22.159.2) CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	94kA (REPORT No. PDL-18.071.5) CABLE OD= Ø36mm	N/A



LATERAL LOAD 'VERTICAL' DIRECTION

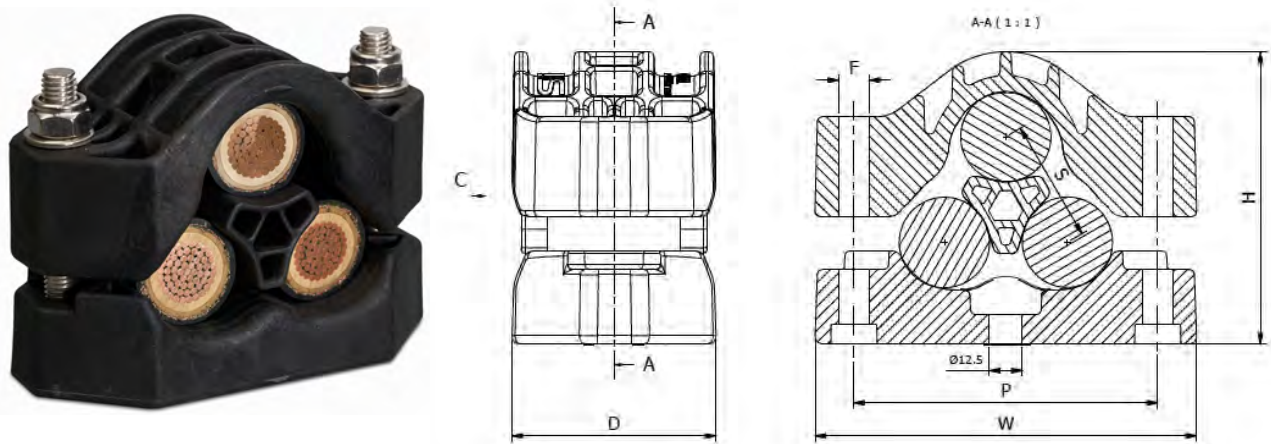


LATERAL LOAD 'HORIZONTAL' DIRECTION

TRIDENT WITH SPACER

Polymeric Trefoil Cleat

- ▶ MANUFACTURED AS STANDARD IN A HIGH STRENGTH LSF GLASS FILLED NYLON
- ▶ SINGLE OR TWO BOLT CLEAT FIXING OPTIONS
- ▶ SHAPING OF THE CLEAT ENSURES CABLES ARE HELD IN A TREFOIL FORMATION ACROSS THE RANGE
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ SPACER PIECE ENSURES EQUIDISTANT CABLE SPACING WHILST PROVIDING A LARGE CLAMP RANGE-TAKE WHEN USED WITH THE STANDARD TRIDENT CLAMP
- ▶ FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST



PART NO.	CABLE RANGE (WITH SPACER)		CABLE RANGE (WITHOUT SPACER)		DIMENSIONS (mm)					WEIGHT (g)	CORRESPONDING TRIDENT
	MIN Ø (mm)	MAX Ø (mm)	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	F		
TR29-41SP	29	34	34	41	144	115	77	114.5	M10	530	TR34-41
TR33-47SP	33	39	39	47	156	127	77	125	M12	618	TR39-47
TR41-54SP	41	45	45	54	172	141	77	145	M12	706	TR45-54

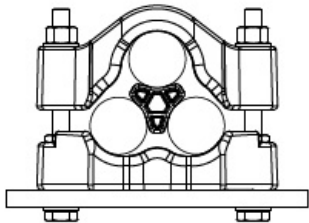
NOTE: REMOVAL OF THE SPACER PIECE CAN BE UTILISED TO PROVIDE A PRODUCT WITH A LARGE RANGE-TAKE. REFER TO THE STANDARD TRIDENT DATA SHEET.

TESTING SUMMARY

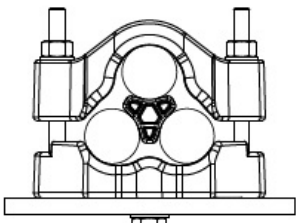
Trident Cleats have been tested in line with the international standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.2	NON-METALLIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-60 to + 60
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
CORROSION RESISTANCE	6.5.2	N/A	N/A
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	106kA (REPORT No. PDL-21.085.03) CABLE OD= Ø36mm CABLE SPACING = 50mm

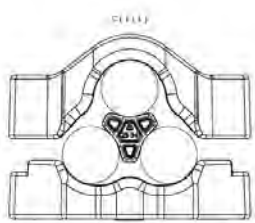
- 1) SP VARIANTS HAVE A DIFFERENT LOAD WITHSTAND TO STANDARD VARIANTS, PLEASE CONTACT ELLIS FOR FURTHER INFORMATION.
2) 'FIXING OPTION 1' S/C STRENGTH IS DERATED. REFER TO ELLIS FOR 'FIXING OPTION 1' SHORT CIRCUIT WITHSTANDS. PLEASE CONTACT ELLIS.
3) THE OPERATING TEMPERATURE IS BASED ON THE TEST REQUIREMENTS OF IEC 61914:2015 ONLY.



FIXING OPTION 1:
2 x M10/M12 FIXINGS



FIXING OPTION 2:
1 x M12 FIXING

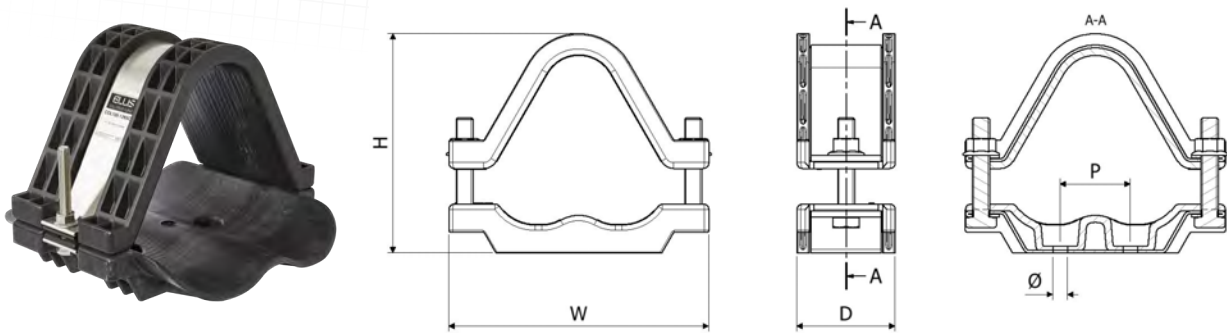


'SP' VARIANTS UTILISE A DISTANCE WEDGE TO INCREASE RANGE-TAKE. EQUAL SPACING BETWEEN THE CABLES IS MAINTAINED.

COLOSSUS™

Community Design
Reg. No. 001927583

- ▶ 316L STAINLESS STEEL FRAME AND FIXINGS
- ▶ LSF POLYMERIC BASE AND TOP MOULDING PROTECTS THE CABLE SHEATH
- ▶ OPTIONAL SADDLED BASE AVAILABLE FOR LARGE CLEAT SPACING APPLICATIONS
- ▶ COLOSSUS RANGE CAN ACCOMMODATE TREFOIL CABLES FROM Ø24MM TO Ø170MM ACROSS 14 SIZES
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914



TESTING SUMMARY

Colossus Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PART NO.	CABLE RANGE		DIMENSIONS (mm)				FIXING HOLES (D1 & D2)	WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P		
COL24-29	24	29	128	87	60	25	2 x M10 + M12	604
COL27-32	27	32	133	92	60	25	2 x M10 + M12	623
COL30-36	30	36	137	101	60	25	2 x M10 + M12	639
COL34-41	34	41	146	110	60	25	2 x M10 + M12	690
COL39-47	39	47	157	122	60	25	2 x M10 + M12	734
COL45-54	45	54	171	141	70	50	2 x M10	913
COL52-62	52	62	185	156	70	50	2 x M10	996
COL60-72	60	72	204	176	70	50	2 x M10	1063
COL69-83	69	83	225	202	100	75	2 x M12	1590
COL79-95	79	95	247	225	100	75	2 x M12	1700
COL91-109	91	109	273	253	100	120	2 x M12	1900
COL105-126	105	126	306	286	150	120	2 x M12	3030
COL122-146	122	146	345	324	150	150	2 x M12	3270
COL142-170	142	170	390	371	150	150	2 x M12	3680
SADDLED COLOSSUS CLEAT								
COL69-83SC	69	83	225	202	300	75	2 x M12	2532
COL79-95SC	79	95	247	225	300	75	2 x M12	2726
COL91-109SC	91	109	273	253	300	120	2 x M12	2995
COL105-126SC	105	126	306	286	300	120	2 x M12	4108
COL122-146SC	122	146	345	324	300	150	2 x M12	4562

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS≥16% CHROMIUM
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	170kA (REPORT No. PDL-18.122) CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	150kA (REPORT No. PDL-16.164.2) CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 7.8M INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	104kA (REPORT No. ZKU-12-179) CABLE OD= Ø70mm (WITH PROTECT STRAPS EVERY 1.3m - BASED ON IEC61914:2009)

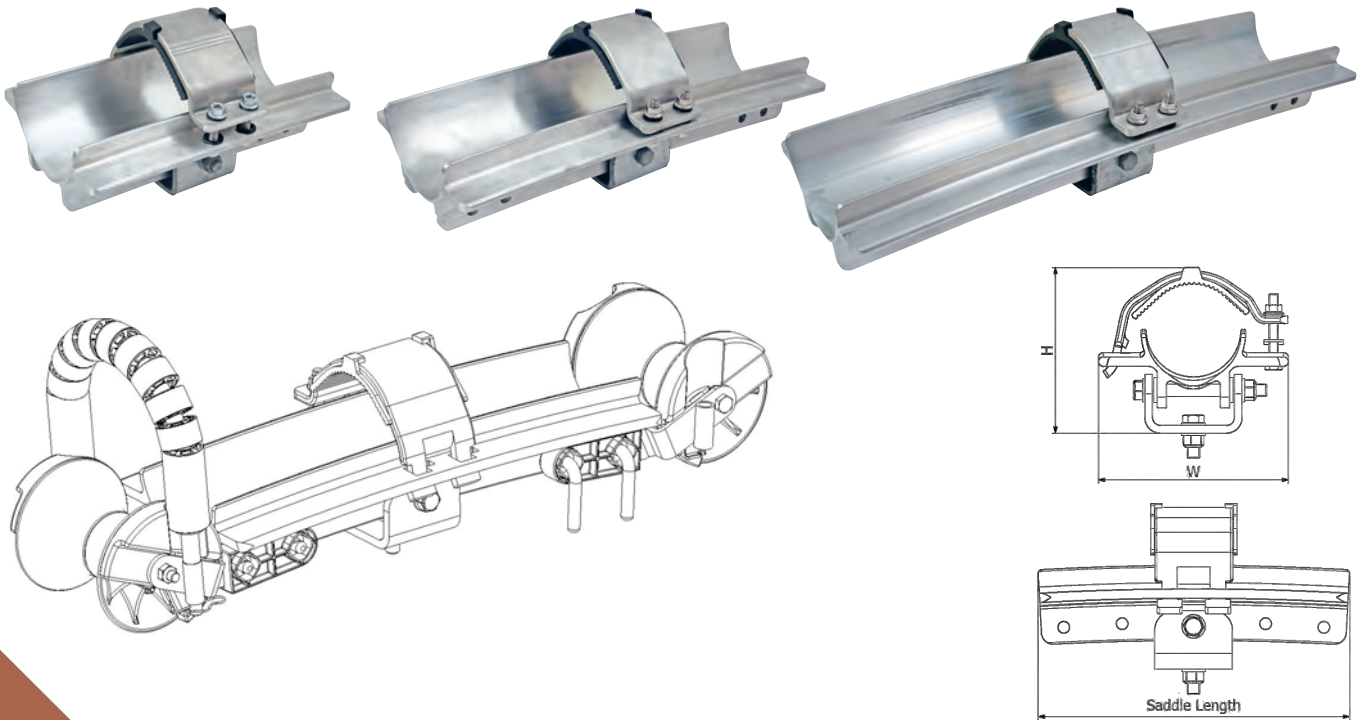
This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

CENTAUR®

Cable Saddle, UK Patent App. No. 0805128.6
European Patent No. 1973211, US Patent No. 8398033
Community Design Registration No. 000749999

- ▶ CURVED SADDLE CLEAT TO SUIT SAGGED CABLE INSTALLATIONS
- ▶ PIVOT POINTS ALLOW THE SADDLE TO PARTIALLY ROTATE UP AND DOWN AND LEFT TO RIGHT ACROSS ITS LENGTH
- ▶ HINGED CABLE STRAP EASES INSTALLATION
- ▶ CABLE ROLLERS CAN BE POSITIONED AT THE ENDS OF THE SADDLE FOR CABLE PULLING AS AN OPTIONAL EXTRA
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED IN LINE WITH IEC 61914

PART NO..	CABLE RANGE		DIMENSIONS (mm)			
	MIN Ø (mm)	MAX Ø (mm)	W	H	SADDLE LENGTH	BASE FIXING TYPE
CS100-112	100	112	244	205	400, 600 or 800	1 x M16
CS108-122	108	122	244	212	400, 600 or 800	1 x M16
CS120-132	120	132	244	221	400, 600 or 800	1 x M16
CS128-142	128	142	244	233	400, 600 or 800	1 x M16
CS140-152	140	152	272	240	400, 600 or 800	1 x M16
CS150-162	150	162	272	253	400, 600 or 800	1 x M16
CS148-162	148	162	272	253	400, 600 or 800	1 x M16



TESTING SUMMARY

Centaur cable saddles have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' As IEC 61914 is part of the low voltage directive it is not possible to follow the standard exactly and thus deviations have been made in areas. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	UV RESISTANT	METALLIC FRAME SHIELDS ALL POLYMER COMPONENTS.
CORROSION RESISTANCE	6.5.2.2	REFER TO ELLIS	-
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	-	163kA (REPORT No. KEMA-313-08)

PROJECT SPECIFIC DESIGNS:

Centaur can be adapted to suit specific project requirements and as such Ellis can alter the design to suit certain load or functionality requirements. Please contact Ellis for further details.



This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

CENTAUR® TREFOIL

UK Patent App. No. 0805128.6
European Patent No. 1973211, US Patent No. 8398033
Community Design Registration No. 000749999

- ▶ CURVED SADDLE CLEAT TO SUIT SAGGED CABLE INSTALLATIONS
- ▶ PIVOT POINTS ALLOW THE SADDLE TO PARTIALLY ROTATE UP AND DOWN AND LEFT TO RIGHT ACROSS ITS LENGTH
- ▶ HINGED CABLE STRAP EASES INSTALLATION
- ▶ SHORT CIRCUIT TESTED IN LINE WITH IEC 61914



Centaur Trefoil cable saddles are designed to support HV cables in trefoil formations alongside steelwork centres typically around 3 - 8m.

The assembly consists of an extruded and pressed aluminium saddle and a hinged aluminium overstrap. The curvature of the saddle accommodates the thermal expansion of the cable and the ends of the saddle are flared so that the cable never comes into contact with a sharp edge under any circumstances.

Centaur Trefoil is available in lengths of 400, 600 and 800mm to allow for different cable diameters and mounting centres.

Centaur Trefoil is project specific and as such range details cannot be provided. Please contact Ellis for further details.



A photo of the short circuit test rig for Centaur Trefoil including Flexi-Straps (see page 28). Testing was carried out at ZKU Laboratories in Prague, CZ.

TESTING SUMMARY

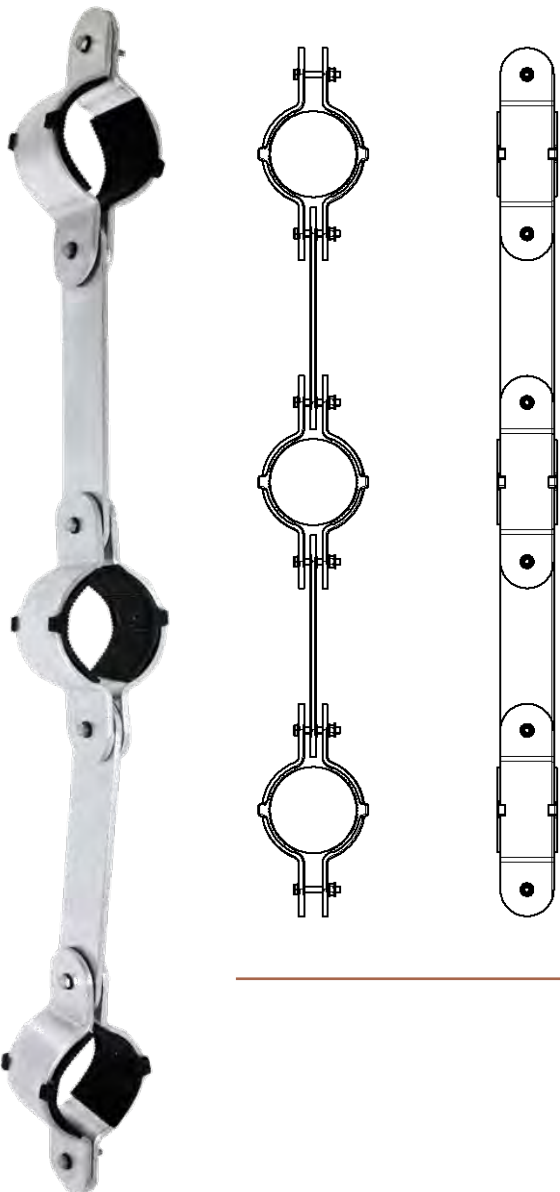
Centaur cable saddles have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' As IEC 61914 is part of the low voltage directive it is not possible to follow the standard exactly and thus deviations have been made in areas. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used:

PROPERTY	CLASSIFICATION CLAUSe IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	UV RESISTANT	METALLIC FRAME SHIELDS ALL POLYMER COMPONENTS.
CORROSION RESISTANCE	6.5.2.2	REFER TO ELLIS	-
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	-	117kA (REPORT No.) ZKU 16-050

CENTAUR[®] INTERMEDIATE STRAP

Aluminium Cable Spacer

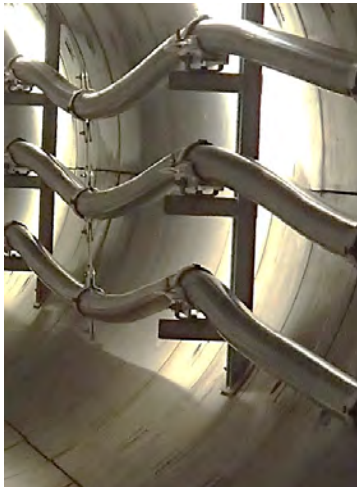
- ▶ DESIGNED TO RESTRAIN CABLES DURING A SHORT CIRCUIT FAULT AND MAINTAIN PHASE SPACING UNDER NORMAL OPERATING CONDITIONS
- ▶ MANUFACTURED IN 6000 SERIES ALUMINIUM
- ▶ TYPICAL SIZES RANGE FROM Ø100 - Ø162MM HOWEVER SPECIALS CAN BE PROVIDED ON REQUEST
- ▶ EACH CLAMP CAN PIVOT ABOUT THE JOINING BAR TO ACCOMMODATE FOR DIFFERENTIAL CABLE MOVEMENT. FIXED VERSIONS CAN BE SUPPLIED ON REQUEST.
- ▶ SHORT CIRCUIT TESTED BASED ON IEC 61914



TYPICAL INSTALLATION, PHOTO TAKEN AT A SHORT CIRCUIT TESTING EVENT AT KEMA LAB, ARNHEM NL.



BALFOUR BEATTY - POWER TRANSMISSION AND DISTRIBUTION ON THE LONDON POWER TUNNELS



SPECIAL VERSIONS CAN BE SUPPLIED ON REQUEST



TESTING SUMMARY

Centaur Intermediate Straps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations'. As IEC 61914 is part of the low voltage directive it is not possible to follow the standard exactly and thus deviations have been made in areas. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	UV RESISTANT	METALLIC FRAME SHIELDS ALL POLYMER COMPONENTS.
CORROSION RESISTANCE	6.5.2.2	REFER TO ELLIS	-
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	-	163kA (REPORT No. KEMA-313-08)

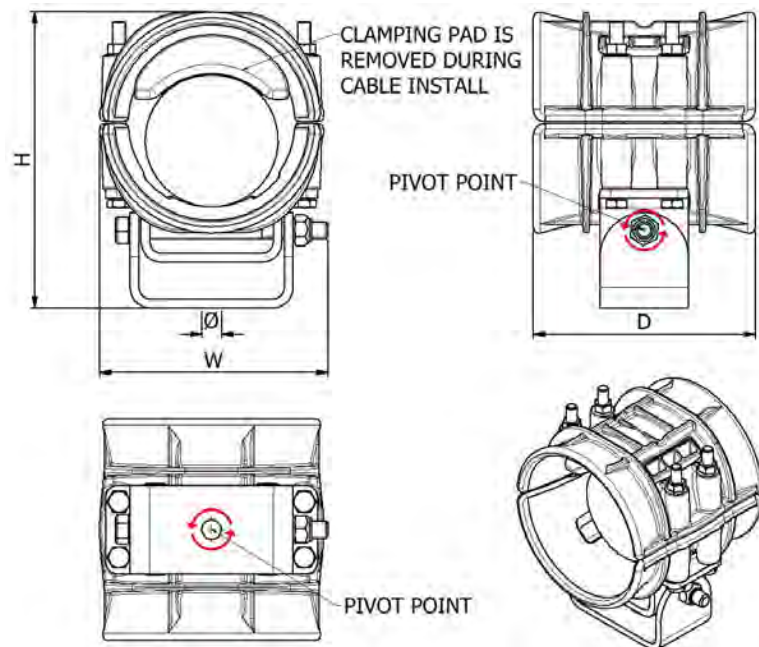
CABLE GUIDE CLAMP™

UK 2514384,
EUROPEAN 2806198
US 9,404,605 Patent

- ▶ FULLY GIMBALED CLAMP IS DESIGNED TO ROTATE UNDER CABLE PULLING FORCES
- ▶ CLAMPING PAD IS REMOVED FOR CABLE PULLING AND RE-INSTALLED TO CLAMP THE CABLE ONCE IT IS IN POSITION
- ▶ CONSTRUCTED FROM HIGH STRENGTH V0 GLASS FILLED NYLON AND GALVANISED STEEL COMPONENTS
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ INSTALLATION ANIMATION AVAILABLE IN THE VIDEOS SECTION OF OUR WEBSITE



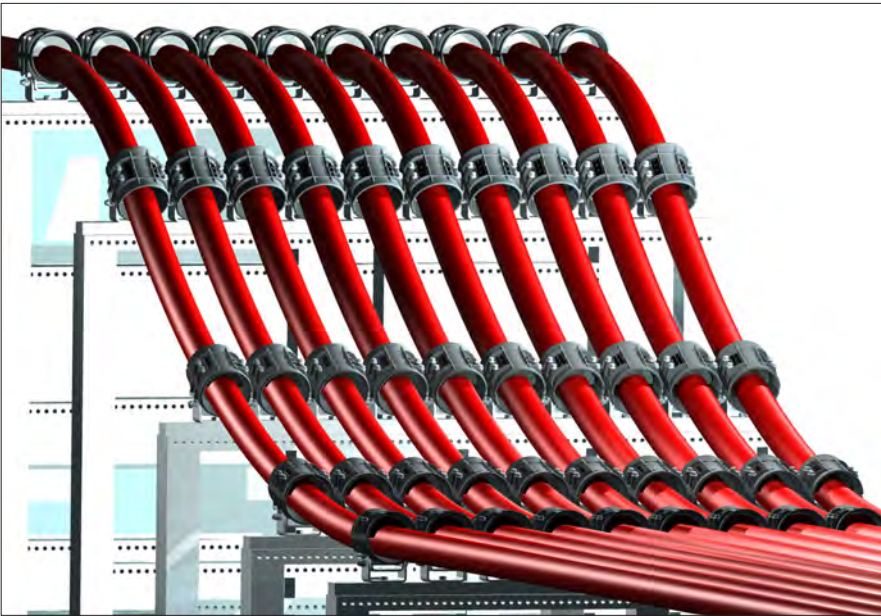
PART NO.	CABLE RANGE		DIMENSIONS (mm)				WEIGHT (kg)
	MIN Ø	MAX Ø	W	H	D	Ø FIXING HOLES	
CGC100-112-G	100	112	185	260	200	1 x M16	5.2
CGC110-122-G	110	122	185	255	200	1 x M16	5.2
CGC120-135-G	120	135	203	281	200	1 x M16	5.5
CGC130-145-G	130	145	203	283	200	1 x M16	5.5
CGC140-160-G	140	160	262	324	250	1 x M16	6.25
CGC150-170-G	150	170	262	324	250	1 x M16	6.25



TESTING SUMMARY

Cable Guide Clamp has been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. As IEC 61914 is part of the low voltage directive it is not possible to follow the standard exactly and thus deviations have been made in areas. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	192H SALT SPRAY TEST - ISO 9227
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 1M INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	114kA (REPORT No. PDL-15.025.1) CABLE OD= Ø117mm PHASE SPACING = 200mm (BASED ON IEC61914:2009)



A computer simulation of the Cable Guide Clamp installed on a wind farm substation in the North Sea. This was used to validate installation methodology.

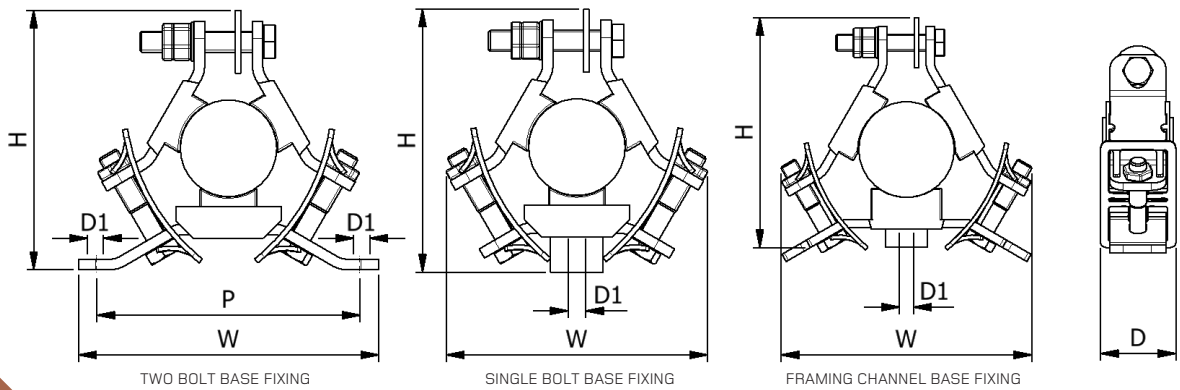
Galvanised Steel Cable Cleats
Patent No. UK Patent GB 228 4444

- ▶ GALVANISED STEEL FRAME WITH LSF POLYMERIC PADS TO PROTECT THE CABLE SHEATH
- ▶ CAN BE FIXED USING ONE BOLT, TWO BOLTS OR A FRAMING CHANNEL FIXING
- ▶ AVAILABLE FOR TREFOIL OR SINGLE CABLE APPLICATIONS
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914



SELECTION TABLE FOR TREFOIL FORMATIONS

PART NO.	CABLE RANGE	DIMENSIONS (mm)													WEIGHT (g)
		TWO BOLT BASE FIXING					SINGLE BOLT BASE FIXING				FRAMING CHANNEL BASE FIXING				
		W	H	D	P	FIXING HOLES (D1)	W	H	D	FIXING HOLES (D1)	W	H	D	FIXING HOLES (D1)	
AR2-A31-XX	24-26	170	121	54	150	2 x M10	144	130	54	1 x M10	144	125	54	1 x M10	930
AR2-A32-XX	26-30	170	122	54	150	2 x M10	144	130	54	1 x M10	144	125	54	1 x M10	930
AR2-A33-XX	30-35	170	133	54	150	2 x M10	157	141	54	1 x M10	157	136	54	1 x M10	970
AR2-A34-XX	35-40	170	134	54	150	2 x M10	158	142	54	1 x M10	158	137	54	1 x M10	930
AR3-A35-XX	40-45	198	158	54	175	2 x M10	185	165	54	1 x M10	185	160	54	1 x M10	1200
AR3-A36-XX	45-50	198	160	54	175	2 x M10	187	167	54	1 x M10	187	162	54	1 x M10	1200
AR4-A37-XX	50-55	224	174	54	200	2 x M10	204	182	54	1 x M12	204	177	54	1 x M12	1300
AR4-A38-XX	55-60	224	179	54	200	2 x M10	210	187	54	1 x M12	210	182	54	1 x M12	1300
AR4-A39-XX	60-66	224	185	54	200	2 x M10	217	193	54	1 x M12	217	188	54	1 x M12	1300
AR5-A61-XX	66-71	250	225	54	225	2 x M10	254	225	54	1 x M12	254	220	54	1 x M12	1800
AR5-A62-XX	71-76	250	226	54	225	2 x M10	255	226	54	1 x M12	255	221	54	1 x M12	1800
AR5-A63-XX	76-82	250	230	54	225	2 x M10	260	230	54	1 x M12	260	225	54	1 x M12	1800
AR8-A64-XX	82-92	285	250	54	225	2 x M10	N/A				N/A				2100
AR8-A65-XX	92-102	285	250	54	225	2 x M10	N/A				N/A				1900



SELECTION TABLE FOR SINGLE FORMATIONS

PART NO.	CABLE RANGE	DIMENSIONS (mm)													WEIGHT (g)
		TWO BOLT BASE FIXING					SINGLE BOLT BASE FIXING				FRAMING CHANNEL BASE FIXING				
		W	H	D	P	FIXING HOLES (D1)	W	H	D	FIXING HOLES (D1)	W	H	D	FIXING HOLES (D1)	
AR2-A11-XX	38-41	170	128	54	150	2 x M10	144	136	54	1 x M10	144	131	54	1 x M10	950
AR2-A12-XX	41-47	170	129	54	150	2 x M10	144	136	54	1 x M10	144	131	54	1 x M10	930
AR2-A13-XX	47-55	170	140	54	150	2 x M10	157	147	54	1 x M10	157	142	54	1 x M10	940
AR2-A14-XX	55-63	170	141	54	150	2 x M10	158	148	54	1 x M10	158	143	54	1 x M10	930
AR3-A15-XX	63-70	198	164	54	175	2 x M10	185	172	54	1 x M10	185	167	54	1 x M10	1200
AR3-A16-XX	70-79	198	166	54	175	2 x M10	187	173	54	1 x M10	187	168	54	1 x M10	1200
AR4-A17-XX	79-87	214	180	54	200	2 x M10	204	188	54	1 x M12	204	183	54	1 x M12	1300
AR4-A18-XX	87-95	214	186	54	200	2 x M10	210	193	54	1 x M12	210	188	54	1 x M12	1300
AR4-A19-XX	95-104	214	192	54	200	2 x M10	217	199	54	1 x M12	217	197	54	1 x M12	1300
AR5-A51-XX	104-112	250	231	54	225	2 x M10	254	231	54	1 x M12	254	226	54	1 x M12	1700
AR5-A52-XX	112-120	250	232	54	225	2 x M10	255	232	54	1 x M12	255	227	54	1 x M12	1700
AR5-A53-XX	120-130	250	237	54	225	2 x M10	260	237	54	1 x M12	260	232	54	1 x M12	1700

For full part number please replace 'XX' with the following:
TB = TWO BOLT BASE FIXING
SB = SINGLE BOLT BASE FIXING
FC = FRAMING CHANNEL BASE FIXING



TESTING SUMMARY

Atlas Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

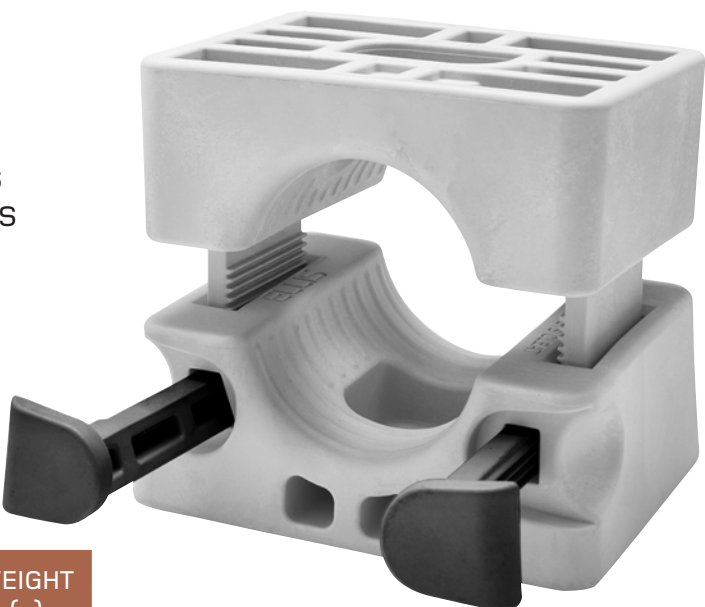
PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	120kA (REPORT No. PDL-18.122.7) CABLE OD= Ø36mm

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

NO BOLTS CLEAT™

Patent Pending
[Application Number 1804174.9]

- ▶ FULLY POLYMERIC CONSTRUCTION ELIMINATES THE RISK OF SNAGGING CABLE ON FIXING BOLTS
- ▶ “NO TOOLS NEEDED” DESIGN ALLOWS FOR FAST INSTALLATION
- ▶ PRODUCT CAN BE STACKED THREE CLAMPS HIGH USING TWIST FOOT FEATURE
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914

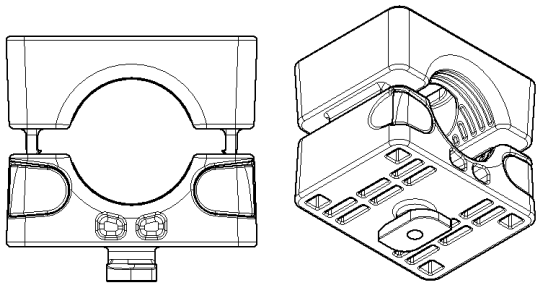
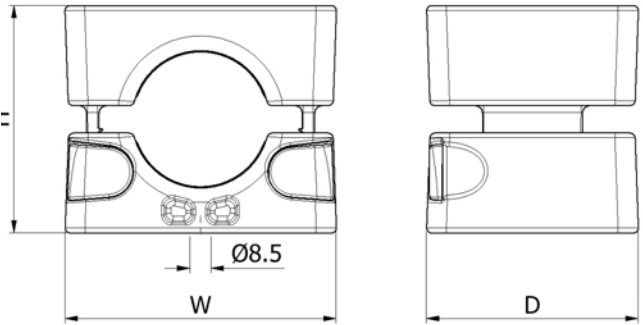


PART NO.	CABLE RANGE	DIMENSIONS (mm)			FIXING HOLES	WEIGHT (g)
		W	H	D		
NBC18-22	18 - 22	109	91	90	1 x M8	830
NBC20-26	20 - 26	109	91	90	1 x M8	815
NBC24-30	24 - 30	109	91	90	1 x M8	808
NBC28-34	28 - 34	109	91	90	1 x M8	801
NBC32-39	32 - 39	109	91	90	1 x M8	792
NBC37-47	37 - 47	109	91	90	1 x M8	758
NBC45-55*	45 - 55	109	91	85	1 x M8	675

NOTE: THE CLEAT RANGE IS COVERED BY A SET OF INSERTS THAT SIT INSIDE THE MAIN BODY, THEREFORE ALL OUTSIDE DIMENSIONS ARE THE SAME. *NBC45-55 DOES NOT USE INSERTS.

NR PADS APPROVAL NO.	ELLIS PART NO.
0111/120321	NBC18-22TF (for 18-22mm cables)
0111/120322	NBC20-26TF (for 20-26mm cables)
0111/120323	NBC24-30TF (for 24-30mm cables)
0111/120324	NBC28-34TF (for 28-34mm cables)
0111/120325	NBC32-39TF (for 32-39mm cables)
0111/120133	NBC37-47TF (for 37-47mm cables)
0111/120134	NBC45-55TF (for 45-55mm cables)

NO BOLTS CLEAT IS A NETWORK RAIL PADS APPROVED PRODUCT.
EXAMPLE PADS NUMBER (NBC45-55): 011/120134



FOR THE TWIST FOOT VERSION ADD A 'TF' SUFFIX E.G. NBC18-22TF



PRODUCT CAN BE STACKED A MAXIMUM OF THREE HIGH BY USING THE TWIST FOOT VARIANT. THIS VERSION LOCKS INTO THE RECESS PROVIDED IN THE TOP OF THE CLAMPS.

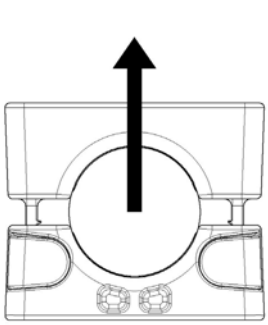
DUE TO THE TOLERANCES OF STANDARD UNISTRUT PROFILE, ELLIS RECOMMEND USING FIXINGS TO FASTEN THE CLAMP TO THE CHANNEL.

TESTING SUMMARY

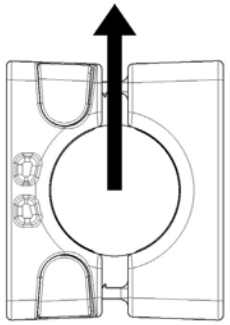
No Bolts Cleat has been tested in line with the International Standard of 'Cable Cleats for Electrical Installations' IEC 61914: 2015. Typical results below.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.2	POLYMERIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	101kA (REPORT No. PDL-16.106) PHASE SPACING = 110mm CABLE OD= Ø36mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	71kA (REPORT No. PDL-16.106) TESTED IN STACKED FORMATION PHASE SPACING = 75mm CABLE OD= Ø36mm

*TESTING CARRIED OUT ON NBC45-55 ONLY



LATERAL LOAD 'VERTICAL' DIRECTION



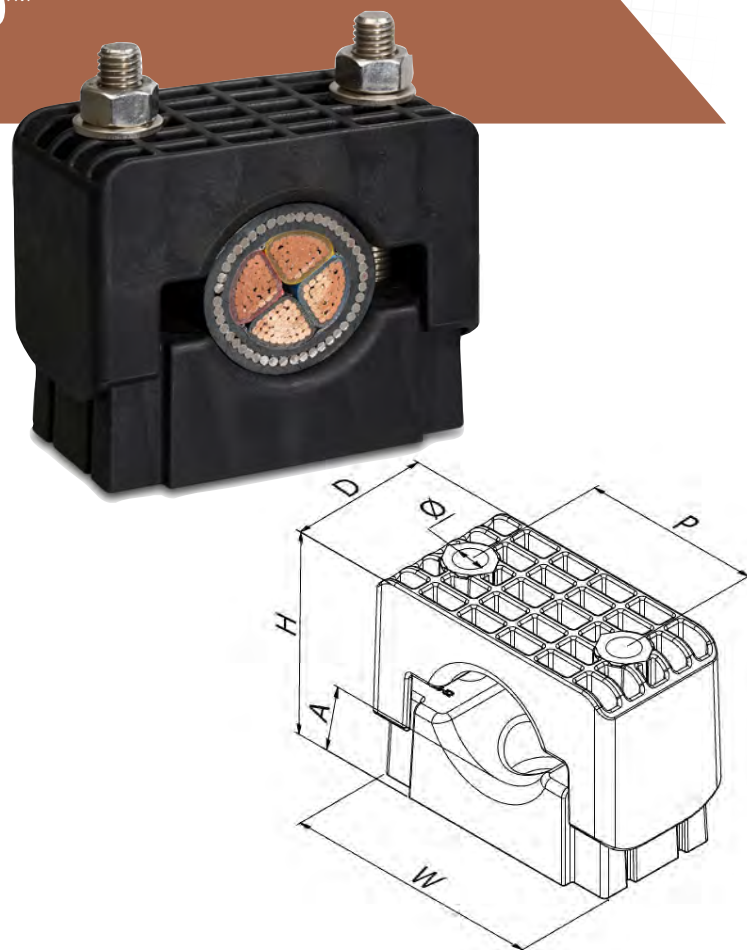
LATERAL LOAD 'HORIZONTAL' DIRECTION

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

SOLUS CLAMP™

EU Design Reg No: 008307425
UK Design Reg No: 90083074250001

- ▶ RANGE ACOMODATES Ø19 - Ø90MM CABLES
- ▶ SUITABLE FOR INDOOR AND OUTDOOR USE
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED IN ACCORDANCE TO IEC 61914
- ▶ SINGLE OR TWIN BOLT FIXING OPTIONS
- ▶ MANUFACTURED IN A HIGH STRENGTH LSF GLASS FILLED NYLON OR NON GLASS REINFORCED POLYMER
- ▶ FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST

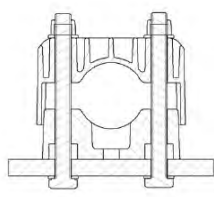


PART NO.	CABLE RANGE		LINER SIZE (mm)	CABLE RANGE WITH LINER		DIMENSIONS						AXIAL LOAD (kN)		LATERAL LOAD - HORIZONTAL (kN)		LATERAL LOAD - VERTICAL (kN)		WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)		MIN Ø (mm)	MAX Ø (mm)	W	H	D	A	P	Ø	SINGLE FIXING	TWIN FIXING	SINGLE FIXING	TWIN FIXING	SINGLE FIXING	TWIN FIXING	
SL25-38GFN	25	38	3	19	32	100	80	60	24	60	M12	0.9	1.2	4	5	6.5	10	285
SL36-52GFN	36	52	3	30	46	116	95	60	24	75	M12	1.2	1.8	4	5.5	6	10	356
SL49-75GFN	49	75	3	43	69	138	124	60	26	95	M12	1.6	1.6	4	10	6.5	9	485
SL66-90GFN	66	90	3	60	84	158	142	70	26	120	M12	1.6	1.6	6.5	10	10	10	655
SL25-38LSF	25	38	3	19	32	100	80	60	24	60	M12	1.1	1.3	6.5	7	10	25	232
SL36-52LSF	36	52	3	30	46	116	95	60	24	75	M12	1.1	1.8	6	8	9	25	287
SL49-75LSF	49	75	3	43	69	138	124	60	26	95	M12	1.1	1.1	6	8	10.5	26	395
SL66-90LSF	66	90	3	60	84	158	142	70	26	120	M12	1.1	1.1	6.5	8	10	25	548

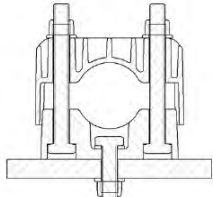
NOTE: FOR CLAMP WITH LINER ADD 'L' SUFFIX E.G. SL25-38GFNL.



POLYMERIC LINER CAN BE SUPPLIED



TWIN FIXING STYLE



SINGLE FIXING STYLE



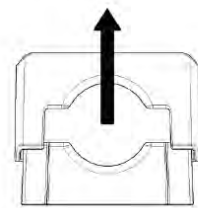
TESTING SUMMARY

Solus clamps have been tested in line with the international standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

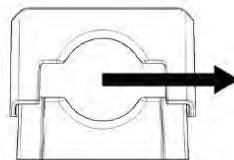
PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA	
			LSF	GFN
CLEAT TYPE	6.1.2	NON-METALLIC	-	
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-60 to +60	-60 to +120
IMPACT RATING	6.3.5	VERY HEAVY	PASS	
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30S	PASS	
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	SEE TABLE ON OPPOSITE PAGE	SEE TABLE ON OPPOSITE PAGE
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	SEE TABLE ON OPPOSITE PAGE	SEE TABLE ON OPPOSITE PAGE
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	157kA (REPORT No. PDL-22.079.02) CABLE OD = Ø35mm PHASE SPACING = 125mm	164kA (REPORT No. PDL-22.079.01) CABLE OD = Ø35mm PHASE SPACING = 125mm

NOTE: THE WITH LINER VERSION HAS A LOWER RATING TO THE STANDARD VERSION AS FOLLOWS:

- 1) TEMPERATURE RANGE OF -60 to +85°C.
- 2) AXIAL PERFORMANCE LOWER THAN STANDARD VERSION, CONTACT ELLIS FOR FURTHER INFORMATION..



LATERAL LOAD 'VERTICAL' DIRECTION



LATERAL LOAD 'HORIZONTAL' DIRECTION



PRODUCT CAN BE STACKED FLAT USING HEX RECESS ON BASE OF PRODUCT - REFER TO INSTALLATION INSTRUCTIONS

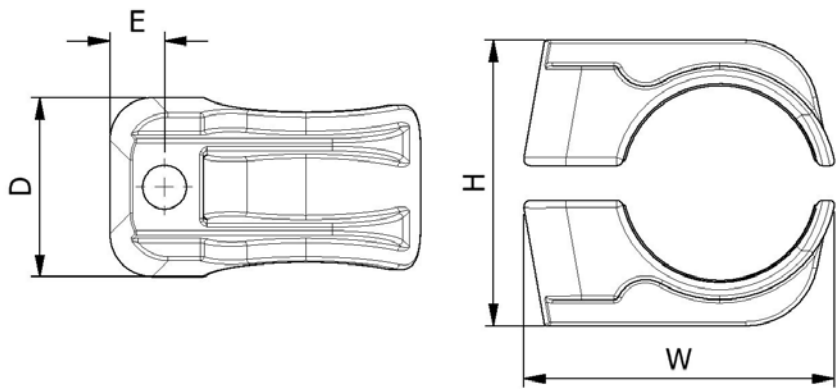
1A CABLE CLAMPS

Cast Aluminium Clamp

- ▶ 1 HOLE CLAMP CAST IN LM6 ALUMINIUM
- ▶ ACCOMMODATES Ø10MM - Ø57MM CABLES ACROSS 10 SIZES
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST



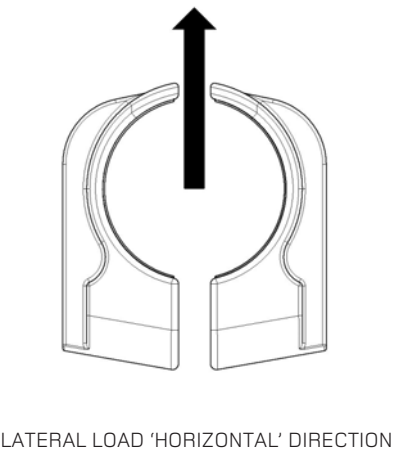
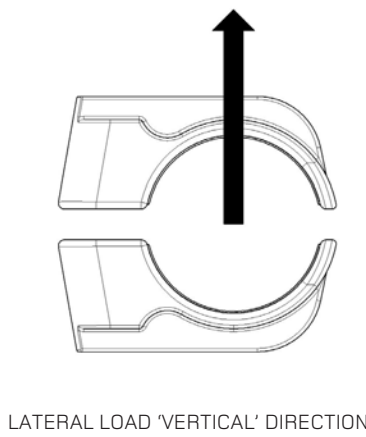
PART NO.	CABLE RANGE (mm)		DIMENSIONS (mm)				FIXING HOLES	WEIGHT (g)
	MIN	MAX	W	H	D	E		
1A-10N	10	13	37.8	27-30	41.4	10.2	1 x M10	43
1A-11N	13	16	41.2	30-33	41.4	10.4	1 x M10	52
1A-12N	16	19	44.3	33-36	41.4	10.7	1 x M10	61
1A-13N	19	23	48.2	36-40	41.4	10.9	1 x M10	68
1A-14N	23	27	52.2	40-44	41.4	11.3	1 x M10	78
1A-15N	27	32	57.1	44-49	41.4	11.6	1 x M10	85
1A-16N	32	38	63.1	49-55	41.4	12.1	1 x M10	97
1A-17N	38	46	71.3	58-66	41.4	12.9	1 x M10	121
1A-18N	46	51	77.3	67-73	41.4	13.5	1 x M10	155
1A-19N	51	57	83.2	72-78	41.4	13.9	1 x M10	171



TESTING SUMMARY

1A Clamps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.2	METALLIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +90
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	N/A
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	70.8kA (REPORT No. PDL-15.025.2) (IEC 61914:2009) PHASE SPACING = 100mm CABLE OD= Ø39mm



2A CABLE CLAMPS

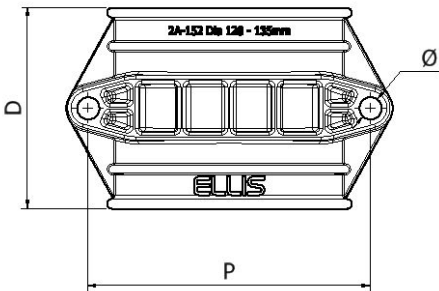
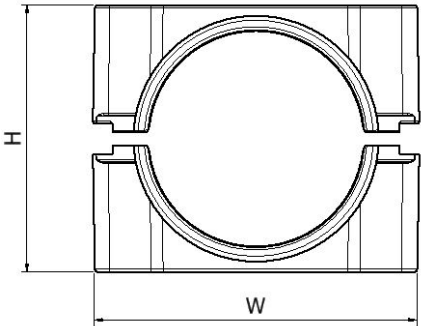
Cast Aluminium Clamp

- 2 HOLE CLAMPS CAST IN LM6 ALUMINIUM
- ROBUST DESIGN OFFERS GOOD RESISTANCE TO CABLE FORCES
- CLAMPING RANGE OF Ø32 - Ø168MM ACHIEVED ACROSS 18 SIZES
- SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST



PART NO.	CABLE RANGE		LINER THICK-NESS (mm)	CABLE RANGE WITH LINER		DIMENSIONS (mm)					WEIGHT (g)	AXIAL LOAD	LATERAL LOAD - HORIZONTAL	LATERAL LOAD - VERTICAL
	MIN Ø (mm)	MAX Ø (mm)		MIN Ø (mm)	MIN Ø (mm)	W	H	D	P	Ø				
2A-07N	38	46	3	32	40	94	48-57	49	68	2 x M10	174	800N	12.5kN	25kN
2A-08N	46	51	3	40	45	104	54-60	49	79	2 x M10	214	800N	12.5kN	25kN
2A-09N	51	57	3	45	51	105	61-68	49	79	2 x M10	224	800N	12.5kN	25kN
2A-10N	57	64	3	51	58	105	68-76	49	79	2 x M10	234	800N	12.5kN	25kN
2A-11N	64	70	3	58	64	133	74-80	64	106	2 x M10	360	1300N	12.5kN	25kN
2A-1200N	70	76	3	64	70	133	80-87	64	106	2 x M10	376	1300N	12.5kN	25kN
2A-1201N	76	83	3	70	77	133	97-95	64	106	2 x M10	388	1300N	12.5kN	25kN
2A-1202N	83	90	3	77	84	133	94-102	64	106	2 x M10	392	1300N	12.5kN	25kN
2A-131N	90	97	4	82	89	154	101-109	76	126	2 x M10	520	1500N	12.5kN	25kN
2A-132N	97	105	4	89	97	154	109-118	76	126	2 x M10	524	1500N	12.5kN	25kN
2A-141N	105	112	4	97	104	165	118-126	76	135	2 x M10	590	1500N	12.5kN	25kN
2A-142N	112	120	4	104	112	173	124-133	76	143	2 x M10	642	1500N	12.5kN	25kN
2A-151N	120	128	5	110	118	196	148-157	125	168	2 x M12	1700	5.5kN	20kN	50kN
2A-152N	128	135	5	118	125	203	158-166	125	176	2 x M12	1840	5.5kN	20kN	50kN
2A-161N	135	144	5	125	134	222	168-178	150	190	2 x M16	2633	6kN	35kN	60kN
2A-162N	144	152	5	134	142	232	179-188	150	200	2 x M16	2856	6kN	35kN	60kN
2A-171N	152	160	5	142	150	242	190-199	150	210	2 x M16	3089	6kN	35kN	60kN
2A-172N	160	168	5	150	158	252	201-210	150	220	2 x M16	3332	6kN	35kN	60kN

FOR THE LINERED VERSION ADD 'L' AS A SUFFIX TO THE PART NO. E.G. '2A-07NL'.

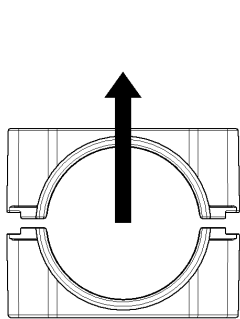


TESTING SUMMARY

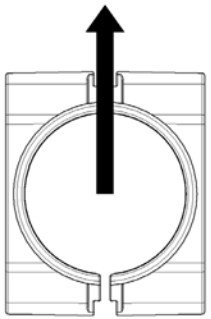
2A Clamps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1, 6.1.3	METALLIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +90
UV RESISTANCE	6.5.1.2	N/A	-
IMPACT RATING	6.35	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	N/A
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO THE DATA TABLE
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO THE DATA TABLE
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING ONE SHORT CIRCUIT)	183kA (REPORT No. PDL-18.071.1) CABLE OD= Ø36mm PHASE SPACING = 100MM
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 1M INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	113kA (REPORT No. PDL-15.025.1) CABLE OD= Ø117mm PHASE SPACING = 200MM

The test data provided above is for the standard version only, for test data with the liner option please contact Ellis.



LATERAL LOAD 'VERTICAL' DIRECTION



LATERAL LOAD 'HORIZONTAL' DIRECTION

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

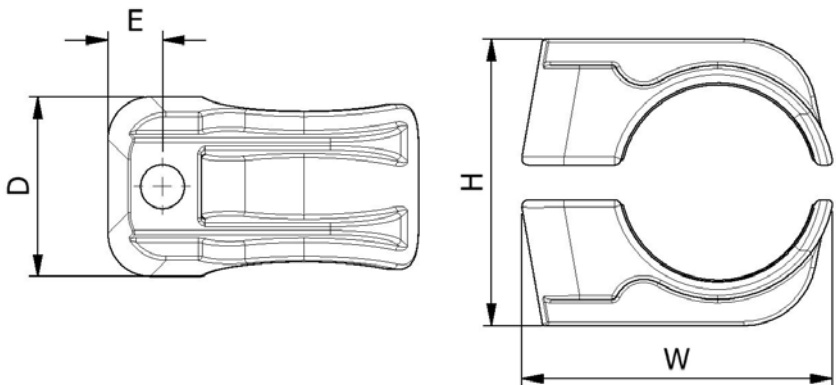
1F CABLE CLAMPS

UK Design Reg. No: 355854

- ▶ 1 HOLE CLAMPS MANUFACTURED IN LSF NYLON OR STANDARD POLYPROPYLENE
- ▶ ACCOMMODATES Ø10MM - Ø57MM CABLES ACROSS 10 SIZES
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST
- ▶ OPTIONAL LSF POLYMERIC LINER AVAILABLE



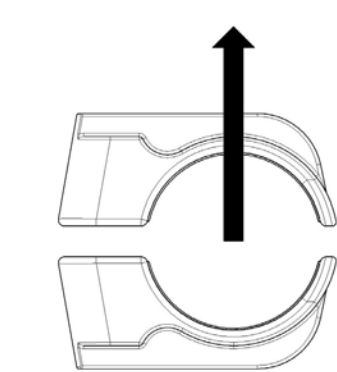
PART NO.	MATERIAL SUFFIX	CABLE RANGE (mm)		DIMENSIONS (mm)				FIXING HOLES	PACK QTY	WEIGHT (g)		
		MIN	MAX	W	H	D	E			B	LSF	LUL
1F-10	B/LSF/LUL	10	13	37.8	27-30	41.4	10.2	1 x M10	100	14.6	19.6	23.8
1F-11	B/LSF/LUL	13	16	41.2	30-33	41.4	10.4	1 x M10	100	17.0	23.0	27.7
1F-12	B/LSF/LUL	16	19	44.3	33-36	41.4	10.7	1 x M10	100	19.6	26.4	32.0
1F-13	B/LSF/LUL	19	23	48.2	36-40	41.4	10.9	1 x M10	100	22.4	30.2	36.5
1F-14	B/LSF/LUL	23	27	52.2	40-44	41.4	11.3	1 x M10	100	25.8	34.6	42.0
1F-15	B/LSF/LUL	27	32	57.1	44-49	41.4	11.6	1 x M10	100	29.2	39.0	47.6
1F-16	B/LSF/LUL	32	38	63.1	49-55	41.4	12.1	1 x M10	100	34.2	46.2	55.7
1F-17	B/LSF/LUL	38	46	71.3	58-66	41.4	12.9	1 x M10	50	47.8	64.0	77.9
1F-18	B/LSF/LUL	46	51	77.3	67-73	41.4	13.5	1 x M10	50	54.0	73.2	88.0
1F-19	B/LSF/LUL	51	57	83.2	72-78	41.4	13.9	1 x M10	50	59.0	80.4	96.2



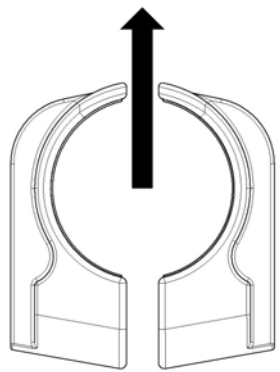
TESTING SUMMARY

1F Clamps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA	
			LSF	B
CLEAT TYPE	6.1.2	POLYMERIC	-	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60	-40 to +40
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS	PASS
IMPACT RATING	6.3.5	VERY HEAVY	REFER TO ELLIS	REFER TO ELLIS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS	NOT COMPLIANT
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	10.4kA (REPORT No. PDL-17.137.2) (IEC 61914:2015) PHASE SPACING = 100mm CABLE OD= Ø36mm	NOT SHORT CIRCUIT TESTED



LATERAL LOAD 'VERTICAL' DIRECTION



LATERAL LOAD 'HORIZONTAL' DIRECTION

APPROVALS:
THE LUL VERSION OF THE 1F ONE HOLE CABLE CLAMPS ARE COMPLIANT WITH THE REQUIREMENT OF LONDON UNDERGROUND STANDARD 1-085. PRODUCT REGISTER NO. 363.

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

2F+ CABLE CLAMPS

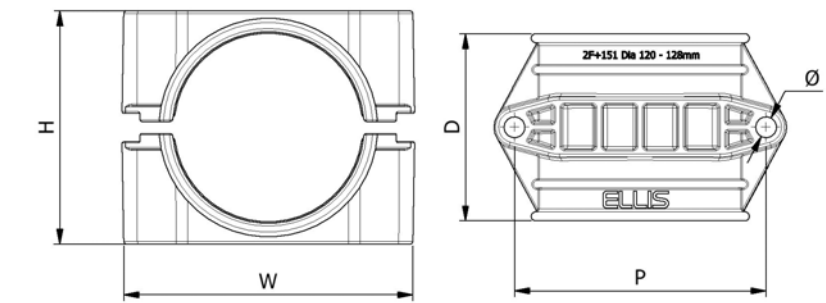
UK Design Reg. No: 355854

- 2 HOLE CLAMPS MANUFACTURED IN LSF NYLON OR STANDARD POLYPROPYLENE
- ROBUST DESIGN OFFERS GOOD RESISTANCE TO CABLE FORCES
- CLAMPING RANGE OF Ø32 - Ø168MM ACHIEVED ACROSS 18 SIZES
- SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- FIXINGS ARE NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST



PART NO.	CABLE RANGE		LINER THICKNESS (mm)	CABLE RANGE WITH LINER		DIMENSIONS (mm)					WEIGHT (g)		PACK QTY	AXIAL LOAD		LATERAL LOAD - HORIZONTAL		LATERAL LOAD - VERTICAL	
	MIN Ø (mm)	MAX Ø (mm)		MIN Ø (mm)	MIN Ø (mm)	W	H	D	P	Ø	LSF	B		LSF	B	LSF	B	LSF	B
2F+07	38	46	3	32	40	92	68	54	68	2 x M10	91	73	25	200N	150N	1.75kN	1.5kN	15kN	4kN
2F+08	46	51	3	40	45	103	76	54	79	2 x M10	110	81	25	200N	150N	1.75kN	1.5kN	15kN	4kN
2F+09	51	57	3	45	51	103	82	54	79	2 x M10	119	95	25	200N	150N	1.75kN	1.5kN	15kN	4kN
2F+10	57	64	3	51	58	103	89	54	79	2 x M10	123	89	25	200N	150N	1.75kN	1.5kN	15kN	4kN
2F+11	64	70	3	58	64	130	95	54	106	2 x M10	157	116	10	200N	150N	1.75kN	1.5kN	15kN	4kN
2F+1200	70	76	4	62	68	128	101	75	104	2 x M10	190	160	10	500N	500N	5kN	1.5kN	15kN	6kN
2F+1201	76	83	4	68	75	135	107	75	111	2 x M10	207	174	10	500N	500N	5kN	1.5kN	15kN	6kN
2F+1202	83	90	4	75	82	143	115	75	119	2 x M10	229	188	10	500N	500N	5kN	1.5kN	15kN	6kN
2F+131	90	97	5	80	87	165	122	100	138	2 x M12	423	336	5	2kN	700N	5kN	3kN	18.5kN	10kN
2F+132	97	105	5	87	95	171	130	100	144	2 x M12	441	355	5	2kN	700N	5kN	3kN	18.5kN	10kN
2F+141	105	112	5	95	102	178	137	100	151	2 x M12	510	382	5	2kN	700N	5kN	3kN	18.5kN	10kN
2F+142	112	120	5	102	110	187	146	125	160	2 x M12	622	496	5	2kN	1.3kN	5kN	4.5kN	18.5kN	8kN
2F+151	120	128	5	110	118	196	156	125	168	2 x M12	716	537	5	2kN	1.3kN	5kN	4.5kN	18.5kN	8kN
2F+152	128	135	5	118	125	203	165	125	176	2 x M12	772	579	5	2kN	1.3kN	5kN	4.5kN	18.5kN	8kN
2F+161	135	144	5	125	134	222	177	150	190	2 x M16	1109	831	5	2.5kN	2kN	30kN	8kN	40kN	15kN
2F+162	144	152	5	134	142	232	187	150	200	2 x M16	1203	902	5	2.5kN	2kN	30kN	8kN	40kN	15kN
2F+171	152	160	5	142	150	242	198	150	210	2 x M16	1302	976	5	2.5kN	2kN	30kN	8kN	40kN	15kN
2F+172	160	168	5	150	158	252	209	150	220	2 x M16	1403	1052	5	2.5kN	2kN	30kN	8kN	40kN	15kN

TO SPECIFY MATERIAL ADD SUFFIX TO PART NO. E.G. 2F+07LSF



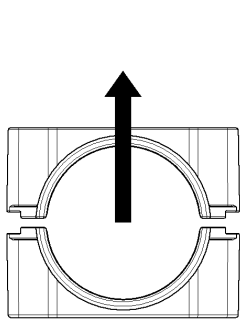
A CLAMP MANUFACTURED IN LONDON UNDERGROUND APPROVED MATERIAL CAN BE SUPPLIED ON REQUEST. CONTACT ELLIS FOR FURTHER DETAILS.

TESTING SUMMARY

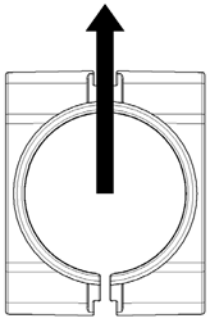
2F+ Clamps have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1, 6.1.3	POLYMERIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	LSF: -40 to +60 B: -40 to +40
UV RESISTANCE	6.5.1.2	XENON ARC METHOD A	PASS
IMPACT RATING	6.35	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	LSF: PASS B: NOT COMPLIANT
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO THE DATA TABLE OPPOSITE
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO THE DATA TABLE OPPOSITE
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	2F+07LSF CLEATS AT 600MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	80.2kA (REPORT No. PDL-17.137.3) CABLE OD= Ø36mm PHASE SPACING = 100mm
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	2F+142LSF CLEATS AT 1M INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	113kA (REPORT No. PDL-15.025.1) (BASED ON IEC 61914: 2009) CABLE OD= Ø117mm PHASE SPACING = 200mm

The test data provided above is for the standard version only, for test data with the liner option please contact Ellis.



LATERAL LOAD 'VERTICAL' DIRECTION



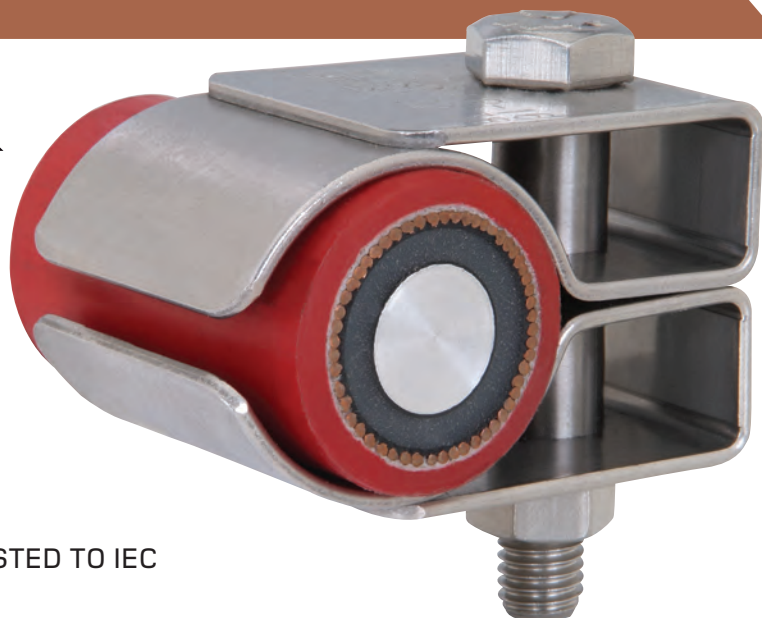
LATERAL LOAD 'HORIZONTAL' DIRECTION

LONDON UNDERGROUND

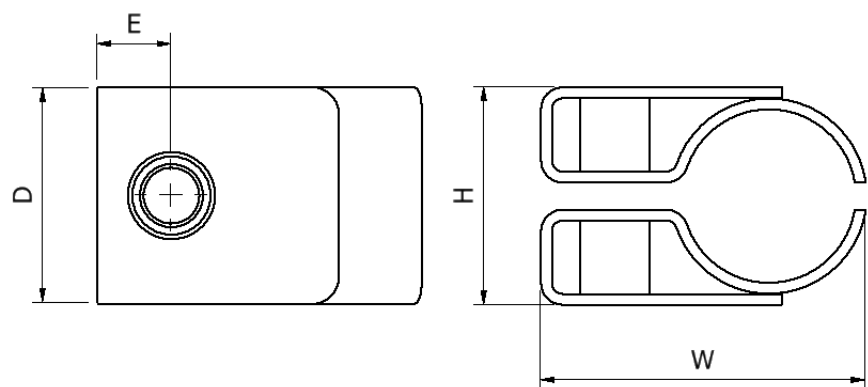
The LUL version of 2F+ Clamps are compliant with the requirements of LUL-1085. Product register number 364.

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

- ▶ METALLIC FRAME IS DESIGNED FOR THE INSTALLATION OF FIRE PROTECTION RATED CABLES.
- ▶ TESTED FOR FIRE RESISTANCE IN ACCORDANCE WITH BS 5839-1.
- ▶ AVAILABLE IN 12 SIZES TO SUIT Ø10MM TO Ø74MM CABLE
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ MARINE GRADE STAINLESS STEEL FRAME ENSURES PERFORMANCE IN THE HARSHTEST OF ENVIRONMENTS
- ▶ FIXINGS NOT SUPPLIED AS STANDARD BUT ARE AVAILABLE ON REQUEST



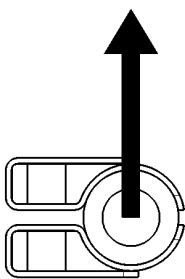
PART NO.	CABLE RANGE		DIMENSIONS (mm)					WEIGHT (g)
	MIN Ø (mm)	MAX Ø (mm)	W	H	D	P	F	
1FP-10SS	10	13	40	21	40	13.7	1 x M10	91
1FP-11SS	13	16	44	24	40	13.7	1 x M10	106
1FP-12SS	16	19	47	27	40	13.7	1 x M10	113
1FP-13SS	19	23	51	31	40	13.7	1 x M10	125
1FP-14SS	23	27	55	35	40	13.7	1 x M10	139
1FP-15SS	27	32	60	40	40	13.7	1 x M10	153
1FP-16SS	32	38	66	46	40	13.7	1 x M10	174
1FP-17SS	38	46	74	54	40	13.7	1 x M10	201
1FP-18SS	46	51	80	59	40	13.7	1 x M10	225
1FP-19SS	51	57	85	64	40	13.7	1 x M10	242
1FP-20SS	57	65	93	73	40	13.7	1 x M10	265
1FP-21SS	65	74	98	82	40	13.7	1 x M10	293



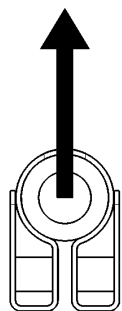
TESTING SUMMARY

Phoenix Cleats have been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2021. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.1	METALLIC	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +150 (FIRE RATED)
UV RESISTANCE	6.5.1	N/A	-
CORROSION RESISTANCE	6.5.2.2	OUTDOOR	316L STAINLESS STEEL HAS 16% CHROMIUM
IMPACT RATING	6.3.4	HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	NO CONTRIBUTION TO FIRE	METALLIC
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	45
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	HORIZONTAL - 350N VERTICAL -350N
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.5, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	31kA (REPORT No. PDL-17.137.1) CABLE OD= Ø36mm Phase Spacing = 100mm



LATERAL LOAD
'VERTICAL'
DIRECTION



LATERAL LOAD
'HORIZONTAL'
DIRECTION



Phoenix clips have been fire tested in accordance with BS 589-1:2017

APPROVALS:

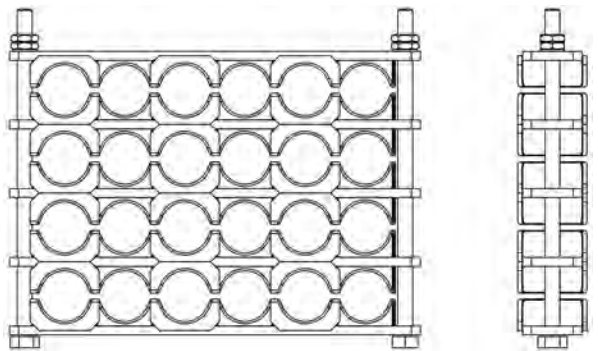
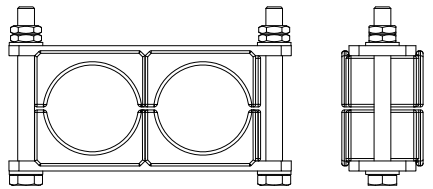
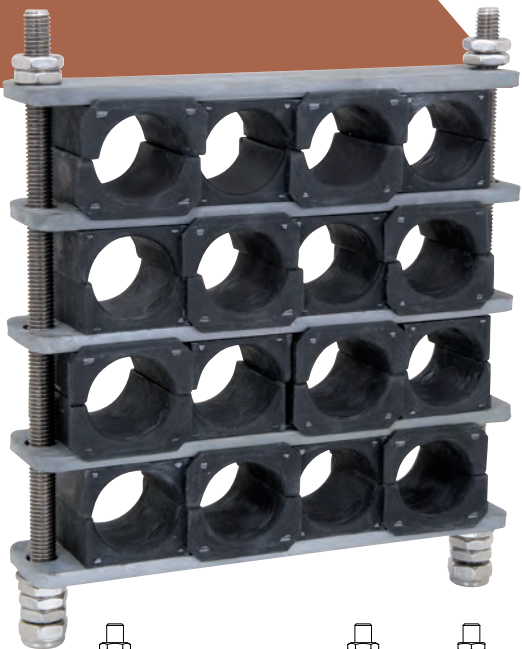
LONDON UNDERGROUND

Phoenix Cable Clamps are compliant with the requirements of LUL-1085. Product register number 1661.

MATRIX™

A Flexible Solution for Multiple Cables

- ▶ CLEAT DESIGN ALLOWS FOR MULTIPLE CABLES TO BE ASSEMBLED IN A MATRIX STYLE WITHIN ONE CLEAT
- ▶ STAINLESS STEEL FRAME AND FIXINGS
- ▶ SOFT LSF POLYMERIC PADS PROTECT CABLE SHEATH
- ▶ SHORT CIRCUIT AND MECHANICALLY TESTED TO IEC 61914
- ▶ FOR FRAME CONFIGURATION DETAILS CONTACT ELLIS



TESTING SUMMARY

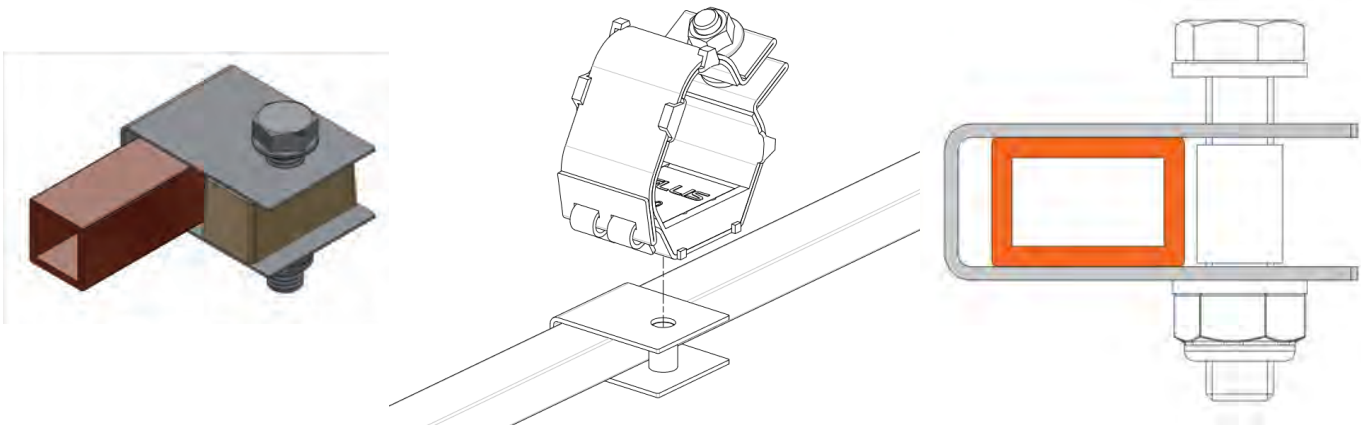
Matrix has been tested in line with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914:2015. Typical results are detailed below, please note that these testing values are maximums and safety factors appropriate to your application should be used.

PROPERTY	CLASSIFICATION CLAUSE IEC 61914	UNITS / CLASSIFICATION	TEST DATA
CLEAT TYPE	6.1.3	COMPOSITE	-
TEMP. FOR PERMANENT APPLICATION	6.2	°C	-40 to +60
UV RESISTANCE	6.5.1.2	REFER TO ELLIS	-
IMPACT RATING	6.3.5	VERY HEAVY	PASS
FLAME PROPAGATION TEST	10.0, 10.1	APPLICATION TIME ≥30s	PASS
AXIAL LOAD RATING	6.4.3, 9.4	NEWTONS (N)	REFER TO ELLIS
LATERAL LOAD RATING	6.4.2, 9.3	NEWTONS (N)	REFER TO ELLIS
RESISTANCE TO ELECTROMECHANICAL FORCE (SHORT CIRCUIT TESTING)	6.4, 6.4.4, 9.5	CLEATS AT 300MM INTERVALS (WITHSTANDING MORE THAN ONE SHORT CIRCUIT)	91.3kA (REPORT No. PDL-18.071.2) PHASE SPACING = Ø45mm (MC-4x1-037-G)

This information is subject to change without notice. The information provided has been generated in laboratory conditions and as such results in use may vary.

LADDER ADAPTORS

- ▶ LADDER ADAPTORS ARE DESIGNED TO FIT ELLIS CLEATS TO A WIDE RANGE OF LADDER RUNGS WHERE NO MOUNTING SLOTS OR HOLES ARE PROVIDED
- ▶ MADE FROM 316L STAINLESS STEEL
- ▶ SUPPLIED WITH FIXINGS
- ▶ AVAILABLE WITH M10 OR M12 FIXINGS



LADDER/STRUT/ MOUNTING SURFACE DIMENSIONS		ELLIS LADDER ADAPTOR PART NUMBER*				
		KIT0042	KIT0046	KIT0008	KIT0104	KIT0105
HEIGHT	INCHES	½	1	1	½	15/16
	MM	12.5	25.4	25.4	12.7	24
WIDTH	INCHES	1½	1 5/8	1	2 1/8	2 1/8
	MM	38	41	25.4	54	54

* ADD SUFFIX - M10 TO PART NUMBER FOR M10 FIXINGS
ADD SUFFIX - M12 TO PART NUMBER FOR M12 FIXINGS

DO YOU NEED A DIFFERENT ADAPTOR?

Ellis can manufacture ladder adaptors to suit any given dimensions, whether you need an adaptor to fit a round, D-rung or top hat shaped ladder rung we have the experience and expertise to deliver exactly what you need. Simply contact us with your height (H) and width (W) requirements:
sales@ellispatents.co.uk

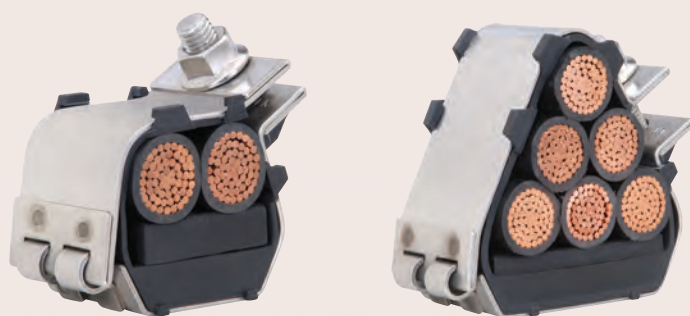
This data sheet is subject to change without notice. The information provided has been generated in laboratory conditions, as such results in use may vary.

ELLIS

Holding Power

BESPOKE SOLUTIONS AND PRODUCTS

We understand that different markets and varying situations demand different solutions; as problem solvers we thrive on new challenges. When our standard product range isn't quite what you need, we can still help. Visit our website for more information: www.ellispatents.co.uk.



Standard Emperor products modified to suit 2, 4 and 6 cable applications.



Standard Emperor product fitted with a universal base clamp designed to retrofit to three different undrilled ladder rung designs.



Side fix low-profile cleat is available as a special with a side fixing for use when height is a limiting factor.

MOST REQUESTED

Our customers often require help with the following:

- Mounting products onto a non-standard structure.
- Manufacturing products in a non-standard format or size.
- Specialist surface treatments such as painting, plating or galvanizing.
- Developing a completely bespoke product.

We are well placed to meet these and many other requirements.

SPECIALIST APPLICATIONS

Just like our standard products, our bespoke solutions are designed to withstand the toughest conditions and can be made for specialist environments such as:

- High shock load
- High or low temperature
- A large temperature range
- Tunnel (including railway)
- Unusual or aggressive corrosion
- Fire

ELLIS
Holding Power

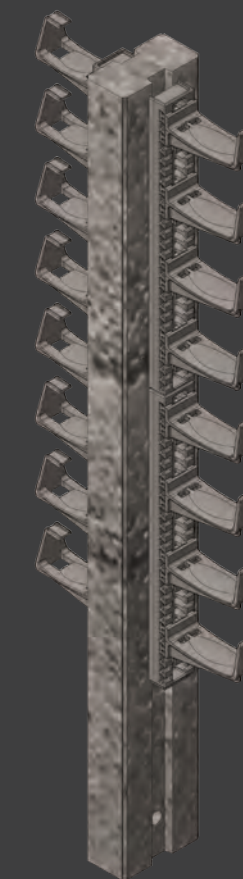
PEGASUS® CABLE HANGERS



▶ Composite Hanger System



▶ Retrofit Hanger System



▶ Multi-Fix Hanger System



▶ Convex Cable Hanger



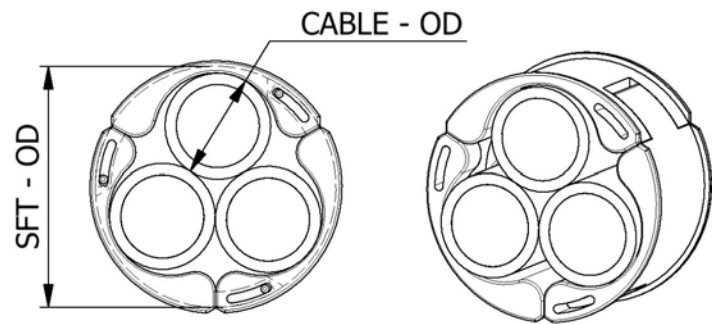
Scan to see the full Pegasus® Hanger range

TRIED | TESTED |
TRUSTED | WORLDWIDE |

TRIPLEX CABLE SURROUND

UK (2514384), EUROPEAN (2806198)
and US (9,404,605) Patent

- ▶ TRIPLEX CABLE SURROUND OVERCOMES THE TWIST IN TRIPLEX CABLE TO ALLOW THE CABLE TO BE CLEATED AT ANY POINT ALONG ITS LENGTH
- ▶ ADAPTOR MANUFACTURED IN A LSF V0 POLYMER
- ▶ CAN BE USED WITH EMPEROR SINGLE, VULCAN+, 2F+ AND 2A CLEATS
- ▶ REFER TO INDIVIDUAL PRODUCT DATA SHEETS FOR PERFORMANCE TO IEC 61914
- ▶ SOLD SEPARATELY TO THE CLEATS AS STANDARD BUT CAN BE PROVIDED ASSEMBLED INSIDE THE CLEAT ON REQUEST



PART NO.	CABLE RANGE		DEPTH (mm)	WEIGHT (g)
	MIN	MAX		
SFT26	24	28	62	67.3
SFT31 / SFT2F+31	28	34	62 / 84	87 / 125
SFT36 / SFT2F+36	33	39	62 / 84	113 / 160
SFT43 / SFT2F+43	39	47	62 / 109	140 / 272
SFT51 / SFT2F+51	47	55	62 / 134	212 / 447

NOTE:
SFT2F+XX part numbers refer to a deeper SFT+ moulding to be used with 2F+ and 2A clamps, see table for more detail.

NOTE: 'CABLE RANGE' REFERS TO THE OUTSIDE DIAMETER OF THE INDIVIDUAL CABLES INSIDE THE TRIPLEX BRAID
THIS PRODUCT HAS BEEN SHORT CIRCUIT TESTED IN LINE WITH EN 50368:
CONFIGURATION: 2F+LSF CLEAT WITH SFT
PEAK CURRENT: 76kA
CLEAT SPACING: 600mm

CABLE CLEAT SELECTION DETAIL FOR CLEATS TO BE USED WITH THE TRIPLEX CABLE SURROUND

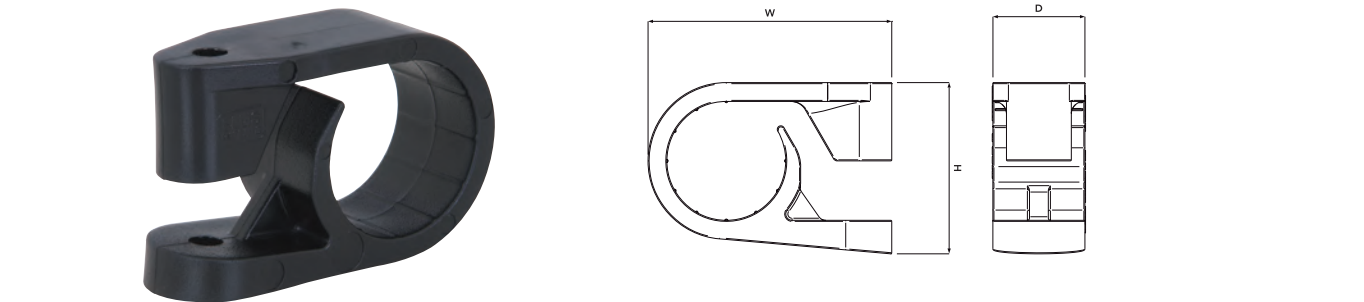
CABLE OD (mm)	SFT OD (mm)	ADAPTOR TYPE	VULCAN+	EMPEROR	2F + CLAMP	2A CLAMP
24	56	SFT26	VRT+03	ES51-59	2F+09	2A-09
25	58	SFT26	VRT+03	ES51-59	2F+10	2A-10
26	59	SFT26	VRT+03	ES51-59	2F+10	2A-10
27	61	SFT26	VRT+04	ES58-66	2F+10	2A-10
28	63	SFT26	VRT+04	ES58-66	2F+10	2A-10
28	64	SFT31	VRT+05	ES58-66	2F+11	2A-11
29	66	SFT31	VRT+05	ES65-73	2F+11	2A-11
30	68	SFT31	VRT+05	ES65-73	2F+11	2A-11
31	70	SFT31	VRT+06	ES65-73	2F+1200	2A-1200
32	71	SFT31	VRT+06	ES65-73	2F+1200	2A-1200
33	73	SFT31	VRT+06	ES65-73	2F+1200	2A-1200
34	75	SFT31	VRT+06	ES73-85	2F+1200	2A-1200
33	76	SFT36	VRT+06	ES73-85	2F+1201	2A-1201
34	78	SFT36	VRT+06	ES73-85	2F+1201	2A-1201
35	80	SFT36	VRT+07	ES73-85	2F+1201	2A-1201
36	82	SFT36	VRT+07	ES73-85	2F+1201	2A-1201
37	83	SFT36	VRT+07	ES73-85	2F+1202	2A-1202
38	84	SFT36	VRT+07	ES73-85	2F+1202	2A-1202
39	86	SFT36	VRT+08	ES84-94	2F+1202	2A-1202
39	88	SFT43	VRT+08	ES84-94	2F+1202	2A-1202
40	89.5	SFT43	VRT+08	ES84-94	2F+1202	2A-1202
41	93	SFT43	VRT+08	ES84-94	2F+131	2A-131
42	94	SFT43	VRT+09	ES84-94	2F+131	2A-131
43	95	SFT43	VRT+09	ES94-118	2F+131	2A-131
44	97	SFT43	VRT+09	ES94-118	2F+131	2A-131
45	99	SFT43	VRT+10	ES94-118	2F+132	2A-132
46	102	SFT43	VRT+10	ES94-118	2F+132	2A-132
47	104.5	SFT43	VRT+11	ES94-118	2F+132	2A-132
47	105	SFT51	VRT+11	ES94-118	2F+132	2A-132
48	107	SFT51	VRT+11	ES94-118	2F+141	2A-141
49	110	SFT51	VRT+12	ES94-118	2F+141	2A-141
50	112	SFT51	VRT+12	ES94-118	2F+141	2A-141
51	114	SFT51	VRT+12	ES94-118	2F+142	2A-142
52	117	SFT51	VRT+12	ES94-118	2F+142	2A-142
53	119.5	SFT51	VRT+13	ES118-130	2F+142	2A-142
54	121	SFT51	VRT+13	ES118-130	2F+151	2A-151
55	123.5	SFT51	VRT+13	ES118-130	2F+151	2A-151

FOR PART NUMBERS IN RED THE WIDER SFT2F+ NEEDS TO BE USED TO SUIT THE INCREASED DEPTHS OF THE CLAMPS

NOTES

INDUSTRIAL CABLE CLAMP

Manufactured as standard in Black LDPE (B) or in a London Underground Approved Material (LUL).
Used to fix power cables in indoor and outdoor applications.

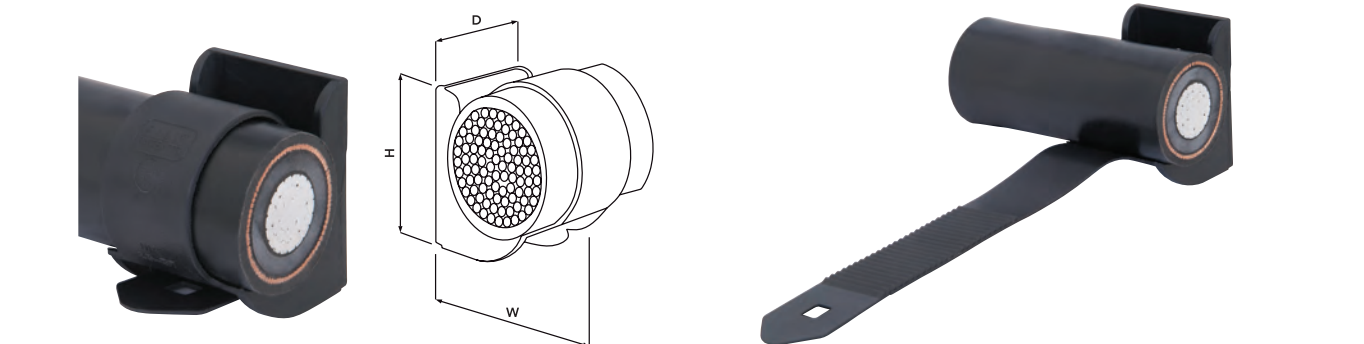


Part No.		Cable Range		Dimensions mm			Fixing Holes	Pack Qty	SWL kgf	Weight g	
LLDPE	LUL	Min Dia. mm	Max Dia. mm	W	H	D				LLDPE	LUL
17-01B	17-01LUL	10	15	27.8	17.6	12	1 x M4	100	18	2.0	3.5
17-02B	17-02LUL	12	17	32.0	20.8	14	1 x M4	100	24	3.3	5.4
17-03B	17-03LUL	15	20	37.1	25.3	16	1 x M4	100	32	5.2	8.6
17-04B	17-04LUL	18	24	41.0	29.6	18	1 x M4	100	39	7.3	12.2
17-05B	17-05LUL	22	29	52.1	35.4	20	1 x M6	50	52	11.2	18.6
17-06B	17-06LUL	26	34	58.2	40.9	22	1 x M6	50	66	16.5	27.9
17-07B	17-07LUL	32	42	69.3	49.2	25	1 x M6	25	79	25.6	42.9
17-08B	17-08LUL	39	51	81.7	58.5	26	1 x M6	25	93	36.2	60.1

The LUL version of this clamp is compliant with the requirement of London Underground Standard 1-085. Product Register No. 365.

ELITE RANGE-TAKER CABLE CLAMP

Manufactured as standard in Black Polypropylene (B), White Polypropylene (W) or Black Flame Retardant V0 Zero Halogen Phosphorus-Free Nylon (LSF). The clamp incorporates a fully releasable strap allowing ease of re-installation. Used to fix power cables in indoor and outdoor applications.



Part No.	Material Suffix	Cable Range		Dimensions mm			Fixing Holes	Pack Qty	Weight g	
		Min Dia. mm	Max Dia. mm	W	H	D			B/W	LSF
15-1	B,W or LSF	9.5	16.0	27.0	37.0	25.0	1 x M6	100	6.0	8.0
15-2	B,W or LSF	15.0	25.0	36.0	37.0	32.0	1 x M6	50	8.0	10.9
15-3	B,W or LSF	23.0	37.0	48.0	48.0	36.0	1 x M6	50	15.0	18.1
15-4	B,W or LSF	34.0	52.0	63.0	65.0	40.0	1 x M6	25	20.0	25.5

EARTHING STRIP CLIP

Manufactured as standard in Black Polypropylene (B) or Grey Flame Retardant Polypropylene (FR). Used to fix PVC coated, bare copper or aluminium strip.



IMPERIAL SIZES

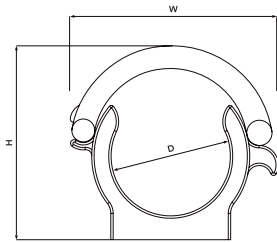
Part No.	Material Suffix	Strip Size inches	Hold Off inches	Length inches	Fixing Holes (slotted) inches	Pack Qty	Weight g
60-04	B or FR	1 x 1/8	5/16	2	7/16 x 5/16	100	12
60-05	B or FR	1 1/4 x 1/8	3/8	2 5/8	7/16 x 5/16	100	21
60-06	B or FR	1 1/4 x 3/16	5/16	2 5/8	7/16 x 5/16	100	20
60-08	B or FR	1 1/2 x 3/16	5/16	2 5/8	7/16 x 5/16	100	20
60-10	B or FR	1 1/2 x 1/8	3/8	2 5/8	7/16 x 5/16	100	20
60-15	B or FR	2 x 1/8	1/4	3 1/8	7/16 x 5/16	100	24
60-26	B or FR	1 x 1/8	3/4	2 1/8	7/16 x 5/16	100	16
60-27	B or FR	1 x 3/16	5/8	2 1/8	7/16 x 5/16	100	16
60-28	B or FR	1 1/2 x 3/16	5/8	2 1/8	7/16 x 5/16	100	25
60-32	B or FR	1 1/4 x 1/4	5/8	3	7/16 x 5/16	100	25
60-34	B or FR	1 1/2 x 1/8	3/4	3	7/16 x 5/16	100	25
60-36	B or FR	1 1/2 x 1/4	5/8	3	7/16 x 5/16	100	24
60-37	B or FR	1 1/2 x 3/8	3/8	2 7/8	7/16 x 5/16	100	23
60-38	B or FR	1 3/4 x 1/8	3/4	3 3/8	7/16 x 5/16	100	27
60-39	B or FR	1 3/4 x 1/4	5/8	3 3/8	7/16 x 5/16	100	27
60-40	B or FR	2 x 1/8	3/4	3 3/8	7/16 x 5/16	100	30
60-42	B or FR	2 x 1/4	5/8	3 3/8	7/16 x 5/16	100	25
60-44	B or FR	2 x 3/8	3/8	3 3/8	7/16 x 5/16	100	24

METRIC SIZES

Part No.	Material Suffix	Strip Size mm	Hold Off mm	Length mm	Fixing Holes (slotted) mm	Pack Qty	Weight g
70-04	B or FR	20 x 4	17	55	11 x 8	100	15
70-06	B or FR	20 x 6	16	55	11 x 8	100	16
70-07	B or FR	25 x 6	16	55	11 x 8	100	14
70-08	B or FR	50 x 4	18	87	11 x 8	100	28
70-09	B or FR	40 x 6	16	87	11 x 8	100	28
70-10	B or FR	50 x 6	15	87	11 x 8	100	26
70-11	B or FR	40 x 4	18	87	11 x 8	100	28
70-12	B or FR	50 x 10	11	87	11 x 8	100	24
70-14	B or FR	60 x 6	18	97	11 x 8	100	31
70-16	B or FR	80 x 6	19	118	11 x 8	50	41

CABLE CONDUIT CLIP

Manufactured as standard in Black Nylon this surface mounted Conduit Clip comes complete with a captive hinged over-strap. Used to fix conduit in indoor and outdoor applications.



Part No.	Material Suffix	D mm	H mm	W mm	Fixing Holes mm	Stand off	Pack Qty	Weight g
CC20B	B or W	20	35	35	4	5	100	8.8
CC25B	B or W	25	40	40	4	5	100	10.6

FRAMING CHANNEL ACCESSORIES

FRAMING CHANNEL END CAPS

Manufactured as standard in Black or White Polypropylene (PP), Black or White LDPE (PE) or Nylon (LSF). The EC version is a spring fit whilst the 'Gripper' version has fins which bend and deform into the channel. There is provision to incorporate the customers logo. Also available to order in other colours.

Part No.	Description	Size mm	Material Suffix	Colour	Pack Qty	Weight g
91-ECLB	'EC' type channel end cap	41 x 41	PP	Black	100	7.3
91-ECLW	'EC' type channel end cap	41 x 41	PP	White	100	7.3
91-ECSB	'EC' type channel end cap	41 x 21	PP	Black	100	3.2
91-ECSW	'EC' type channel end cap	41 x 21	PP	White	100	3.2
91-JGLB	'Gripper' type channel end cap	41 x 41	PE	Black	100	9.4
91-JGLW	'Gripper' type channel end cap	41 x 41	PE	White	100	9.4
91-JGSB	'Gripper' type channel end cap	41 x 21	PE	Black	100	4.4
91-JGSW	'Gripper' type channel end cap	41 x 21	PE	White	100	4.4
91-JGLLSF	'Gripper' type channel end cap	41 x 41	LSF	Black	100	9.4
91-JGSLSF	'Gripper' type channel end cap	41 x 21	LSF	Black	100	4.4



BUTTERFLY CLIP

Manufactured as standard in Black Nylon, the butterfly clip snaps into 41mm wide framing channel. It will accommodate a cable tie of up to 100mm in width (not included). Used to allow cables to be strapped at right angles to the channel.



Part No.	Material Suffix	Pack Qty	Weight g
91-BC	NY	100	3.8

THERMAL SPACER

Manufactured as standard in Black Polypropylene. A slotted hole is also provided for running heat detection cable. Used to ensure separation of the cable on cable ladder, framing channel and ladder rungs with reduced return flanges.



Part No.	Height Above Ladder Rung	Material Suffix	Pack Qty	Weight g
91-TSL1	75mm	PP	100	19.5
91-TS7.5	50mm	PP	100	14.7

FRAMING CHANNEL ACCESSORIES

FRAMING CHANNEL WASHER

Manufactured as standard in the materials shown this washer is recommended for use when our range of 2F+ clamps are fitted to framing channel.

Part No.	Size	Material Suffix	Hole Size mm	Pack Qty	Weight g
91-WZ	40 x 40	Mild Steel Zinc Plated	10	100	33
91-WZ-X	40 x 40	Mild Steel Zinc Plated	12	100	33
91-W-2	40 x 40	A2 Stainless Steel	10	100	34
91-W-4	40 x 40	A4 Stainless Steel	12	100	34
91-WG	40 x 40	Mild Steel Galvanised	10	100	37



CHANNEL NUTS

Manufactured as standard in Bright Zinc Plated Mild Steel.

Part No.	Material Suffix	Pack Qty	Weight g
0F-M10-CN00-Z	M10 Channel Nut (long spring)	100	38
0F-M10-CN01-Z	M10 Channel Nut (short spring)	100	37
0F-M10-CN02-Z	M10 Channel Nut (no spring)	100	36



INSULATION PLATE

Manufactured as standard in Black Polypropylene or Black Flame Retardant VO Zero Halogen Phosphorus-Free UV Stabilised Nylon (LSF), this insulation plate can be used to provide a barrier where galvanic reaction may occur between dissimilar metals, e.g. when installing stainless steel cleats onto galvanised steel channel.

Part No.	Material Suffix	Pack Qty	Weight g
91-IP	B/LSF	100	5
91-IP 12	B/LSF	100	5
91-IP-1	B/LSF	100	5
91-IP-2	B/LSF	100	5
91-IP-3	B/LSF	100	5



TRUNKING ADAPTOR

Manufactured as standard in Black Polypropylene (B) or Nylon (LSF), this adaptor can be used to fit one hole and two hole cable clamps when cables are being installed parallel to the trunking.

Part No.	Material Suffix	Pack Qty	Weight g
91-TA	B	100	5.3
91-TA	LSF	100	7.1



SPECIALIST CABLE FIXINGS FOR UTILITIES



SINGLE WAY FIXING CABLE CLEAT

Manufactured as standard in Black Polypropylene (B) and Grey Flame Retardant Polypropylene (FR) or Black Acetal (A). A robust cleat used for securing armoured power cables.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
10-034	B or FR	9.0	3	200	0.8
10-042	B or FR	10.6	4	200	1.9
10-046	B or FR	11.7	4	200	2.8
10-053	B or FR	13.5	4	200	2.8
10-056	B or FR	14.2	4	200	3.1
10-061	B or FR	15.5	4	200	3.1
10-065	B or FR	16.5	4	200	4.8
10-072	B or FR	18.2	4	200	4.2
10-083	B or FR	21.1	6	100	7.7
10-098	B or FR	24.8	6	100	6.4
10-106	B or FR	27.0	6	100	7.5
10-120	A	31.0	6	50	15.8
10-138	A	35.0	6	50	23.0



SINGLE WAY HEAVY DUTY RADIUSSED POLE CLEAT

Manufactured as standard in Black Polypropylene (B) or Black Flame Retardant VO Zero Halogen Phosphorus-Free UV Stabilised Nylon (LSF). A curved robust cleat used for securing power cables on 200mm diameter wooden electricity supply poles.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
35-04	B	27.6	8	100	13.0
35-06	B	31.2	8	100	12.0
35-065	B	33.5	8	100	18.5
35-07	B	36.0	8	100	14.0
35-08	B	37.8	8	100	16.0
35-10	B	41.5	8	100	26.0
35-12	B	44.6	8	100	25.0
35-22	B	49.2	8	100	23.0
35-26	B	53.5	8	50	25.0
35-30	B	56.6	8	50	27.0
35-34	B	61.6	11	50	53.0
35-42	B	72.5	11	25	84.0



TWO WAY SINGLE FIXING CABLE CLEAT

Manufactured as standard in Black Polypropylene (B) and Grey Flame Retardant Polypropylene (FR). A robust cleat used for securing two armoured power cables on flat surfaces.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
2W37	B	9.4	4	100	2.2
2W42	B or FR	10.6	4	100	3.3
2W46	B or FR	11.7	4	100	3.6
2W53	B or FR	13.5	4	100	4.0
2W56	B or FR	14.2	4	100	5.0



THREE & FOUR WAY DOUBLE FIXING CABLE CLEAT

Manufactured as standard in Black Polypropylene (B) and Grey Flame Retardant Polypropylene (FR). A robust cleat used for securing three or four armoured power cables on flat surfaces.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
3W46	B or FR	11.7	4	200	8.7
3W56	B or FR	14.2	4	200	9.3
4W10	B	4 x 15	4	100	9.5



TWO WAY HEAVY DUTY RADIUSSED POLE CLEAT

Manufactured as standard in Black Polypropylene (B) or Black Flame Retardant VO Zero Halogen Phosphorus-Free UV Stabilised Nylon (LSF). A curved robust cleat used for securing two power cables on 200mm diameter wooden electricity poles.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
2WP04	B	11.7	4	100	6.1
2WP06	B	13.2	4	100	5.4
2WP10	B	16.5	4	100	6.5
2WP15	B	19.1	8	100	7.3

SPECIALIST CABLE FIXINGS FOR UTILITIES



THREE WAY HEAVY DUTY RADIUSED POLE CLEAT

Manufactured as standard in Black Polypropylene (B) or Black Flame Retardant VO Zero Halogen Phosphorus-Free UV Stabilised Nylon (LSF). A curved robust cleat used for securing three power cables on 200mm diameter wooden electricity supply poles.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
3WP04	B	11.7	6.35	200	8.0
3WP06	B	13.2	6.35	200	8.2
3WP10	B	16.5	6.35	200	9.8
3WP15	B	19.2	6.35	200	12.5
3WP20	B	21.7	6.35	200	13.7
3WP2	B	15.0	6.35	200	10.7
3WN05	B	24.0	6.35	200	11.9



TWO WAY CLEAT AND SPACER

Manufactured as standard in Black Polypropylene (B) and Grey Flame Retardant Polypropylene (FR). Used for mounting power cables to poles and flat surfaces. A spacer is available to facilitate the stacking of the cleat

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
E272	B or FR	11.1-19.1	10.0	50 pairs	22.7
E272S	B or FR	11.1-19.1	10.0	50	15.1
E273	B or FR	6.35-12.0	6.63	50 pairs	11.4
E273S	B or FR	6.35-12.0	6.63	50	7.2

S = Spacer



CABLE TIE BASE

Manufactured in Nylon (NY). Used to accommodate a cable tie of up to 10mm in width (not included)

Part No.	Material Suffix	Fixing Holes mm	Pack Qty	Weight g
115-001	NY	6	100	2.5



UNIVERSAL CLEAT

Manufactured as standard in Black Polypropylene (B). Used for stacking cables vertically or horizontally using a framework system. More detail can be supplied on request

Part No.	Material Suffix	Cable Dia. mm	Pack Qty	Weight g
30U-1	B	23.8-38.1	50 pairs	89



SINGLE WAY SNAP ON SADDLE CLIP

Manufactured as standard in Black Polypropylene (B) and Grey Flame Retardant Polypropylene (FR). Used for mounting cables and pipes on flat surfaces also providing clearance between the cable or pipe and the mounting surface.

Part No.	Material Suffix	Cable Dia. mm	Fixing Holes mm	Pack Qty	Weight g
90-M095	B or FR	9.5	3.75	500	1.8
90-M120	B or FR	12.0	3.75	500	2.4
90-01	B or FR	12.7	3.75	500	2.2
90-02	B or FR	15.0	3.75	500	2.4
90-03	B or FR	17.5	4.0	500	3.3
90-075	B or FR	19.0	4.0	500	3.6
90-04	B or FR	23.0	4.0	500	3.2
90-04.1	B or FR	24.2	4.0	500	3.1
90-05	B or FR	25.4	4.0	500	4.3
90-06	B or FR	27.5	5.0	500	5.3
90-07	B or FR	31.7	5.0	200	6.8
90-08	B or FR	34.0	5.0	200	6.7
90-09	B or FR	38.1	5.0	100	6.8
90-10	B or FR	42.0	5.0	200	8.7
90-11	B or FR	42.6	5.0	200	9.5
90-12	B or FR	44.4	5.0	100	7.4
90-13	B or FR	48.7	5.0	200	10.4
90-14	B or FR	53.9	5.0	100	14.4
90-143	B or FR	55.0	6.0	100	26.3
90-15	B or FR	60.5	6.0	100	25.8
90-19	B or FR	75.0	7.5	50	40.8
90-24++	B	88.9	10.0	25	70.7
90-S	B	Saddle Clip Spacer*			1.2

++ This item is supplied with a base plate.

* Spacer suitable for use with all saddle clips (except part no 90-24). Provides additional separation of the cable or pipe from the mounting surface of approximately 12.5mm.



ABC WALL CLEAT

Manufactured as standard in Black Polypropylene (B). Used as a simple solution to the fixing of vertical and horizontal serial bundled cable to walls and other surfaces. (Tested to ESI Standards 43-14.)

Part No.	Material Suffix	A mm	H mm	D mm	Fixing Holes mm	Pack Qty	Weight g
115-010	B	10	47	31	6	100	12
115-050	B	50	59	37	6	100	27
115-100	B	100	72	43	6	25	54
115-125	B	125	80	48	6	25	74

Please note: These clamps are available in 4 stand off variants denoted by 'A'.

JOINTERS' TOOLS

CABLE CORE TWISTERS

Manufactured in Acetal (International Orange). Used to manipulate bare or insulated cable cores and to align the cores prior to jointing.

3 CORE

Part No.	Cores	Core Range Size mm²	Pack Qty	Weight g
110-95C	3	70 Bare x 95 Bare	10	54
110-X01C	3	95 Bare x 95 Ins	10	51
110-120C	3	70 Bare x 120 Bare	10	51
110-120IC	3	70 Ins x 120 Ins	10	49
110-X06C	3	120 Bare x 120 Ins	10	48
110-X07C	3	185 Bare x 185 Ins	10	148
110-240C	3	185 Bare x 240 Bare	10	146
110-300C	3	185 Bare x 300 Bare	10	147
110-300IC	3	185 Ins x 300 Ins	10	139
110-X08C	3	300 Bare x 300 Ins	10	138
110-X09C	3	70 Bare x 70 Ins	10	53
110-X10C	3	95 Bare x 185 Bare	10	154
110-X11C	3	95 Ins x 185 Ins	10	149

Supplied in accordance with IEC 60900

3 & 4 CORE

Part No.	Cores	Core Range Size mm²	Pack Qty	Weight g
110-X03C	3 & 4	3C 95 Ins x 4C 95 Ins	10	50
110-X04C	3 & 4	3C 185 Ins x 4C 185 Ins	10	145
110-X05C	3 & 4	3C 300 Ins x 4C 240 Ins	10	135
110-X12C	3 & 4	3C 300 Bare x 4C 300 Bare	10	141
110-X13C	3 & 4	3C 300 Ins x 4C 300 Ins	10	134

4 CORE

Part No.	Cores	Core Range Size mm²	Pack Qty	Weight g
110-41C	4	95 Bare x 95 Ins	10	51
110-42C	4	185 Ins x 240 Ins	10	142
110-43C	4	185 Bare x 240 Bare	10	150
110-44C	4	185 Ins x 300 Ins	10	141
110-45C	4	185 Ins x 185 Bare	10	170
110-46C	4	300 Ins x 300 Bare	10	160
110-48C	4	120 Ins x 185 Ins	10	150
110-X02C	4	185 Bare x 300 Bare	10	146
110-X14C	4	95 Bare x 185 Bare	10	155
110-X15C	4	95 Ins x 185 Ins	10	149
110-X16C	4	95 Ins stranded x 95 Ins solid	10	51
110-X17C	4	300 Ins stranded x 300 Ins solid	10	140



CABLE CORE FORMER

Manufactured in Nylon. Used to hold the cores of a three core cable apart whilst a joint is being made. The central hole provides a facility for positioning a mastic bung.

Part No.	Core Separation Distance mm	Pack Qty	Weight g
120-F	32 - 58	10	44.1



JOINTERS' TOOLS

CABLE CORE GUARD

Manufactured in Nylon (International Orange). Used to provide separation between a cable core which is being cut and neighbouring cores.

Part No.	Nominal Lift mm	Pack Qty	Weight g
120-CG1C	23	10	57

Supplied in accordance with IEC 60900



CABLE CORE STRIPPER

Manufactured in a Polymeric material. Used to remove insulation and sheathing from armoured power cables. The tool has an exceptionally strong, tough blade and a unique handle moulded in a softer plastic which provides a cushion effect when a hammer is used to initiate a cut in the cable sheath.

Part No.	Nominal Lift mm	Pack Qty	Weight g
120-CS	90	10	183

Supplied in accordance with IEC 60900

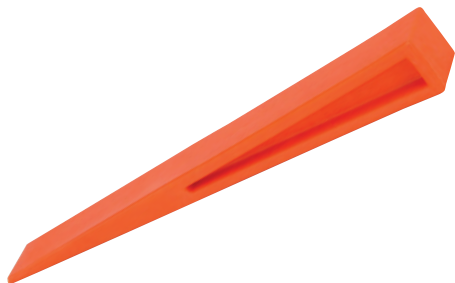


CABLE CORE WEDGE

Manufactured in Nylon (International Orange). Used to prise apart and to separate the cores of cables.

Part No.	Length mm	Width mm	Nominal Lift mm	Pack Qty	Weight g
110-1NYC	150	25	15	10	41
110-2NYC	225	25	25	10	65
110-3NYC	225	25	38	10	89
110-4NYC	150	13	25	10	32

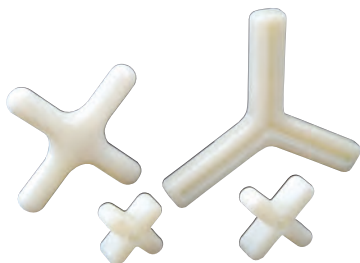
Supplied in accordance with IEC 60900



CABLE CORE SPREADER

Manufactured in Nylon. Used to hold apart the cores of a cable when jointing cables.

Part No.	Core	Core Range Size mm²	Pack Qty	Weight g
120-VNY	3	240 - 300	100	45
120-WNY	3	185	100	38
120-YNY	3	95 - 150	100	30
120-ZNY	3	95	100	24
120-UNY	4	Universal	100	37
120-15	4	Universal	100	10
120-20	4	Universal	100	12



IEC 61914 – CABLE CLEATS FOR ELECTRICAL INSTALLATIONS

IEC 61914 specifies requirements and tests for cable cleats and intermediate restraints used for securing cable in electrical installations. Cable cleats provide resistance to electromechanical forces. Products achieve conformance to the standard after being subjected to a range of tests.

The tests are designed to simulate real world installation conditions and provide designers with data that can be used to aid with system design. Relevant sections of the standard and Ellis' testing regime are detailed below.

- ▶ 1. CLEAT TYPE
- ▶ 2. TEMPERATURE FOR PERMANENT APPLICATION
- ▶ 3. UV RESISTANCE
- ▶ 4. CORROSION RESISTANCE
- ▶ 5. IMPACT RATING
- ▶ 6. FLAME PROPAGATION TEST
- ▶ 7. AXIAL LOAD RATING
- ▶ 8. LATERAL LOAD RATING TEST
- ▶ 9. RESISTANCE TO ELECTROMECHANICAL FORCE

1. CLEAT TYPE

The three cleat classifications are:

- ▶ METALLIC
- ▶ COMPOSITE
- ▶ NON-METALLIC



Metallic cleats are all metal, composite cleats contain a combination of metallic and polymeric parts and non-metallic cleats contain no metallic parts and are fully polymeric.

2. TEMPERATURE FOR PERMANENT APPLICATION

DEFINITION:

The ambient temperature range that a cleat is capable of operating within.

IEC 61914 provides set temperatures to specify against. These values are ambient and are not representative of the expected maximum cable conductor temperature.

MINIMUM TEMPERATURE °C
+5
-5
-15
-25
-40
-60
MAXIMUM TEMPERATURE °C
+40
+60
+85
+105
+120

3. UV RESISTANCE

Composite and non-metallic type cleats are subject to UV resistance testing. Samples are exposed to a minimum of 700 hours of 'Xenon-arc' UV light in accordance with ISO 48922:2006. Products are deemed to have passed if they show no signs of cracking or degradation to normal vision and pass the requirements of the impact test.

Cleats deemed as being UV resistant are certified only to the requirements of IEC 61914 and as such their classification may not extend to harsher criteria (e.g. desert installation). Ellis have UV testing capabilities in house and can test conditions which are more onerous than detailed in IEC 61914.



ELLIS' IN HOUSE UV WEATHERING TEST STATION

4. CORROSION RESISTANCE:



Metallic or composite type cleats are subject to corrosion resistance testing. Any metal components that are non-ferrous (e.g. aluminium) or are ferrous but contain more than 16% chromium (e.g. 316L stainless steel) need not be tested and are assumed to meet the classification for high resistance to corrosion. Any metallic components that do not meet this criteria are subject to a minimum of 192 hours of salt spray according to ISO9227 (for 'high corrosion classification'). After the exposure the cleats are visually checked and deemed to have passed if 'no red rust visible to normal or corrected vision.'

Similar to the UV test data the classification of 'high corrosion resistance' is limited to the criteria of the standard and therefore for applications in harsh environments contact Ellis for guidance.

IN ADDITION TO THE CORROSION TESTING TO IEC 61914 ELLIS CARRIES OUT EXTENDED TESTING ON ITS OUTDOOR WEATHERING STATION.

5. IMPACT RATING

A cleat's impact rating is established by dropping a set weight onto a product from a set height. The rating relevant to the weight and height characteristics are detailed below. For composite and non-metallic cleats this is conducted at the minimum declared temperature for the cleats. For metallic cleats the testing is done at room temperature. A cleat is deemed to have passed providing there is no damage that would affect the cleats load holding capability.

The impact test is reflective of the resistance to items dropping on it whilst on site, or it being dropped during install.



CLASSIFICATION	NOMINAL IMPACT ENERGY (J)	EQUIVALENT MASS (KG)	HEIGHT (MM)
Very light	0.5	0.25	200
Light	1.0	0.25	400
Medium	2.0	0.5	400
Heavy	5.0	1.7	300
Very Heavy	20.0	20.0	400

6. FLAME PROPAGATION

This test applies to composite and non-metallic type cleats. A needle flame is applied to a product to establish its potential contribution to fire. A cleat is deemed to have passed if any drips of material that fall from the product do not ignite tissue paper placed below and if after 30 seconds of the flame being removed there is no flaming of the cleat. The testing follows the general principles of IEC 60695-11-5.

This test determines whether a cleat will propagate fire in the presence of a small external flame, a pass to the criteria of IEC 61914 does not make a cleat 'fire rated'. Ellis offers predominantly flame-retardant polymers, for lower cost non critical applications non FR rated materials are available.



FLAME PROPAGATION TEST ON SOLUS NON-METALLIC CLEAT.



THE AXIAL LOAD RATING OF A CLEAT IS USED TO SPECIFY THE SPACING OF CLEATS TO HOLD THE WEIGHT OF THE CABLE IN VERTICAL INSTALLS

7. AXIAL LOAD RATING TEST

A cleats axial load rating is a measure of its grip on a cable. A manufacturer-declared load is applied to a mandrel, this load is held for 5 minutes and the cleat is deemed to have passed if the deformation of the mandrel relative to the cleat is less than 5mm. For composite and non-metallic cleats, the test is carried out at the maximum declared temperature. For metallic cleats the test is carried out at room temperature.

A cleats axial rating is provided to specify cleats for vertical installations where the cleat is required to hold the weight of the cable within its grip. It may also be applicable to installations where resistance to thermomechanical axial thrust is required.

8. LATERAL LOAD RATING TEST

The lateral load test measures the cleat's capability to withstand continuous loading over long periods of time. A self-declared load is applied and held for an hour and a cleat is deemed to have passed if the deformation of the product is less than 50% of the minimum mandrel diameter the cleat can accept. The test is undertaken in two different cleat mounting scenarios, detailed as horizontal and vertical in Ellis' literature. For composite and non-metallic cleats, the test is carried out at the cleat's maximum declared temperature, for metallic type cleats, testing is at room temperature.

The test can be considered representative of the cleat's ability to hold cable weight, for example if it is installed upside down or on its side. It can also provide detail of the cleat's resistance to any lateral thermomechanical loads. The lateral load test data is not an indication of a cleats short circuit performance.

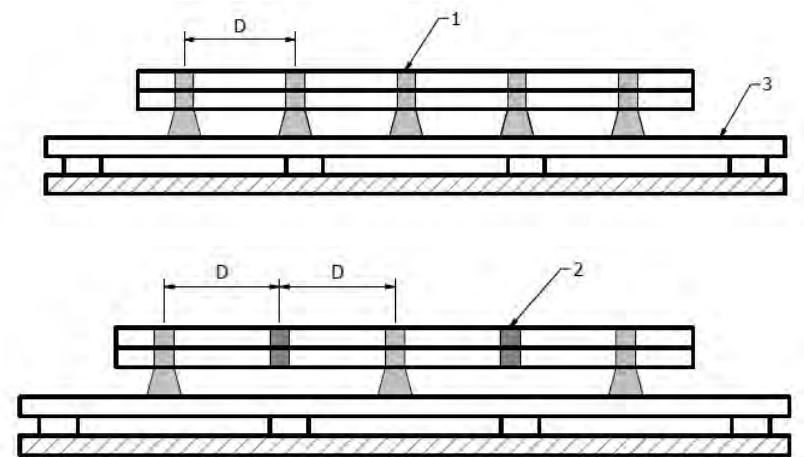


THE LATERAL LOAD RATING OF A CLEAT CAN BE USED TO SPECIFY CLEATS BASED ON CONTINUOUS LOADING, SUCH AS MOUNTING CLEATS ON A SIDE.

9. RESISTANCE TO ELECTROMECHANICAL FORCE

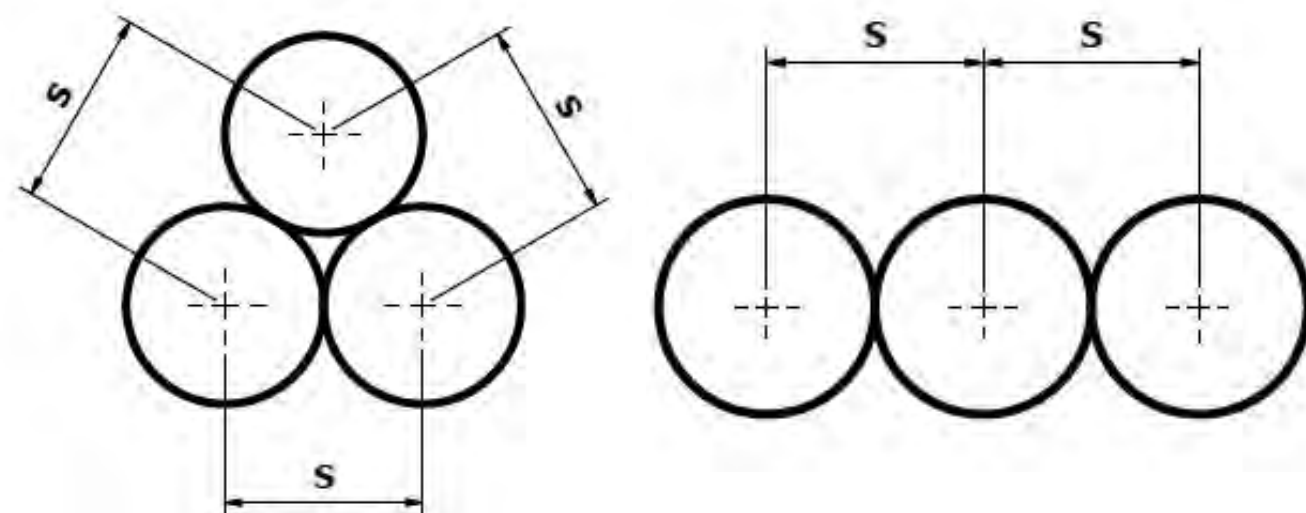
Perhaps the most important function of a cable cleat is to withstand the electromechanical forces generated during a short circuit. IEC 61914 short circuit testing specifies a three phase fault with one cable per phase. One end of the cables is connected to a three phase supply and the other end to a short-circuit busbar connecting all three phases. Some key requirements of the testing are as follows:

- ▶ The short circuit peak current is carried out to a manufacturer declared peak current and lasts no less than 0.1s.
- ▶ The test cable must be unarmoured single core 600 V /100 V stranded copper conductor cable with a 35(±5 mm or 50 (±5)mm outside diameter.
- ▶ Testing is carried out at the prevailing ambient temperature of the laboratory.
- ▶ A minimum of 5 test cleats are to be used for fully cleated tests and at least 4 cleats and 3 intermediate straps must be used for cleat-strap installs, as displayed above.
- ▶ The cable formation tested must either be trefoil or flat formation, see below:



Key	Description
1	Cable Cleats
2	Intermediate Restraints
3	Mounting Surface
D	Lineal Spacing

EXTRACT FROM IEC
INTERMEDIATE
RESTRAINT TEST
LAYOUT.



After one short circuit a cleat is deemed to have passed if:

- ▶ There is no failure that will affect the cleat or intermediate straps from holding the cables in place.
- ▶ The cleats and intermediate straps shall be intact with no missing parts including all devices used to secure cleats to the mounting surface.
- ▶ There shall be no cuts or damage visible to normal or corrected vision to the outer sheath of each cable caused by the cleats or intermediate straps.

A manufacturer can decide to test a second short circuit. The pass criteria for a cleat withstanding two short circuits is as follows:

- ▶ The pass criteria for one short circuit applies.
- ▶ The test rig must pass a 2.8kV d.c or 1.0kV a.c 60 second voltage withstand test administered between the cable cores and the mounting frame. With the cable jackets and mounting frame being pre-wetted to facilitate a current leakage path.

Ellis has over 20 years' experience of short circuit testing. Our experience in the field precedes the inception of National and International Cable Cleat standards. The company has carried out over 1,000 short circuit tests in numerous test labs around the world to the requirements of IEC 61914 as well as specialised testing to customer requirements.



TYPICAL TESTING TO IEC 61914 AND BESPOKE TESTING OF A HV TEST RIG TO A CUSTOMER'S SPECIFICATION.



Holding Power

Ellis Patents Ltd
High Street, Rillington, Malton
North Yorkshire YO17 8LA
United Kingdom

T. +44 (0)1944 758395
F. +44 (0)1944 758808
sales@ellispatents.co.uk
www.ellispatents.co.uk

