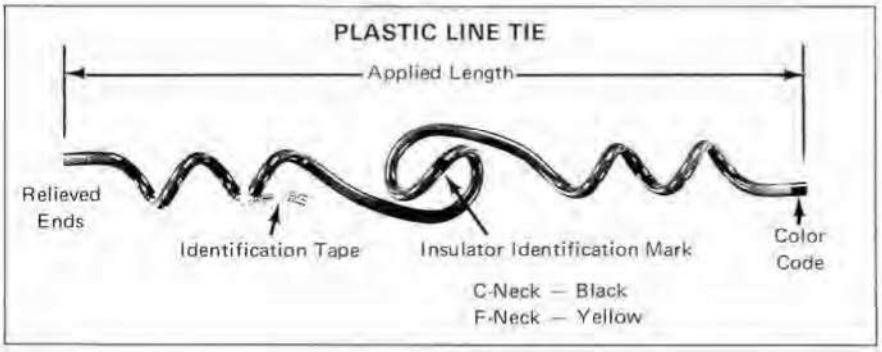
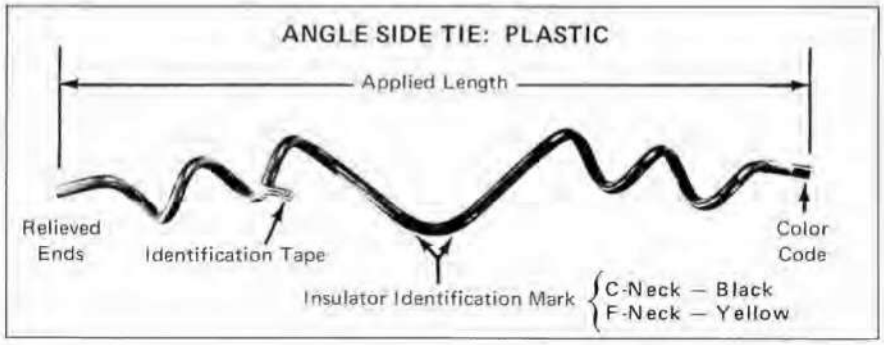
Plastic Ties; PVC and Semi-Con

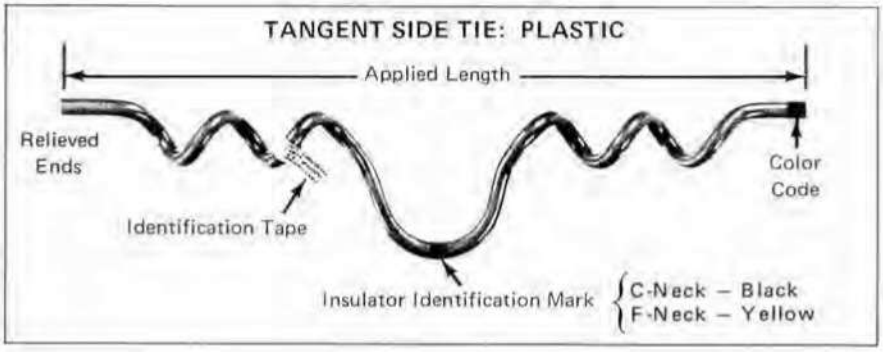
NOMENCLATURE



Plastic Line Ties are intended for use on "tangent" construction with jacketed conductors and vertically mounted tie top insulators on cross-arms, pole-top mounted insulators, or Spacer Cable brackets. Line angles of up to 15° are recommended.

Plastic Angle Side Ties are intended for use on "angle" construction with jacketed conductors and vertically mounted tie top insulators on cross-arms, pole-top mounted insulators, or Spacer Cable brackets. Line angles from 11° to 40° are recommended.





Plastic Tangent Side Ties are intended for use on "tangent" construction with jacketed conductors and side mounted tie top insulators on armless construction. Line or sag angles of up to 15° are recommended.

Relieved Ends: Assist in hot stick application.

Color Code (where applicable) and Applied Length:* Assists in identification of conductor size, corresponding to tabular information appearing on catalog pages.

*Since SC ties are all black, where an insulator or conductor color code normally would be black, no additional black mark is applied to SC ties. Additionally no identification printing is applied to SC ties.

Insulator Identification Mark: Identifies the correct insulator head-style by colors corresponding to information on the catalog pages.

Identification Printing (where applicable): Shows catalog number and conductor diameter range, as an alternate to identification tape on PUC ties.

Plastic Ties; PVC and Semi-Con

GENERAL RECOMMENDATIONS

INTENDED USE: Plastic Line Ties and Plastic Side Ties are intended for use with plastic jacketed conductors and tie top ANSI C29 compliant insulators only. They are suitable for use with any plastic covered conductor such as Tree Wire or Spacer Cable.

MATERIAL: Plastic Ties are offered in two versions: Standard "PVC" and "Semi-Con" for higher voltage applications.

PVC Plastic Ties are made from grey polyvinyl chloride. This material was selected for "standard" applications because of its UV resistance, tensile strength, impact strength, flexural strength, low moisture absorption and self-extinguishing properties.

Semi-Con Plastic Ties are made from a base of clear PVC (with similar mechanical properties of the PVC Plastic Ties) with a proprietary black co-extruded outer covering selected for its superior electrical tracking resistance properties. Use of this co-extruded material allows application on higher voltages and/or more stressful electrical environments than with the standard PVC Plastic Ties.

VOLTAGE APPLICATIONS: Electrical performance of any tie for covered conductors made from plastic materials (or metal) is dependent upon a number of factors, such as the line voltage, insulator style, the BIL of the line/pole, atmospheric contamination levels, type and condition of the covered conductor, etc.

The design of the insulator being used may particularly affect the electric stress environment of an installation. For example field experience suggests multi skirt porcelain insulators may provide a less stressful electrical environment than similarly rated voltage single skirt porcelain insulators, and thus offer a greater electrical "safety margin". Multi skirt polymer insulators may also provide a less electrically stressful environment due to larger leakage distances vs. porcelain insulators, and the similar dielectric characteristics of the materials used to make polymer insulators, the plastic conductor jacket, and a Plastic Tie.

Because of the complex, interwoven nature of these factors, it is difficult to make absolute voltage application recommendations for Plastic Ties on covered conductors. However as a general policy, PLP suggests the following operating line voltage applications may be suitable:

"Standard" PVC Plastic Ties: 13kV or below.

"Semi-Con" Plastic Ties: Up to 30-35kV.

Caution: Because of the line construction and environmental factors noted above, under certain conditions Plastic Ties (particularly the "standard" PVC Ties) may be subjected to burning or tracking, so it is important the product be evaluated by the intended user and PLP to determine if it is suitable for use in a particular installation.

MECHANICAL: Testing has shown Plastic Line Ties and Plastic Side Ties will develop unbalanced and lift-off loads equivalent to, or in excess of, a hand tie over jacketed conductor.

INSULATORS: To insure proper fit and performance, it is recommended that only ANSI C29.5 or C29.7 compliant insulators having nominal neck diameters corresponding to 2-1/4" C-Neck or 2-7/8" F-Neck be used.

Plastic Ties are suitable for use with either ANSI Compliant Polymer or porcelain insulators.

COLD WEATHER INSTALLATION/REMOVAL: Caution should be exercised when installing or removing any Plastic Tie in very cold weather, as the plastic material may become brittle and break at very low temperatures. It is suggested Plastic Ties be kept in a warm environment before installing at outside temperatures below approximately 25° F, although laboratory installation tests indicate they may remain supple at temperatures as low as -20°F.

SAFETY CONSIDERATIONS

1. This product is intended for a single (one-time) use and for the specified application. CAUTION: DO NOT REUSE OR MODIFY THIS PRODUCT UNDER ANY CIRCUMSTANCES.
2. This product is intended for use by trained craftspeople only. This product SHOULD NOT BE USED by anyone who is not familiar with and trained in the use of it.
3. When working in the area of energized lines with this product, EXTRA CARE should be taken to prevent accidental electrical contact. Although made from plastic materials, Plastic Ties should not be considered as insulated devices.
4. For PROPER PERFORMANCE AND PERSONAL SAFETY be sure to select the proper size Plastic Tie before application.
5. Plastic Ties are precision devices. To insure proper performance, they should be stored in cartons under cover and handled carefully.

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Tangent Side Tie: Plastic

For use on:
Plastic Jacketed Conductor

C-Neck Interchangeable Headstyle Insulators

ANSI 55-2 Pin
ANSI 55-3 Pin

2-1/4" Neck Diameter

PVC Plastic Ties Catalog Number	Semi-Con Plastic Ties Catalog Number	OD Range (in.)		Nominal Conductor Size	Units per carton	Approx. Wt./Lbs.	Approx. Applied Length (in.)	Insulator Color ID Mark (PVC/SC)	Conductor Color Code (PVC/SC)
		Min.	Max.						
SSC-2150	SSC-2150SC	0.296	0.400	#4, 6/1, 2/64s	100	22	17	Black/ None	White
SSC-2151	SSC-2151SC	0.401	0.540	#2, 6/1, 3/64s #4, 7W, 8/64s	100	22	16	Black/ None	Green
SSC-2152	SSC-2152SC	0.541	0.730	1/0, 6/1, 10/64s 3/0, 6/1, 4/64s	100	23	16	Black/ None	Blue
SSC-2153	SSC-2153SC	0.731	0.920	4/0, 6/1, 10/64s 336.4, 18/1, 6/64s	100	25	18	Black/ None	Orange
SSC-2154	SSC-2154SC	0.921	1.100	336.4, 18/1, 10/64s 447, 19W, 8/64s	100	27	19	Black/ None	Red
SSC-2155	SSC-2155SC	1.101	1.300	477, 37W, 10/64s 397.5, 19W, 12/64s	100	15	21	Black/ None	Black/ None

Determine exact Conductor OD over the jacket for correct tie selection.

EXPLANATORY NOTES:

(1) Nominal Conductor size indicates one of various conductors within each range.
(2) For quantities less than 25 pieces, consult PLP.

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Tangent Side Tie: Plastic

For use on:
Plastic Jacketed Conductor

F-Neck Interchangeable Headstyle Insulators

ANSI 55-4 Pin
ANSI 55-5 Pin
ANSI 57-1 Post
ANSI 57-2 Post
ANSI 57-3 Post

2-7/8" Neck Diameter

PVC Plastic Ties Catalog Number	Semi-Con Plastic Ties Catalog Number	OD Range (in.)		Nominal Conductor Size	Units per carton	Approx. Wt./Lbs.	Approx. Applied Length (in.)	Insulator Color ID Mark (PVC/SC)	Conductor Color Code (PVC/SC)
		Min.	Max.						
SSF-2250	SSF-2250SC	0.296	0.400	#4, 6/1, 2/64s	50	12	18	Yellow	White
SSF-2251	SSF-2251SC	0.401	0.540	#2, 6/1, 3/64s #4, 7W, 8/64s	50	12	17	Yellow	Green
SSF-2252	SSF-2252SC	0.541	0.730	1/0, 6/1, 10/64s 3/0, 6/1, 4/64s	50	13	17	Yellow	Blue
SSF-2253	SSF-2253SC	0.731	0.920	4/0, 6/1, 10/64s 336.4, 18/1, 6/64s	50	14	19	Yellow	Orange
SSF-2254	SSF-2254SC	0.921	1.100	336.4, 18/1, 10/64s 447, 19W, 8/64s	50	15	20	Yellow	Red
SSF-2255	SSF-2255SC	1.101	1.300	477, 37W, 10/64s 397.5, 19W, 12/64s	50	17	22	Yellow	Black/ None

Determine exact Conductor OD over the jacket for correct tie selection.

EXPLANATORY NOTES:

(1) Nominal Conductor size indicates one of various conductors within each range.
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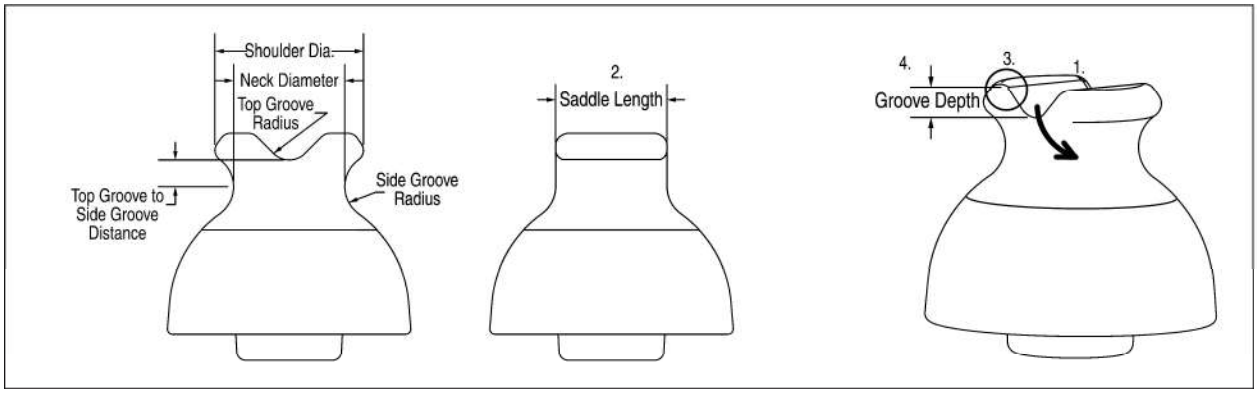
Insulator Fit

Interchangeable Insulators for use with PLP® Ties
Dimensional Factors that affect Tie Application and Performance



It is recommended that only insulators meeting the dimensional requirements of the most recent ANSI® C29.3, C29.5, C29.6, and C29.7 specifications be used with the appropriate PLP ties.

ANSI C29 Insulator Specifications and their Affects on PLP Ties

ANSI C29 specifies and defines dimensions for insulator heads that are crucial to the proper application and lifetime performance of PLP factory formed ties. These dimensions include:

- Neck Diameter - nominal
  - C-neck – 2-1/4"
  - F-neck – 2-7/8"
  - J-neck – 3-1/2"
  - K-neck – 4"
- Top groove radius (minimum)
- Side groove radius (minimum)
- Maximum shoulder diameter (maximum)
- Top groove to side groove vertical spacing

Some of the specified dimensions are simply maximum or minimum allowable values. The dimensions for the vertical distance from the bottom of the top groove to the middle of the side groove and the neck diameter have minimum and maximum values designated.

These dimensions and insulator designations determine the proper tie to be used and the maximum conductor size for the groove application. Review the individual tie sections for groove/conductor diameter limitations.

Insulator characteristics that are not part of the ANSI C29 Specifications

Some of the insulator characteristics that have an impact on the application and performance of PLP Ties are not included in the ANSI specification. These characteristics include:

1. **The transition contour of the top groove into side groove**
2. **Length of the saddle or top groove**
3. **Extension of shoulders past the edge of the top groove.**
4. **Depth of the top groove**

Each of these items has different results on a factory formed tie's performance. Combinations of several of these characteristics could result in initial tie damage and incorrect application.

1. The transition contour of the top groove into the side groove is important due to the tie's shape. If an edge is created instead of a smooth rounded transition, the tie's formed wire is forced to bend over a fulcrum point resulting in a high concentration of stress. This is detrimental for both the insulator and tie.

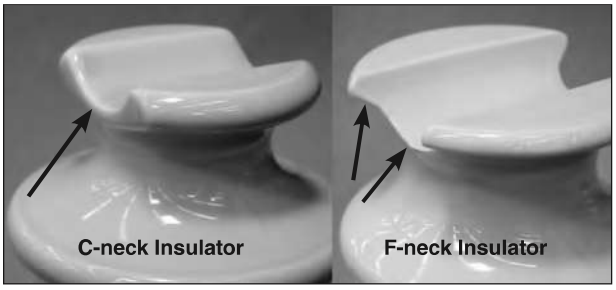


Figure 1a
Note the edge that exists between the top groove and the side groove above. Figure 1b shows a smooth transition.

Figure 1b

Insulator Fit

2. A top groove length longer than the insulator's neck diameter results in an edge. This edge creates a high stress contact point and results in an abnormal tie application. As an example, Figure 2 illustrates how a Distribution Tie reacts to this configuration (the tie tube was omitted to illustrate the gap beneath the conductor). Note the point contact at the insulator/tie interface.

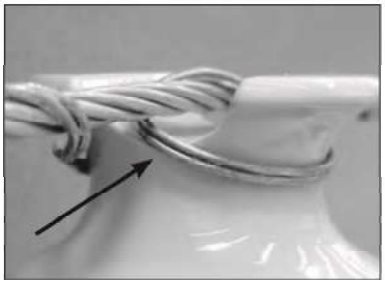


Figure 2

3. The shoulder extensions result in difficulty in application of top ties. As the tie is rotated, the added protrusions from the shoulders past the end of the top groove provide catch points for the tie (see F-neck Insulator in Figure 1a).

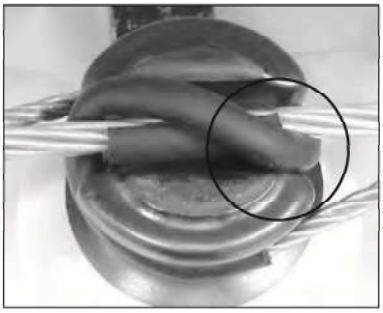


Figure 3

4. The top groove of the insulator can cause installation difficulties of top ties when its diameter is at the minimum ANSI designation. This is especially troublesome when installing the WRAPLOCK® Tie. Figure 3 illustrates the application on a C-neck insulator on 1/0 ACSR 6/1 conductor.

The circled area illustrates that the covered center section of the WRAPLOCK® Tie is wedged between the conductor and the inner surface of the insulator. This increases the installation difficulty of the tie.

In many instances the transition of the grooves can have a great impact on the form, fit, and function of a factory formed tie and hand tie wire. The sharp edge of a long top groove saddle (see Figure #1) can be especially hazardous to the soft hand tie wire as well as a factory formed tie.

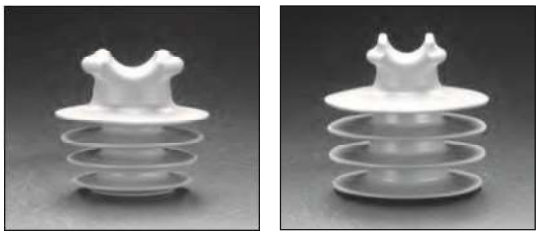
Insulator Review and Trial Applications

It is recommended the user conduct a thorough review of the insulator size, shape and geometry and conduct trial fits with the ties, prior to full scale field installations. Consult PLP for assistance, especially if there are any doubts concerning tie and insulator fit or performance.

Non-ANSI C29 Insulators

Some insulators that do not technically meet all the ANSI C29 Wet Process Porcelain Insulator standards may be suitable for use with PLP factory formed ties depending on their head and neck dimensions and geometry.

An example is the PLP polymer C & F-neck tie top insulators. These insulators have head and neck designs for use with PLP factory formed ties or PLP Ring Ties. The head and neck dimensions of the PLP Polymer C & F-neck insulators have been designed to match critical ANSI C29 dimensional specifications and meet or exceed most of the mechanical and electrical performance requirements specified in that standard.



PLP Polymer 15kV and 35kV Insulators