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Frequently Asked Questions

1) Please explain the electrical performance of ClampStar®

ClampStar is designed to carry more current than the largest conductor which a given unit will accommodate, i.e. no limitation to the user, and are suitable for use at the maximum conductor temperatures specified by the conductor manufacturer, continuous operating temperatures, emergency temperatures, or otherwise.

Tests performed by CCI and others indicate the largest conductor (aluminum stranding) will fuse before the ClampStar sustains any damage. As the industry has not yet set a "standard" for evaluation of connector performance on High Temperature – Low Sag Conductors, we have chosen ACSS as the maximum temperature model, specified by the manufacturers as suitable for continuous operation at 250C conductor temperature (assumed measured at the surface – as this is not yet specified either).

Based on testing such applications for a minimum of 500 thermal cycles with the ClampStar serving as a connector (carrying 100% of the electrical load) at conductor temperature of 390C, which we deem an equivalent percentage of thermal induced stress in comparison to the long established ANSI C119.4 Class "AA" test protocol, Extra Heavy Duty, said test being performed for the purpose of indicating stable performance of a connector installed on "service aged" conductor.

2) Please explain the mechanical performance of ClampStar®

ClampStar is designed to withstand and maintain conductor tensions of at least 60% of the RBS of the conductor on which it is applied (See notes [a] and [b] below), without the benefit of a primary connector within, having the conductor ends terminated in each respective end of the unit.

ClampStar is not intended to be a primary connector, but is designed to operate in conjunction with a primary connector, such as a splice or deadend, to reinforce the primary connector and restore its electrical and mechanical integrity to its original condition, or to exceed that condition.

As is the case with all bolted connectors and strain clamps, because ClampStar utilizes threaded fasteners, and is installed over a conductor, directly engaging only the outer layer of stranding, mechanical performance varies with the type of conductor. A full explanation of this is included in the PDF document titled: "Understanding the Mechanical Performance of ClampStar."

(Note [a]: This 60% is based on ACSR type conductor. AAC, AAAC, and ACAR will typically approach "full tension" ratings).

(Note [b]: ACSS, ACCC, ACCR, INVAR, Gap Type, SD Type conductors rely on the primary connectors purchase and engagement of the core. ClampStar cannot engage or purchase the core of any conductor, including ACSR, and therefore requires the primary connector to serve as the mechanical anchor).

3) Please explain the affect of Tension load on ClampStar®

In its normal application, as a current shunt and a mechanical support for splices and other full tension connectors, there is no tension load on the ClampStar® unit because the connector over which the ClampStar® is installed is holding the tension and the conductor span is already tensioned when the ClampStar® unit is installed. Thus, the ClampStar / primary connector combination continues to maintain a full tension rating.

Similarly, there is no tension load on the ClampStar® unit when it is applied to shunt tangent suspension and other non-tension clamps and connectors.

The only purpose of ClampStar® units having a tension rating is to assure that the ClampStar® unit will continue to support the mechanical load and maintain conductor integrity in the unlikely event a severely degraded primary connector fails mechanically after ClampStar® installation.

The mechanical integrity of bolted line hardware is dependent upon the application as well as the conductor size and construction. This applies to all types of bolted conductor hardware, including straight line strain clamps, quadrant strain clamps, deadend shoes, etc. Like all bolted line hardware, ClampStar® units have two mechanical strength ratings. One is the UTS or Ultimate Tensile Strength of the ClampStar® body. ClampStar® units sized up through 4/0 AWG (CSR-0609) have UTS ratings that exceed the RBS (Rated Breaking Strength) of the largest conductor on which the ClampStar® unit can be used. The UTS of larger ClampStar® units is at least 70% of the RBS of the largest conductor on which it can be applied.

The conductor holding or slip strength is dependent upon the conductor used. ClampStar® Connector Correctors alone are designed to hold at least 60% RBS of the largest and highest strength conductor for which it is designed. However, most applications will exceed that rating and most AA conductors will be held to at least 95% of the conductor RBS, which is considered to be full tension.

4) Does ClampStar® restore mechanical integrity for full line tension ACSR repairs?

Maximum line tension designs under worst case conditions for a given geographical area, are limited to 60% conductor RBS under maximum ice combined with maximum wind conditions. Normal line tensions are on the order of 10 to 25%. For example, a line utilizing 795 Drake ACSR conductor, which has a specified RBS (Rated Breaking Strength) would be normally tensioned to something between about 3000 lbs. to perhaps as much as 10,000 lbs, depending on span length and allowable sag. Thus many utilities utilize bolted deadends, such as inline shoes or quadrant style clamps, of which the vast majority are only rated at 40% RBS, but often test (on a given conductor) to tensions of 60 to 70%.

Exactly like bolted deadends, ClampStar units are designed to obtain a minimum of 60% RBS for a given conductor size, not including the connector already in place. i.e., if two cable ends were terminated in respective ends of a ClampStar, having no connector in between, with the ClampStar holding the entire tensile load, it would be intended for 60% minimum of the largest ACSR conductor which it will accommodate. Typically, it will exceed 70% or more, but being an external bolted connection, like all bolted deadends or other line hardware that has been used for over 100 years, it probably will not reach full tension based on the conductor rating, because it does not directly attach to the core. However, the design and intent of ClampStar is to be applied over an aged connector, that although is undoubtedly weakened due to annealing, is presently supporting the full line tension, and now having been protected from further thermal excursions, will contribute sufficiently to the overall assembly, and thus the repaired assembly with ClampStar included can restore the mechanical integrity to that of the original conductor/connector.

For applications on Dead-ends and suspension clamps, a stainless steel tether cable is available to attach through the steel eye, to assure the mechanical integrity of the assembly.

5) What is the purpose of the mechanical tethers and are they needed for all installations?

A mechanical tether would generally be unnecessary for straight mid-span applications. The mechanical tether is an option that is available on ClampStars® with flexible cable rails and is primarily intended for use with deadends, tangent suspension clamps and similar devices on large diameter transmission conductors. It is an auxiliary safety cable that is intended to keep the conductor in the air, even if the primary connector fails or completely separates mechanically.

Perhaps the best way to summarize is that safety tethers would be recommended for conductor sizes and applications in which the rated tensile strength of the ClampStar is less than 95% of the rated tensile strength of the phase conductor, in the event of total separation of the connector, clamp, conductor or other device that the ClampStar is shunting.

One example that will illustrate its function is a jumpered compression deadend. The typical failure location is the crimp zone between the eye, or similar attachment fitting, and the outer sleeve. The CSF ClampStar will connect between the phase conductor and jumper loop; providing an effective current shunt around the critical sleeve and jumper pad connections. However, assume that the deadend was running hot and was severely weakened mechanically prior to installation of the ClampStar. If that deadend should mechanically fail or separate (even though the electrical duty has been significantly reduced by the installation of ClampStar), the safety tether effectively picks up the mechanical tensile load on the conductor, prevents the transfer of the entire tensile load to the flexible rails and jumper and maintains near normal conductor position thereby preventing conductor drop, fault, and outage. We would not consider that final condition suitable for long term continuous operation but it would maintain service until a new deadend could be installed and there would be visual evidence of the deadend failure.

Another example would be a conductor with severely damaged strands in the mouth of a tangent suspension clamp. A safety tether from one ClampStar clamp, through the insulator connection to the clamp, to the opposite ClampStar clamp would ensure that the conductor remains in the air if either the conductor or clamp should fail completely.

It's important to note that tether ferrules are 7/8" diameter (give or take a few thousandths) and will readily fit through a one inch opening. We have not standardized hardware for deadend tether fittings due to the substantial variety of components, not only between different manufacturers, but even from a single mfg. i.e., HPS has vertical eyes, horizontal eyes, clevis ends, adjustable clevis ends, and among those, there are different dimensions (such as diameter of cross-section through component) such as 30K insulator hardware, 50K hardware, etc., that it is almost impossible to make a one fits all, or even a 3 fits all.

At the present time we are working diligently with individual utilities to come up with a bracket for their particular application. We will gladly review hardware, and provide a solution for all inquiries.

6) Please explain the fundamentals of ClampStar® applications on Tangent Suspension Clamps with Rods.

Several customers, from around the globe have brought to our attention, that broken conductor strands due to fatigue are often found under armor rod. It is presently undetermined if the action of the rods may be part of the fatigue problem due to their direct interaction with the conductor strands, nonetheless, this condition is found in both standard saddle type suspension clamps as well as the helical rod suspension systems which incorporate the elastomeric "dog bone" or "hourglass" shaped gripping components under the rods.

The problem is often not detected until conductor failure occurs, because the rods tend to assist in conduction of current, and in so doing, mask the thermal rise which would otherwise be more readily detectable. Thus one might argue that the rods are performing as intended, assuming that fatigue breaks might have occurred earlier had the rods not been in place, and the failure might have occurred earlier. It is difficult to determine the location of broken strands, as they seem to occur in all areas underneath the rods, from close proximity to the clamp, all the way out to nearly the end of the rods with many occurring near the center.

Therefore, the application of ClampStar over suspension systems that incorporate helical rod overlays is recommended to be attached at points directly on the conductor, beyond the end of the rods. Because the ClampStar is attached to the conductor, it moves with it, just as the “clamp portion” of a damper, the added weight serving to disturb the normal wave frequency, and as it has the flex rail attachment, traversing to the opposite side of the suspension system, it transfers a portion of the vibration energy around the normally “fixed point” and dissipates some portion of that energy through the process. Thus by two distinct means, ClampStar serves to dampen the vibration and lessen its severity.

Attaching the ClampStar directly to the conductor assures that (a) the electrical interface will serve to conduct ALL the current in the line if needed with no limits on ampacity, and (b) that should a mechanical need arise, with the addition of a safety tether, the conductor would remain suspended, with almost no detectable differential in sag. In most applications with ACSR type conductor, on normal spans, over cleared right-of-ways, unless there were some concern about the integrity of the core strands, (such as severe corrosion on aged conductor), a safety tether would normally not be required, because the thermal concern will be eliminated by the ClampStar, and the mechanical integrity is unlikely to degrade further. It would perhaps be wise to include a safety tether on “critical” or “high risk” spans such as river crossings, highway crossings, rail crossings, and areas of high pedestrian traffic, where a dropped conductor would cause significant damage or danger. For other types of conductor, such as AAC, not incorporating the safety advantage of a higher strength core, the overall integrity of the conductor must be considered.

The clearance length of the ClampStar is selected by the end user for the application, designated in the part number by the last three digits, i.e. ClampStar CSF-1108-072 is a Flex-Rail ClampStar for conductors typically from just under ¾” diameter up to a maximum diameter of 1.108 inches (795 Drake ACSR); and having 72 inches of clearance between the heads.

Creating a software program to compute the optimal placement of a ClampStar to minimize vibration is extremely complex, as all the mechanical characteristics are not yet quantified. The same may be said for modifying existing vibration analysis software at this time. Therefore, the optimal placement may be slightly different, but at this time, we would recommend placing the ClampStar ends such that the clearance to the end of the helical rods is no less than 3 inches, and typically no greater than 12 inches.

For example, an application of helical rods over 795 Drake ACSR conductor would utilize rods 100 inches long. Thus, an optimal ClampStar for this application would be CSF-1108-112, which would provide 6” clearance beyond the end of the rods.

7) How do I determine if I should use a Flex (CSF) or Rigid (CSR) rail ClampStar unit for my application?

The basis for ordering CSF vs CSR for splice applications has to do with (a) length, as max CSR lengths are limited to a 40” clearance, but (b) more importantly is the characteristics of the line related to vibration. If the line is prone to high vibration, we would recommend the CSF units, and this is typically related to tension and positions of the span. Short spans of 3-500 feet, typical of some lower voltage applications are optimal candidates for CSR units. Longer spans, 800+ feet are typically best served by CSF units because of their inherent vibration damping characteristics. This is especially important for long spans that are predominantly perpendicular to the prevailing wind direction.

For deadend applications, we would suggest you take a look at the Classic Connectors photo gallery, the first photo is of an improved design specifically for deadends and suspension clamps, which is substantially easier to install, and a few dollars less expensive than the CSF units. It is known as the CSS unit, and should be the first choice for ClampStar applications on deadends or suspension clamps.

8) What is the highest voltage for which ClampStar® is designed?

ClampStars for higher voltages will be corona-free to at least the corona inception level of the largest conductor for which it is designed. This will be accomplished through a combination of self and auxiliary corona shielding, as required.

9) Can ClampStars be ordered with Corona Shields?

Yes. Corona shields are generally required for applications above 138 kV. The appropriate shielding is obtained by combining the ClampStar unit number with the highest anticipated system voltage. Example: Corona Shield part number CSC-1108-230 designates shielding for corona-free performance of CSF/CSR-1108 units installed on a 230 kV system.

The corona shields for 161 and 230kV are the same components and are made to fit specific ClampStar flex frame units. If you wish to order the complete assembly with ClampStar and Corona Shield then please add a "CORXXX" suffix. Therefore the full number for a unit with Corona Shielding for a 230kV maximum voltage would be, for example, CSF-1302-048-COR230.

As noted above the shields for 161 and 230kV are identical for a specific ClampStar size. This is dictated by the number of keepers on the unit, since the shields fit over the complete keeper array and the fixing bolts. Therefore, for the range of wires that fit in a specific unit, the shields are the same.

Shields for 345kV and 500kV will be different [larger diameter tubes].

Note: To ensure that shields are used appropriately at 161kV and above, it is more secure to order ClampStar units complete with shielding when necessary.

10) How does Corona noise and Radio interference affect ClampStars on 345kV and above?

There can be no generated RIV/TVI without corona and the only type of fair weather AC corona that is generally of concern is positive polarity plume corona which in air, at 25°C and sea level, appears (corona inception level) at a voltage gradient of approximately 30 kV rms/cm (76 kV rms/in).

Positive polarity plumes occur on the positive half cycle and are so named from the appearance of the corona discharges. Positive polarity plume corona is audible and generates significant RIV/TVI.

In laboratory RIV / corona tests two corona levels are usually obtained; corona inception on rising voltage and extinction as the applied voltage is reduced. Extinction generally occurs at a lower voltage than inception due to ionization of the surrounding air. There are two other types of AC corona that occur at lower voltage gradients. Brush at approximately 25 kV rms/cm (64 kV rms/in) and glow at 20 kV rms/cm (50 kV rms/in). Both are also named for their visual appearance and neither generates objectionable fair weather corona.

Under wet conditions virtually all energized electrodes are in corona, including the phase conductors. We have completed RIV tests on 230 kV assemblies with original prototype 230 kV corona shields that resulted in positive polarity corona extinction within 10 kV of nominal 345 kV phase to ground voltage. That shielding was made from 1.5" OD tubing and a Corona Test Report with that shielding on CSF-1108-036 is available. The 345 kV shield is made from 2" OD tubing and the shield for 500 kV is made from 3" OD tubing.

11) Have RIV and corona tests been conducted at 345 and 500 kV?

Yes. Full scale laboratory RIV/TVI tests and corona observations have been completed on CSF-1108-COR345 and CSF-1302-COR500 units at 345 and 500 kV, respectively. CSF-1108-COR345 is corona-free and generates no significant RIV/TVI above background at 240 kV RMS L-G (20% above nominal) and the same applies to CSF-1302-COR500 at 350 kV RMS L-G (20% above nominal). Since the same corona shields are provided with CSF-1108-COR230, that unit will be corona free at 230 kV and the results also apply to CSR-1108 units with rigid rails. "Click to request a copy of the CSF1108 & CSF1302 RIV Corona Test Report."

12) Have there been any 500kV installations completed to date?

We have several 230 and 345 kV commercial installations but do not yet have any at 500 kV primarily due to the unavailability of the ClampStar® sizes needed for those larger conductors. However, several customers want to use ClampStar® on their 500 kV systems and, we are working toward being able to provide them in the near future.

13) How does ClampStar® affect damping or galloping and how does it perform under galloping?

ClampStar® has little effect on the conductor's self-damping characteristics due to its relatively small mass and, if anything, it will tend to diminish propensity to gallop because it is difficult to establish a wind foil on an irregular shape and the ClampStar® will tend to create turbulence (which also diminishes Aeolian vibration).

NOTE: Damper placement is never an exact science. Typically, utilities obtain placement recommendations from the damper manufacturer and those recommendations will vary, based on the damper characteristics. All are based on energy balance but, it is impossible to locate dampers such that they are on anti-nodes of vibration loops over the range of susceptible laminar wind velocities. It's a very dynamic environment and damper placement becomes a matter of compromise. For example, the worst possible damper placement is on a vibration node and the reason for two dampers on one end of a deadend span is often to simply be sure that at least one will always be somewhere on the quarter cycle of a vibration loop.

Additionally, we have done some computer vibration analysis with hypothetical conductors, spans, tensions, etc. using a couple of different software packages and, if anyone would like an analysis of a specific case, we would welcome the opportunity to model and analyze it (and we do have the ability to simulate a defined mass anywhere in the span).

Vibration Analysis Report from an independent lab is available upon request.

14) Why do we seem to have more splice failures within a few miles of substations than we do at the ends?

The primary reason is the available system fault current diminishes with distance from the sources. In an attempt to quantify this, representative fault current calculations were made on a "typical" 34.5 kV circuit. I'll call it "typical" because no circuit details or transformer nameplate data were available. We do know that the utility uses both 336.4 kcmil (Linnet) and 636 kcmil (Grosbeak) ACSR conductors on their 34.5 kV circuits and it is assumed that both are loaded to their 75°C maximum operating temperatures. The transformer used for these calculations was arbitrarily selected as 34.5 kV, 95.0 MVA, X/R=5.0, 5%Z (which may or may not be representative of the actual transformer). Visit www.ClassicConnectors.com/faqs for more details.

15) How does ClampStar affect conductor sag?

Installed on 954 kcmil 54/7 (Cardinal) ACSR conductor under the following conditions:

- 700 ft Ruling Span.
- Final tension: 19% RTS @ 60°F = 6,422 lbf..
- NESC Medium Loading with Heavy Ice Loading (temperature: 15°F, ½" radial ice, 4 lb/ft² horizontal wind pressure, 0.20 lb/ft safety factor added to the resultant).
- Level spans with no significant change in elevation.
- Conductor properties:
- Area = 0.8464 in², Diameter = 1.196", Weight = 1.229 lbs/ft, RTS = 33,800 lbf.

The curved shape of a completely flexible cable suspended between two rigid supports is defined as a catenary. A stranded conductor suspended between two rigid supports assumes very nearly that shape even though it is not completely flexible. The exact formula for determining the sag of a catenary is expressed as:

$S = Th/Wc\ [(\cosh WcL/2Th) - 1]$

Where:

S = sag at mid-span in feet

L = span length in feet

Th = horizontal tension in lbf

Wc = weight of the conductor in lbs/ft

For span lengths less than 1,000 ft, or where sag is less than 5% of the span length, the parabola equation can be used with sufficient accuracy for level spans.

$S = WcL^2/8Th$

This equation is the first term of MacLaurin's infinite series for hyperbolic functions with each successive term resulting in greater accuracy.

Using this equation, the conductor final sag (S) = 11.72 ft at 60°F and the length of the conductor in the span = 700.52 ft.

Applying ClampStar unit CSF-1302-048-COR230 at the center, or elsewhere in the span results in sag at mid-span (S) = 12.25 ft, or an increase of 0.53 ft.

Combined Wind and Ice Loading

The combined wind and ice loading noted above (including the 0.20 lb/ft safety factor added to the resultant vector sum of weight and transverse loading at +15°F) results in conductor tension of 10,530 lbf (31% RTS), combined loading of 2.598 lbs/ft and mid-span sag = 15.1 ft. With a CSF-1302-048-230COR installed on the iced conductor, the mid-span sag increases to 15.42 ft.

Discussion: A good example of what happens when conductor weight changes can be illustrated by considering this iced conductor in which the weight of the bare conductor is 1.229 lbs/ft and the combined loading on the iced conductor results in a conductor weight of 2.598 lbs/ft. Thus, 2.598/1.229 = 2.1, which means the conductor tension must increase by a factor of 2.1 unless there is a change in conductor length. In this case, the length of the conductor does change due to the 45° difference in ambient temperature, based on the stress-strain properties of the Cardinal conductor.

Another interesting comparison is this relatively light weight ClampStar unit (at approximately 39 lbs) to in-line, hook stick operated disconnect switches that are frequently used in overhead transmission and distribution lines. A 161 kV 1200 amp in-line switch with a single polymer insulator typically weighs approximately 81 lbs and similar switches for 230 kV weigh in the neighborhood of 130 lbs, depending on the BIL. Similar 1200 amp switches for 69 – 138 kV range from around 54 – 70 lbs.

16) The ClampStar® part numbers 0883 and 1108 both cover a 477 kcmil conductor, is there a reason to go with the larger ClampStar?

The ClampStar CSF & CSR-0883 is the correct part number for this application. Although CSF & CSR-1108 would also fit the 477 kcmil conductor, there would be no advantage in going to the larger size unless you also have additional applications for larger conductors that exceed the maximum diameter of CSF & CSR-0883. In that case, there might be some inventory advantages in using the CSF or CSR-1108 for both.

17) What do the last 3 digits in the part number represent?

That number represents the length of the opening or window between the two clamping sections to fit over the splice or other connector. For instance part number CSF-0883-30 (indicates a 30" long window). That defines the required length of the flexible cable rails. That is the approximate length that would probably be required to fit over most splices.

Example: The nominal uncompressed length of a Burndy splice YDS37RP1 is 26-3/8", the installed length will be greater due to extrusion of both ends during crimping. The length increase due to extrusion will depend upon the installation tooling and number of crimps (which for YDS37RP1 will likely be either 4 or 12 crimps per end; depending on the die set).

18) How is ClampStar® installed regarding nut torque to insure adequate connection?

All ClampStars are supplied by the factory with pre-installed torque limiting nuts containing a top section that is designed to snap off when the correct torque level is attained. The remaining nut can be removed in the event a need arises to do so.

19) What are ClampStar® "Installation Kits"?

When the ClampStar® flex units are being installed with hot sticks you need something to grab onto to support the ClampStar flex connector. The Installation Kit contains an eyebolt with a flat washer welded to the eye near the threaded base. The threaded bolt part screws into a tapped hole in the body of the ClampStar. This is removed after installation to be used for the next CSF-0883-036 installation. This replaces the welded in-place hot stick loop on the rigid connectors.

20) What tools are needed for a successful ClampStar® installation?

1. 2 Shot gun sticks of appropriate length to work the design voltage of the line intended.
2. 1 Universal stick with "V" brush to clean the conductor
3. 1 "Insulated Wrench" (which is essentially an insulated socket extension) fitted with ¾" deep-well socket and ½" drive adapter.
4. 1 Ratchet/power handle attachment to achieve 40 ft. lbs. of torque– or – a swivel ratchet adapter on a universal stick. Your tool of choice to tighten bolts/nuts to 40 ft. lbs. of torque.
5. A battery drill (18V or larger) – or – a rattle gun, to rapidly advance the nuts – easier and faster, w/adapter for insulated wrench.

Note: Items listed in #5 are optional, but are common tools that make the job go faster and easier. Any other hot-line tools you may wish to experiment with are welcome.

21) What are the characteristics of your proprietary CC^2 inhibitor?

Our inhibitor is a synthetic base suitable for all applications, and a similar inhibitor formulation [using the same synthetic base] has been tested and certified in compression connectors tested in cyclic testing at 335C. This similar inhibitor has also been tested successfully through 4,000 hours of salt fog testing. Therefore, we have no concerns with the intended application and, indeed, it mirrors several other Coastal Utility environments with which we are working.

Using our proprietary CC2 Inhibitor, ClampStar units successfully pass thermal cycle tests at 390°C conductor temperature.

22) What is “inhibitor washout” and how does it affect ClampStar’s CC² inhibitor?

“Inhibitor washout” is generally not washout at all. It’s more like “inhibitor runout” and it certainly can be an issue for compression connectors.

There are many different joint compounds, inhibitors and sealants made from natural and synthetic oil bases. Depending upon the intended application, they may or may not contain grits of various materials, shapes and sizes. As with all compounds, the base oil imparts specific characteristics but the final properties are dependent upon the compounding constituents.

One means of evaluating the susceptibility of inhibitor washout or runout is the inhibitor’s dropping point. Dropping point is the temperature at which the inhibitor becomes fluid enough to drip. It indicates the upper temperature limit at which the inhibitor retains its structure. It does not necessarily indicate the maximum service temperature. There are well-known inhibitors that have dropping points of 50ºC that are commonly recommended for use up to maximum temperatures of 93ºC, depending solely on the film that remains to seal the joint.

Inhibitor washout or runout typically occurs when the joint temperature exceeds the inhibitor dropping point and the base oil begins to run out.

In ClampStar, inhibitor washout and runout of our proprietary CC² Compound is of no concern. It’s designed to withstand the maximum conductor operating temperatures that are being considered. It is non-melting with a dropping point in excess of 260ºC.

23) Can installed ClampStar® units be removed from service and be reinstalled in another location?

Yes, provided the unit is appropriate for the new location. ClampStar® units are installed with two part torque-limiting nuts to ensure proper installation torque without the need for torque wrenches or other devices. The CSR-0325-015 unit has 3/8” keeper bolts. All other units use ½”. The torque nuts of CSR-0325-015 units are tightened using a 9/16” deep well socket and the outer 9/16” nut shears at 20 – 25 ft-lbs leaving a ¾” nut in place. The torque nuts of the larger units are tightened with a ½” deep well socket and the outer nut shears at either 40 or 55 ft-lbs, depending upon the unit, leaving a 15/16” nut in place.

The unit can be removed from service by removing the keeper nuts with either a ¾” or 15/16” deep well socket. Retain the flat and spring washers for reuse and visually inspect the unit for any damage. If any damage is evident, do not reuse and contact CCI. Although the unit can be installed in a new location using the removed nuts, it is recommended that new torque nuts be used to ensure proper installation torque. Reinstallation also requires recoating the conductor grooves with CC² compound. This proprietary compound and replacement torque nuts are available from CCI**.**