www.cmp-products.com

CMP
CABLE CLEATS

GLOBAL

WHAT WE PROMISE FOR YOUR BUSINESS

CMP Products is a leading designer, manufacturer, and supplier of cable glands, cable cleats and cable accessories for customers around the globe.

Striving to be the best at what we do, delivering the standard of excellence that customers come to expect from us, and retaining our number one supplier status are key objectives of CMP. This means we are committed to continual improvements in our business processes and related activities.

This enables us to offer unrivalled customer service to our customers - wherever they may be in the world.

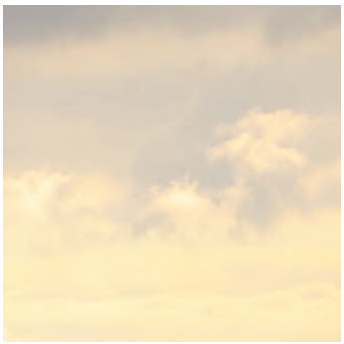
OUR COMMITMENTS AND OBJECTIVES
Innovative design and continual research and development are at the heart of what we do.

As a market leader in cable gland, cable connector and cable cleat technology, we continually invest in advanced manufacturing techniques, modern IT systems and effective training to offer unparalleled levels of quality and customer service.

We have also developed alliances with distributors and end-users internationally, which is key to our strategy of bringing products to a worldwide audience via a strategic global distribution network.

CMP Products is committed to employing the best people. Those who have the experience, responsibility, skills and passion required to meet our objectives in a safe and healthy manner and who cause no harm to themselves, others or the environment.

OUR VISION OF CUSTOMER CARE
Keeping the customer at the centre of what we do and ensuring a positive experience for everyone we work with is a vital part of our vision.



CMP PRODUCTS
CABLE CLEATS - REFERENCE GUIDE

- All products meet IEC 61914 to ensure safety of personnel and protection of equipment.
- LSF, Halogen-Free, UV, weather & corrosion resistant for longevity.
- Short circuit testing as standard to ensure the securing and retention of cables without damage.

CLEAT NAME & SPECIFICATION

	SABRE	VALIANT	FALCON	ZENITH	SOLACE	THEMIS	HELIOS	CYCLONE I	CYCLONE II	CYCLONE III	CYCLONE STRAP	TREFOIL RESTRAINT	PATRIOT	SOVEREIGN	CONQUEROR	HURON	RELIANCE	SAPPHIRE
CLEAT TYPE	1 Bolt	1 Bolt	2 Bolt	2 Bolt	1 Bolt (High Temperature)	2 Bolt (High Temperature)	1 Bolt (High Temperature)	Double Strap	Double Strap	Triple Strap	2 or 3 Strap	Standard Duty Intermediate Restraint	Standard Duty Hinged	Heavy Duty Hinged	Range Taking Hinged	Light Duty Hinged	Standard Duty Hinged	Heavy Duty Hinged
CABLE RANGE	10-57 mm	10-71 mm	38-135 mm	38-151 mm	10-71 mm	38-97 mm	10-65 mm	Single 36-165 mm Trefoil 24-145 mm Quad 21-124 mm	Single 36-165 mm Trefoil 24-145 mm Quad 21-124 mm	Single 36-165 mm Trefoil 24-145 mm Quad 21-124 mm	Single 36-165mm Trefoil 24-145 mm Quad 21-124 mm	19-130 mm	17-128 mm	17-128 mm	19-130 mm	19-128 mm	19-128 mm	19-150 mm
CABLE FORMATION	○	○	○	○	○	○	○	○ ○○	○ ○○	○ ○○	○ ○○	○○	○○	○○	○○	○○	○○	○
NO OF SIZES	10	12	8	9	12	5	11	10 / 15 / 15	10 / 15 / 15	10 / 15 / 15	10 / 15 / 15	28	24	24	16	23	24	13
FIXINGS	One Bolt Fixing	One Bolt Fixing	Two Bolt Fixing	Two Bolt fixing	One Bolt Fixing	Two Bolt Fixing	One Bolt Fixing	One or Two Bolt Fixing	One or Two Bolt Fixing	One or Two Bolt Fixing	NA	NA	One or Two Fixings	One or Two Fixings	One or Two Fixings	One or Two Fixings	One or Two Fixings	One or Two Fixings
MATERIAL	Nylon, LSF or LUL approved polymer	Cast Aluminium	Nylon, LSF or LUL approved polymer	Cast Aluminium	Cast Stainless Steel 316L	Cast Stainless Steel 316L	Stainless Steel 316L	Aluminium Base Stainless Steel Strap	Stainless Steel Base Stainless Steel Strap	Stainless Steel Base Stainless Steel Strap	Stainless Steel 316L	Stainless Steel 316L	Stainless Steel 316L	Stainless Steel 316L	Stainless Steel 316L	Aluminium	Aluminium	Stainless Steel 316L

CLEAT ORDERING CODES

CLEAT NAME	CLEAT TYPE		SIZE RANGE		MATERIAL SUFFIX	MATERIAL	EXAMPLE CODES
SABRE / VALIANT / SOLACE	1BC	1 Bolt Cleat	3238	Required range 32-38 mm	- Z LUL A HT	The material only applies to the 1BC and 2BC range. Leave blank for nylon, Z for LSF, LUL for LUL approved polymer, A for aluminium and HT for high temperature stainless steel.	1BC3238HT
HELIOS	FPC	Fire Performance Cleat	2327	Required range 23-27 mm	-	Available only in high temperature stainless steel, no code required	FPC2327
ZENITH / FALCON / THEMIS	2BC	2 Bolt Cleat	048058	Required range 48-58 mm	- Z LUL A HT	The material only applies to the 1BC and 2BC range. Leave blank for nylon, Z for LSF, LUL for LUL approved polymer, A for aluminium and HT for high temperature stainless steel.	2BC048058LUL
PATRIOT	SDSS	Standard Duty Stainless Steel	036042	Required range 36-42 mm	-	Available only in stainless steel, no code required	SDSS036042
SAPPHIRE	SHDSS	Single Heavy Duty Stainless Steel	050070	Required range 50-70 mm	-	Available only in stainless steel, no code required	SHDSS050070
HURON	LDAL	Light Duty Aluminium	019023	Required range 19-23 mm	-	Available only in aluminium, no code required	LDAL019023
RELIANCE	SDAL	Heavy Duty Aluminium	023028	Required range 23-28 mm	-	Available only in aluminium, no code required	SDAL023028
SOVEREIGN	HDSS	Heavy Duty Stainless Steel	082088	Required range 82-88 mm	-	Available only in stainless steel, no code required	HDSS082088
CONQUEROR	RTSS	Range Taking Stainless Steel	058067	Required range 58-67 mm	-	Available only in stainless steel, no code required	RTSS058067
CYCLONE I	1CYC	Light Duty 2 Loop Stainless Steel Strap	030041	Required range 30-41 mm	-	Base aluminium and strap stainless steel, no code required	1CYC030041
CYCLONE II	2CYC	Standard Duty 2 Loop Stainless Steel Strap	030041	Required range 30-41 mm	-	Base and strap stainless steel, no code required	2CYC030041
CYCLONE III	3CYC	Heavy Duty 3 Loop Stainless Steel Strap	030041	Required range 30-41 mm	-	Base and strap stainless steel, no code required	3CYC030041
CYCLONE II STRAP	2STR	Standard Duty 2 Loop Intermediate Restraint	082095	Required range 82-095 mm	-	Stainless steel strap, no code required	2STR082095
CYCLONE III STRAP	3STR	Heavy Duty 3 Loop Intermediate Restraint	132145	Required range 132-145 mm	-	Stainless steel strap, no code required	3STR132145
TREFOIL INTERMEDIATE RESTRAINT	SDSSIR	Standard Duty Stainless Steel Intermediate Restraint	058062	Required range 58-62 mm	-	Stainless steel strap, no code required	SDSSIR058062

CLEAT RANGE

THEMIS
2BCHT

SAPPHIRE
SHDSS

SOLACE
1BCHT

CYCLONE I
LDSTR

TREFOIL INT
SDSSIR

CYCLONE II
SDSTR

RELIANCE
SDAL

SABRE
1BC

HURON
LDAL

CYCLONE III
HDSTR

PATRIOT
SDSS

CONQUEROR
RTSS

ZENITH
2BCAL

CYCLONE
STR

HELIOS
FPC

FALCON
2BC

VALIANT
1BCAL

SOVEREIGN
HDSS

CMP
CABLE CLEATS

CMP Products offers a comprehensive range of cable cleats that support cables and conductors, retaining the mechanical load of the cable itself and reducing the mechanical stress placed on any cable termination.

RIGOROUS TESTING
All of our range is designed, constructed, tested and third party certified in accordance with IEC 61914 to ensure the safety of personnel, the protection of the cable management system and the operating environment.

This testing ensures that our cable cleats are capable of providing the necessary resistance to electromechanical forces; can retain the mechanical load that the cables and conductors are subjected to when under fault conditions; and will safely maintain the integrity of the cable. We also offer project-specific testing to ensure customer needs are met in full.

EXPERTISE AND EXPERIENCE
At CMP Products, we can design and manufacture cable cleats for all applications, including single, trefoil, quad and matrix applications, and the expertise offered by our technical department means we can assist with detailed technical queries and design bespoke applications to suit the specialist needs of our customers.

Alongside this expertise comes experience. Our cable cleat range has been created and developed with a comprehensive understanding of the site installation requirements and issues faced by engineering design contractors and installers alike. Lessons learned over many years of supplying other cable- related solutions are factored into our products and can be seen in a raft of unique new design features.

These include the capability to accommodate a wide range of fluctuating cable diameters and detailing that adds to the general ease of installation.

A COMPREHENSIVE AND DIVERSE RANGE
CMP cable cleats are designed for use within heavy industrial applications and hazardous locations, as well as the arduous conditions and harsh environments encountered by operators in the railways, tunnels and underground, oil and gas and petrochemical industry sectors.

We can offer a cable cleat to suit a variety of support structures including, cable ladder, cable tray, basket, channel, masonry or concrete, and can manufacture in a variety of materials to suit the environmental conditions they may be subjected to.

SAFETY IS THE CMP PRIORITY - ALL CMP CABLE CLEAT PRODUCTS ARE THIRD PARTY TESTED AND CERTIFIED TO IEC 61914 PRIOR TO BEING RELEASED ON TO THE MARKET.

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WHAT IS A CABLE CLEAT

Cable cleats are devices designed and tested to ensure the retention and support of cables, and have been used for many years all over the world.

It was not until 2003 with the emergence of the standard EN 50368, that any standard for cable cleats existed. This not only highlighted the retention and support that cable cleats provided to cables, but more importantly highlighted the protection of the cable management system and the potential risk to human life without the use of cable cleats. Prior to EN 50368 both cable and cable cleat manufacturers provided testing to their own standards.

This was then followed up with the publication of IEC 61914 in 2009 and superseded by a new standard in 2015 which further highlighted the importance of cable cleat products, and correct cable cleating.

IEC 61914 CABLE CLEAT

'Cable cleat' according to IEC 61914 defined as:

"A device designed to provide securing of cables when installed at intervals along the length of cables."

"Note: A cable cleat is provided with a means of attachment to a mounting surface but does not rely on an unspecified mounting surface for the retention of the cables. Examples of mounting surfaces that may be specified are ladder, tray, strut, or rail, wire and beam. Where declared, cable cleats provide resistance to electromechanical forces."

INTERMEDIATE RESTRAINT

'intermediate restraint' according to IEC 61914 defined as:

"cable retaining device to be used with cable cleats to hold the cables together in order to provide resistance to electromechanical forces. Intermediate restraints are not attached to the mounting surface."

WHY USE A CABLE CLEAT?

CMP cable cleats are designed to ensure the retention and support of cables and conductors, reducing the load that the cable may be exposed to under its own weight.

By ensuring the cables are fixed, retained and supported correctly this protects all of the cable terminations by reducing the mechanical load exerted on them. CMP cable cleats are designed and tested so that in the event of short circuit fault conditions, they will contain the cables without causing damage; enabling the circuit to be restored once the fault has been rectified.

The latest standard IEC61914 specifies requirements and tests for cable cleats and intermediate restraints, used for securing cable in electrical installations. CMP cable cleats provide the necessary levels of resistance to electromechanical forces, where declared, and in addition achieve the following safety measures:

- Support cables and conductors.
- Reduce the mechanical load the cable may be exposed to under its own weight.
- Reduce the mechanical load the cable termination may be exposed to.
- Reduce the mechanical load a cable may be exposed to due to electrical fault conditions.

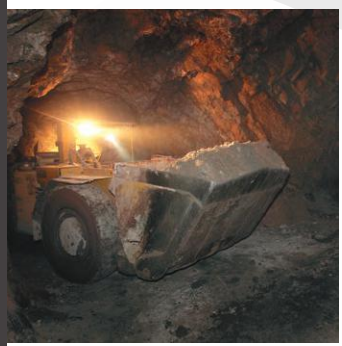
Cable cleats are for those whose core values include operating responsibly, safeguarding people, protecting the environment, and delivering on their zero harm HSE policies.

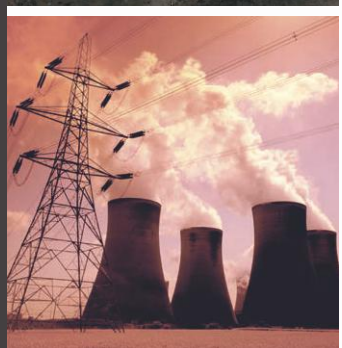
BS7671:2008 IET Wiring Regulations Seventeenth Edition:

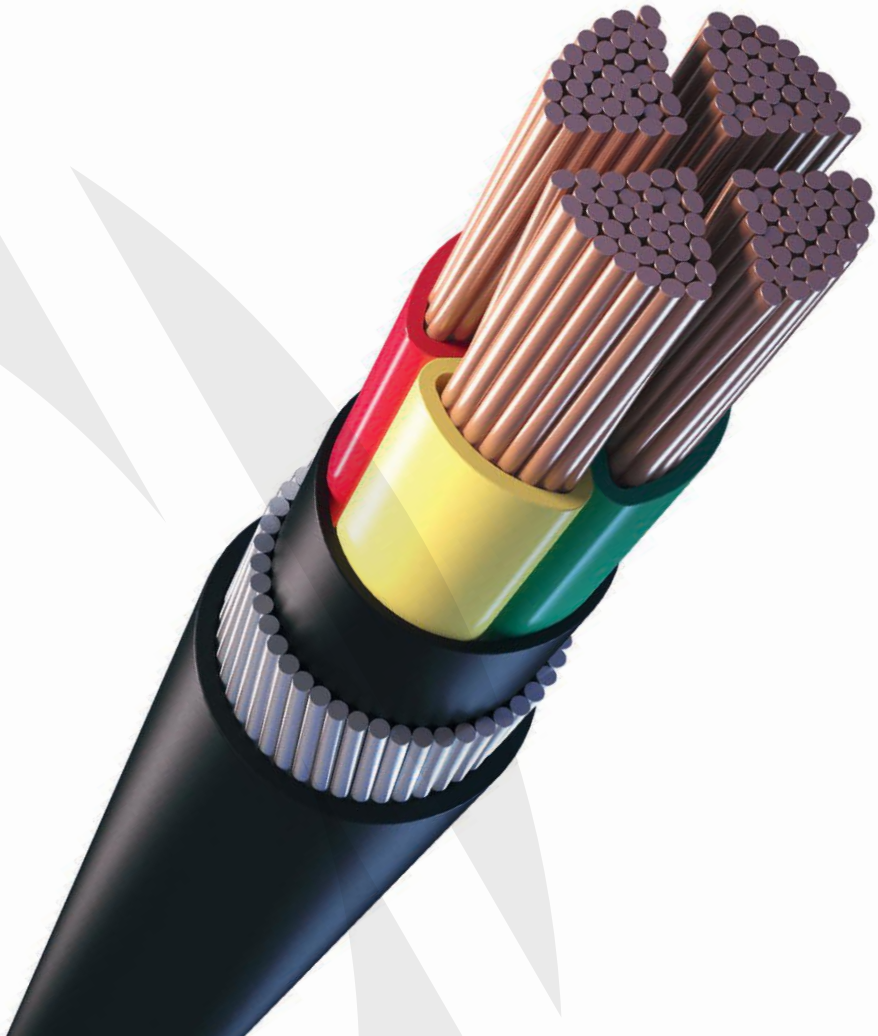
‘522.8.3 – The radius of every bend in a wiring system shall be such that conductors or cables do not suffer damage and terminations are not stressed.’

‘522.8.4 – Where the conductors or cables are not supported continuously due to the method of installation, they shall be supported by suitable means at appropriate intervals in such a manner that the conductors or cables do not suffer damage by their own weight.’

‘522.8.5 – Every cable or conductor shall be supported in such a way that it is not exposed to undue mechanical strain and so that there is no appreciable mechanical strain on the terminations of the conductors, account being taken of mechanical strain imposed by the supported weight of the cable or conductor itself.’





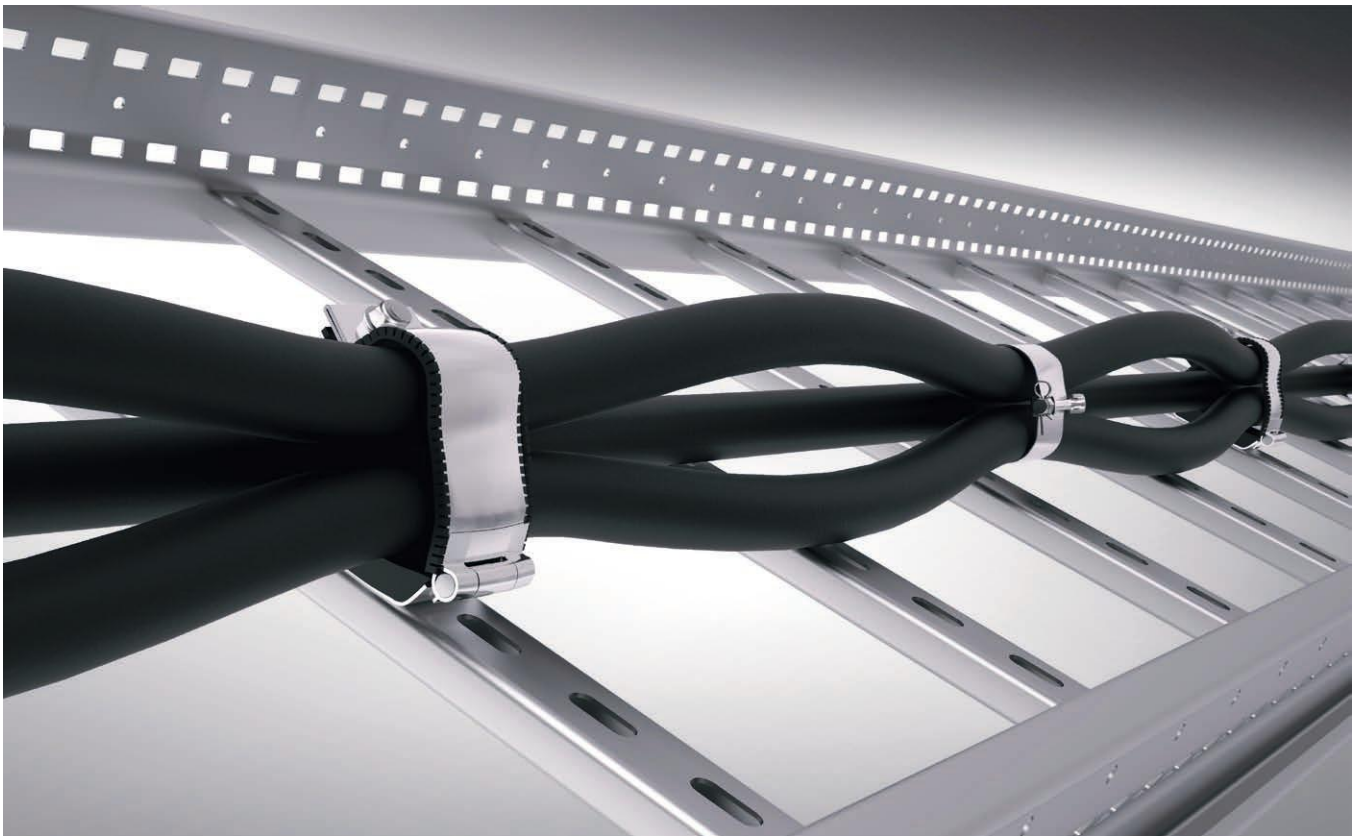


CAN I USE A CIRCUIT BREAKER INSTEAD OF CABLE CLEATS?

Although circuit breakers are capable of instantaneous protection, damage to the cables under fault conditions occurs within the first quarter cycle of the fault. Within this period of time the circuit breaker cannot open to suspend the fault, resulting in cable management system damage. A typical circuit breaker interrupts the fault after three cycles. Whilst this may protect the equipment, the cables however may have already been damaged within this short duration and depending on the size of the short circuit, need replacing.

The replacement of any cables comes at a high price as this includes the expensive cable costs themselves, the labour time of decommissioning, the reinstallation of the cable management system and the cost of operational downtime.

The latest standard for cable cleats IEC 61914 lays down the standardised method for testing and certification of cable cleats to prove they can withstand one or more short circuit tests: 6.4.4 resistant to electromechanical forces, withstanding one short circuit, 6.4.5 resistant to electromechanical forces, withstanding more than one short circuit.



"Birdcaging" effect of cables after exposure to short circuit conditions

CABLE CLEAT SELECTION

Cable cleat selection takes into account numerous factors listed below, and ideally if CMP Products can be supplied with the following: cable construction – type, ratings and diameter, system design, support structure and environment; it will then be possible to provide further advice on the correct type of cable cleat, and also the cable cleat spacing requirements for a specific application.

CABLE – WHAT TYPE OF CABLE IS BEING USED?

DIAMETER
The overall diameter of the cable will allow CMP Products to size the correct cable cleat and calculate the short circuit forces the cable cleat may be subjected to under fault conditions.

PERFORMANCE
The cable may have fire performance (FR), or Low Smoke & Fume or Zero Halogen (LSF / LS0H / LSZH) requirements that the cable cleat would also have to adhere to.

CABLE TYPE
Consideration should be given to whether the cable is single or multi-core and whether the voltage is Low (LV), Medium (MV) or High (HV).

DESIGN - OVERVIEW OF THE CABLE MANAGEMENT SYSTEM

MECHANICAL LOAD
All CMP cable cleats have been tested for both axial and lateral loads, this will ensure they will be capable of supporting the weight of the cables(s).

SHORT CIRCUIT RATING – kA PEAK FAULT OR r.m.s
What is the maximum peak fault (kA) the cable may be subjected to under short circuit conditions? Based upon the specified cable the short circuit rating can be calculated with use of the standard IEC 61914 to give the maximum forces the cable cleat will need to be able to withstand during a short circuit fault.

CABLE CONFIGURATION - FLAT FORM / PARALLEL OR TREFOIL FORMATION?
The cable configuration of the system will define the type of cable cleat required; either a single cable cleat, a trefoil cable cleat, a quad cable cleat, or this may even indicate that a bespoke cable cleat may be required which CMP Products will design, test, and certify to suit the cable management system requirements of its client.

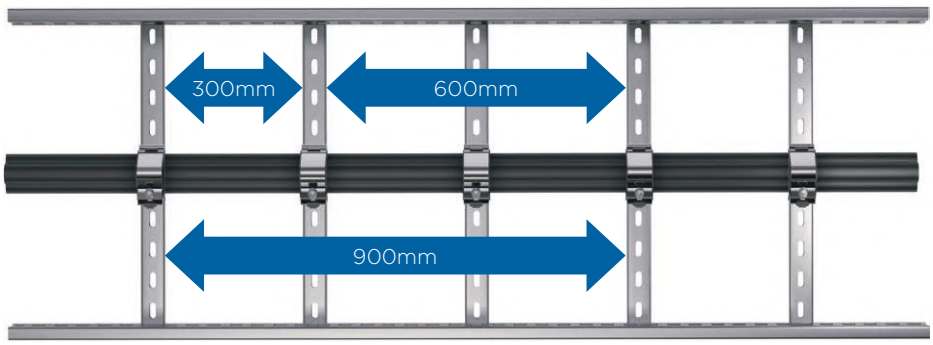
CABLE RUN LENGTH – HOW MANY CABLE CLEATS ARE REQUIRED?
Whilst the spacing requirements for cable cleats will be subject to cable formation, cable diameter, and short circuit rating, the overall cable run length will give the correct number of cable cleats required for the installation. Cable runs that turn through 90° must also be noted as the cable cleat spacing will be reduced throughout these bends.
See page 54 for more information on installing cleats through bends.

EXPANSION
Single core cables expand and contract more due to temperature changes than multicore cables. If the cable is constrained, considerable forces can be transferred to the supporting structure. To allow for this, single core cables are generally “snaked” making slight loops to take up the expansion and contraction. It is also usual to allow some of the cable cleats to move freely and not restrain all cable cleats.

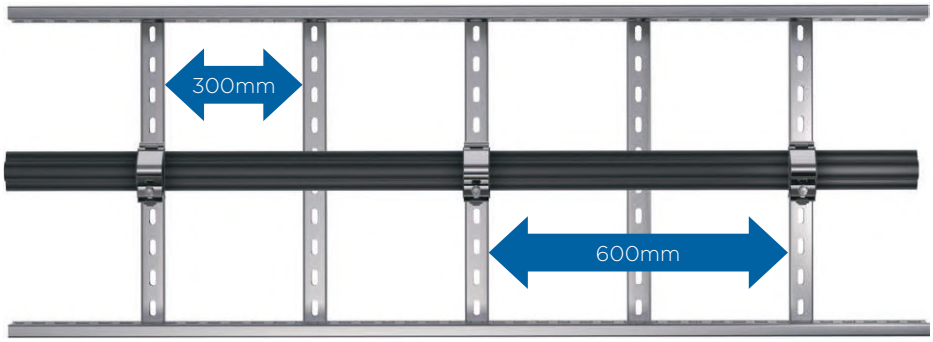
CABLE CLEAT SPACING

The following illustration shows the tensile strength required by each cable cleat depending upon fixing centres/intervals.

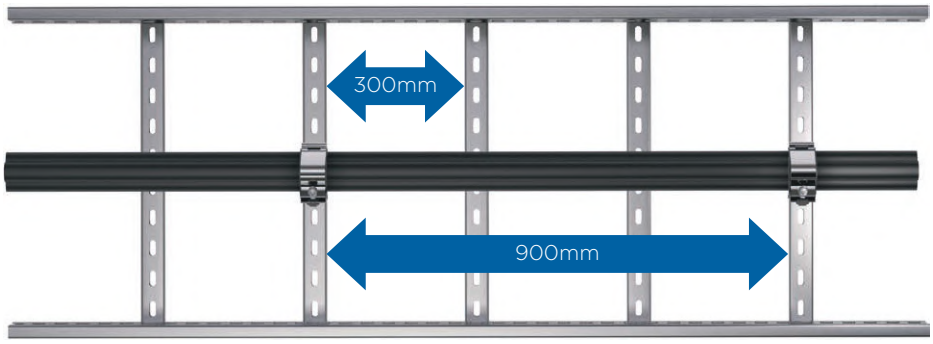
F_t = 0.17 i_p^2 / S
F_t = maximum force on the cable conductor (N/m)



0.17 (190 x 190) / (36 / 1000) = 170,477.22 N/m
Cable Ø = 36mm i_p = 190kA
mounting intervals: 300mm (x 0.3) = 51,141.67N per cable cleat



0.17 (190 x 190) / (36 / 1000) = 170,477.22 N/m
Cable Ø = 36mm i_p = 190kA
mounting intervals: 600mm (x 0.6) = 102,283.33N per cable cleat.
Each cable cleat in this configuration must restrain two times the force of those in the above configuration (300mm).



0.17 (190 x 190) / (36 / 1000) = 170,477.22 N/m
Cable Ø = 36mm i_p = 190kA
mounting intervals: 900mm (x 0.9) = 153,424.00N per cable cleat.
Each cable cleat in this configuration must restrain one-and-a-half times the force of those in the above configuration (600mm), or three times the force of those in the first configuration (300mm).

Refer to page 72-73 for more detailed information.

WHAT IS A SHORT CIRCUIT?

A short circuit is an electrical circuit that allows a current to travel along an unintended path, often where essentially no (or a very low) electrical impedance is encountered.

Impedance is the measure of opposition that a circuit presents to a current when a voltage is applied. This unintended or abnormal path of negligible impedance can be between live conductors, or between a live conductor and an earth, which have a difference in potential under normal operating conditions.

When electric current flows in a conductor, it creates a magnetic field. In the case of alternating current the magnetic field varies with that current. This magnetic field affects adjacent conductors in two ways: the first is to induce eddy currents, and the second is to induce an electromagnetic field.

Under Short circuit conditions the magnetic fields around the conductors will generate mechanical forces between those conductors. These forces may be considerable and will be greater the closer together the conductors are.

Whilst direct current creates a field, this field is steady and its main effect is to magnetise nearby susceptible objects.

EDDY CURRENTS (FOUCAULT)

Eddy currents are electric currents induced in conductors when a conductor is exposed to a changing magnetic field.

Eddy currents are induced circumferentially around the current carrying conductors. For this reason, the use of steel wire or steel tape armour is not permitted in single core cables used in a.c. circuits. Similarly it is strongly recommended that cast iron or ferromagnetic cable cleats are not used in conjunction with individual single core cables deployed in a.c. circuits.

TYPES OF SHORT CIRCUIT FAULTS

The most common type of short circuit in a three phase system is a single conductor to earth fault (Fig 1. Phase-to-earth). This is when one of the conductors in a circuit comes into contact with an earth.

The next most common type of short circuit is a phase to phase or conductor to conductor fault (Fig 2. Phase-phase) - when two of the conductors in a circuit come into contact with each other.

Next is a double phase or double conductor to earth fault (Fig 3. Phase-phase-to-earth) - two of the two conductors in a circuit each simultaneously come into contact with an earth.

And lastly, the least common type of short circuit is a balanced three phase or three conductor fault (Fig 4. Three-phase) - when all three conductors come into contact with an earth. Whilst this is uncommon, it can happen, and design engineers must go to considerable lengths to guard against the consequences of such an event.

In all cases these faults are short circuits - the path of least resistance is through a fault, and not through the equipment you are attempting to power.

SHORT CIRCUIT FORCES

The forces of repulsion between the individual phases of a three phase system cables under fault conditions can be considerable. The cable cleats selected must be capable of withstanding these repulsive forces, which are exacerbated when the cables involved are single core cables.

The short circuit forces generated during fault conditions will be governed by a number of factors, and not just by the type of short circuit. CMP Products cable cleats have been tested and certified in accordance with IEC 61914 for the worst case scenario, a three phase short circuit. The effects of other types of short circuits will create considerably less forces on the cables, nevertheless any short circuit has the potential to develop into a three phase short circuit.

SHORT CIRCUIT TESTING

CMP Products has carried out over 300 short circuit tests in accordance with the IEC 61914 standard 'cable cleats for electrical installations'. These tests include various peak faults, cable cleat spacing intervals, and cable formations to conclusively prove the cable cleats' ability to withstand and resist a range of electromechanical forces according to IEC 61914. CMP Products has the technical resources, capabilities and capacity to engage with its clients and deliver bespoke solutions to suit new or unusual situations. The company is able to conduct physical short circuit tests on any of its cable cleats for project specific applications including: specific cable size / type, fault current, cable cleat, and fixing centre / spacing interval configurations.

Fig 1. Phase-to-earth short circuit

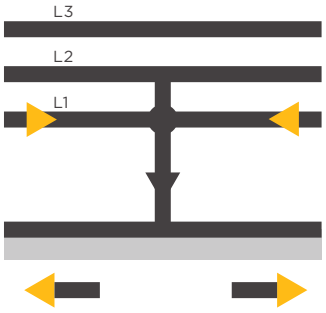


Fig 2. Phase-phase short circuit clear of earth

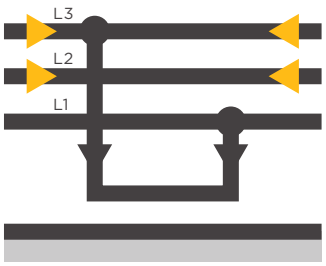


Fig 3. Phase-phase-to-earth short circuit

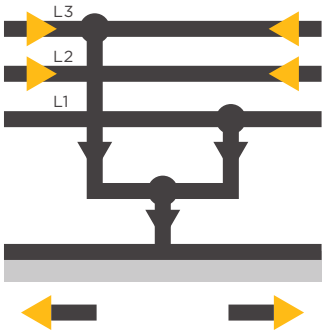
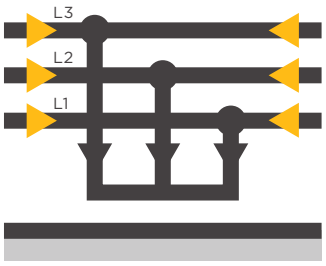


Fig 4. Three-phase short circuit



Please refer to page 56 for further information on short circuits.

MULTIPHYSICS CABLE CLEAT SIMULATION

To ensure our customers are able to benefit from the advantages that are possible with the use of advanced simulation technologies, we work closely with Comsol-certified company, Continuum Blue.

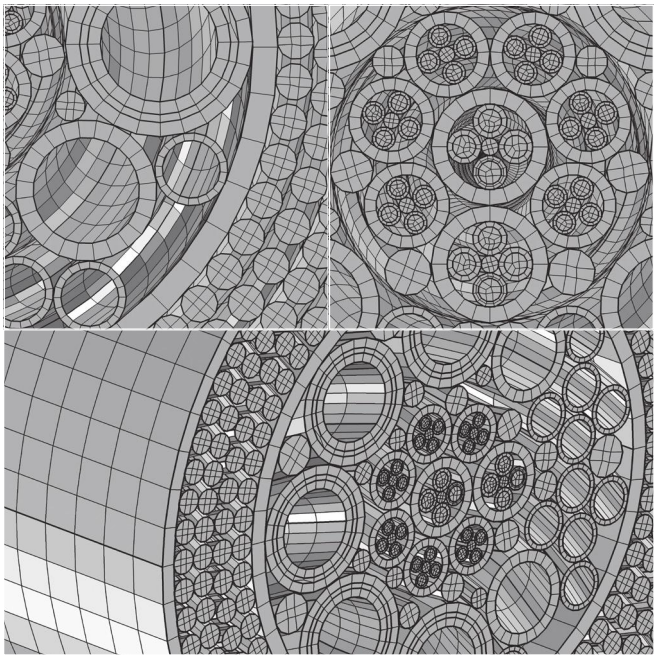
CONTINUUMBLUE
technology development

COMSOL
certified consultant

Continuum Blue's strength lies in its ability to help customers develop, assess, quantify and optimise new innovative technologies and existing products where coupled physical phenomena play a strong part in the development process.

Virtual prototyping and real world simulation helps to:

- understand and quantify a design's performance more accurately
- compare a design with a competitors products before the process of prototyping, production and testing
- reduce development cycles and costs
- eliminate redundant designs at an early stage
- ultimately produce a better product.

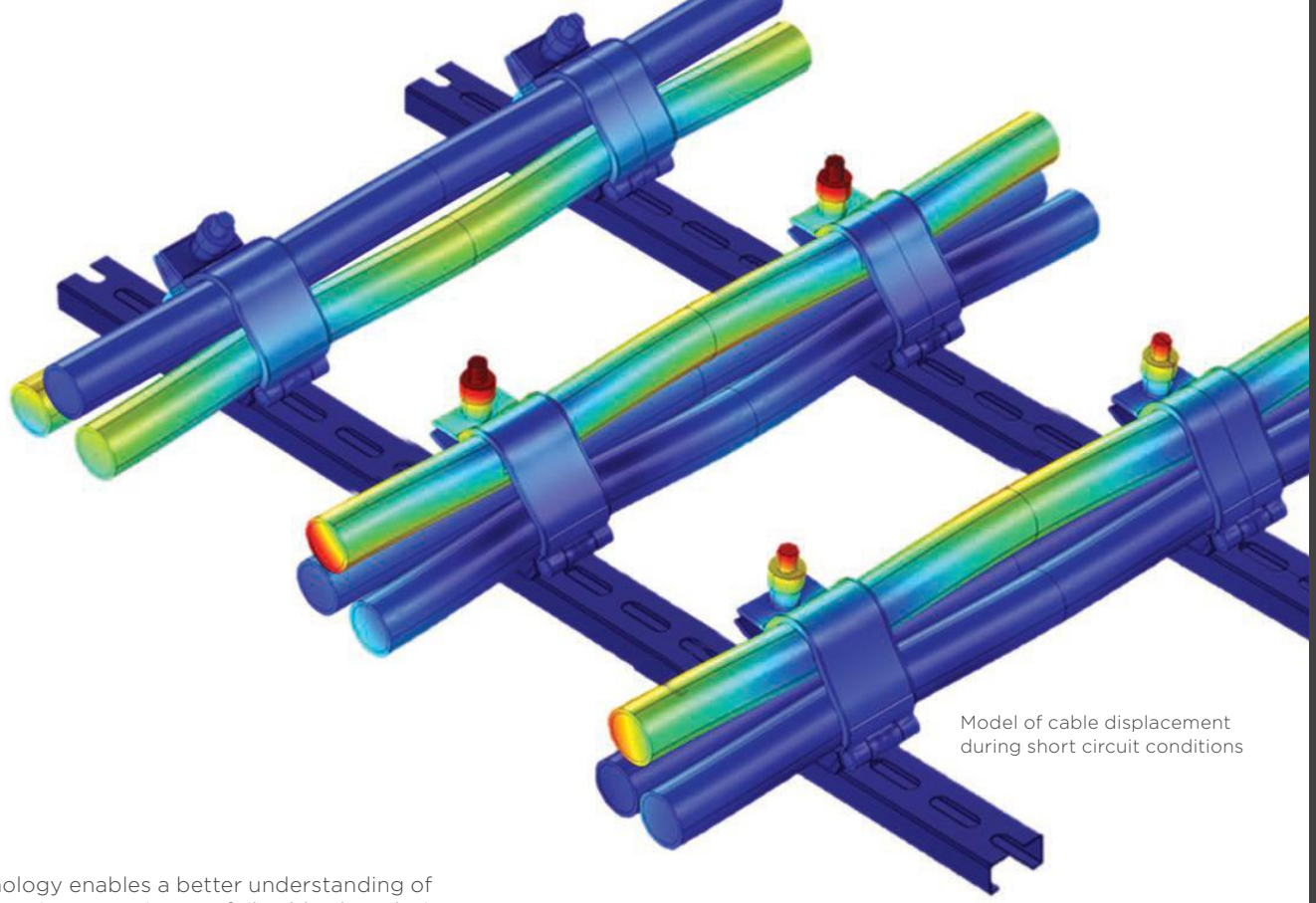


Finite Element Analysis (FEA) mesh.

We are able to call on the Continuum Blue's experience in a range of advanced simulation services that includes finite element analysis (FEA), computational fluid dynamics (CFD) and multi-body dynamics. From complex multiphase fluid flow, conjugate heat transfer and electrical and electromagnetic problems to highly nonlinear structural simulations, Continuum Blue's expertise has been used to endorse the extensive CMP cable cleat development programme.

CMP TREFOIL CABLE CLEAT MODEL

CMP selected Continuum Blue to develop the trefoil cable cleat short circuit simulation models for its range of products because of its exceptional modelling capabilities and ability to accurately predict electromagnetic and mechanical effects during short circuiting of power cables.



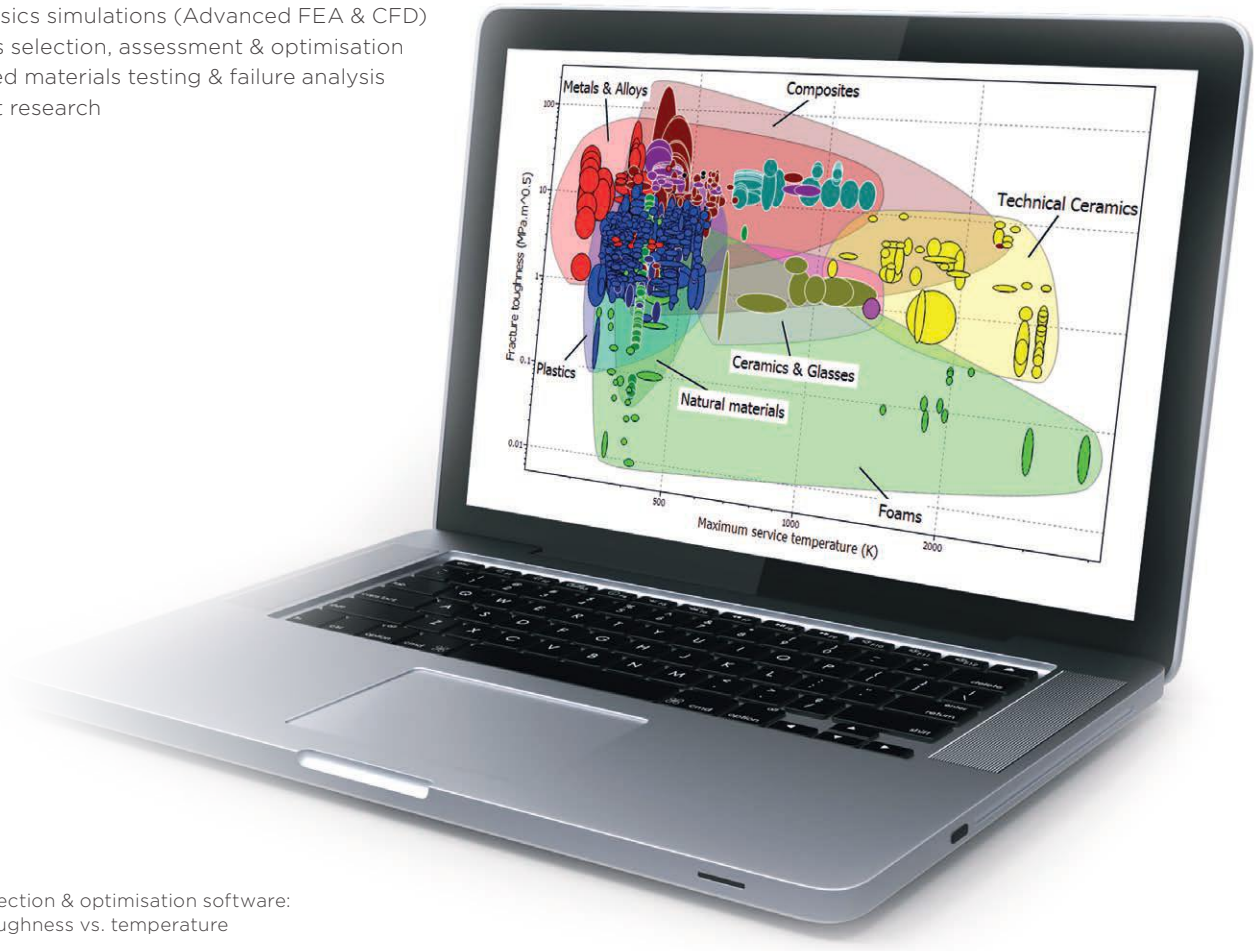
Model of cable displacement during short circuit conditions

This technology enables a better understanding of the forces acting on various trefoil cable cleat designs, the stresses and deformations observed and the subtle changes in cable cleat design or materials which result in dramatic changes in performance.

Under its founder, Dr Mark Yeoman, who has worked in the oil & gas, aerospace, automotive, chemical and biomedical industries, Continuum Blue offers over 15 years' experience in multiphysics modelling.

The company's full range of services includes:

- Multiphysics simulations (Advanced FEA & CFD)
- Materials selection, assessment & optimisation
- Advanced materials testing & failure analysis
- Contract research



Material selection & optimisation software:
Fracture toughness vs. temperature

SIMULATIONS OF TREFOIL CABLE CLEATS DURING SHORT CIRCUIT

Trefoil cable formation is used where three phases are carried by three single core power cables, rather than a single multicore cable.

The advantage of installing three single core cables in such a configuration is that it minimises the induction of eddy currents, therefore reducing the effect of localised heating, whilst maintaining the current carrying capacity of the circuit.

Trefoil cable cleats are devices used to hold the three single core power cables in a triangular touching (trefoil) formation, along the length of the laid cables.

Short circuit fault conditions of single core cables in trefoil formation result in high dynamic electromagnetic forces; these forces need to be restrained correctly in order to prevent extensive damage to the cable management system, and more importantly potential injury.

Manufacturers of trefoil cable cleats are required to physically test their designs in an applied test, where a section of three single core power cables are held with the cable cleats and then exposed to a three phase short circuit.

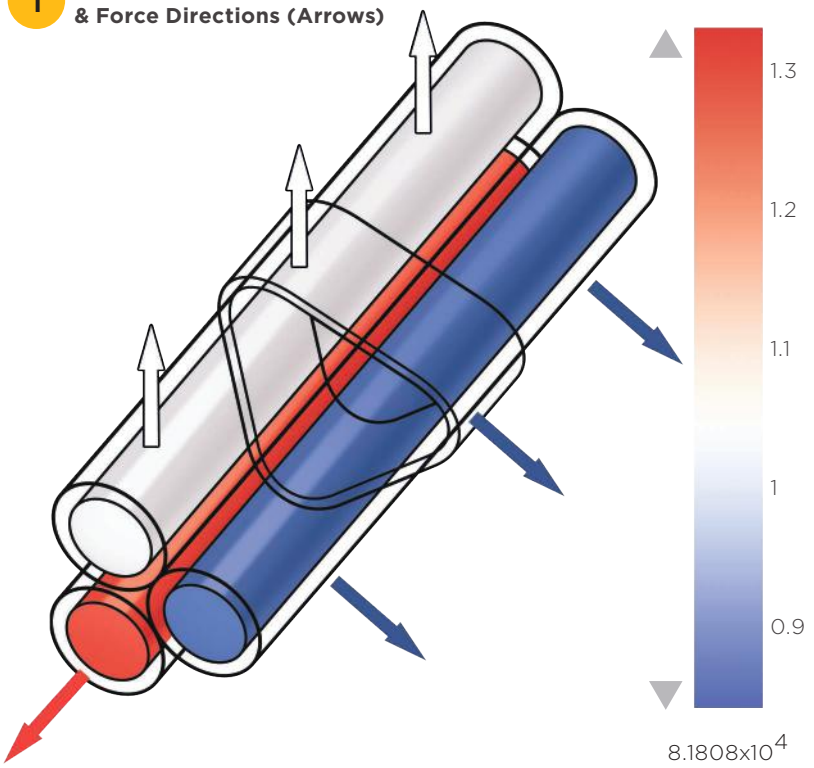
Each assembly of cable cleat, cable and applied current will yield a different result, so in theory an infinite number of tests are required. These physical tests can be costly in terms of both expense and time.

To avoid the inevitable delays in testing all of the possible permutations that may arise, a time-dependent multiphysics model including currents, induced electromagnetic forces, material plasticity and contact analysis has been set up. This can fully describe and simulate the dynamic load conditions on the cables and cable cleats during a short circuit fault condition.

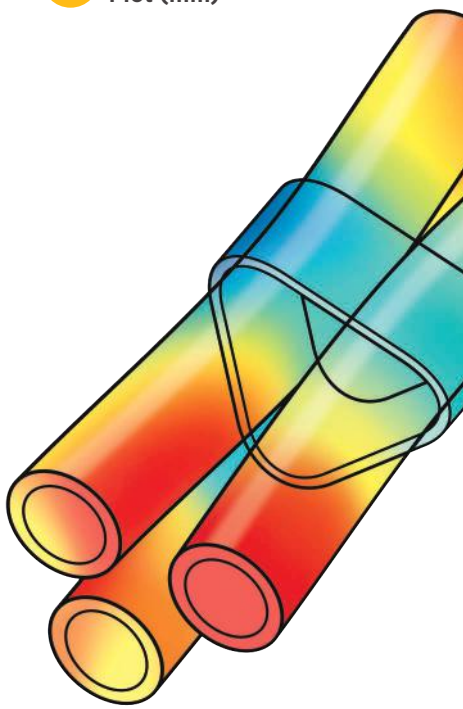
This multiphysics model can be used to test and assess various cable cleat designs during a short circuit, in a fraction of the time taken to set up and carry out a physical short circuit test.

CABLE CLEAT VON MISES STRESS (MPa) CABLE DISPLACEMENT (mm)
CABLE FORCES (N) ELECTROMAGNETIC FORCE (VECTOR DIRECTIONS)

1 **Electromagnetic Forces (N) & Force Directions (Arrows)**



2 **Displacement Plot (mm)**

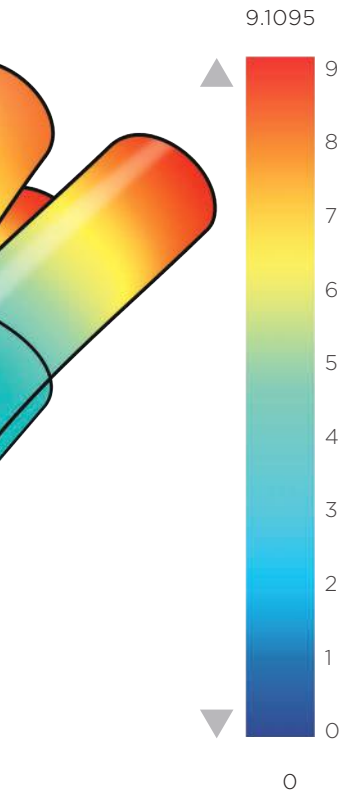


Every parameter is taken into consideration in the model such as peak fault current, cable diameter, conductor size and type, insulation thickness, cable cleat and liner material properties, cable cleat spacing etc.

Example outputs of the model are shown below:

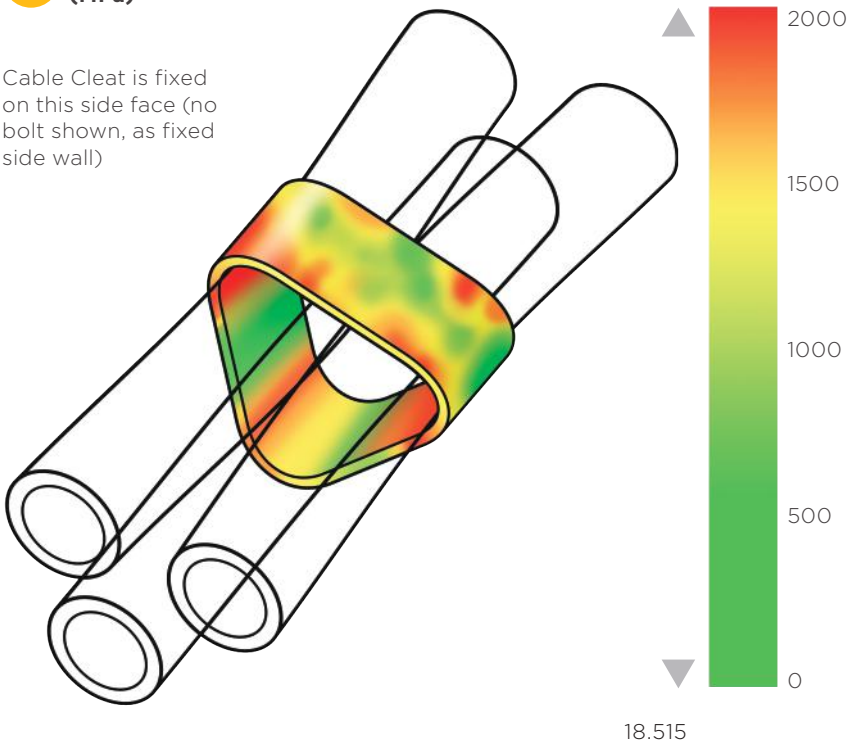
1. The electromechanical forces in Newtons, coupled with arrows showing the vector direction of forces acting upon each cable conductor at a specified point in time during the short circuit.
2. The displacement magnitude in mm of the cables caused by the electromagnetic forces acting upon them.
3. The von Mises stress in MPa of the cable cleat material caused by the cable displacement and dynamic load.

Comparisons between the model outputs, physical test data, and calculations given in the test standard, show an excellent correlation. Once the user inputs their defined parameters, the model calculates and displays the outputs which quickly indicate whether or not the selected cable cleat is safe enough to use in that particular application.



3 von Mises Stress (MPa)

Cable Cleat is fixed on this side face (no bolt shown, as fixed side wall)



CABLE FORMATIONS

Cable installations vary in design from one installation to the next. CMP cable cleats have been designed and tested in accordance with IEC 61914 to ensure that regardless of the cable formation there is a suitable cable cleat available for selection.

The advantage of installing three single core cables in such a configuration is that it minimises the induction of eddy currents, therefore reducing the effect of localised heating, whilst maintaining the current carrying capacity of the circuit.

Trefoil cable cleats are devices used to hold the three single core power cables in a triangular touching (trefoil) formation, along the length of the laid cables.

Short circuit fault conditions of single core cables in trefoil formation result in high dynamic electromagnetic forces; these forces need to be restrained correctly in order to prevent extensive damage to the cable management system, and more importantly potential loss of human life.

PARALLEL / FLAT FORMATION OF SINGLE CORE CABLES

The formation of a number of cables laid in a plane, usually with equal spacing between adjacent cables.

CMP Products manufactures a variety of cable cleats designed to support and restrain cables installed in parallel / flat formation, and manufacture these cable cleats in a number of materials to ensure that the cable cleat is suitable for its intended environment. The CMP Products cable cleats have also been tested for short circuit conditions in parallel / flat formation in accordance with IEC 61914.

TREFOIL FORMATION

The formation of three cables so laid to be mutually equidistant. Viewed in cross-section, the lines joining the cable centres form an equilateral triangle.

CMP Products manufactures several cable cleats designed and tested specifically for cables laid in trefoil formation. This range of cable cleats has been successfully tested and certified in accordance with IEC 61914, and these tests include some of the most extreme short circuit conditions ever tested, and greatest electromechanical forces on the cable ever experienced, by any cable cleat for the relevant cable diameters.

MULTICORE CABLE

Cable consisting of multiple conductors, with a common overall covering.

There are currently no standards for the testing of cable cleats during short circuit conditions when used with multicore cable. Nevertheless there is also a need to restrain, keep safe, and preserve the integrity of multicore cables, whether or not they are equipped with some form of mechanical protection or armour. Multicore cables by their very nature have additional layers of insulation and / or fillers as well as an outer jacket or sheath that are intended to keep them intact during their service life. It is a common assumption that the multicore cables which are equipped with armour and an outer jacket or sheath would contain the forces experienced during a short circuit. However, CMP Products continues to test its range of cable cleats on multicore cables during short circuit conditions, for project specific installations.

MATERIALS

CMP Products manufactures cable cleats from high quality materials, with excellent flame retardant properties, including products in the range that are approved to London Underground (LUL) Standard 1-085.

All of the CMP polymeric cable cleats have been tested in accordance with various standards that relate to flame propagation, vertical burning, flammability (oxygen index), halogen gas, toxic fume, and smoke emissions tests.

POLYMER:

NYLON
Standard nylon is tough, high tensile, and resistant to abrasion. This material is typically used for industrial applications where less harsh conditions exist.

LOW SMOKE & FUME (LSF), ZERO HALOGEN (LS0H) AND PHOSPHORUS FREE, V0 NYLON
Nylon polymer, free of halogens and elemental phosphorus, providing a Low Smoke & Fume (LSF) solution. Rated V-0 to UL94, with very good flame retardant properties.

LUL
Flame retardant polymer, free of halogens and elemental phosphorus. It has excellent flame retardant properties and passes the most stringent tests for smoke and toxic fume emissions, making it compliant with the requirements of London Underground Standard 1-085.

METALLIC:

ALUMINIUM
Aluminium is remarkable for its low density and corrosion resistance due to the phenomenon of passivation. Corrosion resistance can be excellent due to a thin surface layer of aluminium oxide that forms when the metal is exposed to air, effectively preventing further oxidation.

The yield strength of pure aluminium is 7–11 MPa, whilst aluminium alloys have yield strengths ranging from 200 MPa to 600 Mpa.

Aluminium is non magnetic, making it suitable for use with single core cables, and does not easily ignite, ensuring that it does not contribute to the burning process in the event of a fire.

CMP utilises 5000 series copper free aluminium for its all-round performance characteristics including mechanical strength, durability, corrosion resistance and flame retardancy.

STAINLESS STEEL
The CMP Stainless Steel range of cable cleats is manufactured with type 316L Stainless Steel. Type 316L is more resistant to corrosion and pitting than more conventional Stainless Steels, and exhibits higher creep resistance, excellent tensile strength and rupture resistance at high temperatures.

ACCESSORIES

FASTENERS
The fasteners shown from pages 32 to 51 form an integral part of the cable cleat design and certification, and are included with the ordering references shown in each product selection table. They must not be substituted, or removed and replaced, with a different set of fasteners as this will inevitably change the performance of the installed cable cleat.

Additional fasteners required to secure the cable cleat to the support structure are not included with the ordering references shown in the selection table but can be supplied on request. See page 66 for guidance on Cleat Fixing Packs. If in doubt please consult CMP for further information.

LINERS (OR PADS)
All CMP cable cleats and intermediate restraints are supplied with liners. The liners are Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus free as standard. The Liners ensure the cable(s) do not have direct contact with the metallic cable cleat or intermediate restraint. Under short circuit conditions, these liners help to cushion the cables from the cable cleats and intermediate restraints during any such fault conditions. They also protect the cables from chafing, particularly in offshore / marine applications where movement between two modules or structures is common. Liners also assist with the restraining of cables when used in vertical cable run applications, where thermal elongation and axial movement occur.

WIRE MESH CABLE TRAY / BASKET CLIPS
The CMP Wire Mesh Cable Tray / Basket Clips are manufactured from 316L Stainless Steel and are designed to allow cable cleats to be safely installed onto wire mesh cable tray and / or basket. The CMP basket clip has one M12 and two M10 clearance holes, and slides over the mesh wires of the tray or basket to provide a secure fixing surface for the cable cleat. The CMP wire mesh cable tray / basket clips have been utilised and tested during short circuit conditions as specified in IEC 61914 'cable cleats for electrical installations'.

POWDER COATINGS

Powder coatings are available for all of our aluminium and stainless steel products. There are three types of powder coating available, each providing different properties for a range of environments.

EPOXY COATING (EC)
Excellent durability, corrosion resistance, chemical resistance and impact resistance. Only suitable for indoor applications (poor UV resistance and heat tolerance).

POLYESTER COATING (PC)
Excellent durability with good chemical resistance, impact resistance and resistance to yellowing under UV light. Suitable for all interior and some exterior applications (good UV resistance).

THERMOPLASTIC COATING (TC)
Excellent durability, corrosion resistance, chemical resistance, impact resistance, resistance to salt spray and weathering. The TC coating is Low Smoke and Fume, Halogen Free and LUL approved. Suitable for all interior and exterior applications (Excellent UV resistance).

ORDERING CODES

- ADD **EC** SUFFIX TO ORDER REFERENCE FOR AN EPOXY COATED PRODUCT
- ADD **PC** SUFFIX TO ORDER REFERENCE FOR A POLYESTER COATED PRODUCT
- ADD **TC** SUFFIX TO ORDER REFERENCE FOR A THERMOPLASTIC COATED PRODUCT

GALVANIC CORROSION (BI-METALLIC CORROSION)

Galvanic corrosion (Bi-metallic corrosion) is the corrosion that occurs when dissimilar metals are in contact in the presence of an electrolyte.

Dissimilar metals and alloys have different electrode potentials, and when two or more come into contact with an electrolyte, one metal acts as anode and the other as cathode. The electrolyte acts as a path for ion migration between the two metals, and the electro-potential difference between the dissimilar metals causes the anode metal to dissolve in to the electrolyte, and deposits collect on the cathode metal.

CMP advises the cable cleat and support structure combinations shown in the following tables.

GENERIC CORROSION DATA TABLE

GALVANIC CORROSION TABLE						
DIRECT CONNECTION OF METAL TO METAL SURFACE CONTACT WITHOUT INTERVENTION OR ISOLATION	ALUMINIUM	CAST IRON	GALVANISED STEEL	MILD STEEL	STAINLESS STEEL	ZINC
ALUMINIUM						
CAST IRON						
GALVANISED STEEL						
MILD STEEL						
STAINLESS STEEL						
ZINC						

CABLE CLEAT / SUPPORT STRUCTURE GALVANIC CORROSION TABLE

GALVANIC CORROSION TABLE										
MATERIAL OF CABLE MANAGEMENT / SUPPORT STRUCTURE	SABRE (POLYMERIC)	FALCON (POLYMERIC)	VALIANT (ALUMINIUM)	ZENITH (ALUMINIUM)	CYCLONE I (ALUMINIUM BASE)	CYCLONE II (STAINLESS STEEL BASE)	CYCLONE III (STAINLESS STEEL BASE)	SOVEREIGN (STAINLESS STEEL)	PATRIOT (STAINLESS STEEL)	HURON (ALUMINIUM)
ALUMINIUM										
GALVANISED STEEL										
GRP										
MILD STEEL										
POWDER COATED										
STAINLESS STEEL										
ZINC PLATED										

Galvanic corrosion will not occur

Galvanic corrosion insignificant

Galvanic corrosion may occur

Galvanic corrosion will occur

CABLE CLEAT FIXINGS/SUPPORT STRUCTURE GALVANIC CORROSION TABLE

CMP CABLE CLEAT MATERIAL				
MATERIAL OF CABLE MANAGEMENT / SUPPORT STRUCTURE	SINGLE BOLT AND TWO BOLT CLEAT NYLON	SINGLE BOLT AND TWO BOLT CLEAT ALUMINIUM	316L GRADE STAINLESS STEEL	5000 SERIES ALUMINIUM
	RECOMMENDED FASTENER MATERIAL			
ALUMINIUM	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel
GALVANISED STEEL	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel
GRP	Zinc plated steel	Zinc plated steel	Stainless steel 316	Zinc plated steel
MILD STEEL	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel
STAINLESS STEEL	Stainless steel 316	Stainless steel 316	Stainless steel 316	Stainless steel 316

GALVANIC CORROSION (BI-METALLIC CORROSION)

FIRE PERFORMANCE

Various international standards aim to ensure that the level of circuit integrity is not compromised by other components of the electrical system, including cable glands, terminations, joints, and cable support systems.

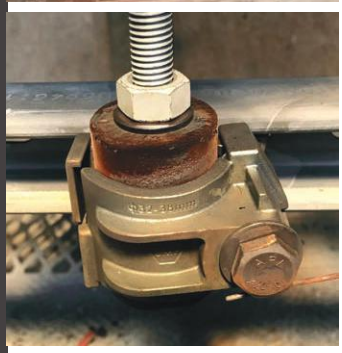
The need for fire performance cables to perform in the event of a fire is more prevalent today than ever before, and the dangers of fire threatens the safety of people and the continuous functioning of electrical circuits that are required to maintain circuit integrity.

When installing fire performance cables, the resistance to fire of the cable fixings should be at least equivalent to the survival time for the cable, allowing the cable to continue operating as intended. The fire performance of these cable management systems should take into account, fire survival, fire resistance, flame retardancy, flame propagation, smoke toxicity and emissions.

CMP PRODUCTS MANUFACTURES CABLE CLEATS SPECIFICALLY FOR THESE APPLICATIONS:

- To safely support and restrain cables for means of escape, whilst maintaining circuit integrity
- To safely support and restrain cable for means of fire-fighting, whilst maintaining circuit integrity
- All composite materials of cable cleats (where applicable) are produced in Low, Smoke, and Fume (LSF) as standard
- All composite materials of cable cleats (where applicable) are produced in V0 in accordance with UL94 as standard
- LUL approved and certified polymers are available on request for some of the most stringent smoke toxicity and smoke emission testing

CMP Products' range of fire performance cable cleats has been rigorously tested to temperatures of 1,200°C including periodic water spray and shock testing. The range is certified to EN50200, BS5839, BS8491, BS8434 and AS-NZS 3013, providing fire survival times of up to 120 minutes.



CLASSIFICATIONS

FLAMMABILITY CLASSES (UL94)

The classification of the ignition and burning resistance characteristics of materials other than metal or ceramic:

CLASSIFICATION	V-0	V-1	V-2
Number of flame applications per sample	2 x 10	2 x 10	2 x 10
Maximum burning time of one sample (seconds)	≤ 10	≤ 30	≤ 30
Maximum burning time of five samples (seconds)	≤ 50	≤ 250	≤ 250
Allowable dripping and subsequent ignition of cotton below	No	No	Yes
Allowable afterglow remaining for: (seconds)	≤ 30	≤ 60	≤ 60

HB - Slow burning on a horizontal specimen; burning rate < 76 mm/min for thickness < 3 mm.

IMPACT CLASSIFICATION (IEC 61914)

CLASSIFICATION	IMPACT ENERGY (J)	EQUIVALENT MASS (KG)	HEIGHT MM (3 1%)
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	5.0	400

CORROSION RESISTANCE (IEC 61914)

CLASSIFICATION	TYPICAL USAGE	MEAN ZINC LAYER THICKNESS (M)	MINIMUM ZINC LAYER THICKNESS (M)	SALT SPRAY DURATION (H)
Low	Indoor, dry locations	5	3.5	24
High	Outdoor, wet locations	25	18	192

Resistance to corrosion (IEC 61914 - Clause 11.2)

'Stainless Steel containing at least 16% chromium need not be tested and are assumed to meet the classification for high resistance to corrosion.'

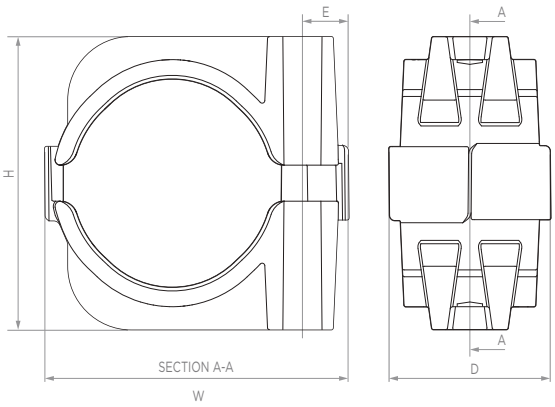
SABRE (1BC PLASTIC)

The Sabre One Bolt single cable cleat is a non-metallic cable cleat which has been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' (IEC 61914).

It ensures the retention and securing of single cables, without damaging or deforming the cable. The cable cleat is manufactured from various materials making it suitable for both indoor and outdoor applications. Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral cable movement. The Sabre One Bolt cable cleat is available in ten sizes suitable for cable diameters of 10mm up to 57mm. This cable cleat has an M10 clearance hole for securing it to a mounting surface.

FEATURES

- Third party certification to IEC 61914
- Available in three different materials:
  - Nylon
  - Low Smoke & Fume (LSF), Zero Halogen (LS0H), Phosphorus
  - Free and V0 Nylon
  - LUL approved polymer
- Sunlight (UV) & weather resistant
- Operating temperature -40°C to +60°C
- 10 - 57mm in 10 sizes
- Excellent axial & lateral load retention
- Single bolt fixing design



TECHNICAL DATA & CLASSIFICATION	
TYPE	Type 6.1.2. Non Metallic 1BC - One Bolt Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-40°C to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	1kN - 1.25kN IEC 61914 clause 9.3
AXIAL LOAD TEST	0.5kN-1kN IEC61914 clause 9.4
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914 clause 6.3, 6.3.5, 9.2
UV RESISTANCE	Pass IEC 61914 clause 6.5.1.2, 11.1
MATERIAL	Standard Nylon, UL94 V0 Nylon or LUL Approved Polymer Note: V0 Nylon & LUL Polymer are Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
MATERIAL COLOUR	Black

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5		
MULTICORE FORMATION		PARALLEL FORMATION
One short circuit 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres 105mm cable centres
0.1 sec	0.1 sec	0.1 sec
113kA Peak	99kA Peak	68kA Peak
51.3kA r.m.s	47.1kA r.m.s	32.3kA r.m.s

CABLE CLEAT SELECTION TABLE

SABRE PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g) *(LUL +5%)
		W	H	D	E	FIXING HOLE Ø	
1BC1013	10 - 13	41	34	46	13	1 x M10	23
1BC1316	13 - 16	44	37	46	13	1 x M10	26
1BC1619	16 - 19	47	40	46	13	1 x M10	30
1BC1923	19 - 23	51	44	46	13	1 x M10	34
1BC2327	23 - 27	54	48	46	13	1 x M10	38
1BC2732	27 - 32	61	56	46	13	1 x M10	47
1BC3238	32 - 38	67	62	46	13	1 x M10	53
1BC3846	38 - 46	75	73	46	13	1 x M10	68
1BC4651	46 - 51	81	77	46	13	1 x M10	79
1BC5157	51 - 57	86	83	46	13	1 x M10	88

Order reference examples: for standard nylon 1BC1013, for LSF suffix Z (1BC1013Z), for LUL approved polymer suffix LUL (1BC1013LUL). * LUL products are 5% heavier than the weights shown in table. Fasteners required to secure the cable cleat to the support structure are not included with the ordering references shown in the selection table but can be supplied on request - see cleat fixing pack page 64-65. For lateral and axial load ratings or short circuit ratings of LUL polymer products, please contact CMP.

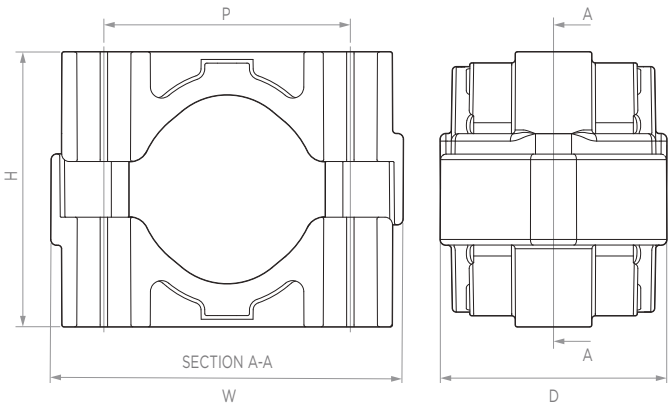
FALCON (2BC PLASTIC)

The Falcon Two Bolt single cable cleat is a non-metallic cable cleat which has been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' (IEC 61914).

It ensures the retention and securing of single cables, without damaging or deforming the cable. The cable cleat is manufactured from various materials making it suitable for both indoor and outdoor applications. Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral movement. The Falcon Two Bolt cable cleats have an excellent range take and are suitable for cable diameters of 38mm up to 135mm in only eight sizes. This cable cleat has two M12 clearance holes for securing it to a mounting surface, which allows for either M10 or M12 fasteners to be used.

FEATURES

- Third party certification to IEC 61914
- Available in three different materials:
  - Nylon
  - Low Smoke & Fume (LSF), Zero Halogen (LS0H, Phosphorus Free and V0 Nylon
  - LUL approved polymer
- Sunlight (UV) & weather resistant
- Operating temperature -40°C to +60°C
- Can be double stacked
- 38 - 135mm in 8 sizes
- Excellent axial & lateral load retention
- Two bolt fixing design



TECHNICAL DATA & CLASSIFICATION	
TYPE	Type 6.1.2. Non Metallic 2BC - Two Bolt Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-40°C to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	16kN - 26kN, IEC 61914 clause 9.3
AXIAL LOAD TEST	2.75kN - 5kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914 clause 6.3, 6.3.5, 9.2
UV RESISTANCE	Pass - IEC 61914 clause 6.5.1.2, 11.1
MATERIAL	Standard Nylon, UL94 V0 Nylon or LUL Approved Polymer Note: V0 Nylon & LUL Polymer are Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
MATERIAL COLOUR	Black

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5		
MULTICORE FORMATION	PARALLEL FORMATION	
Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres 105mm cable centres	Two short circuits 600mm fixed cleat centres 105mm cable centres
0.1 sec	0.1 sec	0.1 sec
76kA Peak	110kA Peak	86kA Peak
36.2kA r.m.s	50.0kA r.m.s	40.9kA r.m.s

CABLE CLEAT SELECTION TABLE

FALCON PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g) *(LUL +5%)
		W	H	D	P	FIXING HOLE Ø	
2BC038048	38 - 48	96	74	61	65 - 69	2 x M10 / M12	124
2BC048058	48 - 58	107	84	61	76 - 80	2 x M10 / M12	146
2BC058070	58 - 70	119	97	61	88 - 92	2 x M10 / M12	176
2BC070083	70 - 83	133	110	61	102 - 106	2 x M10 / M12	211
2BC083097	83 - 97	147	124	61	116 - 120	2 x M10 / M12	242
2BC096109	96 - 109	160	136	61	129 - 133	2 x M10 / M12	276
2BC106120	106 - 120	172	148	61	141 - 145	2 x M10 / M12	310
2BC120135	120 - 135	187	163	61	156 - 160	2 x M10 / M12	349

Order reference examples: for standard nylon 2BC038048, for LSF suffix Z (2BC038048Z), for LUL approved polymer suffix LUL (2BC038048LUL). * LUL products are 5% heavier than the weights shown in table. Fasteners required to secure the cable cleat to the support structure are not included with the ordering references shown in the selection table but can be supplied on request - see cleat fixing pack page 64-65. For lateral and axial load ratings or short circuit ratings of LUL polymer products, please contact CMP.

VALIANT (1BCAL)

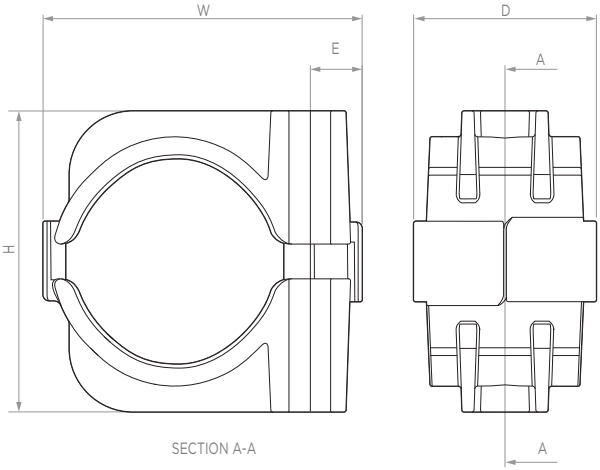
The Valiant One Bolt Aluminium single cable cleat is a metallic cleat which has been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' (IEC 61914).

It ensures the retention and securing of single cables, without damaging or deforming the cable. The cable cleat is manufactured from high pressure die cast aluminium (LM20) making it suitable for both indoor and outdoor applications. Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral movement. The Valiant One Bolt cable cleat is available in twelve sizes suitable for cable diameters of 10mm up to 71mm. The cable cleat has an M10 clearance hole for securing it to a mounting surface.

FEATURES

- Third party certification to IEC 61914
- Available in high pressure die cast aluminium
- Sunlight (UV) resistant
- Operating temperature -60°C to +150°C
- Can be double stacked
- 10 - 71mm in 12 sizes
- Excellent axial & lateral load retention
- Single bolt fixing design

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.1 Metallic 1BCAL - One Bolt Aluminium Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-60°C to +150°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	5kN - 6kN IEC 61914 clause 9.3
AXIAL LOAD TEST	1.5kN IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914clause 6.3, 6.3.5, 9.2
MATERIAL	High pressure die cast aluminium
MATERIAL COLOUR	Silver / grey



SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5			
MULTICORE FORMATION		PARALLEL FORMATION	
One short circuit 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres 105mm cable centres	Two short circuits 600mm fixed cleat centres 105mm cable centres
0.1 sec	0.1 sec	0.1 sec	0.1 sec
118kA Peak	89kA Peak	90kA Peak	76kA Peak
53.6kA r.m.s	42.3kA r.m.s	42.8kA r.m.s	36.1kA r.m.s

CABLE CLEAT SELECTION TABLE

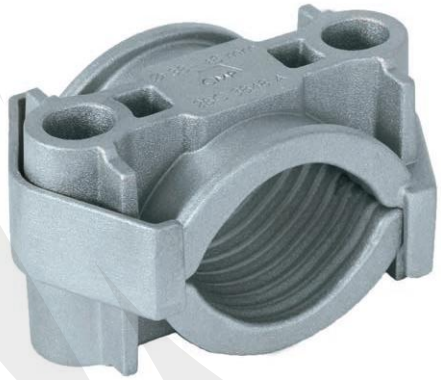
VALIANT PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g) *(LUL +5%)
		W	H	D	E	FIXING HOLE Ø	
1BC1013A	10 - 13	41	34	46	13	1 x M10	57
1BC1316A	13 - 16	44	37	46	13	1 x M10	66
1BC1619A	16 - 19	47	40	46	13	1 x M10	74
1BC1923A	19 - 23	51	44	46	13	1 x M10	83
1BC2327A	23 - 27	55	48	46	13	1 x M10	93
1BC2732A	27 - 32	61	56	46	13	1 x M10	114
1BC3238A	32 - 38	67	62	46	13	1 x M10	130
1BC3845A	38 - 45	75	73	46	13	1 x M10	162
1BC4551A	45 - 51	81	76	46	13	1 x M10	181
1BC5158A	51 - 58	86	83	46	13	1 x M10	199
1BC5865A	58 - 65	94	90	46	13	1 x M10	222
1BC6571A	65 - 71	101	97	46	13	1 x M10	240

Coatings are available upon request by adding the following suffixes to the ordering reference - EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (1BC1013AEC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

ZENITH (2BCAL)

The Zenith Two Bolt single cable cleat is a metallic cable cleat which has been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' (IEC 61914).

It ensures the retention and securing of single cables, without damaging or deforming the cable. The cable cleat is manufactured from high pressure die cast aluminium (LM20) making it suitable for both indoor and outdoor applications. Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral movement. The Zenith Two Bolt cable cleats have an excellent range take and are suitable for cable diameters of 38mm up to 151mm in only nine sizes. This cable cleat has two M12 clearance holes for securing it to a mounting surface, which allows for either M10 or M12 fasteners to be used.

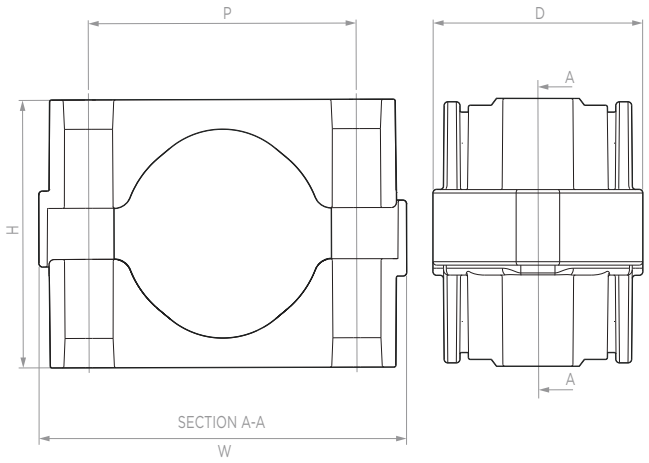


TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.1 Metallic 2BCAL - Two Bolt Aluminium Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-60°C to 150°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	18kN - 32kN, IEC 61914 clause 9.3
AXIAL LOAD TEST	8kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	High pressure die cast aluminium
MATERIAL COLOUR	Silver / grey

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5					
MULTICORE FORMATION		PARALLEL FORMATION			
One short circuit 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres 105mm cable centres	Two short circuits 600mm fixed cleat centres 105mm cable centres	One short circuit 600mm fixed cleat centres 105mm cable centres	Two short circuits 600mm fixed cleat centres 105mm cable centres
0.1 sec	0.1 sec	0.1 sec	0.1 sec	1 sec	1 sec
102kA Peak	102kA Peak	130kA Peak	120kA Peak	81kA Peak	71kA Peak
48.6kA r.m.s	48.6kA r.m.s	59.0kA r.m.s	54.5kA r.m.s	36.8kA r.m.s	32.2kA r.m.s

FEATURES

- Third party certification to IEC 61914
- Available in high pressure die cast aluminium
- Sunlight (UV) & weather resistant
- Operating temperature -60°C to 150°C
- Can be double stacked
- 38 - 151mm in 9 sizes
- Excellent axial & lateral load retention
- Two bolt fixing design



CABLE CLEAT SELECTION TABLE							
ZENITH PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø	
2BC038048A	38 - 48	96	68	61	67	2 x M10 / M12	250
2BC048058A	48 - 58	107	78	61	78	2 x M10 / M12	297
2BC058070A	58 - 70	119	91	61	90	2 x M10 / M12	357
2BC070083A	70 - 83	133	104	61	104	2 x M10 / M12	420
2BC083097A	83 - 97	147	118	61	118	2 x M10 / M12	484
2BC096109A	96 - 109	160	130	61	131	2 x M10 / M12	549
2BC106120A	106 - 120	172	142	61	143	2 x M10 / M12	616
2BC120135A	120 - 135	187	157	61	158	2 x M10 / M12	693
2BC135151A	135 - 151	201	174	61	172	2 x M10 / M12	768

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (2BC038048AEC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

SOLACE (1BCHT)

The Solace Heavy Duty, One Bolt, High Temperature Fire Rated Stainless Steel single cable cleat is a cast metallic cleat which has been designed, constructed, and tested in accordance with the International Standard 'Cable Cleats for Electrical Installations' (IEC 61914).

These Fire Rated cable cleats can be used with fire performance cables to ensure the safe retention and securing of single cables in the event of a wiring system being affected by fire. These fire resisting supports help to maintain the electrical system's integrity for any critical circuits during an emergency situation to enable safe evacuation. The cable cleat is manufactured from Stainless Steel 316L making it suitable for both indoor and outdoor applications. Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral movement.

The Solace One Bolt High Temperature Stainless Steel cable cleat is available in twelve sizes suitable for cable diameters of 10mm up to 71mm. The cable cleat has an M10 clearance hole for securing it to a mounting surface.

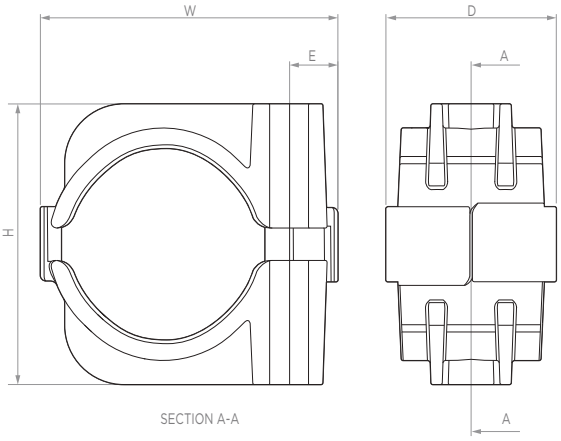
FEATURES

- 316L Stainless Steel
- Operating temperature -60°C to +250°C
- Surpasses requirements of Fire testing BS5839 / BS8491 / EN50200 / BS8434 / AS-NZS 3013 (1,200°C) (Fire, shock & water)
- 10 - 71mm cable range take in 12 sizes
- Single bolt fixing design
- Can be stacked
- Excellent axial & lateral load retention
- Corrosion resistant

BS 5839 'Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises'

States that *"Methods of cable support should be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable used, and should withstand a similar temperature and duration to that of the cable, while maintaining adequate support"*

To adhere to this BSI standard fire rated Cable Cleats must be used to support the cable in the event of a fire.



TECHNICAL DATA & CLASSIFICATION

TYPE	6.1.1 Metallic 1BCHT - One Bolt High Temperature Stainless Steel Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-60°C to +250°C IEC 61914
FIRE TESTED	Surpasses requirements of Fire testing BS5839/BS8491 / EN50200/BS8434/AS-NZS 3013 (1,200°C) (Fire, shock & water)
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914, IEC 60695-11-5
LATERAL LOAD TEST	15kN - 23kN IEC 61914
AXIAL LOAD TEST	1kN IEC 61914
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914
MATERIAL	316L Stainless Steel
MATERIAL COLOUR	Silver / grey

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

PARALLEL FORMATION	
One short circuit 600mm fixed cleat centres 100mm cable centres	Two short circuit 600mm fixed cleat centres 100mm cable centres
0.1 sec	0.1 sec
100kA Peak	100kA Peak
47.6kA r.m.s	47.6kA r.m.s

CABLE CLEAT SELECTION TABLE

SOLACE PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g)
		W	H	D	E	FIXING HOLE Ø	
1BC1013HT	10-13	41	34	46	13	1 x M10	164
1BC1316HT	13-16	44	37	46	13	1 x M10	185
1BC1619HT	16-19	47	40	46	13	1 x M10	215
1BC1923HT	19-23	51	44	46	13	1 x M10	237
1BC2327HT	23-27	55	48	46	13	1 x M10	277
1BC2732HT	27-32	61	56	46	13	1 x M10	341
1BC3238HT	32-38	67	62	46	13	1 x M10	387
1BC3845HT	38-45	75	73	46	13	1 x M10	486
1BC4551HT	45-51	81	76	46	13	1 x M10	541
1BC5158HT	51-58	86	83	46	13	1 x M10	617
1BC5865HT	58-65	94	90	46	13	1 x M10	697
1BC6571HT	65-71	101	97	46	13	1 x M10	763

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (1BC3845HTEC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

THEMIS (2BCHT)

The Themis Heavy Duty, Two Bolt, High Temperature Fire Rated Stainless Steel single cable cleat which has been designed, constructed, and tested in accordance with the International Standard 'Cable Cleats for Electrical Installations' (IEC 61914). It ensures the retention and securing of single cables, without damaging or deforming the cable.

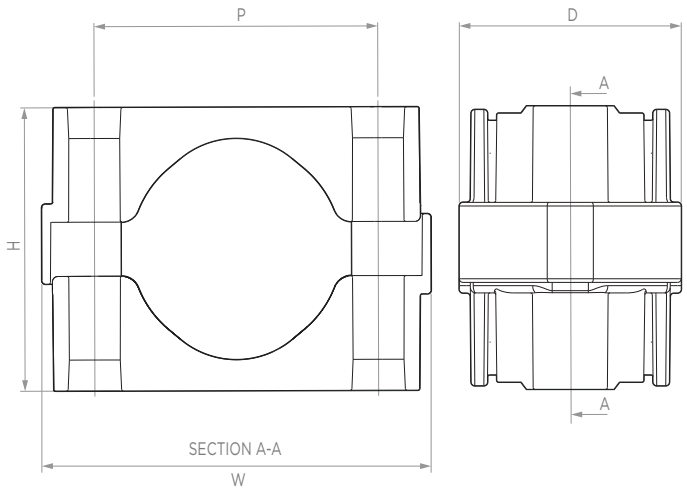
These Fire Rated cable cleats can be used with fire performance cables to ensure the safe retention and securing of single cables in the event of a wiring system being affected by fire. These fire resisting supports help to maintain the electrical systems integrity for any critical circuits during an emergency situation to enable safe evacuation. The cable cleat is manufactured from Stainless Steel 316L making it suitable for both indoor and outdoor applications.

Due to its unique twin arc internal patent pending design profile it exhibits excellent retention, limiting both the axial and lateral movement. The Themis Two Bolt cable cleats have an excellent range take and are suitable for cable diameters of 38mm up to 97mm in only five sizes.
This cable cleat has two M12 clearance holes for securing it to a mounting surface, which allows for either M10 or M12 fasteners to be used.

BS 5839 'Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises'

States that *"Methods of cable support should be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable used, and should withstand a similar temperature and duration to that of the cable, while maintaining adequate support"*

To adhere to this BSI standard fire rated Cable Cleats must be used to support the cable in the event of a fire.



FEATURES

- 316L Stainless Steel
- Operating temperature -60°C to +250°C
- Surpasses requirements of Fire testing BS5839 / BS8491 / EN50200 / BS8434 / AS-NZS 3013 (1,200°C) (Fire, shock & water)
- 38 - 97mm cable range take in 5 sizes
- Can be stacked
- Excellent axial & lateral load retention
- Corrosion resistant

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.1 Metallic 2BCHT - Two Bolt High Temperature Stainless Steel Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-60°C to +250°C IEC 61914
FIRE TESTED	Surpasses requirements of Fire testing BS5839/BS8491/ EN50200/BS8434/AS-NZS 3013 (1,200°C) (Fire, shock & water)
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914, IEC 60695-11-5
LATERAL LOAD TEST	25kN IEC 61914
AXIAL LOAD TEST	5kN IEC 61914
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914
MATERIAL	316L Stainless Steel
MATERIAL COLOUR	Silver / grey

For information regarding short circuit ratings please contact CMP Products.

CABLE CLEAT SELECTION TABLE							
THEMIS PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø	
2BC038048HT	38 - 48	96	68	61	67	2 x M10 / M12	742
2BC048058HT	48 - 58	107	78	61	78	2 x M10 / M12	900
2BC058070HT	58 - 70	119	91	61	90	2 x M10 / M12	1102
2BC070083HT	70 - 83	133	104	61	104	2 x M10 / M12	1324
2BC083097HT	83 - 97	147	118	61	118	2 x M10 / M12	1554

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (2BC038048HTEC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

HELIOS (FPC)

The Helios Standard Duty, One Bolt, High Temperature Fire Rated Stainless Steel single cable cleat is a fabricated metallic cleat which has been designed, constructed, and tested in accordance with the International Standard 'Cable Cleats for Electrical Installations' (IEC 61914).

These Fire Rated cable cleats can be used with fire performance cables to ensure the safe retention and securing of single cables in the event of a wiring system being affected by fire. These fire resisting supports help to maintain the electrical systems integrity for any critical circuits during an emergency situation to enable safe evacuation. The cable cleat is fabricated from Stainless Steel 316L making it suitable for both indoor and outdoor applications.

The Helios High Temperature Stainless Steel 316L cable cleat is available in eleven sizes suitable for cable diameters of 10mm up to 65mm. The cable cleat has an M10 clearance hole for securing it to a mounting surface.

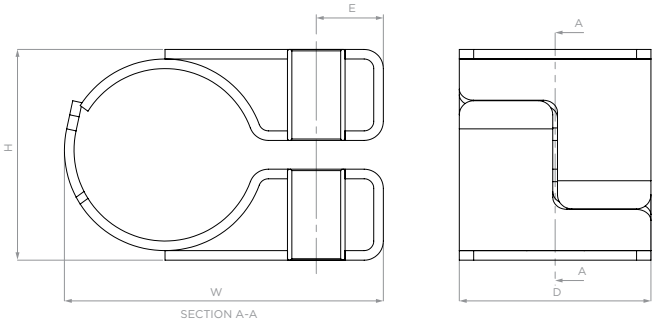
FEATURES

- Fabricated Stainless Steel 316L
- Operating temperature -60°C to +250°C
- Surpasses requirements of Fire testing BS5839 / BS8491 / EN50200 / BS8434 / AS-NZS 3013 (1,200°C) (Fire, shock & water)
- 10 - 65mm cable range take in 11 sizes
- Single bolt fixing design
- Can be stacked
- Corrosion resistant

BS 5839 'Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises'

States that *"Methods of cable support should be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable used, and should withstand a similar temperature and duration to that of the cable, while maintaining adequate support"*

To adhere to this BSI standard fire rated Cable Cleats must be used to support the cable in the event of a fire.



TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.1 Metallic SDHT - One Bolt Fabricated High Temperature Stainless Steel Cable Cleat
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-60°C to +250°C IEC 61914
FIRE TESTED	Surpasses requirements of Fire testing BS5839/BS8491/ EN50200/BS8434/AS-NZS 3013 (1,200°C)(Fire, shock & water)
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914, IEC 60695-11-5
LATERAL LOAD TEST	480N IEC 61914
AXIAL LOAD TEST	28N IEC 61914
IMPACT RESISTANCE	Pass - Very heavy IEC 61914
MATERIAL	Stainless Steel 316L
MATERIAL COLOUR	Silver / grey

PARALLEL FORMATION	
One short circuit 600mm fixed cleat centres 100mm cable centres	Two short circuit 600mm fixed cleat centres 100mm cable centres
0.1 sec	0.1 sec
60kA Peak	60kA Peak
29kA r.m.s	29kA r.m.s

CABLE CLEAT SELECTION TABLE

HELIOS PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM					WEIGHT (g)
		W	H	D	E	FIXING HOLE Ø	
FPC1013	10-13	38	19	40	14	1 x M10	88
FPC1316	13-16	41	22	40	14	1 x M10	103
FPC1619	16-19	45	25	40	14	1 x M10	114
FPC1923	19-23	50	29	40	14	1 x M10	128
FPC2327	23-27	55	33	40	14	1 x M10	143
FPC2732	27-32	61	38	40	14	1 x M10	165
FPC3238	32-38	67	44	40	14	1 x M10	182
FPC3846	38-46	74	52	40	14	1 x M10	210
FPC4651	46-51	80	57	40	14	1 x M10	233
FPC5157	51-57	86	63	40	14	1 x M10	252
FPC5765	57-65	94	71	40	14	1 x M10	274

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (FPC2327EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

SAPPHIRE (SHDSS)

The SHDSS cable cleat range consists of metallic cable cleats which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914.

The SHDSS cable cleat has been designed and tested for high short circuit conditions on cables held in single, parallel / flat formation, to ensure the securing and retention of cables without damage.

The Sapphire cable cleat is available for single parallel formation for diameters of 19 to 150mm in 13 sizes. The cable cleat is fabricated from 316L stainless steel, giving it high creep strength whilst providing excellent corrosion resistance in the harshest of environments.

The Sapphire cable cleat has one M12 and two M10 fixing clearance holes within its base, allowing versatility to the installer during installation, and is designed to enable the product to be secured to a variety of mounting surfaces. The Sapphire cable cleat hinge opens fully, allowing the cables to be easily placed within the cable cleat, to aid the installer before closing and securing via the mouth piece bolt.

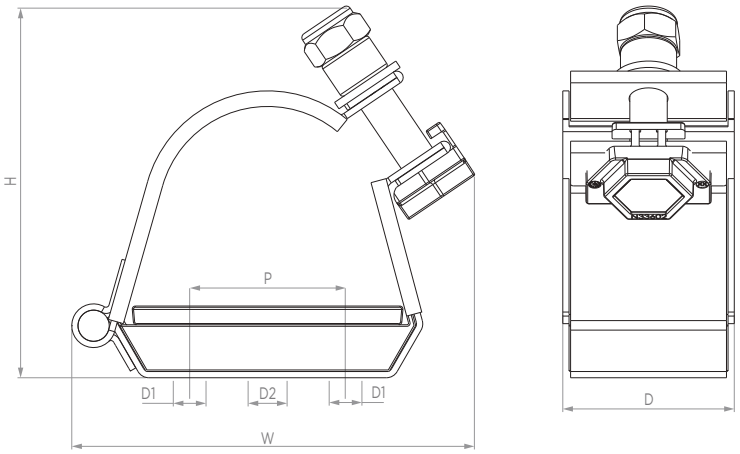
The Sapphire cable cleats come with liners as standard, helping to restrain the cables within vertical applications, providing a layer of protection between the cable sheath and the cable cleat during normal operation, where thermal elongation of cable occurs, protecting the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cables in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

- Third party certification to IEC 61914
- 316L stainless steel
- 19 to 150mm in 13 sizes for single / parallel formation
- Operating temperature -50°C to +60°C
- Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- Combined single (M12) and two bolt (M10) fixing design

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.3 Composite SHDSS - Single Heavy Duty Stainless Steel
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	3.5kN - 14.5kN, IEC 61914 clause 9.3
AXIAL LOAD TEST	0.2kN - 0.9kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5			
MULTICORE FORMATION		PARALLEL FORMATION	
One short circuit 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres 105mm cable centres	Two short circuits 600mm fixed cleat centres 105mm cable centres
0.1 sec	0.1 sec	0.1 sec	0.1 sec
105kA Peak	105kA Peak	110kA Peak	109kA Peak
50.0kA r.m.s	50.0kA r.m.s	50.0kA r.m.s	50.0kA r.m.s



CABLE CLEAT SELECTION TABLE								
PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM				FIXING HOLE Ø		WEIGHT (g)
		W	H	D	P	D1	D2	
SHDSS019026	19-26	94	85	54	25	2 x M10	1 x M12	395
SHDSS026032	26-32	95	88	54	25	2 x M10	1 x M12	402
SHDSS032038	32-38	96	93	54	25	2 x M10	1 x M12	431
SHDSS038046	38-46	100	100	54	25	2 x M10	1 x M12	446
SHDSS046051	46-51	104	103	54	25	2 x M10	1 x M12	456
SHDSS051058	51-58	108	107	54	25	2 x M10	1 x M12	472
SHDSS058070	58-70	129	119	54	50	2 x M10	1 x M12	554
SHDSS070083	70-83	137	120	54	50	2 x M10	1 x M12	581
SHDSS083097	83-97	157	137	54	75	2 x M10	1 x M12	665
SHDSS096109	96-109	165	133	54	75	2 x M10	1 x M12	688
SHDSS106120	106-120	170	142	54	75	2 x M10	1 x M12	713
SHDSS120135	120-135	197	157	54	75	2 x M10	1 x M12	814
SHDSS135150	135-150	205	172	54	75	2 x M10	1 x M12	847

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (SHDSS046051EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

CYCLONE I (LDSTR 2 LOOP)

The Cyclone I Strap cable cleat is a metallic cable cleat consisting of a fabricated lightweight aluminium base and a stainless steel strap which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914.

The Cyclone I Strap cable cleat ensures the retention and securing of cables, whilst preventing damage to the cable when in normal operation, or in the event of a short circuit.

The cable cleats allow a wide range of applications including miscellaneous formations. They have an exceptional overlapping cable range take and give the end user more flexibility when compared to more rigid cable cleats on the market. Each cleat is capable of securing various cable formations, such as single cable (multicore) or single cable in parallel formation, trefoil formation, and quad formation. Suitable for single cable applications in diameters of 36mm to 165mm in 10 sizes, in trefoil formation from diameters of 24mm to 145mm in 15 sizes and quad formation from 21mm to 124mm in 15 sizes.

The Cyclone I bases are manufactured from 5000 series aluminium, making the base lightweight, easy to handle and corrosion resistant. The Cyclone straps are manufactured in 316L stainless steel, providing excellent corrosion resistance, and the tensioned straps act as a coil during short circuit conditions to restrain the cable. The Cyclone strap wraps around the angled Cyclone I aluminium base ensuring the cables are always kept central. The strap is fastened to a stainless steel pin with a hexagon shaped head at one end allowing fast, easy installation via the use of a ratchet, power tool or other suitable mechanical device.

The Cyclone I Strap cable cleat has one M12 and two M10 fixing clearance holes within each base, allowing versatile installation and enabling the product to be secured to a variety of mounting surfaces. Due to the design of the Cyclone, the cables do not need to be lifted and placed in to the cable cleat, instead the cables are placed on to the Cyclone bases and the Cyclone straps then wrap around the cables securing them to the mounting surface of the Cyclone base.

The Cyclone I Cable Cleats and Cyclone intermediate straps come with standard liners, which are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free. A high temperature version of the liner is available by adding HT suffix to the ordering code. The liners help to restrain the cables within vertical applications, providing a layer of protection between the cable sheath and the Cyclone stainless steel strap and base during normal operation where thermal elongation of cables occurs. The liners also prevent the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications, and protect the cable during short circuit conditions.

The Cyclone Strap is also designed to be used as an intermediate restraint (where applicable) between two Cyclone cable cleats to bind cables together giving a cost effective, easy application fixing system. Using the Cyclone I Strap cable cleat and the Cyclone Intermediate Restraint alternatively will dramatically reduce installation time and cost, when compared to alternative cable cleat only solutions.

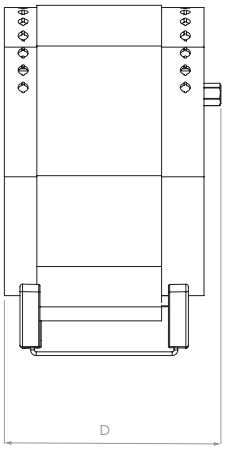
FEATURES

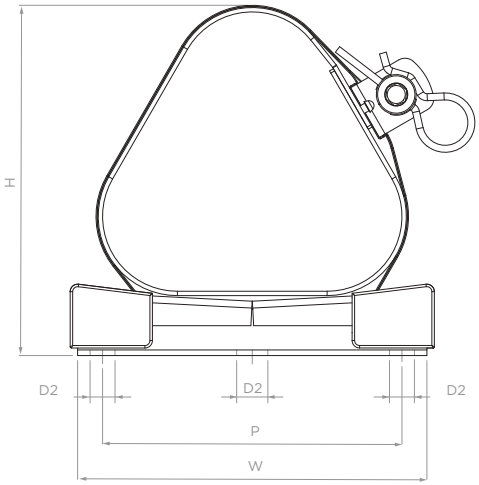
- Third party certification to IEC 61914
- Lightweight aluminium base with 316L stainless steel strap
- Short circuit rating of 124kA peak fault
- Standard operating temperature -50°C to +40°C
- Standard liners are LUL approved and are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- High temperature liner version with HT suffix available with operating temperature -50°C to +90°C
- High temperature liners are classified as V0 Flame Retardant Polymer
- Combined single (M12) and two bolt (M10) base fixing design

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.3 Composite Strap Cable Cleat - 2 Loop Cyclone I
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50 to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Single and Trefoil, Refer to CMP Products, IEC 61914 clause 9.3
AXIAL LOAD TEST	Single and Trefoil, Refer to CMP Products, IEC 61914 clause 9.4
IMPACT RESISTANCE	Very Heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	5000 Series Aluminium, 316L Stainless Steel Strap Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free. HT liners are classified as V0 Flame Retardant Polymer.

300MM CYCLONE I (0.1 SEC)	
CABLE OD (MM)	PEAK kA
36	124.0
38	127.4
43	135.5
59	158.7
65	166.6

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5		
TREFOIL FORMATION		
One short circuit 300mm fixed cleat centres	Two short circuits 300mm fixed cleat centres	Two short circuits 300mm fixed cleat centres
0.1 sec	0.1 sec	3 sec
124kA Peak	116kA Peak	61kA Peak
56.3kA r.m.s	52.7kA r.m.s	29.0kA r.m.s





CABLE CLEAT SELECTION TABLE

CYCLONE I PART NO.	INTERMEDIATE RESTRAINT PART NO.	CABLE Ø RANGE TAKE (MM)			DIMENSIONS (MM)						WEIGHT (g)
		SINGLE	TREFOIL	QUAD	W	H	D	P	FIXING HOLE Ø		
									D1	D2	
1CYC024034	2STR024034	36-50	24-34	21-29	108	96	89	80	2 x M10	1 x M12	347
1CYC030041	2STR030041	45-60	30-41	26-35	108	109	89	80	2 x M10	1 x M12	358
1CYC037047	2STR037047	55-69	37-47	32-40	128	120	89	100	2 x M10	1 x M12	393
1CYC043054	2STR043054	64-80	43-54	37-46	128	134	89	100	2 x M10	1 x M12	406
1CYC050060	2STR050060	75-88	50-60	43-51	148	145	89	120	2 x M10	1 x M12	465
1CYC056067	2STR056067	83-99	56-67	49-57	148	158	89	120	2 x M10	1 x M12	478
1CYC063073	2STR063073	94-108	63-73	55-62	168	170	89	140	2 x M10	1 x M12	514
1CYC069080	2STR069080	103-118	69-80	60-68	168	183	89	140	2 x M10	1 x M12	527
1CYC072085	2STR072085	114-150	72-85	66-72	188	193	89	160	2 x M10	1 x M12	596
1CYC082095	2STR082095	145-165	82-95	70-81	188	212	89	160	2 x M10	1 x M12	615
1CYC092105	2STR092105		92-105	70-81	210	231	89	100	2 x M10	1 x M12	653
1CYC102115	2STR102115		102-115	88-98	210	250	89	100	2 x M10	1 x M12	672
1CYC112125	2STR112125		112-125	96-107	235	269	89	100	2 x M10	1 x M12	751
1CYC122135	2STR122135		122-135	105-116	235	288	89	100	2 x M10	1 x M12	771
1CYC132145	2STR132145		132-145	113-124	250	307	89	120	2 x M10	1 x M12	808

Note: Cyclone I cable cleat consists of one base and one strap, additional Cyclone cable straps (restraints) ordered separately.
Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Order reference example for epoxy coating of cable cleat base suffix EC (1CYC024034EC). Order reference example for High Temperature liner version suffix HT (1CYC024034HT). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

CYCLONE II/III (SDSTR 2 LOOP/ HDSTR 3 LOOP)

The Cyclone II and III Strap cable cleats are metallic cable cleats consisting of a fabricated 316L stainless steel base and a stainless steel strap which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914.

The Cyclone II and III Strap cable cleats ensure the retention and securing of cables, whilst preventing damage to the cable when in normal operation or in the event a short circuit fault condition.

The cable cleats allow a wide range of applications including miscellaneous formations. They have an exceptional overlapping range and give the end user more flexibility when compared to more rigid cable cleats on the market. Each cable cleat is capable of securing various cable formations, such as single cable (multicore) or single cable in parallel formation, trefoil formation, and quad formation. Suitable for single cable applications diameters from 36mm to 165mm in 10 sizes, in trefoil formation from diameters of 24mm to 145mm in 15 sizes and quad formation from 21mm to 124mm in 15 sizes.

The Cyclone II Strap cable cleat is designed and tested to restrain cables securely during moderate short circuit forces, whilst the Cyclone III Strap cable cleat is designed for high short circuit forces. Cyclone II straps are designed to wrap around the cables twice, whilst the Cyclone III straps are designed to wrap around the cables three times to provide the resistance needed during high fault short circuit conditions.

The Cyclone II and III bases are manufactured from 316L stainless steel, giving the cable cleats high creep strength and excellent corrosion resistance. The Cyclone straps are manufactured in 316L stainless steel providing excellent corrosion resistance, and the tensioned straps act as a coil during short circuit conditions to restrain the cable. The Cyclone strap wraps around the angled Cyclone II or III stainless steel base ensuring the cables are always kept central, the strap is fastened to a stainless steel pin with a hexagon shaped head at one end allowing fast, easy installation via the use of a ratchet, power tool or other suitable mechanical device.

The Cyclone II and III Strap cable cleats have one M12 and two M10 fixing clearance holes within each base, allowing versatile installation, and enabling the product to be secured to a variety of mounting surfaces. Due to the design of the Cyclone, the cables do not need to be lifted and placed in to the cable cleat, instead the cables are placed on to the bases and the Cyclone straps then wrap around the cables securing them to the mounting surface of the base.

The Cyclone II and III cable cleats and Cyclone intermediate straps come with standard liners, which are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus free. A high temperature version of the liner is available by adding HT suffix to the ordering code. The liners help to restrain the cables within vertical applications, providing a layer of protection between the cable sheath and the Cyclone stainless steel strap and base during normal operation where thermal elongation of cables occurs. The liners also prevent the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications, and protect the cable during short circuit conditions.

The Cyclone Straps are designed to be used as an intermediate restraint (where applicable) between two Cyclone cable cleats to bind cables together giving a cost effective, easy application fixing system. Using the Cyclone II or III Strap cable cleat and the Cyclone Intermediate Restraints alternatively will dramatically reduce installation time and cost, when compared to alternative cable cleat only solutions.

FEATURES

- **Third party certification to IEC 61914**
- **316L stainless steel base with stainless steel strap**
- **Cyclone II short circuit rating of 151kA peak fault**
- **Cyclone III short circuit rating of 180kA peak fault**
- **Standard operating temperature -50°C to +40°C**
- **Standard liners are LUL approved and are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free**
- **High temperature liner version with HT suffix available with operating temperature -50°C to +90°C**
- **High temperature liners are classified as V0 Flame Retardant Polymer**
- **Combined single (M12) and two bolt (M10) base fixing design**

300MM CYCLONE II (0.1 SEC)	
CABLE OD (MM)	PEAK kA
36	151.0
38	155.1
43	165.0
59	193.3
65	202.9

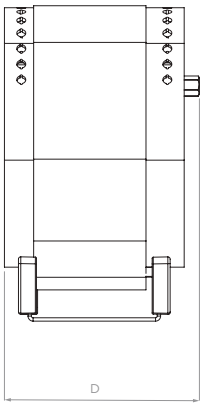
300MM CYCLONE III (0.1 SEC)	
CABLE OD (MM)	PEAK kA
36	180.0
38	184.9
43	196.7
59	230.4
65	241.9

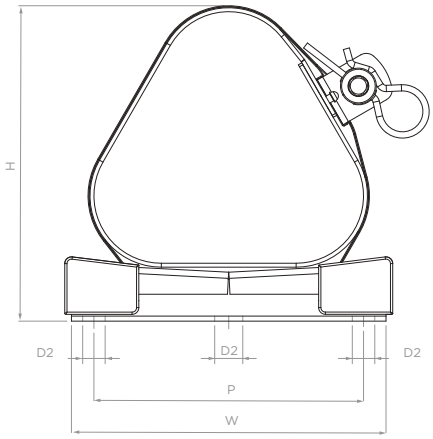
CYCLONE II SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION						
One short circuit			One short circuit w/ Cyclone strap	Two short circuits		Two short circuits w/ Cyclone strap
fixed cleat centres 300mm	300mm	600mm	1200mm	600mm	600mm	1200mm
0.1 sec	1 sec	1 sec	0.1 sec	0.1 sec	1 sec	0.1 sec
151kA Peak	80kA Peak	75kA Peak	125kA Peak	120kA Peak	70kA Peak	114kA Peak
68.6kA r.m.s	35.6kA r.m.s	34.8kA r.m.s	56.8kA r.m.s	54.5kA r.m.s	32.8kA r.m.s	51.8kA r.m.s

CYCLONE III SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION						
One short circuit			One short circuit w/ Cyclone strap	Two short circuits		Two short circuits w/ Cyclone strap
fixed cleat centres 300mm	300mm	600mm	1200mm	600mm	600mm	1200mm
0.1 sec	1 sec	1 sec	0.1 sec	0.1 sec	1 sec	0.1 sec
180kA Peak	90kA Peak	80kA Peak	137kA Peak	135kA Peak	75kA Peak	130kA Peak
81.8kA r.m.s	41.7kA r.m.s	36.9kA r.m.s	62.2kA r.m.s	61.4kA r.m.s	34.7kA r.m.s	60kA r.m.s





TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.3 Composite Strap Cable Cleat - 2 Loop Cyclone II / 3 Loop Cyclone III
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50 to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time, IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Single - 5.5kN - 20kN Cyclone II and 6.5kN - 22kN Cyclone III, IEC 61914 clause 9.3 Trefoil - Refer to CMP Products, Cyclone II and Cyclone III, IEC 61914 clause 9.3
AXIAL LOAD TEST	IEC 61914 clause 9.4, Single - 0.4kN - 0.6kN Cyclone II and 0.4kN Cyclone III IEC 61914 clause 9.4, Trefoil - 0.4kN Cyclone II and 0.4kN Cyclone III
IMPACT RESISTANCE	Very Heavy, IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel Base & Strap Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free. HT liners are classified as V0 Flame Retardant Polymer

CABLE CLEAT SELECTION TABLE

CYCLONE II PART NO.	CYCLONE III PART NO.	CABLE Ø RANGE TAKE (MM)			DIMENSIONS MM						WEIGHT (g)
		SINGLE	TREFOIL	QUAD	W	H	D	P	FIXING HOLE Ø D1	FIXING HOLE Ø D2	
2CYC024034	3CYC024034	36-50	24-34	21-29	108	96	89	80	2 x M10	1 x M12	519
2CYC030041	3CYC030041	45-60	30-41	26-35	108	109	89	80	2 x M10	1 x M12	538
2CYC037047	3CYC037047	55-69	37-47	32-40	128	120	89	100	2 x M10	1 x M12	612
2CYC043054	3CYC043054	64-80	43-54	37-46	128	134	89	100	2 x M10	1 x M12	634
2CYC050060	3CYC050060	75-88	50-60	43-51	148	145	89	120	2 x M10	1 x M12	729
2CYC056067	3CYC056067	83-99	56-67	49-57	148	158	89	120	2 x M10	1 x M12	747
2CYC063073	3CYC063073	94-108	63-73	55-62	168	170	89	140	2 x M10	1 x M12	822
2CYC069080	3CYC069080	103-118	69-80	60-68	168	183	89	140	2 x M10	1 x M12	841
2CYC072085	3CYC072085	114-150	72-85	66-72	188	193	89	160	2 x M10	1 x M12	951
2CYC082095	3CYC082095	145-165	82-95	70-81	188	212	89	160	2 x M10	1 x M12	978
2CYC092105	3CYC092105		92-105	70-81	210	231	89	100	2 x M10	1 x M12	1051
2CYC102115	3CYC102115		102-115	88-98	210	250	89	100	2 x M10	1 x M12	1080
2CYC112125	3CYC112125		112-125	96-107	235	269	89	100	2 x M10	1 x M12	1210
2CYC122135	3CYC122135		122-135	105-116	235	288	89	100	2 x M10	1 x M12	1239
2CYC132145	3CYC132145		132-145	113-124	250	307	89	120	2 x M10	1 x M12	1314

Note: Both Cyclone II and Cyclone III cable cleat consists of one base and one strap, additional cable straps (restraints) ordered separately. Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Order reference example for epoxy coating of cable cleat base suffix EC (2CYC024034EC). Order reference example for high temperature liner version suffix HT (2CYC024034HT). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

INTERMEDIATE RESTRAINTS

Intermediate Restraints are cable restraining devices designed to be used with cable cleats, without being attached to the mounting surface, to hold the cables together in order to provide resistance to electromechanical forces.

All CMP's Intermediate Restraints have been designed, constructed, and third party tested and certified in accordance with the International Standard 'cable cleats for electrical installations' IEC 61914.

CMP offers two types of Intermediate Restraint, the SDSSIR range and the STR range. The SDSSIR range is designed and tested for use with the Patriot (SDSS), Huron (LDAL) and Reliance (SDAL) cable cleat, whilst the STR type is available in standard duty and heavy duty for use with all other cable cleats. All types are manufactured in 316L stainless steel, providing excellent corrosion resistance, and have Low Smoke and Fume (LSF) liners as standard.

All types of Intermediate Restraint are designed to be installed at mid-point between cable cleats.

The use of Intermediate Restraints as part of the cable management system can be a safe cost-effective method when compared to a cable cleat only installation, reducing the number of cable cleats by 50% in most systems. In addition to this cost reduction, installation time is also reduced by employing a cable cleat and intermediate restraint solution when compared to cable cleat only installations, as the intermediate restraint is not secured to the mounting surface.

INTERMEDIATE RESTRAINT TYPE	CABLE CLEAT TYPE							
	HURON (LDAL)	RELIANCE (SDAL)	PATRIOT (SDSS)	CYCLONE I (LDSTR)	CYCLONE II (SDSTR)	CYCLONE III (HDSTR)	SOVEREIGN (HDSS)	CONQUEROR (RTSS)
SDSSIR	✓	✓	✓	X	X	X	X	X
2STR	✓	✓	✓	✓	✓	✓	✓	✓
3STR	✓	✓	✓	X	X	✓	✓	✓

The above table should be used as a guide for the selection of the correct intermediate restraints to be installed with the desired cable cleat, this will be dependent on the installation parameters such as the short circuit fault conditions and centre-to-centre conductor distances. Even when relatively low short circuits are anticipated which produce relatively low electromechanical forces, CMP advises the use of intermediate restraints for installations where cable cleats are spaced 1200mm or greater. These intermediate restraints should be installed at mid-point between cable cleats to prevent unnecessary 'bird caging' effects, which can cause damage to the cables and to other surrounding equipment, as well as potentially personnel whom may be in the vicinity during such a short circuit fault.

WITHOUT INTERMEDIATE RESTRAINTS

WITH INTERMEDIATE RESTRAINTS

TREFOIL INTERMEDIATE RESTRAINT (SDSSIR)

The SDSSIR intermediate restraint range are metallic restraints which have been designed, constructed, and tested in accordance with the International Standard 'Cable Cleats for Electrical Installations' IEC 61914 to ensure the securing and retention of cables, without sustaining damage to the cable(s).

The restraint has been designed and tested for short circuit conditions, within harsh environments. The SDSSIR are available for trefoil application/formation and are fabricated from 316L stainless steel giving it high creep strength whilst providing excellent corrosion resistance in the harshest of environments.

The restraint comes with liners as standard, helping to restrain the cable(s) within vertical applications, providing a layer of protection between the cable sheath and the cable cleat during normal operation, where thermal elongation of cables occur, protecting the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

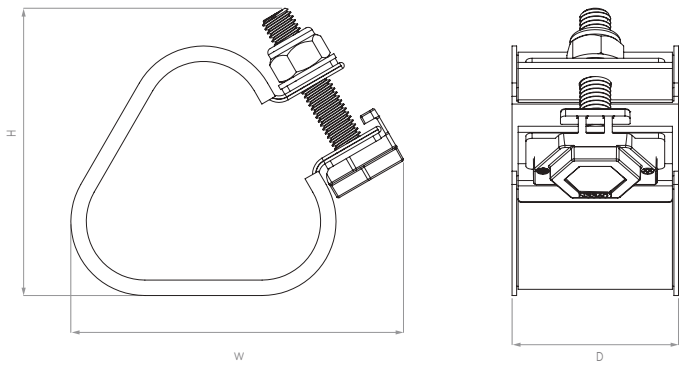
- **Third party certification to IEC 61914**
- **316L stainless steel**
- **Operating temperature -50°C to +60°C**
- **Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free**

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.3 Composite SDSSIR - Standard Duty Stainless Steel Intermediate Restraint
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	Standard Liner -50 to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products
AXIAL LOAD TEST	Refer to CMP Products
IMPACT RESISTANCE	Pass - Very heavy IEC 61914
MATERIAL	316L Stainless Steel Low Smoke & Fume (LSF) Liners

SELECTION TABLE

PATRIOT PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS MM			WEIGHT (g)
		W	H	D	
SDSSIR019022	19-22	81	78	54	214
SDSSIR022026	22-26	89	81	54	227
SDSSIR026030	26-30	97	84	54	238
SDSSIR030034	30-34	105	87	54	250
SDSSIR034038	34-38	112	91	54	263
SDSSIR038042	38-42	119	97	54	276
SDSSIR042046	42-46	126	101	54	289
SDSSIR046050	46-50	131	106	54	302
SDSSIR050054	50-54	139	111	54	315
SDSSIR054058	54-58	146	118	54	327
SDSSIR058062	58-62	153	126	54	341
SDSSIR062066	62-66	160	133	54	355
SDSSIR066070	66-70	167	141	54	368
SDSSIR070074	70-74	174	148	54	381
SDSSIR074078	74-78	181	156	54	394
SDSSIR078082	78-82	188	163	54	407
SDSSIR082086	82-86	195	171	54	421
SDSSIR086090	86-90	201	178	54	434
SDSSIR090094	90-94	208	186	54	447
SDSSIR094098	94-98	215	193	54	460
SDSSIR098102	98-102	222	201	54	473
SDSSIR102106	102-106	229	208	54	486
SDSSIR106110	106-110	236	215	54	499
SDSSIR110114	110-114	243	223	54	512
SDSSIR114118	114-118	250	230	54	525
SDSSIR118122	118-122	256	238	54	539
SDSSIR122126	122-126	263	246	54	552
SDSSIR126130	126-130	270	253	54	565

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (SDSSIR066070EC)



CYCLONE STRAP (INTERMEDIATE RESTRAINT)

Cyclone Straps are metallic intermediate restraints consisting of a 316L stainless steel strap complete with standard liners which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914.

The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

Intermediate restraints are cable retaining devices that can be used in conjunction with cable cleats to hold the cables together in order to provide resistance to electromechanical forces.

Cyclone II Intermediate restraints (2STR) are designed to wrap around the cables twice to provide resistance required for moderate short circuit faults, whilst the Cyclone III intermediate restraints (3STR) are designed to wrap around the cables three times to provide the resistance needed during high fault short circuit conditions.

Using intermediate restraints between each cable cleat reduces installation time and cost when compared to alternative cleat only systems for use in trefoil or quad formations. CMP has tested the Cyclone strap range in accordance to IEC 61914 and is certified to offer these for use with any trefoil cable cleats.

FEATURES

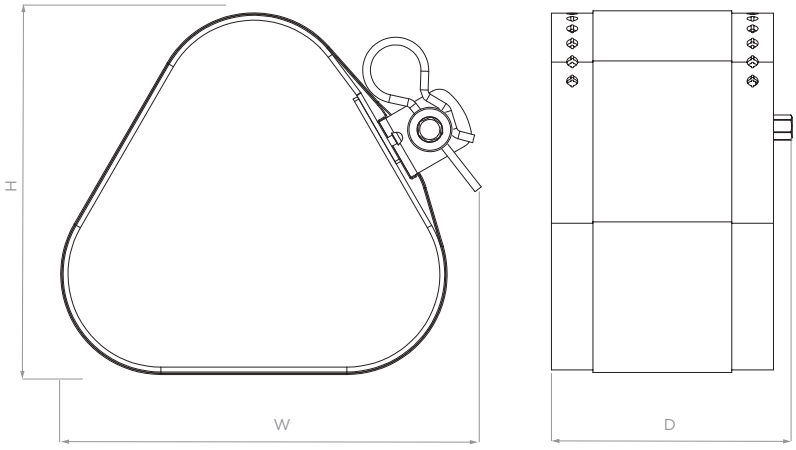
- Reduces installation cost
- Reduces installation time
- For trefoil and quad installations
- Third party certification to IEC 61914
- Lightweight 316L stainless steel strap
- Sunlight (UV) resistant
- Standard operating temperature -50°C to +40°C
- Standard liners are LUL approved and are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- High temperature liner version with HT suffix available with operating temperature -50°C to +90°C
- High temperature liners are classified as V0 Flame Retardant Polymer

TECHNICAL DATA & CLASSIFICATION

TYPE	6.1.3 Composite Strap
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause / part 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time, IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Single - 5.5kN - 20kN 2STR and 6.5kN - 22kN 3STR, IEC 61914 clause 9.3 Trefoil - Refer to CMP Products, 2STR and 3STR IEC 61914 clause 9.3
AXIAL LOAD TEST	IEC 61914 clause 9.4, Single - 0.4kN - 0.6kN 2STR and 0.4kN 3STR IEC 61914 clause 9.4, Trefoil - 0.4kN 2STR and 0.4kN 3STR
IMPACT RESISTANCE	Pass - Very Heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel Strap with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free. HT liners are classified as V0 Flame Retardant Polymer.
MATERIAL COLOUR	Silver / Grey

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

Short circuit tested and certified for use with all CMP cable cleats.
Refer to CMP Products for further information



CABLE CLEAT SELECTION TABLE

CYCLONE II STRAP PART NO.	CYCLONE III STRAP PART NO.	CABLE Ø RANGE TAKE (MM)			DIMENSIONS (MM)			II STRAP WEIGHT (g)	III STRAP WEIGHT (g)
		SINGLE	TREFOIL	QUAD	W	H	D		
2STR024034	3STR024034	36-50	24-34	21-29	73	67	80	211	254
2STR030041	3STR030041	45-60	30-41	26-35	87	81	80	230	267
2STR037047	3STR037047	55-69	37-47	32-40	97	93	80	247	301
2STR043054	3STR043054	64-80	43-54	37-46	113	106	80	265	320
2STR050060	3STR050060	75-88	50-60	43-51	125	118	80	280	336
2STR056067	3STR056067	83-99	56-67	49-57	139	131	80	300	377
2STR063073	3STR063073	94-108	63-73	55-62	151	142	80	316	385
2STR069080	3STR069080	103-118	69-80	60-68	165	156	80	334	421
2STR072085	3STR072085	114-150	72-85	66-72	175	165	80	348	429
2STR082095	3STR082095	145-165	82-95	70-81	195	185	80	375	465
2STR092105	3STR092105		92-105	70-81	215	204	80	402	502
2STR102115	3STR102115		102-115	88-98	235	223	80	429	549
2STR112125	3STR112125		112-125	96-107	255	243	80	456	588
2STR122135	3STR122135		122-135	105-116	275	262	80	483	619
2STR132145	3STR132145		132-145	113-124	295	281.5	80	510	657

HURON (LDAL)

The Huron cable cleats are metallic cable cleats which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914 to ensure the securing and retention of cables, without sustaining damage to the cable(s).

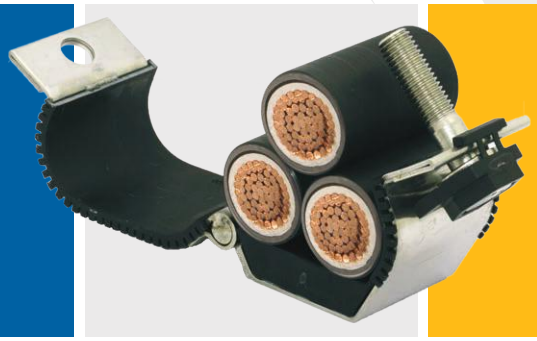
The range is fabricated from 5000 series aluminium and is available in 23 sizes to suit cable diameters 19mm to 128mm.

The cleat has three M10 fixing clearance holes within one base, allowing versatility to the installer during installation to use either one M10 bolt or two M10 bolts, and is designed to enable the product to be secured to a variety of mounting surfaces. The Huron cable cleats hinge opens fully allowing the cables to be easily placed within the cable cleat to aid the installer before closing and securing via the mouth piece bolt.

Liners come as standard which help to restrain the cable(s) within vertical applications. Where thermal elongation of cables occurs, the liner also provides a layer of protection between the cable sheath and the cable cleat during normal operation. This additional layer protects the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

- Third party certification to IEC 61914
- 5000 series aluminium
- 19 - 128mm in 23 sizes for trefoil formation/application
- Short circuit rating of 84kA peak fault
- Operating temperature -50°C to +60°C
- Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- Combined single (M10) or two bolt (M10) fixing design



TECHNICAL DATA & CLASSIFICATION

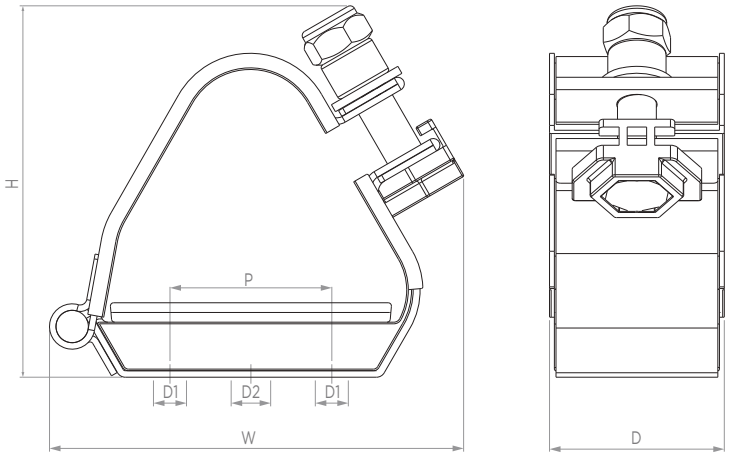
TYPE	6.1.3 Composite LDAL - Aluminium
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products, IEC 61914 clause 9.3
AXIAL LOAD TEST	Refer to CMP Products, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	5000 Series Aluminium with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION	
One short circuit 300mm fixed cleat centres	Two short circuits 300mm fixed cleat centres
0.1 sec	0.1 sec
84kA Peak 40.5kA r.m.s	84kA Peak 40.5kA r.m.s

300MM HURON LDAL (0.1 SEC)

CABLE OD (MM)	PEAK kA
36	84.0
38	86.3
43	91.8
59	107.5
65	112.9



CABLE CLEAT SELECTION TABLE

HURON PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS (MM)						WEIGHT (g)
		W	H	H	P	FIXING HOLE Ø		
						D1	D2	
LDAL019023	19-23	100	87	54	25	2 x M10	1 x M10	213
LDAL023028	23-28	104	88	54	25	2 x M10	1 x M10	235
LDAL027032	27-32	106	97	54	25	2 x M10	1 x M10	242
LDAL030035	30-35	108	103	54	25	2 x M10	1 x M10	248
LDAL033038	33-38	110	107	54	25	2 x M10	1 x M10	251
LDAL036042	36-42	132	108	54	50	2 x M10	1 x M10	295
LDAL040046	40-46	134	113	54	50	2 x M10	1 x M10	302
LDAL044050	44-50	136	121	54	50	2 x M10	1 x M10	309
LDAL048055	48-55	138	127	54	50	2 x M10	1 x M10	320
LDAL051058	51-58	140	130	54	50	2 x M10	1 x M10	326
LDAL055062	55-62	157	138	54	75	2 x M10	1 x M10	363
LDAL059066	59-66	157	145	54	75	2 x M10	1 x M10	371
LDAL063070	63-70	160	152	54	75	2 x M10	1 x M10	378
LDAL067074	67-74	163	160	54	75	2 x M10	1 x M10	386
LDAL071078	71-78	168	167	54	75	2 x M10	1 x M10	395
LDAL074082	74-82	190	175	54	75	2 x M10	1 x M10	444
LDAL077085	77-85	192	180	54	75	2 x M10	1 x M10	450
LDAL082088	82-88	193	186	54	75	2 x M10	1 x M10	455
LDAL088096	88-96	202	201	54	75	2 x M10	1 x M10	472
LDAL096103	96-103	214	215	54	75	2 x M10	1 x M10	486
LDAL103111	103-111	237	229	54	75	2 x M10	1 x M10	545
LDAL111119	111-119	248	244	54	75	2 x M10	1 x M10	561
LDAL119128	119-128	265	260	54	75	2 x M10	1 x M10	591

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (LDAL019023EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

RELIANCE (SDAL)

The Reliance cable cleats are metallic cable cleats which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914 to ensure the securing and retention of cables, without sustaining damage to the cable(s).

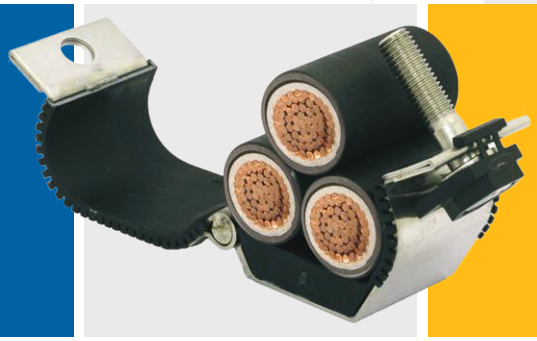
The range is fabricated from 5000 series aluminium and is available in 24 sizes to suit cable diameters 19mm to 128mm.

The cleat has three M10 fixing clearance holes within one base, allowing versatility to the installer during installation to use either one M10 bolt or two M10 bolts, and is designed to enable the product to be secured to a variety of mounting surfaces. The hinge opens fully allowing the cables to be easily placed within the cable cleat to aid the installer before closing and securing via the mouth piece bolt.

Liners come as standard which help to restrain the cable(s) within vertical applications. Where thermal elongation of cables occurs, the liner also provides a layer of protection between the cable sheath and the cable cleat during normal operation. This additional layer protects the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

- Third party certification to IEC 61914
- 5000 series aluminium
- 3mm material thickness
- 19 - 128mm in 24 sizes for trefoil formation / application
- Short circuit rating of 106kA peak fault
- Operating temperature -50°C to +60°C
- Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- Combined single (M10) or two bolt (M10) fixing design



TECHNICAL DATA & CLASSIFICATION

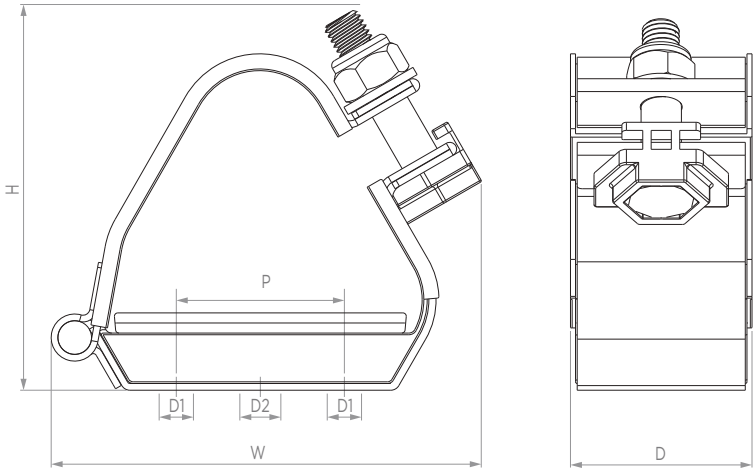
TYPE	6.1.3 Composite SDAL - Aluminium
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products
AXIAL LOAD TEST	Refer to CMP Products
IMPACT RESISTANCE	Pass - Very heavy IEC 61914
MATERIAL	5000 Series Aluminium with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION	
One short circuit 300mm fixed cleat centres	One short circuit 300mm fixed cleat centres
0.1 sec	1.0 sec
106kA Peak	70kA Peak
50.5kA r.m.s	33.3 r.m.s
Cable Ø 38 mm	Cable Ø 38 mm

300MM RELIANCE SDAL (0.1 SEC)

CABLE OD (MM)	PEAK kA
36	103
38	106
43	112
59	132
65	138



CABLE CLEAT SELECTION TABLE

RELIANCE PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS (MM)						WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø		
						D1	D2	
SDAL019023	19-23	102	88	54	25	2 x M10	1 x M10	260
SDAL023028	23-28	106	94	54	25	2 x M10	1 x M10	285
SDAL027032	27-32	108	97	54	25	2 x M10	1 x M10	294
SDAL031035	31-35	110	103	54	25	2 x M10	1 x M10	302
SDAL034038	34-38	112	107	54	25	2 x M10	1 x M10	307
SDAL037042	37-42	134	107	54	50	2 x M10	1 x M10	357
SDAL041046	41-46	136	113	54	50	2 x M10	1 x M10	366
SDAL045050	45-50	138	121	54	50	2 x M10	1 x M10	376
SDAL049055	49-55	140	127	54	50	2 x M10	1 x M10	390
SDAL052058	52-58	142	130	54	50	2 x M10	1 x M10	398
SDAL056059	56-59	144	131	54	50	2 x M10	1 x M10	419
SDAL056062	56-62	159	138	54	75	2 x M10	1 x M10	448
SDAL060066	60-66	159	146	54	75	2 x M10	1 x M10	451
SDAL064070	64-70	162	153	54	75	2 x M10	1 x M10	461
SDAL068074	68-74	165	160	54	75	2 x M10	1 x M10	471
SDAL072078	72-78	170	168	54	75	2 x M10	1 x M10	483
SDAL076082	76-82	192	175	54	75	2 x M10	1 x M10	539
SDAL080086	80-86	196	183	54	75	2 x M10	1 x M10	547
SDAL084090	84-90	199	190	54	75	2 x M10	1 x M10	554
SDAL090098	90-98	208	205	54	75	2 x M10	1 x M10	576
SDAL098103	98-103	216	215	54	75	2 x M10	1 x M10	594
SDAL103111	103-111	239	229	54	75	2 x M10	1 x M10	663
SDAL111119	111-119	250	244	54	75	2 x M10	1 x M10	684
SDAL119128	119-128	267	261	54	75	2 x M10	1 x M10	720

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (SDAL019023EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

PATRIOT (SDSS)

The Patriot cable cleats are metallic cable cleats which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914 to ensure the securing and retention of cables, without sustaining damage to the cable.

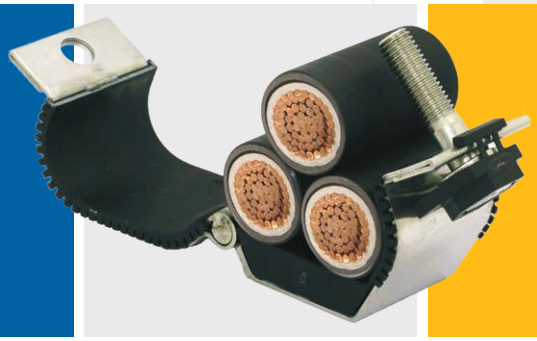
The range is fabricated from 316L stainless steel, giving it high creep strength whilst providing excellent corrosion resistance in the harshest of environments. The Patriot cable cleats are available for trefoil application / formation for diameters of 17mm to 128mm in 24 sizes.

The cleat has three M10 fixing clearance holes within one base allowing versatility to the installer during installation, and is designed to enable the product to be secured to a variety of mounting surfaces. The hinge opens fully allowing the cables to be easily placed within the cable cleat to aid the installer before closing and securing via the mouth piece bolt.

Liners come as standard which help to restrain the cable(s) within vertical applications. Where thermal elongation of cables occurs, the liner also provides a layer of protection between the cable sheath and the cable cleat during normal operation. This additional layer protects the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

- Third party certification to IEC 61914
- 316L stainless steel
- 17 - 128mm in 24 sizes for trefoil formation / application
- Short circuit rating of 135kA peak fault
- Operating temperature -50°C to +60°C
- Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- Combined single (M10) or two bolt (M10) fixing design



TECHNICAL DATA & CLASSIFICATION

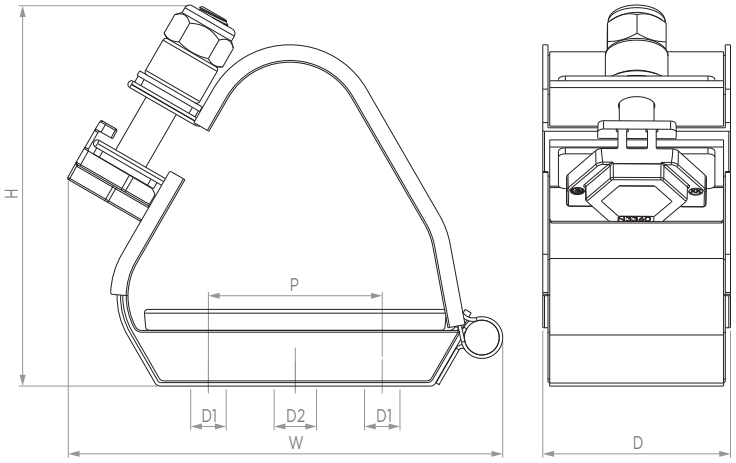
TYPE	6.1.3 Composite SDSS - Standard Duty Stainless Steel
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products, IEC 61914 clause 9.3
AXIAL LOAD TEST	0.6kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION			
One short circuit 300mm fixed cleat centres	Two short circuits 300mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres
0.1 sec	1 sec	0.1 sec	1 sec
135kA Peak	80kA Peak	108kA Peak	75kA Peak
58.8kA r.m.s	38.3kA r.m.s	49.1kA r.m.s	35.7kA r.m.s

300MM PATRIOT SDSS (0.1 SEC)

CABLE OD (MM)	PEAK kA
36	135.0
38	138.7
43	147.5
59	172.8
65	181.4



CABLE CLEAT SELECTION TABLE

PATRIOT PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS (MM)						WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø		
						D1	D2	
SDSS017021	17-21	95	84	54	25	2 x M10	1 x M10	305
SDSS019024	19-24	97	87	54	25	2 x M10	1 x M10	312
SDSS023028	23-28	99	92	54	25	2 x M10	1 x M10	318
SDSS027032	27-32	102	97	54	25	2 x M10	1 x M10	324
SDSS030035	30-35	104	101	54	25	2 x M10	1 x M10	329
SDSS033038	33-38	106	104	54	25	2 x M10	1 x M10	336
SDSS036042	36-42	125	109	54	50	2 x M10	1 x M10	395
SDSS040046	40-46	128	114	54	50	2 x M10	1 x M10	403
SDSS044050	44-50	132	116	54	50	2 x M10	1 x M10	409
SDSS048055	48-55	136	123	54	50	2 x M10	1 x M10	420
SDSS051058	51-58	138	129	54	50	2 x M10	1 x M10	426
SDSS055062	55-62	158	136	54	75	2 x M10	1 x M10	482
SDSS059066	59-66	158	144	54	75	2 x M10	1 x M10	489
SDSS063070	63-70	159	151	54	75	2 x M10	1 x M10	496
SDSS067074	67-74	165	159	54	75	2 x M10	1 x M10	504
SDSS071078	71-78	172	166	54	75	2 x M10	1 x M10	513
SDSS074082	74-82	188	174	54	75	2 x M10	1 x M10	588
SDSS077085	77-85	189	179	54	75	2 x M10	1 x M10	593
SDSS082088	82-88	190	185	54	75	2 x M10	1 x M10	598
SDSS088096	88-96	202	200	54	75	2 x M10	1 x M10	614
SDSS096103	96-103	215	213	54	75	2 x M10	1 x M10	628
SDSS103111	103-111	234	228	54	75	2 x M10	1 x M10	710
SDSS111119	111-119	248	243	54	75	2 x M10	1 x M10	726
SDSS119128	119-128	265	259	54	75	2 x M10	1 x M10	744

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (SDSS030035EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

SOVEREIGN (HDSS)

The Sovereign cable cleats are metallic cable cleats which have been designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914. The Sovereign cable cleat has been designed and tested for high short circuit conditions on cables held in trefoil application / formation, to ensure the securing and retention of cables without damage.

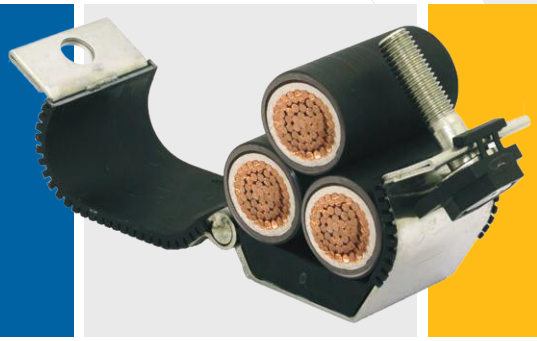
The range is fabricated from 316L stainless steel, giving it high creep strength whilst providing excellent corrosion resistance in the harshest of environments. The Sovereign cable cleat is available for trefoil application/ formation for diameters of 17mm to 128mm in 24 sizes.

The cleat has one M12 and two M10 fixing clearance holes within its base, allowing versatility to the installer during installation, and is designed to enable the product to be secured to a variety of mounting surfaces. The hinge opens fully, allowing the cables to be easily placed within the cable cleat, to aid the installer before closing and securing via the mouth piece bolt.

Liners come as standard which help to restrain the cable(s) within vertical applications. Where thermal elongation of cables occurs, the liner also provides a layer of protection between the cable sheath and the cable cleat during normal operation. This additional layer protects the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

FEATURES

- Third party certification to IEC 61914
- 316L stainless steel
- 17 - 128mm in 24 sizes for trefoil formation /application
- Short circuit rating of 190kA peak fault
- Operating temperature -50°C to +60°C
- Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free
- Combined single (M12) and two bolt (M10) fixing design



TECHNICAL DATA & CLASSIFICATION

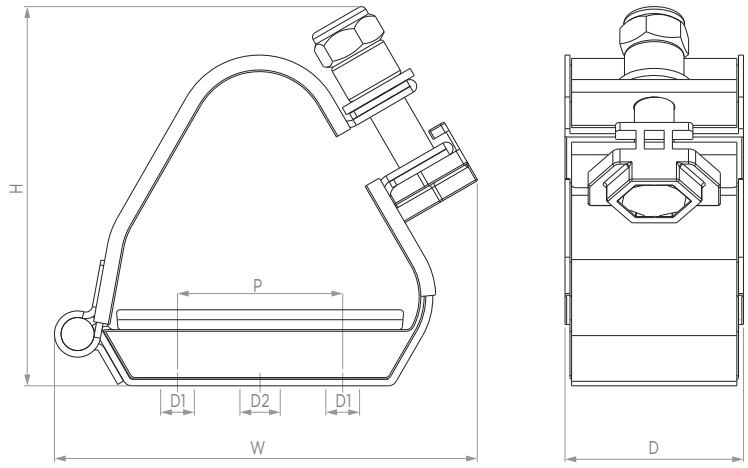
TYPE	6.1.3 Composite HDSS - Heavy Duty Stainless Steel
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products, IEC 61914 clause 9.3
AXIAL LOAD TEST	0.7kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5

TREFOIL FORMATION			
One short circuit 300mm fixed cleat centres	One short circuit 300mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres
0.1 sec	1 sec	0.1 sec	1 sec
190kA Peak	96kA Peak	150kA Peak	80kA Peak
87.7kA r.m.s	46.1kA r.m.s	68.2kA r.m.s	38.1kA r.m.s

300MM SOVEREIGN HDSS (0.1 SEC)

CABLE OD (MM)	PEAK kA
36	190.0
38	195.2
43	207.7
59	243.5
65	255.3



CABLE CLEAT SELECTION TABLE

SOVEREIGN PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS (MM)						WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø		
						D1	D2	
HDSS017021	17-21	99	88	54	25	2 x M10	1 x M12	406
HDSS019023	19-23	100	87	54	25	2 x M10	1 x M12	417
HDSS023028	23-28	104	88	54	25	2 x M10	1 x M12	450
HDSS027032	27-32	106	97	54	25	2 x M10	1 x M12	465
HDSS030035	30-35	108	103	54	25	2 x M10	1 x M12	473
HDSS033038	33-38	110	107	54	25	2 x M10	1 x M12	485
HDSS036042	36-42	132	108	54	50	2 x M10	1 x M12	570
HDSS040046	40-46	134	113	54	50	2 x M10	1 x M12	581
HDSS044050	44-50	136	121	54	50	2 x M10	1 x M12	594
HDSS048055	48-55	138	127	54	50	2 x M10	1 x M12	616
HDSS051058	51-58	140	130	54	50	2 x M10	1 x M12	627
HDSS055062	55-62	157	138	54	75	2 x M10	1 x M12	704
HDSS059066	59-66	157	145	54	75	2 x M10	1 x M12	718
HDSS063070	63-70	160	152	54	75	2 x M10	1 x M12	733
HDSS067074	67-74	163	160	54	75	2 x M10	1 x M12	748
HDSS071078	71-78	168	167	54	75	2 x M10	1 x M12	764
HDSS074082	74-82	190	175	54	75	2 x M10	1 x M12	863
HDSS077085	77-85	192	180	54	75	2 x M10	1 x M12	873
HDSS082088	82-88	193	186	54	75	2 x M10	1 x M12	883
HDSS088096	88-96	202	201	54	75	2 x M10	1 x M12	914
HDSS096103	96-103	214	215	54	75	2 x M10	1 x M12	942
HDSS103111	103-111	237	229	54	75	2 x M10	1 x M12	1055
HDSS111119	111-119	248	244	54	75	2 x M10	1 x M12	1086
HDSS119128	119-128	265	260	54	75	2 x M10	1 x M12	1122

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (HDSS033038EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

CONQUEROR (RTSS)
THE FULLY VERSATILE CABLE CLEAT

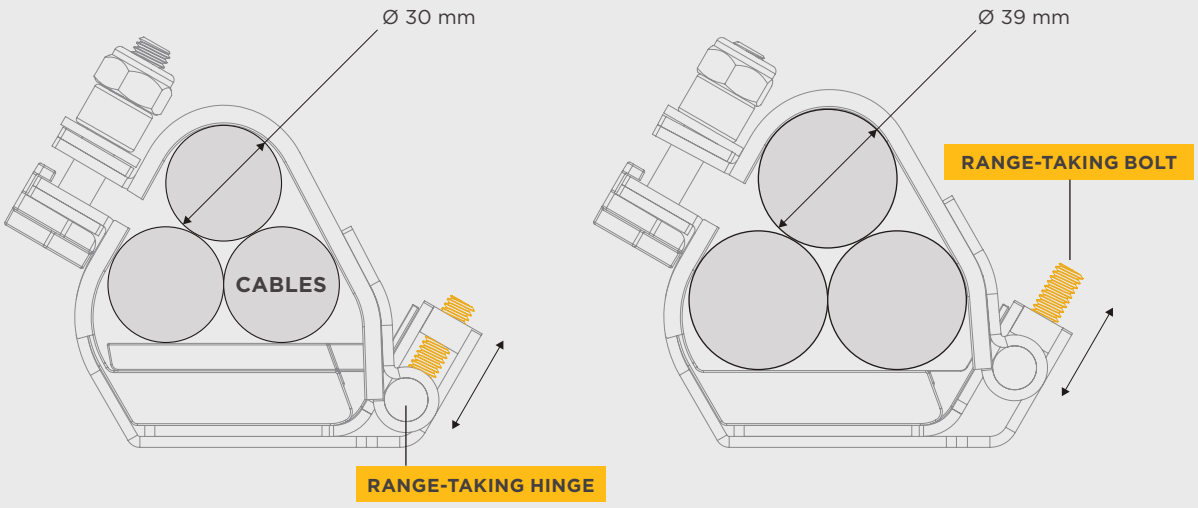
Conqueror has been designed to suit a wide cable range take, allowing one cleat to fit a much broader range of cable sizes than a conventional fixed hinge cable cleat.

A common problem when ordering cable is that the actual outer cable diameter may vary from the nominal size by as much as 5%. If the cable diameter is at the upper or lower limit of a fixed hinge cable cleats range, this could result in the cleat being either too small or too large to properly restrain the cables. When this happens during a project, especially one situated in a remote location, there will be delays and additional costs to re-order cleats of the correct size.

The Conqueror can easily cope with these size fluctuations, reducing the need for multiple cleat sizes to safely clamp the cables. The simple and easy-to-use adjustable hinge of the conqueror cable cleat allows each of the 16 sizes to provide a cable range take of 9mm, almost twice that of other fixed hinge cable cleats.

CABLE RANGE CAPABILITIES

Each of the 15 sizes has 9mm range take. Range-taking bolt allows the Conqueror to safely clamp cables within its 9mm range.



The Conqueror cable cleats are metallic cable cleats designed, constructed, and tested in accordance with the International Standard 'cable cleats for Electrical Installations' IEC 61914. The Conqueror cable cleat has been designed to restrain a large cable range take, and tested for exceptionally high short circuit conditions on cables held in trefoil application / formation, to ensure the securing and retention of cables without damage.

Conqueror is unique with its patent pending adjustable hinge. The movement of this hinge virtually doubles the range take adjustment when compared to other fixed hinged products on the market. Conqueror covers a range of cable diameters from 19mm up to 130mm in only 15 sizes. The cable cleat is fabricated from 316L stainless steel, giving it high creep strength whilst providing excellent corrosion resistance in the harshest of environments.

The Conqueror cable cleat has one M12 and two M10 fixing clearance holes within its base, allowing versatility to the installer during installation, and is designed to enable the product to be secured to a variety of mounting surfaces. The cable cleat hinge opens fully, allowing the cables to be easily placed within the cable cleat, to aid the installer before closing and securing via the mouth piece bolt.

The Conqueror cable cleats come with a liner as standard which help to restrain the cable(s) within vertical applications. The liner also provides a layer of protection between the cable sheath and the cable cleat during normal operation, where thermal elongation of cables occurs. This additional layer protects the cable from chafing on any mounting surface due to differential movements such as those found in marine and offshore applications. The liners also assist in the extra protection of cable(s) in the event of short circuit fault conditions. The standard liners supplied are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free.

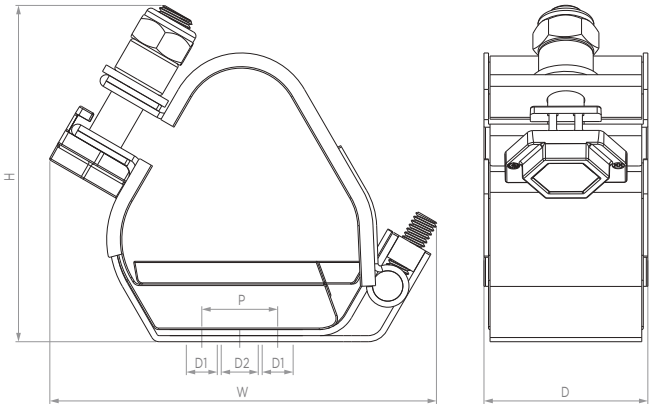
FEATURES

- **Third party certification to IEC 61914**
- **316L stainless steel**
- **23-130mm in 15 sizes for trefoil formation /application**
- **Short circuit rating of 170kA peak fault**
- **Operating temperature -50°C to +60°C**
- **Liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus Free**
- **Combined single (M12) and two bolt (M10) fixing design**

CONQUEROR (RTSS)
THE FULLY VERSATILE CABLE CLEAT

TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.3 Composite RTSS - Range Taking Stainless Steel
DESIGN SPECIFICATION	IEC 61914
TEMPERATURE FOR PERMANENT APPLICATION	-50°C to +60°C IEC 61914 clause 6.2
NEEDLE FLAME TEST	Pass - 120 second flame application time IEC 61914 clause 10.0, 10.1, IEC 60695-11-5
LATERAL LOAD TEST	Refer to CMP Products, IEC 61914 clause 9.3
AXIAL LOAD TEST	0.9kN - 1.1kN, IEC 61914 clause 9.4
IMPACT RESISTANCE	Pass - Very heavy IEC 61914 clause 6.3, 6.3.5, 9.2
MATERIAL	316L Stainless Steel with Standard Liner Standard liners are classified as Low Smoke & Fume (LSF), Zero Halogen (LSOH) and Phosphorus Free

SHORT CIRCUIT TESTING TO IEC 61914 - CLAUSE 9.5				
TREFOIL FORMATION				
One short circuit 300mm fixed cleat centres	One short circuit 300mm fixed cleat centres	Two short circuits 600mm fixed cleat centres	One short circuit 600mm fixed cleat centres	Two short circuits 600mm fixed cleat centres
0.1 sec	1 sec	0.1 sec	3 sec	1 sec
170kA Peak	90kA Peak	131kA Peak	61kA Peak	80kA Peak
77.3kA r.m.s	43.2kA r.m.s	59.6kA r.m.s	29.1kA r.m.s	38.1kA r.m.s



300MM CONQUEROR RTSS (0.1 SEC)	
CABLE OD (MM)	PEAK kA
36	170.0
38	174.6
43	185.7
59	217.6
65	228.4

CABLE CLEAT SELECTION TABLE

CONQUEROR PART NO.	CABLE Ø RANGE TAKE (MM)	DIMENSIONS (MM)						WEIGHT (g)
		W	H	D	P	FIXING HOLE Ø		
						D1	D2	
RTSS023032	23-32	122	99	54	25	2 x M10	1 x M12	509
RTSS030039	30-39	126	111	54	25	2 x M10	1 x M12	534
RTSS037046	37-46	132	117	54	25	2 x M10	1 x M12	557
RTSS044053	44-53	151	128	54	50	2 x M10	1 x M12	676
RTSS051060	51-60	154	139	54	50	2 x M10	1 x M12	694
RTSS058067	58-67	157	151	54	50	2 x M10	1 x M12	727
RTSS065074	65-74	176	163	54	75	2 x M10	1 x M12	839
RTSS072081	72-81	182	175	54	75	2 x M10	1 x M12	866
RTSS079088	79-88	191	190	54	75	2 x M10	1 x M12	900
RTSS086095	86-95	216	202	54	75	2 x M10	1 x M12	1023
RTSS093102	93-102	222	215	54	75	2 x M10	1 x M12	1050
RTSS100109	100-109	228	228	54	75	2 x M10	1 x M12	1079
RTSS107116	107-116	254	241	54	75	2 x M10	1 x M12	1199
RTSS114123	114-123	257	254	54	75	2 x M10	1 x M12	1228
RTSS121130	121-130	268	267	54	75	2 x M10	1 x M12	1255

Coatings are available upon request by adding the following suffixes to the ordering reference – EC for epoxy coating, PC for polyester coating and TC for thermoplastic coating. Example order reference for epoxy coating suffix EC (RTSS065074EC). Fasteners required to secure the cable cleat to the support structure are not included but can be supplied upon request - see cleat fixing pack page 64-65. Isolation/separation pads (to prevent corrosion between two dissimilar metals) are not included but can be supplied on request - see isolation/separation pad page 66.

GOOD INSTALLATION PRACTICES

CHANGES OF DIRECTION IN CABLE ROUTES

Cable routes that are installed through bends should be restrained differently to straight lengths of cable run, whether this cable routing is through a change in direction in the horizontal or vertical plane, or a transition from horizontal to vertical or vice versa.

As a guide to good practice, CMP recommends that throughout these changes in direction, cable cleats should be installed at a distance of 300mm; if this is not possible due to the lack of substructure then it is recommended that as an alternative to cable cleats, intermediate restraints are used in conjunction with cable cleats, spaced equidistant between the fixed cable cleats.

KEY

1. 900mm linear spacing
2. 300mm cleat spacing around cable bend

Fig 1.

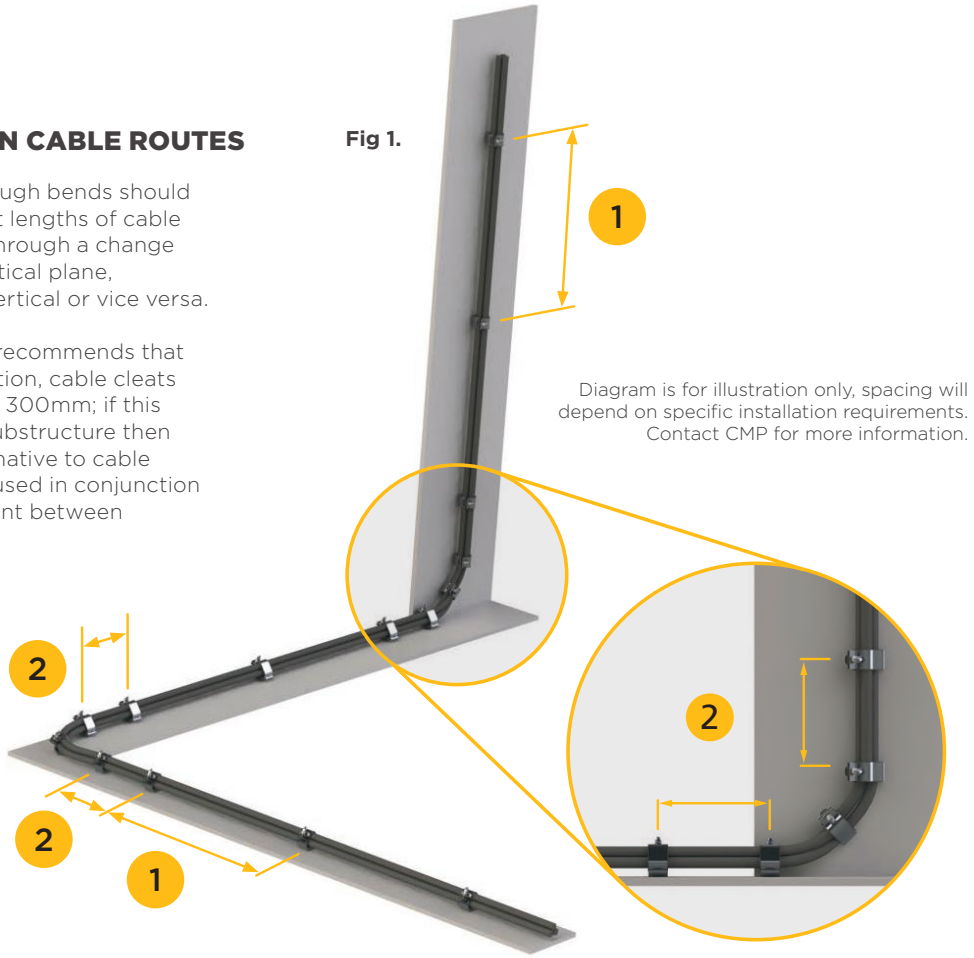


Diagram is for illustration only, spacing will depend on specific installation requirements. Contact CMP for more information.

TERMINATION AND JOINTING

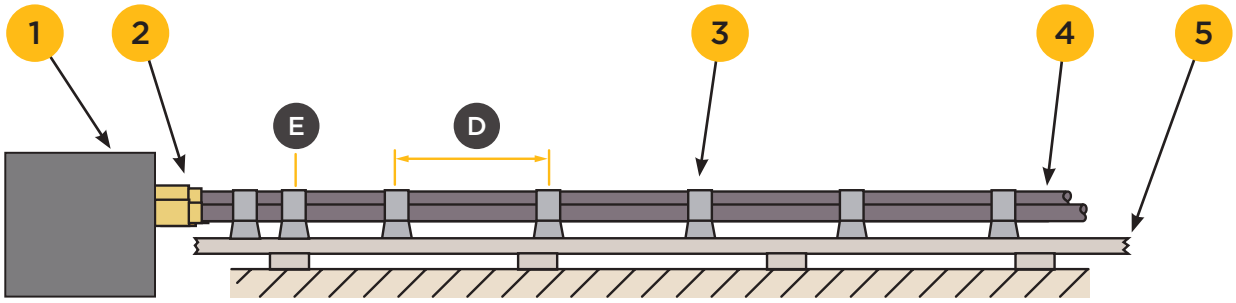
Cable cleats are not only designed for the protection of the cable but for the cable system itself. This includes the accessories such as joints and terminations. In order to protect such accessories and reduce the mechanical load on these items, cable cleats are recommended to be installed as close as possible to the accessories, followed immediately by an additional cable cleat before the equidistant spacing of the cable cleat installation.

This is recommended to compensate for the expansion forces generated during normal operation of the cables, and to prevent excessive axial movement that could be transferred onto the accessories / terminations and subsequently to the equipment.

The same installation technique should be applied at either side of any cable joints.

TERMINATING CABLE RUNS:

Fig 2.



KEY 1 Equipment 2 Cable termination 3 Cable cleats 4 Cable 5 Mounting surface
D Spacing E Additional cleat before equidistant spacing

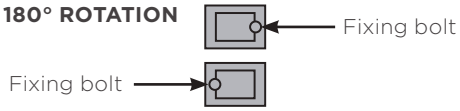
TREFOIL FORMATION VERTICAL RUNS

CMP Products recommends that cables that are to be installed in trefoil formation, in long vertical runs should use a method known as 'alternative cleating'. This method involves installing cable cleats at equidistant spacing, but rotated by 180° every cleat.

This method allows a more even distribution of axial load through the cable cleat, resulting in a safer installation.

Fig 4.

180° ROTATION



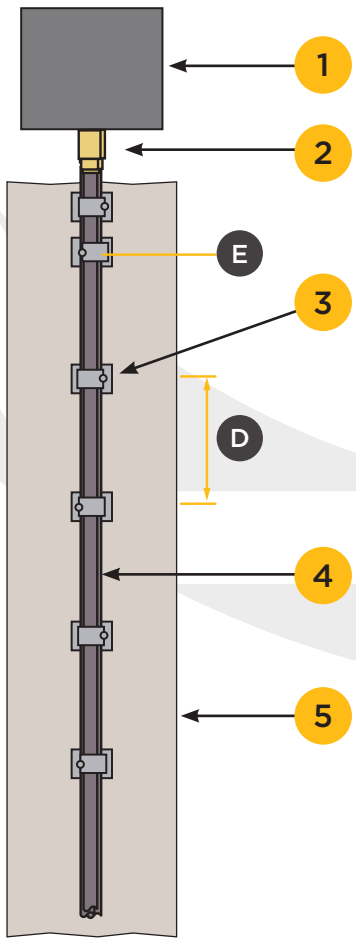
PRACTICAL CABLE CLEAT SPACING

The correct spacing of cable cleats is dictated by the short circuit forces produced during a fault, or by the axial load when cables are held in a vertical application, whichever is more onerous. When calculating these distances between cable cleats, the distances can be very large.

CMP Products recommends that cable cleats to be used for cables in trefoil formation should not exceed a 900mm spacing; for cable cleating in excess of 900mm, intermediate restraints shall be used at the mid-point between fixed cable cleats up to and including a distance of 1800mm. This provides the safe restraint of the cables during fault conditions and prevents excessive 'bird caging' which can lead to cable damage and damage to surrounding infrastructure. These distances ensure that the cable formation specified for the installation is correctly maintained throughout the cable run.
See page 40 for more information.

If the required cable cleat spacing of any particular installation exceeds a distance of 1800mm, it should be noted that every installation is different, CMP Products will work with customers to ensure a safe and successful installation on a case-by-case basis.

Fig 3.



KEY

- 1 Equipment
- 2 Cable termination
- 3 Cable cleats
- 4 Vertical trefoil cable formation
- 5 Mounting surface
- D Equidistant spacing - 180° rotation as per Fig 4.
- E Additional cleat before equidistant spacing

SHORT CIRCUIT TESTING

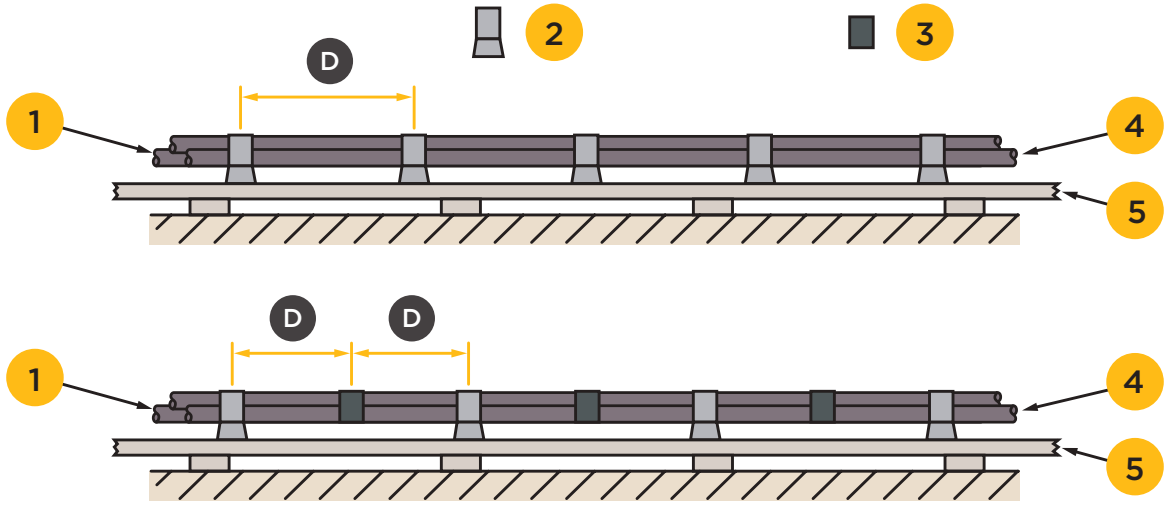
Test for resistance to electromechanical force according to IEC 61914.

A short circuit test is carried out as follows, using the manufacturer's or responsible vendor's declared values of peak short circuit current (i_p) and initial r.m.s symmetrical short circuit current (I"k). Where there are a number of cable cleats in the range, one or more classes are defined (see IEC 61914 - Clause 5.1). This test is performed on the most critical size in each class.

The test is carried out at ambient temperature, considered to be the defined temperature for permanent application, using unarmoured single core 600 V / 1,000 V cable with stranded copper conductor. A test rig is assembled using the selected cables and cable cleats, being the equipment under test, with the equipment and cables used being fully documented. The test is then carried out on the declared arrangement at the declared short circuit level.

Typical test rig layouts are shown in the illustrations below.

TYPICAL LAYOUT FOR TESTING FOR THE RESISTANCE TO ELECTROMECHANICAL FORCES DURING SHORT CIRCUIT:



IEC 144/09

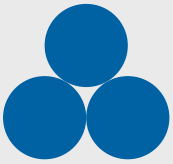
KEY

1. Supply end
2. Cable cleats
3. Intermediate restraints
4. Short circuit busbar end
5. Mounting surface

D Spacing

FIGURE 1.

Typical arrangement of three cables in close trefoil formation



For the purpose of testing, the arrangement of the cables may be as shown in Figure 1, Figure 2 or any other configuration as declared by the manufacturer or responsible vendor.

One end of the test set-up is connected to a three phase supply and the other end to a short circuiting busbar, with all three phases connected. The cable is restrained at a minimum of 5 positions along the length of the cable run. Where intermediate restraints are used, at least 4 cable cleats and at least 3 intermediate restraints shall be used. Cable cleats and intermediate restraints, where used, shall be equally spaced. The cable cleats are fixed to a mounting surface defined by the manufacturer (e.g. cable ladder) which shall be suitably selected taking into account the electromechanical forces likely to occur during the test.

FIGURE 2.

Typical arrangement of cables in flat formation

Care is taken to ensure that the cross-sectional area of the cable is adequate for the magnitude and duration of the test current.

The manufacturer's or responsible vendor's catalogue references of the cable cleats and intermediate restraint (where used), the assembly details showing the spacing intervals and the external cable diameter used in the test shall be recorded.

The test set-up is subjected to a three phase short circuit for a duration of not less than 0.1 s. The duration of the test is recorded along with any other relevant data.

IEC 61914 CLAUSE 9.5.2 FOR CABLE CLEATS AND INTERMEDIATE RESTRAINTS CLASSIFIED IN IEC 61914:2009 CLAUSE 6.4.3 / IEC 61914:2015 CLAUSE 6.4.4

(IEC 61914:2009 Clause 6.4.3 / IEC 61914:2015 Clause 6.4.4 Resistant to electromechanical forces, withstanding one short circuit)

Cable cleats and intermediate restraints classified under the aforementioned clauses shall comply with the following requirements:

- there shall be no failure that will affect the intended function of holding the cables in place;
- the cable cleats and the intermediate restraints, if used, shall be intact with no missing parts (minor deformation is acceptable):
- there shall be no cuts or damage visible to normal or corrected vision to the outer sheath of the cable caused by the cable cleats or by the intermediate restraints, if used.

IEC 61914 CLAUSE 9.5.3 FOR CABLE CLEATS AND INTERMEDIATE RESTRAINTS CLASSIFIED IN IN IEC 61914:2009 CLAUSE 6.4.4 / IEC 61914:2015 CLAUSE 6.4.5

(IEC 61914:2009 Clause 6.4.4 / IEC 61914:2015 Clause 6.4.5 Resistant to electromechanical forces, withstanding more than one short circuit)

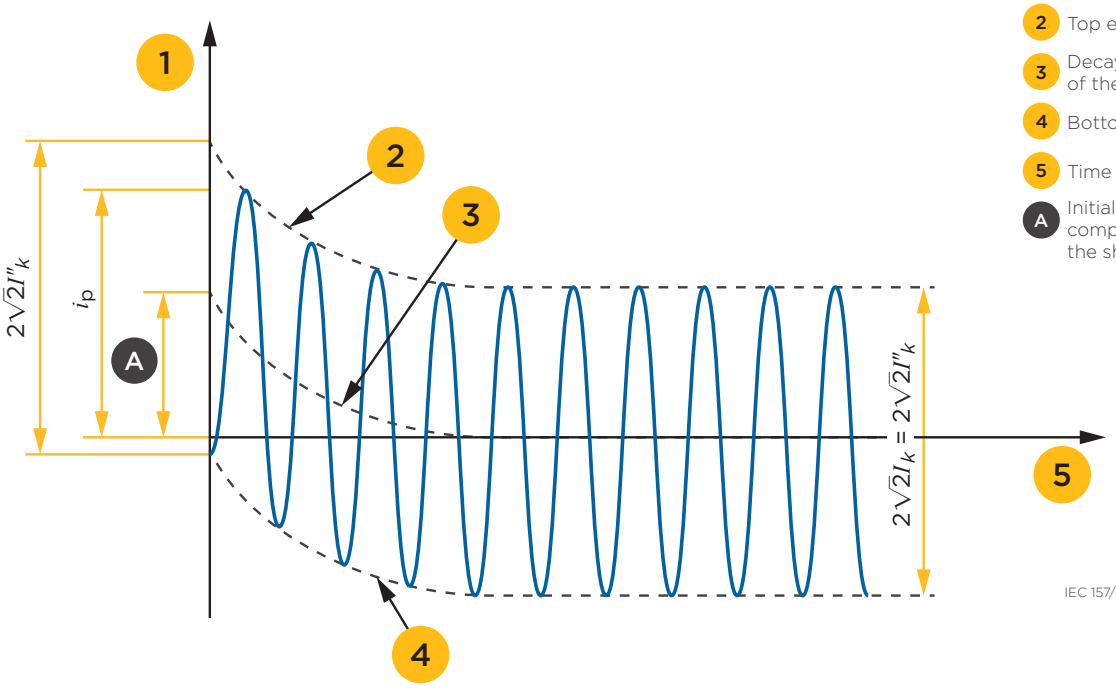
Cable cleats and intermediate restraints classified under the aforementioned clauses shall comply with Clause 9.5.2. After a second short circuit application, a voltage withstand test is performed by applying a minimum test voltage of 2.8 kV d.c. for a period of (60^{+5}_{0}) seconds according to the provisions of IEC 60060-1:1989, 'High-voltage test techniques - Part 1: General definitions and test requirements', Clause 13.1, 'Requirements for the test voltage', and Clause 14.1, 'Withstand voltage tests'. The voltage withstand test shall be administered between the cable cores and the mounting frame. The mounting frame shall be bonded to the earthing system. Where the cables incorporate screening or shielding, the screens and shields shall be bonded together and also bonded to the mounting frame. Where the cables do not incorporate screening or shielding, the cable jackets or sheaths and mounting frames shall be pre-wetted with sufficient water to facilitate a current leakage path along the outer jackets or sheaths. The cable jackets or sheaths and mounting frames shall be pre-wetted for (2^{+1}_{0}) minutes before the test begins using water with a resistivity of (100^{+15}_{-15})ff.m, which shall be measured immediately before starting the test.

The cables shall meet the requirements of the voltage withstand test without failure of the insulation.

CALCULATION OF FORCES CAUSED BY SHORT CIRCUIT CURRENTS (IEC 61914)

The characteristics of the current during a short circuit depend on a number of factors, including the electrical separation from the generator. The figure below shows a current vs. time characteristic typical of a far-from-generator short circuit. The a.c. component in this case has a constant amplitude ($I''_k = I_k$) and is superimposed on a decaying d.c component, i d.c. This falls from an initial value, A, to zero.

SHORT CIRCUIT CURRENT OF A FAR-FROM-GENERATOR SHORT CIRCUIT WITH CONSTANT a.c. COMPONENT



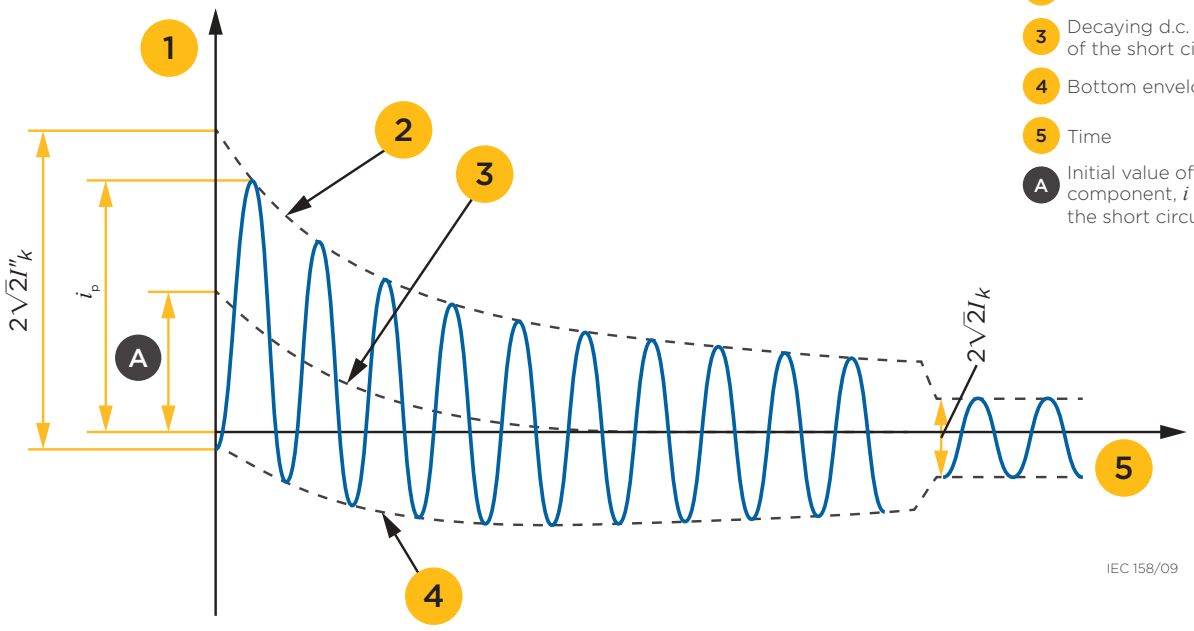
KEY

1. Current
2. Top envelope
3. Decaying d.c. component, *i* d.c. of the short circuit current
4. Bottom envelope
5. Time

A. Initial value of the d.c. component, *i* d.c. of the short circuit current

For near-to-generator short circuits, the a.c. component has a decaying amplitude ($I''_k > I_k$) and is also superimposed on a decaying d.c. component, *i* d.c. that falls from an initial value, A, to zero. The figure below shows a typical current vs. time characteristic for a near-to-generator short circuit.

SHORT CIRCUIT CURRENT OF A NEAR-TO-GENERATOR SHORT CIRCUIT WITH DECAYING a.c. COMPONENT



KEY

1. Current
2. Top envelope
3. Decaying d.c. component, *i* d.c. of the short circuit current
4. Bottom envelope
5. Time

A. Initial value of the d.c. component, *i* d.c. of the short circuit current

SPECIFICATION OF THE TEST CURRENT

A complete specification of short circuit currents should give the currents as a function of time at the short circuit location from the initiation of the short circuit up to its end. In most practical cases, this is not necessary. It is usually sufficient to know the peak current, ip, and the values of the initial r.m.s symmetrical, I''_k, and steady state, I_k, currents.

In order to specify the current used in a short circuit test the following are quoted:

- the peak current, $\boldsymbol{i_p}$;
- the initial r.m.s symmetrical short circuit current, I''_k;
- the short circuit duration, t.

CALCULATION OF THE MECHANICAL FORCES BETWEEN CONDUCTORS

The electromagnetic force acting on a conductor is determined by the current in the conductor and the magnetic field from the neighbouring conductors. In cable installations, the distances between the conductors are normally small and hence the forces may be considerable. In the case of two parallel conductors, the electromagnetic force on a conductor can be derived from Equation B1:

$F(t) = B(t) \cdot i(t) \cdot l$

- l is the length;
- F(t) is the momentary electromagnetic force on a conductor;
- B(t) is the momentary magnetic field from the neighbouring conductor;
- i(t) is the momentary current in the neighbouring conductor.

If the d.c. component of the short circuit current is disregarded, the momentary force has a sinusoidal variation with a frequency twice the frequency of the currents (Equation B.1). The d.c. component gives a decaying force-component with a frequency the same as the system frequency.

TWO PARALLEL CONDUCTORS

For the two parallel conductors in figure above, the magnetic field from current i1, at the location of the other conductor is:

$$\boldsymbol{B = \mu 0 \cdot H = \mu_0 \cdot i1 \,/\, 2 \cdot \pi \cdot S} \text{ (B.2)}$$

where $\mu o = 4 \cdot \pi \cdot 10^{-7}$ (H/m)
and the mechanical force is:

$$\boldsymbol{F = i_2 \times B = i2 \cdot \mu_0 \cdot i1 \,/\, 2 \cdot \pi \cdot S} \text{ (B.3)}$$

his equation is usually written as:

$$\boldsymbol{F_s = 0.2 \cdot i1 \cdot i2 \,/\, S} \text{ (B.4)}$$

In this equation, the force is given in N/m, ***i*** in kA and S in metres. The evaluation of Equation B.4 requires *S >> d* but gives an acceptable accuracy when the current distribution is uniform (or symmetrical) within the conductors.

The vector Equation B.3 confirms that two parallel conductors are repelled if the two currents have a difference in phase angle of 180° and that the force is directed towards the other conductor for currents that have the same phase angle.

In a three phase system, the magnetic field in Equation B.2 is the resulting momentary vector value from the other two phases.

For a three phase short circuit with the conductors in flat configuration, the forces on the two outer conductors are always directed outwards from the central conductor. The force on the central conductor is oscillating. The maximum force on the outer conductors in flat formation can be calculated by:

$$F_{fo} = 0.16\ i_p^2 / S \quad \text{(B.5)}$$

The maximum force on the middle conductor in flat formation can be calculated by:

$$F_{fm} = 0.17\ i_p^2 / S \quad \text{(B.6)}$$

For a three phase short circuit with the cables in a trefoil configuration the maximum force on the conductor is:

$$F_t = 0.17\ i_p^2 / S \quad \text{(B.7)}$$

where:

F_s is the maximum force on the cable conductor in flat formation for a single phase short circuit [N/m];

F_{fo} is the maximum force on the outer cable conductors in flat formation for a three phase short circuit [N/m];

F_{fm} is the maximum force on the centre cable conductor in flat formation for a three phase short circuit [N/m];

F_t is the maximum force on the cable conductor in a trefoil configuration for a three phase short circuit [N/m];

i_p is the peak short circuit current [kA];

d is the external diameter of the conductor [m];

S is the centre to centre distance between two neighbouring conductors [m].

PEAK FAULT & r.m.s

A three phase short circuit fault can be split into two states, an asymmetrical state and a symmetrical state. The Peak fault occurs first during the asymmetrical state and is the maximum possible instantaneous value of the short circuit current. The r.m.s fault occurs after the Peak fault and is the latter more symmetrical state of the short circuit. r.m.s is the square root of the mean of the squares of the values of these two states.

PEAK SHORT CIRCUIT - i_p

'maximum possible instantaneous value of the short circuit current'

INITIAL r.m.s SYMMETRICAL SHORT CIRCUIT CURRENT – I''_k

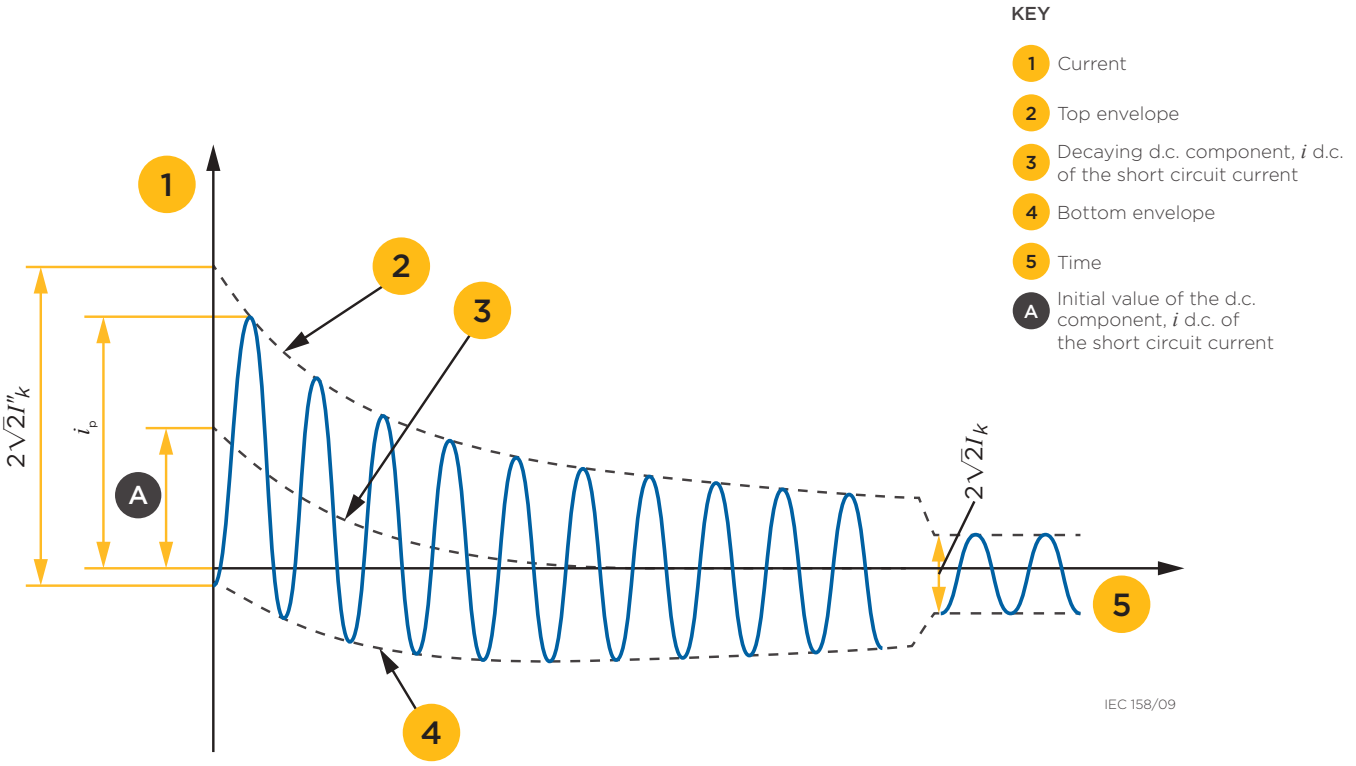
'r.m.s value of the a.c. symmetrical component of a short circuit current, applicable at the instant of the short circuit if the impedance remains at the zero-time value'

DECAYING (APERIODIC) COMPONENT OF SHORT CIRCUIT CURRENT - id.c

'mean value between the top and bottom envelope of a Short circuit current decaying from an initial value to zero'

STEADY-STATE SHORT CIRCUIT CURRENT - I_k

'r.m.s value of the Short circuit current which remains after the decay of the transient phenomena'



CMP SHORT CIRCUIT TESTING

ALL CMP PRODUCTS CABLE CLEATS HAVE BEEN TESTED AND CERTIFIED ACCORDING TO THE LATEST IEC 61914 STANDARD BEFORE THEIR RELEASE TO THE MARKET.

PROJECTING PEAK FAULTS AND MECHANICAL FORCES

CABLE CLEATS - SHORT CIRCUIT CALCULATIONS

Below is an explanation of how CMP Products calculates Peak kA current short circuit current ratings for each specific customer application and installation.

CMP Products has carried out over 300 short circuit tests, however it is not viable to test for every fault current, cable cleat, cable size/type and fixing centre configuration.

In order to replicate these tests CMP is continuously developing simulation software and can undertake project specific testing on the cable cleat, cable and cable tray or ladder intended to be used on the installation.

CMP also has the experience to reliably calculate what the Peak kA short circuit rating will be, based upon the expansive test data it holds following the comprehensive testing programme undertaken.

TESTING

Beginning with a short circuit test at 300mm fixing centres, the maximum safe Peak current in kA that the cable cleat under test can restrain is established and achieved.

In the example below the cable cleat successfully passed the tests in the IEC 61914 standard at 190kA on Ø36mm cable @ 300mm fixing centres.

Before short circuit test

After short circuit test

CALCULATING THE MAX FORCE PER CABLE CLEAT TESTED

$$F_t = \frac{0.17 \times i_p^2}{S} \qquad F_t = \frac{0.17 \times 190^2\,(\text{kA})}{0.036\ (\text{m})}$$

From that test result the calculation from the cable cleat standard IEC 61914 is used to work out the force restrained by the cable cleat under test:

- F_t is the maximum force on the cable (N/m)
- i_p is the peak short circuit current (kA)
- S is the centre to centre distance between two neighbouring conductors i.e. for trefoil formation this is the cable outside diameter (m)

IN THIS EXAMPLE THE F_t EQUALS 170,472.22 N/m

F_t is a force in Newtons per metre so to calculate the maximum force which each cable cleat restrained, this must be multiplied by the cable cleat fixing centres:

Max force per cable cleat = F_t (N/m) x fixing centres (m)
Max force per cable cleat in this example (0.3m fixing centres) = 51,141.67 N

CALCULATING THE F*t* FOR A NEW APPLICATION

$$F_t = \frac{\text{max force per cable cleat (N)}}{\text{fixing centres (m)}} \qquad F_t = \frac{51.141.67\ (\text{N})}{0.6\ (\text{m})}$$

Now that the maximum force per cable cleat has been established, the formula is transposed to calculate the maximum peak fault current for different fixing centres, cable diameters etc.

To calculate the i_p if the fixing centres were to be increased 600mm then Ft would first need to be calculated:

- F_t is the maximum force on the cable (N/m)
- i_p is the peak short circuit current (kA)
- S is the centre to centre distance between two neighbouring conductors i.e. the cable outside diameter (m)

F_t IN THIS NEW EXAMPLE = 85,236.11 (N/m)

Now that the F_t for this application has been established, the i_p can be calculated.

CALCULATING THE i_p FOR A NEW APPLICATION

$$i_p = \sqrt{\left(\frac{F_t \times S}{0.17}\right)} \qquad i_p = \sqrt{\left(\frac{85{,}236.11\ (\text{N/m}) \times 0.036\ (\text{m})}{0.17}\right)}$$

F_t is the maximum force on the cable (N/m)

i_p is the peak short circuit current (kA)

S is the centre to centre distance between two neighbouring conductors i.e. the cable outside diameter (m)

i_p IN THIS EXAMPLE = 134.35kA

Experience shows that this value is always lower than can be achieved in a physical test. This confirms that there is a safety factor element included in the IEC 61914 calculation; this is a good thing as it means that calculated values are always on the conservative side.

However it also means that the F_t or maximum force per cable cleat ratings taken from test results should only be used on fixing centre intervals which are shorter than those actually tested, as a basis for any calculated i_p's. Calculating the opposite way is not recommended as it contradicts the safety factor employed in the standard and gives unrealistic and unachievable i_p's.

FOR EXAMPLE

On the same cable cleat and cable the cable cleat successfully passed the tests in the 61914 standard at 150kA @ 600mm fixing centres (calculated i_p was only 134.35kA so in practice ~12% more was achieved)

From this new i_p an F_t is calculated:

$$F_t = \frac{0.17 \times i_p^2}{S} \qquad F_t = \frac{0.17 \times 150^2\ (\text{kA})}{0.036\ (\text{m})}$$

F_t is the maximum force on the cable (N/m)

i_p is the peak short circuit current (kA)

S is the centre to centre distance between two neighbouring conductors i.e. the cable outside diameter (m)

IN THIS EXAMPLE THE F_t = 106,250 N/m

Max force per cable cleat in this example (0.6m fixing centres) = 63,750 N

If this maximum force per cable cleat value was to be used as a basis to calculate the i_p for fixing centres of 0.3m, then the F_t would = 212,500 N/m

This gives a calculated ip of 212.13kA – THIS IS DANGEROUSLY HIGH!

Only 190kA was achieved @ 300mm fixing centres under physical test and that showed that the cable cleat was very close to its maximum strength capabilities.

TO RE-CONFIRM:

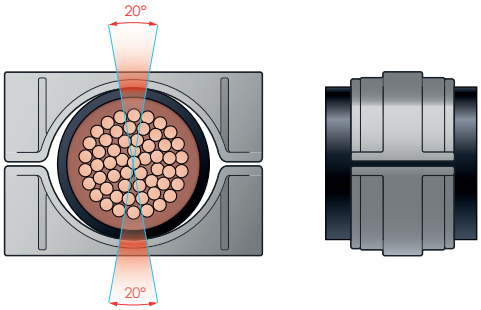
Only use the F_t or max force per cleat ratings from CMP test results on shorter fixing centres than those intended to be used, as a basis for any calculated i_p's. Calculating the opposite way is dangerous, as it contradicts the included safety factor in the standard calculation which gives unrealistic and unachievable i_p's.

For the most accurate calculation and safest installation, CMP recommends that the data from the CMP test result of cable cleats fixed closest (but still shorter) to the target fixing centres is used to calculate the i_p, for example:

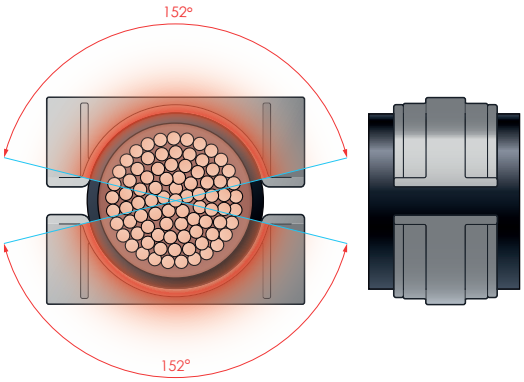
If 500mm fixing centres are required, use the 300mm centres force per cleat CMP test data as a basis for the i_p calculation.

If 900mm fixing centres are required, use the 600mm centres force per cleat CMP test data as a basis for the i_p calculation.

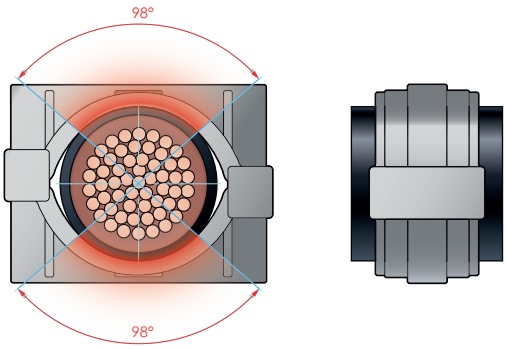
TWIN ARC PROFILES



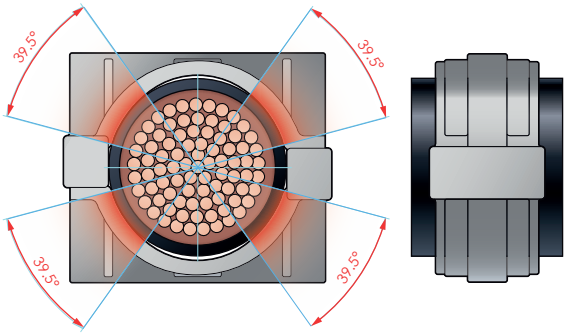
SMALLEST CABLE
40° therefore 11% of cable surface in contact with cable cleat



LARGEST CABLE
304° therefore 84% of cable surface in contact with cable cleat



SMALLEST CABLE
196° therefore 54% of cable surface in contact with cable cleat



LARGEST CABLE
158° therefore 44% of cable surface in contact with cable cleat

DISADVANTAGES OF STANDARD CABLE CLEAT PROFILES

In the past many cable cleats had a simple circular internal profile; this gives excellent surface contact on the maximum size of cable in the clamping range (84% of the cable in contact with the cable cleat) which in turn gives an excellent level of axial restraint.

However, on the minimum size of cable in the clamping range, little more than a point contact between the top and bottom of the cable and the cable cleat (11% of the cable in contact with the cable cleat) is achieved which gives a very poor level of axial restraint.

Due to the poor surface contact (only in the centres at the top and bottom of the cable) on the smaller sizes of cable in the range, it is easy to over-tighten the fixing bolts. This not only crushes the cable out of shape, it also deforms the cable cleat around the cable therefore stressing the cable cleat material. It is not possible to have the same bolt torque settings for every size of cable, since the smaller cables allow the cable cleat to deform (closing the gaps either side of the cable to cable cleat contact areas in the centre) and the torque level will be reached later, so installation procedures can be ambiguous.

Typical range taking capabilities of prior art cable cleats vary from 5-8mm on cable outside diameter.

BENEFITS OF CMP TWIN ARC CABLE CLEAT PROFILES

Analysing CMP's single bolt Sabre, Valiant and Solace and two bolt Falcon, Zenith and Themis cable cleat internal profile, there are two separate arcs joined tangentially; one arc suited to the minimum sized cable and the other arc suited to the maximum sized cable in the clamping range. The tangential join means that all cable sizes in-between are clamped just as effectively.

This gives an almost uniform level of surface contact throughout the clamping range (44% on the minimum and 54% on the maximum sized cables) meaning axial restraint is just as good on the smaller sizes of cable in the range as it is for the largest.

The better comparative surface area contact throughout the clamping range also means that the same torque settings can be used, no matter what size of cable is fitted; removing any uncertainty during installation.

By using the new twin arc design, CMP has also dramatically increased the range taking capability of these types of cable cleat, which varies from 10-15mm on cable outside diameter.

CABLE CLEAT NUT SPACER

Industry-wide, a fully threaded bolt is used as standard to ensure that the cable cleat can accept a range of cable diameters. However, the use of a fully threaded bolt can lead to damage to the cables during high short circuit fault conditions.

The cable cleat nut spacer from CMP Products comes as standard with cable cleats designed to withstand high circuit fault conditions. The nut spacers are designed to ensure the cable never comes into contact with the threaded portion of the cable cleat closure bolt during high circuit fault conditions.

In over 300 short circuit tests which CMP Products has conducted on our cable cleat range, tremendous forces were generated by the cables during high short circuit conditions. It is during this stage that cables can expel away from each other and try to break the cable cleat restraining them. If any sharp edges, such as threads are exposed to the cables, there may be damage to the cable insulation and, depending on the peak fault, this can be catastrophic. Where the cable insulation is sufficiently damaged, earth shortages will occur, leading to a life-threatening environment for any personnel in the vicinity.

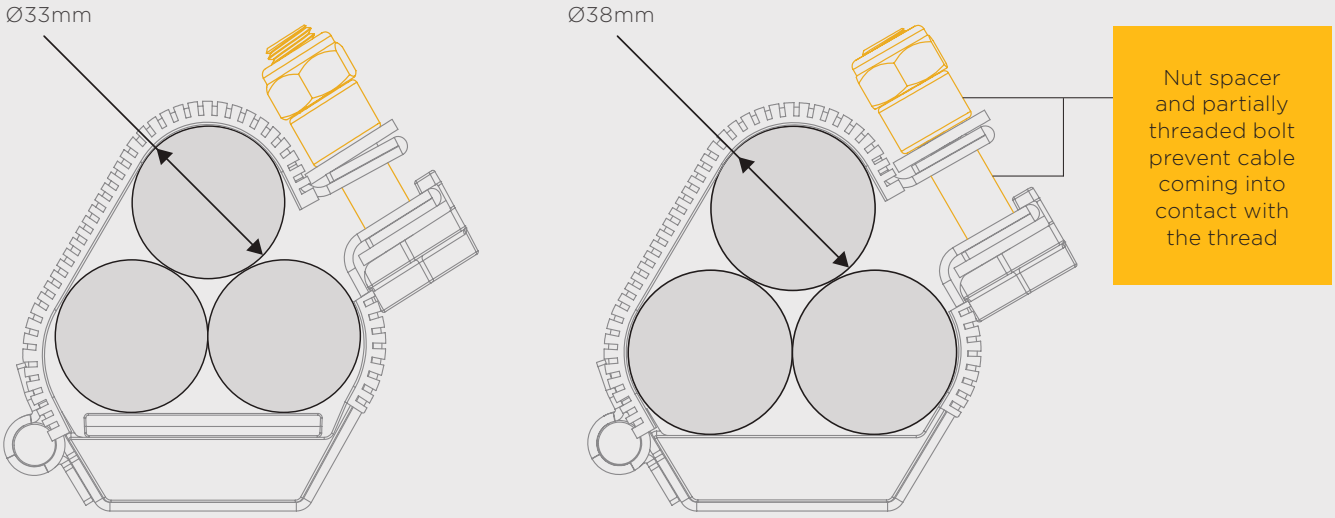
Minor cable damage caused by thread contact

Major cable damage caused by thread contact

THE CMP SPACER AND BOLT COMBINATION - ONE SIZE FITS ALL

CMP Products' cable cleats use a partially threaded bolt in conjunction with the nut spacer, never allowing the cables to be exposed to the thread of the bolt. The use of these, along with cable cleat liners as standard, means the cables can only ever come into contact with smooth or flat surfaces.

THE CABLE CLEAT CAN ACCEPT A RANGE OF CABLE DIAMETERS



CLEAT FIXING PACKS

EXAMPLE ORDERING CODES

CFP	02	M12	080	BZP
Product Type	Quantity	Bolt Thread Size	Bolt Length	Material

CLEAT FIXING PACK EXAMPLE ORDERING CODES

PRODUCT TYPE		QUANTITY		BOLT THREAD SIZE		BOLT LENGTH		MATERIAL	
CFP	Cleat Fixing Pack	01	2 Digit Value*	M10	Thread Size**	080	3 Digit Value***	A4	Grade A4 Stainless Steel
		02		M12				BZP	Bright Zinc Plated

* 01 x Cleat Fixing Pack includes: 1 Bolt, 2 x FORM A Washer, 1 Nyloc Nut
02 x Cleat Fixing Pack includes: 2 Bolt, 4 x FORM A Washer, 2 Nyloc Nut

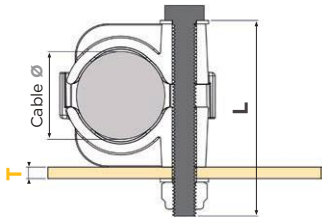
** M10 / M12 Standard

*** Min Bolt length (L) should be calculated using equation, standard increments of 5 (see below) If an insulation pad is required then add 2mm onto length of bolt. Bespoke fixings available on request.

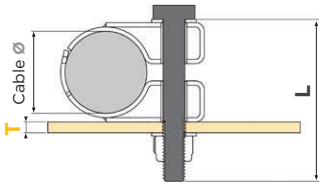
DETERMINING BOLT LENGTH

1 BOLT CABLE CLEAT & HELIOS

1 Bolt



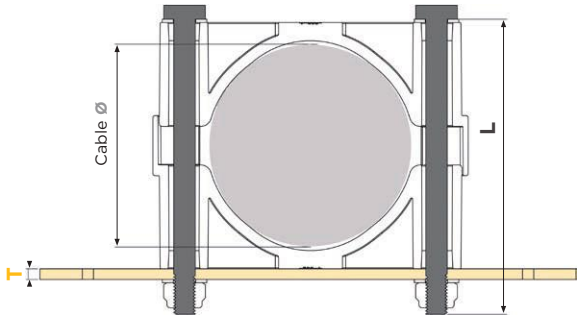
Helios



1 Bolt: Bolt Length **(L)** = Cable Ø + T + 48.0mm
Helios: Bolt Length **(L)** = Cable Ø + T + 27.0mm

(T = Substrate Thickness)

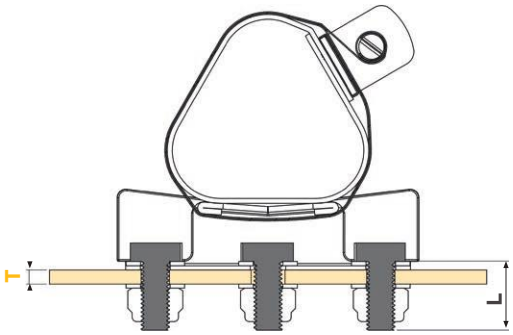
2 BOLT CABLE CLEAT



M10 Bolt Length **(L)** = Cable Ø + T + 39.0mm
M12 Bolt Length **(L)** = Cable Ø + T + 41.0mm

(T = Substrate Thickness)

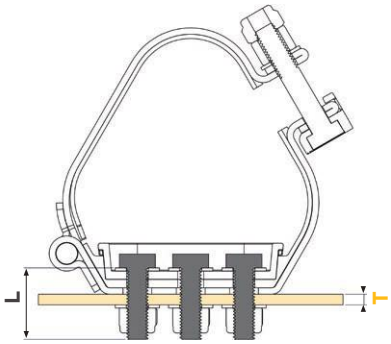
CYCLONE CABLE CLEAT



M10 Bolt Length **(L)** = 19.5mm + T
M12 Bolt Length **(L)** = 21.5mm + T

(T = Substrate Thickness)

HINGED CABLE CLEAT



M10 Bolt Length **(L)** = 29.0mm + T
M12 Bolt Length **(L)** = 31.0mm + T

(T = Substrate Thickness)

Note: See standard bolt lengths on page 65. Always round up to nearest whole number.
Fixings can be ordered as packs or individually. Any queries please contact CMP.

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INDIVIDUAL ORDERING CODES

INDIVIDUAL BOLT (SET SCREW) CODES				
	M10		M12	
	A4	BZP	A4	BZP
25MM SET SCREW	M10X025FTA4	M10X025FTBZP	M12X025FTA4	M12X025FTBZP
30MM SET SCREW	M10X030FTA4	M10X030FTBZP	M12X030FTA4	M12X030FTBZP
35MM SET SCREW	M10X035FTA4	M10X035FTBZP	M12X035FTA4	M12X035FTBZP
40MM SET SCREW	M10X040FTA4	M10X040FTBZP	M12X040FTA4	M12X040FTBZP
45MM SET SCREW	M10X045FTA4	M10X045FTBZP	M12X045FTA4	M12X045FTBZP
50MM SET SCREW	M10X050FTA4	M10X050FTBZP	M12X050FTA4	M12X050FTBZP
55MM SET SCREW	M10X055FTA4	M10X055FTBZP	M12X055FTA4	M12X055FTBZP
60MM SET SCREW	M10X060FTA4	M10X060FTBZP	M12X060FTA4	M12X060FTBZP
65MM SET SCREW	M10X065FTA4	M10X065FTBZP	M12X065FTA4	M12X065FTBZP
70MM SET SCREW	M10X070FTA4	M10X070FTBZP	M12X070FTA4	M12X070FTBZP
75MM SET SCREW	M10X075FTA4	M10X075FTBZP	M12X075FTA4	M12X075FTBZP
80MM SET SCREW	M10X080FTA4	M10X080FTBZP	M12X080FTA4	M12X080FTBZP
90MM SET SCREW	M10X090FTA4	M10X090FTBZP	M12X090FTA4	M12X090FTBZP
100MM SET SCREW	M10X100FTA4	M10X100FTBZP	M12X100FTA4	M12X100FTBZP
110MM SET SCREW	M10X110FTA4	M10X110FTBZP	M12X110FTA4	M12X110FTBZP
120MM SET SCREW	M10X120FTA4	M10X120FTBZP	M12X120FTA4	M12X120FTBZP
130MM SET SCREW	M10X130FTA4	M10X130FTBZP	M12X130FTA4	M12X130FTBZP
140MM SET SCREW	M10X140FTA4	M10X140FTBZP	M12X140FTA4	M12X140FTBZP
150MM SET SCREW	M10X150FTA4	M10X150FTBZP	M12X150FTA4	M12X150FTBZP
160MM SET SCREW	M10X160FTA4	M10X160FTBZP	M12X160FTA4	M12X160FTBZP
170MM SET SCREW	M10X170FTA4	M10X170FTBZP	M12X170FTA4	M12X170FTBZP
180MM SET SCREW	M10X180FTA4	M10X180FTBZP	M12X180FTA4	M12X180FTBZP
190MM SET SCREW	M10X190FTA4	M10X190FTBZP	M12X190FTA4	M12X190FTBZP
200MM SET SCREW	M10X200FTA4	M10X200FTBZP	M12X200FTA4	M12X200FTBZP

STUDDING CODES				
	M10		M12	
	A4	BZP	A4	BZP
STUDDING 1M LENGTH	M10STUDA41M	M10STUDBZP1M	M12STUDA41M	M12STUDBZP1M
	Studding is available to order in 1m lengths			

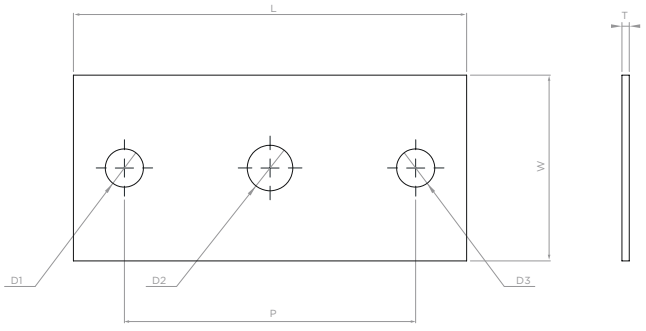
NUT & WASHER CODES				
	M10		M12	
	A4	BZP	A4	BZP
NYLOC NUT	M10NYNA4	M10NYNBZP	M12NYNA4	M12NYNBZP
FORM A WASHER	M10FAWA4	M10FAWBZP	M12FAWA4	M12FAWBZP

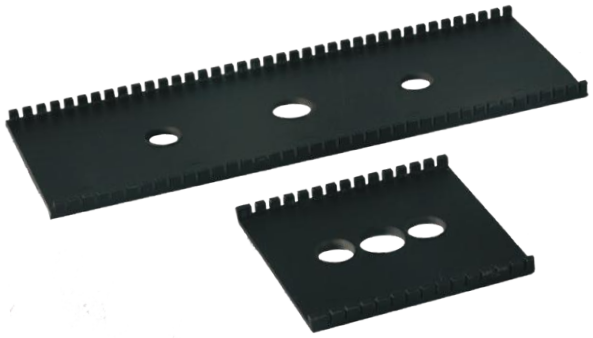
Note: If your requirements are not listed above then please contact CMP. Bespoke fixings are available on request.

ISOLATION / SEPARATION PADS

The CMP cable cleat isolation / separation pad is designed to prevent corrosion between two dissimilar metals, by ensuring that the cable cleat avoids direct contact with the supporting structure.

The pad is manufactured from a Low Smoke & Fume (LSF), Zero Halogen (LS0H) and Phosphorus free material as standard. There is a suitable isolation pad for each of CMP Products' cable cleats, all of which have pre-defined bolt hole positions and have been specifically designed to be easily fitted with no preparation required by the installer. Once installed the isolation pad will help prevent galvanic corrosion should the material of the cable management system be different from that of the cable cleat. The selection table below covers all of the standard CMP Products cable cleats however bespoke isolation/separation solutions are available on request.





ISOLATION PADS

SUITABLE FOR CLEATS	ISOLATION PAD	TREFOIL CLEAT SIZE (MM)	SINGLE CLEAT SIZE(MM)	DIMENSIONS (MM)						
				L	W	T	P	FIXING HOLE Ø		
								D1	D2	D3
Patriot (SDSS) Sovereign (HDSS) Huron (LDAL) Reliance (SDAL) Conqueror (RTSS) Sapphire (SHDSS)	IP01	19-38	26-58	60	55	2	25	M10	M12	M10
	IP02	36-58	58-83	80	55	2	50	M10	M12	M10
	IP03	55-78	83-120	110	55	2	75	M10	M12	M10
	IP04	74-103	120-135	150	55	2	75	M10	M12	M10
	IP05	103-128	N/A	190	55	2	75	M10	M12	M10
Zenith (2BCAL) Falcon (2BC Nylon) Themis (2BCHT)	IP2BC01	N/A	38-48	89	51	2	67	M12	N/A	M12
	IP2BC02	N/A	48-58	100	51	2	78	M12	N/A	M12
	IP2BC03	N/A	58-70	112	51	2	90	M12	N/A	M12
	IP2BC04	N/A	70-83	126	51	2	104	M12	N/A	M12
	IP2BC05	N/A	83-97	140	51	2	118	M12	N/A	M12
	IP2BC06	N/A	96-109	153	51	2	131	M12	N/A	M12
	IP2BC07	N/A	106-120	165	51	2	143	M12	N/A	M12
	IP2BC08	N/A	120-135	180	51	2	158	M12	N/A	M12
	IP2BC09	N/A	135-151	194	51	2	172	M12	N/A	M12
Valiant (1BCAL) Sabre (1BC Nylon) Solace (1BCHT) Helios (FPC)	IP1BC01	N/A	10-13	32	25	2	NA	M10	N/A	N/A
	IP1BC02	N/A	13-16	35	25	2	NA	M10	N/A	N/A
	IP1BC03	N/A	16-19	38	25	2	NA	M10	N/A	N/A
	IP1BC04	N/A	19-23	42	25	2	NA	M10	N/A	N/A
	IP1BC05	N/A	23-27	46	25	2	NA	M10	N/A	N/A
	IP1BC06	N/A	27-32	51	25	2	NA	M10	N/A	N/A
	IP1BC07	N/A	32-38	57	25	2	NA	M10	N/A	N/A
	IP1BC08	N/A	38-45	65	25	2	NA	M10	N/A	N/A
	IP1BC09	N/A	45-51	71	25	2	NA	M10	N/A	N/A
	IP1BC10	N/A	51-58	78	25	2	NA	M10	N/A	N/A
	IP1BC11	N/A	58-65	85	25	2	NA	M10	N/A	N/A
	IP1BC12	N/A	65-71	91	25	2	NA	M10	N/A	N/A
Cyclone I (LDSTR) Cyclone II (SDSTR) Cyclone III (HDSTR)	IPCYC01	24-41	36-60	108	51	2	80	M10	M12	M10
	IPCYC02	37-54	55-80	128	51	2	100	M10	M12	M10
	IPCYC03	50-67	75-99	148	51	2	120	M10	M12	M10
	IPCYC04	63-80	94-118	168	51	2	140	M10	M12	M10
	IPCYC05	72-95	N/A	188	51	2	160	M10	M12	M10
	IPCYC06	92-115	N/A	210	51	2	100	M10	M12	M10
	IPCYC07	112-135	N/A	235	51	2	100	M10	M12	M10
	IPCYC08	132-145	N/A	250	51	2	120	M10	M12	M10

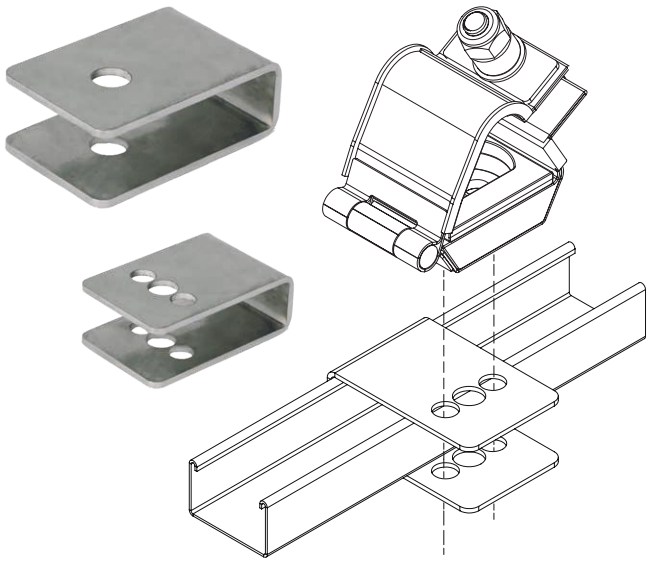
C-CLAMPS

The CMP C-Clamp is designed to be used with all plain or continuous ladder rungs, struts, or channel mounting frame which have no mounting slots or holes provided allowing for ease of cable cleat mounting.

The C-Clamp is manufactured from 316L Stainless Steel, and is supplied in various sizes to suit all CMP cable cleats. The C-Clamps have been extensively tested during short circuit conditions as specified in IEC 61914 'cable cleats for electrical installations'.

The product is supplied as a complete fixing pack which includes fixing bolt, C-Clamp spacer, washers and nyloc nut.

CMP is also able to manufacture bespoke C-Clamps to suit installation requirements. If a bespoke C-Clamp is required, the width (W) and height (H) of the rung is required from the customer.

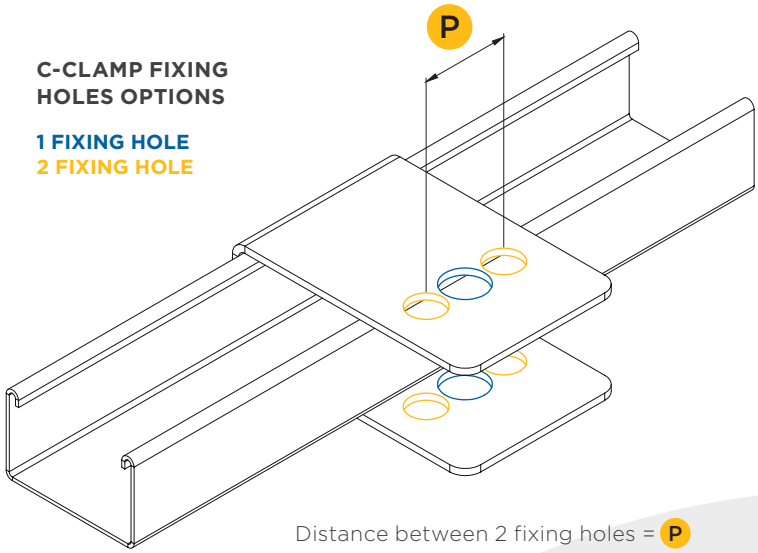


TECHNICAL DATA & CLASSIFICATION	
TYPE	6.1.1 Metallic C-Clamp
DESIGN SPECIFICATION	IEC 61914
MATERIAL	316L Stainless Steel

CLEAT IDENTIFICATION	
FIXING TYPE	NAME
1 BC RANGE	Sabre
	Valiant
	Solace
	Helios
1 BOLT FIXING HOLE	Cyclone I / II / III
	Patriot
	Sovereign
	Conqueror
	Huron
	Reliance
	Sapphire
2 BOLT FIXING HOLE	Cyclone I / II / III
	Patriot
	Sovereign
	Conqueror
	Huron
	Reliance
	Sapphire
2 BC RANGE	Falcon
	Zenith
	Themis

C-CLAMP FIXING HOLES OPTIONS

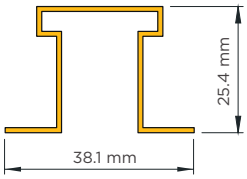
1 FIXING HOLE
2 FIXING HOLE



Distance between 2 fixing holes = P

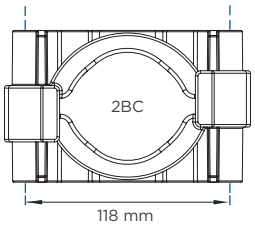
HOW TO ORDER

1. Identify ladder type and size. (refer to line drawings in section below).



2a. Identify cleat fixing type and bolt size for 1BC or any 1 Bolt Fixing Hole. Identify pitch for 2BC or 2 Bolt Fixing Hole.

2b. Cross reference cleat and ladder to find order code.



1. LADDER / STRUT / MOUNTING SURFACE DIMENSIONS

		CFP-CC-A	CFP-CC-B	CFP-CC-C	CFP-CC-D	CFP-CC-E	CFP-CC-F
HEIGHT	INCHES	1/2"	1"	1"	3/4"	1"	1"
	MM	12.7	25.4	25.4	19.05	25.4	25.4
WIDTH	INCHES	1-1/2"	1-5/8"	1-1/2"	25/32"	1"	1-1/8"
	MM	38.1	41.275	38.1	19.84	25.4	28.6

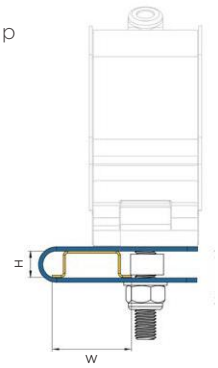
Ladder types shown are typical examples, if you have a different type please contact CMP directly. Bespoke sizes available on request.

2. C - CLAMP PRODUCT CODES

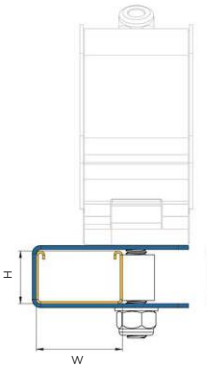
FIXING TYPE	BOLT SIZE	PITCH	RANGE	CFP-CC-A	CFP-CC-B	CFP-CC-C	CFP-CC-D	CFP-CC-E	CFP-CC-F
1 BOLT FIXING HOLE	M10	-	-	CFP-CC-A-M10	CFP-CC-B-M10	CFP-CC-C-M10	CFP-CC-D-M10	CFP-CC-E-M10	CFP-CC-F-M10
	M12	-	-	CFP-CC-A-M12	CFP-CC-B-M12	CFP-CC-C-M12	CFP-CC-D-M12	CFP-CC-E-M12	CFP-CC-F-M12
2 BOLT FIXING HOLES	M10	P = 25	-	CFP-CC-A-25	CFP-CC-B-25	CFP-CC-C-25	CFP-CC-D-25	CFP-CC-E-25	CFP-CC-F-25
		P = 50	-	CFP-CC-A-50	CFP-CC-B-50	CFP-CC-C-50	CFP-CC-D-50	CFP-CC-E-50	CFP-CC-F-50
		P = 75	-	CFP-CC-A-75	CFP-CC-B-75	CFP-CC-C-75	CFP-CC-D-75	CFP-CC-E-75	CFP-CC-F-75
1BC RANGE	M10	-	10-23	CFP-CC-A-1BC1023	CFP-CC-B-1BC1023	CFP-CC-C-1BC1023	CFP-CC-D-1BC1023	CFP-CC-E-1BC1023	CFP-CC-F-1BC1023
		-	23-38	CFP-CC-A-1BC2338	CFP-CC-B-1BC2338	CFP-CC-C-1BC2338	CFP-CC-D-1BC2338	CFP-CC-E-1BC2338	CFP-CC-F-1BC2338
		-	38-58	CFP-CC-A-1BC3858	CFP-CC-B-1BC3858	CFP-CC-C-1BC3858	CFP-CC-D-1BC3858	CFP-CC-E-1BC3858	CFP-CC-F-1BC3858
		-	58-71	CFP-CC-A-1BC5871	CFP-CC-B-1BC5871	CFP-CC-C-1BC5871	CFP-CC-D-1BC5871	CFP-CC-E-1BC5871	CFP-CC-F-1BC5871
2BC RANGE	M10	P = 67	38-48	CFP-CC-A-67	CFP-CC-B-67	CFP-CC-C-67	CFP-CC-D-67	CFP-CC-E-67	CFP-CC-F-67
		P = 78	48-58	CFP-CC-A-78	CFP-CC-B-78	CFP-CC-C-78	CFP-CC-D-78	CFP-CC-E-78	CFP-CC-F-78
		P = 90	58-70	CFP-CC-A-90	CFP-CC-B-90	CFP-CC-C-90	CFP-CC-D-90	CFP-CC-E-90	CFP-CC-F-90
		P = 104	70-83	CFP-CC-A-104	CFP-CC-B-104	CFP-CC-C-104	CFP-CC-D-104	CFP-CC-E-104	CFP-CC-F-104
		P = 118	83-97	CFP-CC-A-118	CFP-CC-B-118	CFP-CC-C-118	CFP-CC-D-118	CFP-CC-E-118	CFP-CC-F-118
		P = 131	96-109	CFP-CC-A-131	CFP-CC-B-131	CFP-CC-C-131	CFP-CC-D-131	CFP-CC-E-131	CFP-CC-F-131
		P = 143	106-120	CFP-CC-A-143	CFP-CC-B-143	CFP-CC-C-143	CFP-CC-D-143	CFP-CC-E-143	CFP-CC-F-143
		P = 158	120-135	CFP-CC-A-158	CFP-CC-B-158	CFP-CC-C-158	CFP-CC-D-158	CFP-CC-E-158	CFP-CC-F-158
		P = 172	135-151	CFP-CC-A-172	CFP-CC-B-172	CFP-CC-C-172	CFP-CC-D-172	CFP-CC-E-172	CFP-CC-F-172

LADDER TYPE

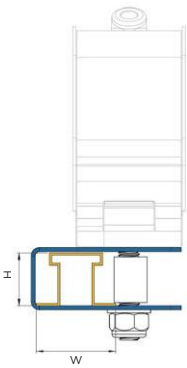
Ladder
C - Clamp



CFP-CC-A



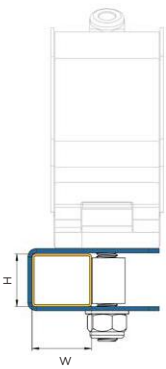
CFP-CC-B



CFP-CC-C

CFP-CC-D

CFP-CC-E



CFP-CC-F

Overview of Peak Fault Current Withstand Capabilities of CMP Trefoil Cable Cleats at Various Mounting Intervals

CABLE OD (MM)	CABLE CLEAT PEAK FAULT LEVEL (KA)								CABLE CLEAT SPACING (MM) (1)
	CONQUEROR	CYCLONE I	CYCLONE II	CYCLONE III	HURON	RELIANCE	PATRIOT	SOVEREIGN	
24	138.80	101.25	123.29	146.97	68.59	84.24	110.23	155.13	300
	106.96	71.59	97.98	110.23	48.50	59.57	88.18	122.47	600
	87.33	58.45	80.00	90.00	39.60	48.64	72.00	100.00	900
	75.63	50.62	69.27	77.94	34.29	42.12	50.91	86.60	1200(2)
26	144.70	105.38	128.33	152.97	71.39	87.68	114.73	161.47	300
	111.33	74.51	101.98	114.73	50.48	62	91.78	127.48	600
	90.90	60.84	83.27	93.68	41.22	50.62	74.94	104.08	900
	78.72	52.69	72.10	81.13	35.69	43.84	52.99	90.13	1200(2)
28	149.93	109.36	133.17	158.75	74.08	90.99	119.06	167.56	300
	115.53	77.33	105.83	119.06	52.39	64.34	95.25	132.29	600
	94.33	63.14	86.41	97.21	42.77	52.33	77.77	108.01	900
	81.69	54.68	74.82	84.19	37.04	45.5	54.99	93.54	1200(2)
30	155.19	113.20	137.84	164.32	76.68	94.18	123.24	173.45	300
	119.59	80.04	109.54	123.24	54.22	66.6	98.59	136.93	600
	97.74	65.35	89.44	100.63	44.27	54.37	80.50	111.80	900
	84.56	56.60	77.45	87.14	38.34	47.09	56.92	96.82	1200(2)
32	160.28	116.91	142.36	169.71	79.20	97.27	127.28	179.13	300
	123.51	82.67	113.14	127.28	56.00	68.78	101.82	141.42	600
	100.84	67.50	92.38	103.93	45.73	56.16	83.14	115.47	900
	87.33	58.45	79.99	90.00	39.60	48.64	58.78	99.99	1200(2)
34	165.21	120.51	146.75	174.93	81.63	100.27	131.20	184.65	300
	127.31	85.21	116.62	131.20	57.73	70.9	104.96	145.77	600
	103.95	69.57	95.22	107.12	47.13	57.89	85.70	119.02	900
	90.02	60.25	82.45	92.77	40.82	50.14	60.59	103.07	1200(2)
36	170.00	124.00	151.00	180.00	84.00	103.17	135.00	190.00	300
	131.00	87.68	120.00	135.00	59.40	72.95	108.00	150.00	600
	106.96	71.59	97.98	110.23	48.50	59.57	88.18	122.47	900
	92.63	62.00	84.84	95.46	42.00	51.59	62.35	106.06	1200(2)
38	174.66	127.40	155.14	184.93	86.30	106	138.70	195.21	300
	134.59	90.08	123.29	138.70	61.03	74.95	110.96	154.11	600
	109.89	73.55	100.66	113.25	49.83	61.2	90.60	125.83	900
	95.17	63.70	87.16	98.08	43.15	53	64.06	108.97	1200(2)
40	179.20	130.71	159.17	189.74	88.54	108.75	142.30	200.28	300
	138.09	92.42	126.49	142.30	62.61	76.9	113.84	158.11	600
	112.75	75.46	103.28	116.19	51.12	62.79	92.95	129.09	900
	97.64	65.35	89.43	100.62	44.27	54.38	65.72	111.80	1200(2)
42	183.62	133.94	163.10	194.42	90.73	111.44	145.82	205.22	300
	141.50	94.71	129.61	145.82	64.16	78.8	116.65	162.02	600
	115.53	77.33	105.83	119.06	52.39	64.34	95.25	132.28	900
	100.05	66.97	91.64	103.11	45.37	55.72	67.35	114.56	1200(2)
44	187.94	137.09	166.94	199.00	92.87	114.06	149.25	210.05	300
	144.83	96.93	132.66	149.25	65.67	80.65	119.40	165.83	600
	118.25	79.15	108.32	121.86	53.62	65.85	97.49	135.40	900
	102.41	68.54	93.79	105.54	46.43	57.03	68.93	117.25	1200(2)
46	192.17	140.17	170.69	203.47	94.95	116.63	152.60	214.77	300
	148.08	99.11	135.65	152.60	67.15	82.47	122.08	169.56	600
	120.91	80.92	110.76	124.60	54.82	67.34	99.68	138.44	900
	104.71	70.08	95.90	107.91	47.48	58.32	70.48	119.89	1200(2)
48	196.30	143.18	174.36	207.85	96.99	119.13	155.88	219.39	300
	151.27	101.24	138.56	155.88	68.59	84.24	124.71	173.21	600
	123.51	82.67	113.14	127.28	56.00	68.78	101.82	141.42	900
	106.96	71.59	97.96	110.23	48.50	59.57	72.00	122.47	1200(2)
50	200.35	146.14	177.96	212.13	98.99	121.59	159.10	223.92	300
	154.38	103.33	141.42	159.10	70.00	85.98	127.28	176.78	600
	126.05	84.37	115.47	129.91	57.16	70.2	103.92	144.33	900
	109.17	73.07	99.98	112.50	49.50	60.8	73.48	124.99	1200(2)

(1) CMP recommends that all fixed cleat centres are reduced to 300mm at and near to cable bends, in order to provide better restraint in these important areas.

(2) 1200mm fault levels are shown are for installations that do not include intermediate restraints. Although cables would be safely restrained with fixed cleats mounted at 1200mm intervals, CMP recommends spacing fixed cleats at a maximum of 900mm; this avoids long distances between fixed cleat centres which would allow large 'arches' of cables between each fixed cleat in the event of a Short circuit. With longer fixed cleat mounting intervals, these large 'arches' could damage the cable ladder or interfere with neighbouring components, and damage the cable insulation in the process. Alternatively, the addition of intermediate restraints fitted midway between two fixed cable cleats will prevent large cable 'arches' and also increase the maximum fault current capability of the circuit – please contact CMP for further details.

CABLE OD (MM)	CABLE CLEAT PEAK FAULT LEVEL (KA)								CABLE CLEAT SPACING (MM) (1)
	CONQUEROR	CYCLONE I	CYCLONE II	CYCLONE III	HURON	RELIANCE	PATRIOT	SOVEREIGN	
52	204.31	149.03	181.48	216.33	100.96	124	162.25	228.35	300
	157.44	105.38	144.22	162.25	71.39	87.68	129.80	180.28	600
	128.55	86.04	117.76	132.48	58.29	71.59	105.98	147.19	900
	111.33	74.51	101.96	114.73	50.48	62	74.94	127.47	1200(2)
54	208.21	151.87	184.94	220.45	102.88	126.36	165.34	232.70	300
	160.44	107.39	146.97	165.34	72.75	89.35	132.27	183.71	600
	131.00	87.68	120.00	135.00	59.40	72.95	108.00	149.99	900
	113.45	75.93	103.91	116.91	51.44	63.18	76.36	129.90	1200(2)
56	212.03	154.66	188.33	224.50	104.77	128.68	168.37	236.97	300
	163.39	109.36	149.67	168.37	74.08	90.99	134.70	187.08	600
	133.40	89.29	122.20	137.48	60.49	74.29	109.98	152.75	900
	115.53	77.33	105.81	119.06	52.38	64.34	77.76	132.28	1200(2)
58	215.78	157.39	191.66	228.47	106.62	130.96	171.35	241.17	300
	166.28	111.29	152.32	171.35	75.40	92.6	137.08	190.39	600
	135.76	90.87	124.37	139.91	61.56	75.61	111.93	155.45	900
	117.57	78.70	107.69	121.17	53.31	65.48	79.14	134.62	1200(2)
60	219.47	160.08	194.94	232.38	108.44	133.2	174.28	245.29	300
	169.12	113.19	154.92	174.28	76.69	94.19	139.43	193.65	600
	138.08	92.42	126.49	142.31	62.61	76.9	113.84	158.11	900
	119.58	80.04	109.53	123.24	54.22	66.2	80.49	136.92	1200(2)
62	223.10	162.73	198.16	236.22	110.24	135.4	177.17	249.34	300
	171.92	115.07	157.48	177.17	77.95	95.74	141.73	196.85	600
	140.37	93.95	128.58	144.66	63.65	78.17	115.72	160.72	900
	121.56	81.36	111.34	125.28	55.12	67.7	81.82	139.19	1200(2)
64	226.67	165.33	201.33	240.00	112.00	137.56	180.00	253.33	300
	174.67	116.91	160.00	180.00	79.20	97.27	144.00	200.00	600
	142.61	95.45	130.64	146.97	64.67	79.42	117.57	163.29	900
	123.51	82.67	113.12	127.28	56.00	68.78	83.13	141.41	1200(2)
66	230.18	167.90	204.45	243.72	113.74	139.7	182.79	257.26	300
	177.37	118.72	162.48	182.79	80.43	98.78	146.23	203.10	600
	144.82	96.93	132.67	149.25	65.67	80.66	119.40	165.83	900
	125.42	83.95	114.87	129.25	56.87	69.85	84.42	143.61	1200(2)
68	233.64	170.42	207.53	247.39	115.45	141.8	185.54	261.13	300
	180.04	120.50	164.92	185.54	81.64	100.27	148.43	206.16	600
	147.00	98.39	134.66	151.50	66.66	81.87	121.19	168.32	900
	127.31	85.21	116.60	131.20	57.72	70.9	85.69	145.77	1200(2)
70	237.05	172.91	210.56	251.00	117.13	143.87	188.25	264.94	300
	182.67	122.26	167.33	188.25	82.83	101.73	150.60	209.17	600
	149.15	99.83	136.63	153.71	67.63	83.06	122.96	170.78	900
	129.17	86.45	118.30	133.11	58.57	71.94	86.94	147.89	1200(2)
72	240.42	175.36	213.55	254.56	118.79	145.91	190.92	268.70	300
	185.26	124.00	169.71	190.92	84.00	103.17	152.74	212.13	600
	151.26	101.24	138.56	155.89	68.59	84.24	124.71	173.20	900
	131.00	87.68	119.98	135.00	59.40	73.96	88.18	149.99	1200(2)
74	243.73	177.78	216.49	258.07	120.43	147.92	193.55	272.41	300
	187.82	125.71	172.05	193.55	90.73	104.6	154.84	215.06	600
	153.35	102.64	140.48	158.04	69.54	85.4	126.43	175.59	900
	132.81	88.89	121.64	136.86	60.22	73.96	89.39	152.06	1200(2)
76	247.00	180.17	219.40	261.53	122.05	149.91	196.15	276.06	300
	190.34	127.40	174.36	196.15	86.31	106	156.92	217.94	600
	155.41	104.02	142.36	160.16	70.47	86.55	128.12	177.94	900
	134.59	90.08	123.27	138.70	61.02	74.96	90.59	154.10	1200(2)
78	250.23	182.52	222.27	264.95	123.64	151.87	198.71	279.67	300
	192.83	129.06	176.64	198.71	87.43	107.39	158.97	220.79	600
	157.44	105.38	144.22	162.25	71.39	87.68	129.80	180.27	900
	136.35	91.26	124.88	140.51	61.82	75.94	91.78	156.12	1200(2)
80	253.42	184.85	225.10	268.33	125.22	153.8	201.25	283.24	300
	195.28	130.71	178.89	201.25	88.55	108.75	161.00	223.61	600
	159.45	106.72	146.06	164.32	72.30	88.8	131.45	182.57	900
	138.08	92.42	126.47	142.30	62.61	76.9	92.95	158.10	1200(2)

(1) CMP recommends that all fixed cleat centres are reduced to 300mm at and near to cable bends, in order to provide better restraint in these important areas.

(2) 1200mm fault levels are shown are for installations that do not include intermediate restraints. Although cables would be safely restrained with fixed cleats mounted at 1200mm intervals, CMP recommends spacing fixed cleats at a maximum of 900mm; this avoids long distances between fixed cleat centres which would allow large 'arches' of cables between each fixed cleat in the event of a short-circuit. With longer fixed cleat mounting intervals, these large 'arches' could damage the cable ladder or interfere with neighbouring components, and damage the cable insulation in the process. Alternatively, the addition of intermediate restraints fitted midway between two fixed cable cleats will prevent large cable 'arches' and also increase the maximum fault current capability of the circuit – please contact CMP for further details.

ABOUT CMP

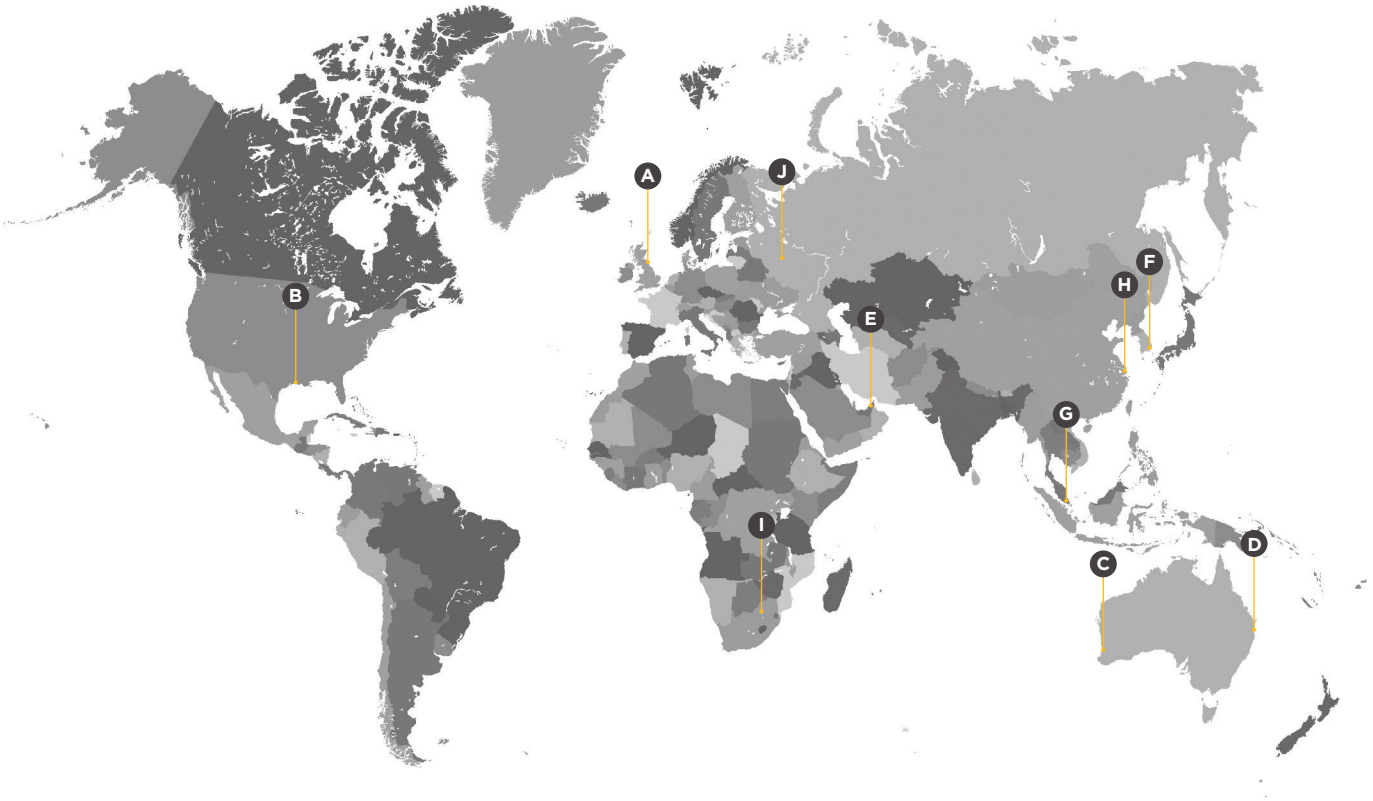
SECURING CABLES WORLDWIDE

At CMP Products, we owe our success to our commitment to quality, dedication to innovation and investment in our people.

As a market-leading specialist designer and manufacturer of cable glands, cable cleats and accessories, CMP has been providing safe and innovative solutions to the global market for over 60 years; gaining us an international reputation for quality and reliability.

Our products are developed to suit a wide range of hazardous and industrial applications; including industries such as mining, oil & gas, rail, pharmaceuticals and construction. They have been designed and rigorously tested to cover a variety of international codes, standards and approvals.

Our high-quality products are reinforced with exceptional customer service and innovative solutions; we offer on-hand technical support from our experts across the globe, from 10 different offices spread across 6 continents.



A NEWCASTLE (Headquarters)
CMP Products Limited
United Kingdom
Tel: +44 (0) 191 2657411
E-Mail:
customerservices@cmp-products.com

B HOUSTON (Texas Inc)
CMP Products Texas Inc
Texas, USA
Tel: +1 281 776 5201
E-Mail:
houstonoffice@cmp-products.com

C PERTH, WA
CMP Products Pty Ltd
Australia
Tel: +61 8 9249 4508
E-Mail: perthoffice@cmp-products.com

D BRISBANE, QLD
CMP Products Pty Ltd
Australia
Tel: +61 7 3801 0301
E-Mail: qldoffice@cmp-products.com

E DUBAI
CMP Products Middle East Office
United Arab Emirates
Tel: +971 4 214 6114
E-Mail: meoffice@cmp-products.com

F BUSAN
CMP Products (Korea) Ltd
South Korea
Tel: +82 51 780 5300
E-Mail: busanoffice@cmp-products.com

G SINGAPORE
CMP Products (S.E.A) Pte Ltd.
Singapore
Tel: +65 6466 6180
E-Mail: seaoffice@cmp-products.com

H SHANGHAI
CMP Products Division
P.R. China
Tel: +86 21 5837 9978
E-Mail:
shanghaioffice@cmp-products.com

I JOHANNESBURG
CMP Products
South Africa
Tel: +27 11 266 8880
E-Mail: africaoffice@cmp-products.com

J MOSCOW
CMP Products
Russia
Tel: +7 495 803 3794
E-Mail:
russiaoffice@cmp-products.com

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