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Rejuvenation Instructions
Unsustained Pressure Rejuvenation Splice Installation

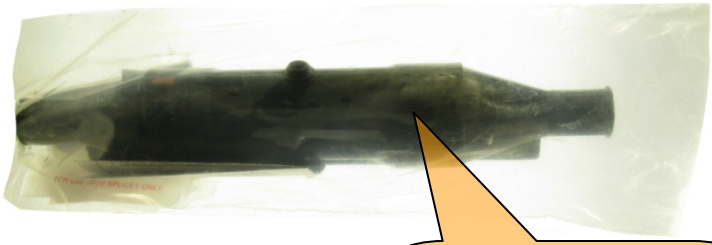
Version 20110222

Installing Splices for Unsustained Pressure Rejuvenation

Caution: Working around energized high-voltage systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling high-voltage electrical equipment. De-energize, test and ground all electrical systems before attempting a splice installation.

This NRI 33 describes the installation of new splices for use with the Unsustained Pressure Rejuvenation (UPR) process. Because Sustained Pressure Rejuvenation (SPR) provides much greater benefit for what is effectively the same amount of work, new splices for UPR are typically only installed when SPR equipment is not available, where SPR is not practical, or by customers who are seeking to have greater likelihood of being able to successfully have cables injected using the UPR method in the future. Any molded EPDM rubber splice may be used for the unsustained pressure rejuvenation process so long as the conductive insert is at least 1 5/8" longer than the connector which will be used.

1. Check contents of the splice kit to verify the kit is complete and undamaged. Ensure the splice to be installed is of the molded EPDM variety. Only EPDM rubber components may be installed in direct fluid contact applications. Cooper® brand splices are not recommended for unsustained pressure rejuvenation.



ensure the splice is complete and in good condition – **only molded EPDM splices may be used**

2. Check all components to verify proper fit with cable and / or mating products. <u>Confirm insulation diameter is at least 20 mils larger</u>

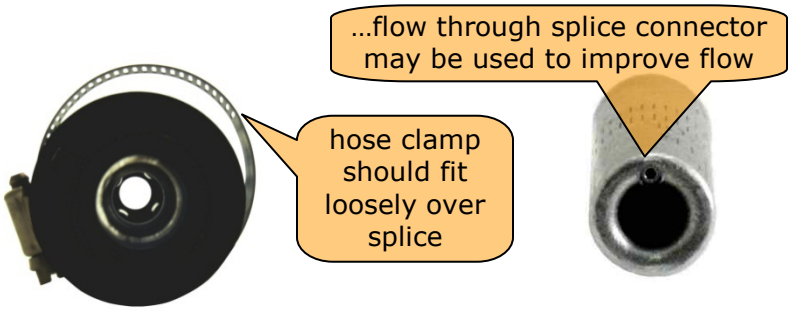
insulation diameter must be at least 20 mils (.020") larger than the minimum listed on the splice

…this splice may be used on cables .900 – 1.110" diameter

than the minimum diameter specified on the splice body, and less than or equal to the maximum allowed in the splice insulation range. Refer to cable measurement instructions in NRI 10, and component sizing instructions in NRI 30. Choose hose clamps which fit loosely over the splice. Optionally, Novinium flow through splice connectors may be used to enhance flow when compared to standard splice connectors.

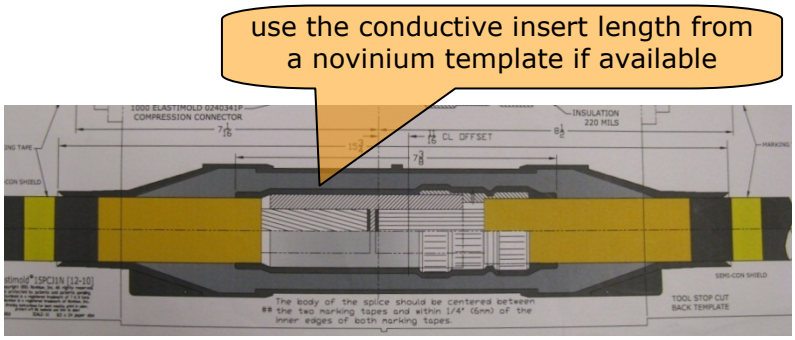
NRI 10: Visual Inspection and Measurement

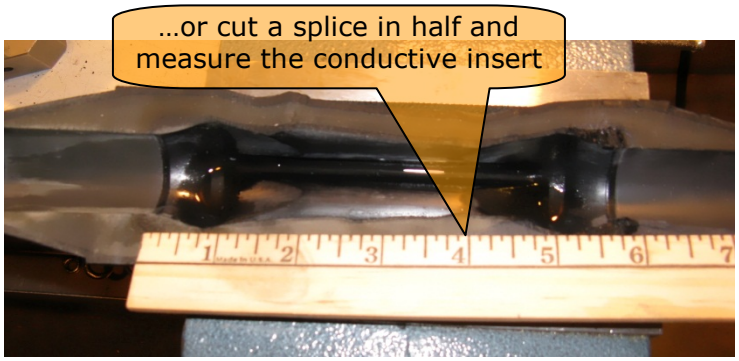
NRI 30: Component Selection and Sizing



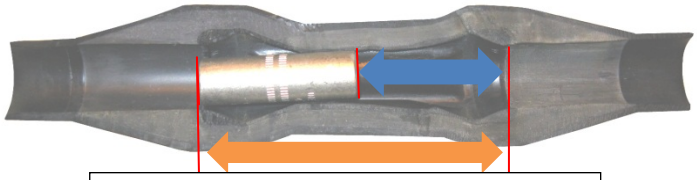
3. Determine the length of the conductive insert (faraday cage) within the splice which will be installed. Note the position of the ends of the conductive insert.

    a. If a Novinium template for the splice exists, use the conductive insert length from the template. Templates for suggested UPR splices can be found at the end of this NRI. Any template detailing the conductive insert length of a splice may be used.





b. If there is no Novinium template available, carefully cut a splice of the same type to be injected in half lengthwise, and measure the conductive insert. Ensure the conductive insert is at least 1 5/8” (41.3cm) longer than the connector.



conductive insert must be at least 1 5/8” longer than connector

4. Remove existing components

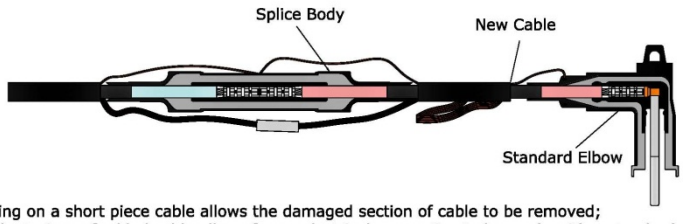
   a. For replacement of existing splices, remove the splice body which is currently on the cable, then remove the connector per NRI 30, steps 1-3.

NRI 30: Steps 1-3

   b. For installation of splices to extend cable length as part of a corrective action, cut off the damaged length of cable or insulation.

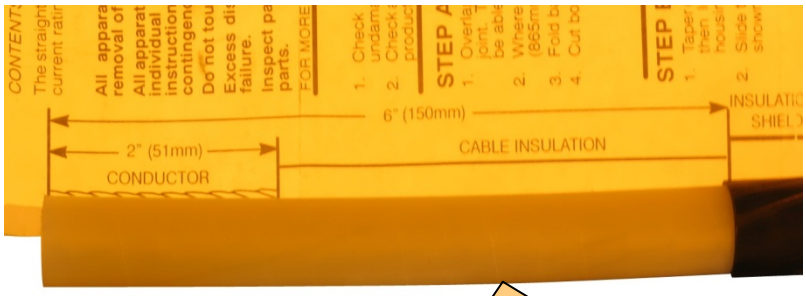
5. Ensure that the cable installation will meet IEEE® P1816™ requirements, and will not subject the splice to bending or excessive tensile or compressive forces. Use an extended or repair length kit if necessary for the cable to be re-prepared for installation of the new splice. New cable used for this type of installation cannot be strand blocked.

Cable Preparation must meet IEEE P1816 requirements



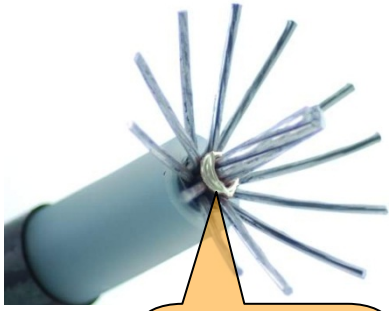
Splicing on a short piece cable allows the damaged section of cable to be removed; the short piece of added cable allows for an electrical connection to be made with a standard elbow.

6. Prepare the cable's insulation shield semi-con, neutrals, and jacket according to the splice manufacturer's instructions. Use a template if one is provided.



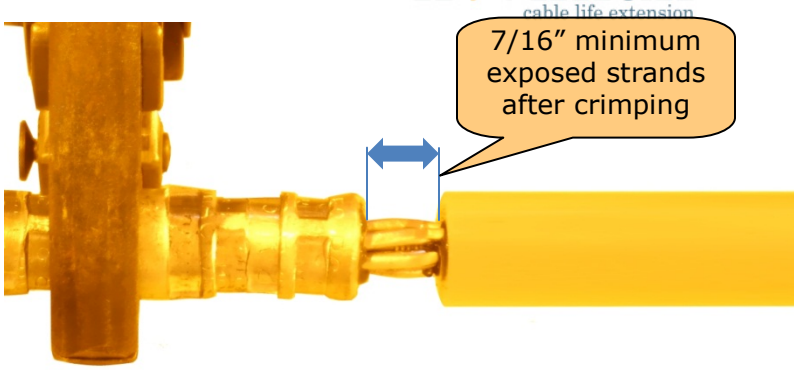
prepare semi-con, neutrals, and jacket per instructions

7. Prepare the conductor strands per NRI 30, steps 8-19. Ensure that at least 7/16" of bare conductor strands are exposed to facilitate flow. Ensure the exposed strands are free of antioxidant grease.

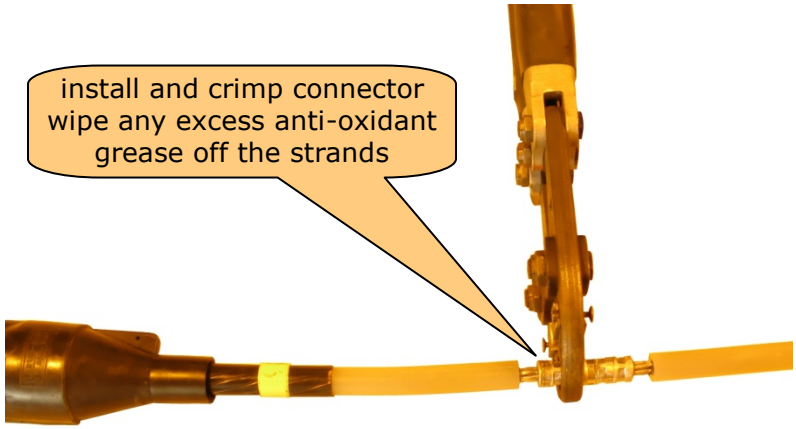


prepare wires per NRI 30, steps 8-19

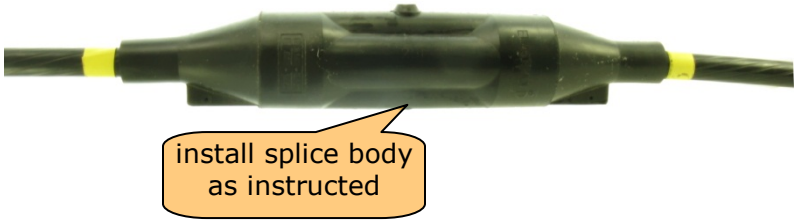
8. Clean the insulation, and install any insulation adapters before installing the connector. Shorten the insulation adapters if necessary to maintain at least 7/16” of exposed conductor strands after crimping.



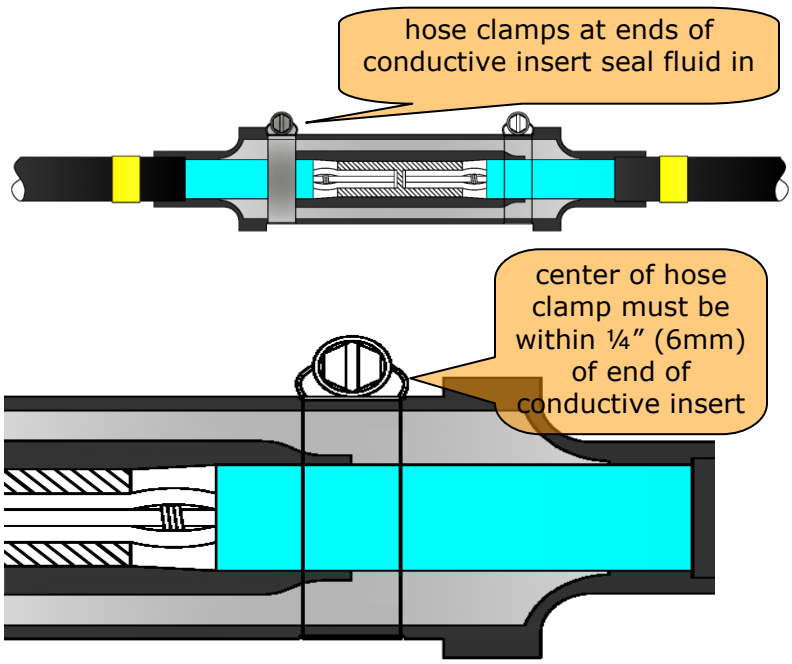
9. Complete installation of the connector. Crimp as specified in the connector instructions; clean any excess anti-oxidant grease from the exposed strands, and adjust the insulation cutback if necessary.



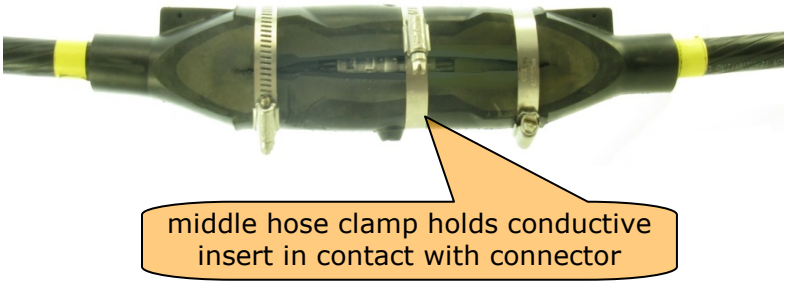
10. Clean the cable, and install the splice body per manufacturer’s instructions. Avoid getting silicone grease on the exposed conductor strands.



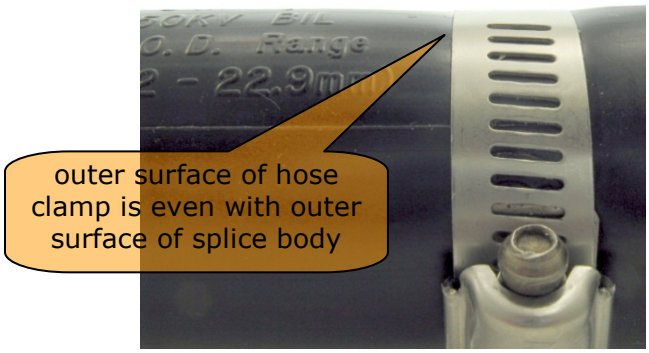
11. Install two hose clamps centered within ¼" of the ends of the conductive insert to seal in fluid.



12. Install an additional hose clamp near the center of the splice to maintain electrical contact between the metallic portions of the cable, and the inner surface of the conductive insert. Extra hose clamps may be installed if desired.



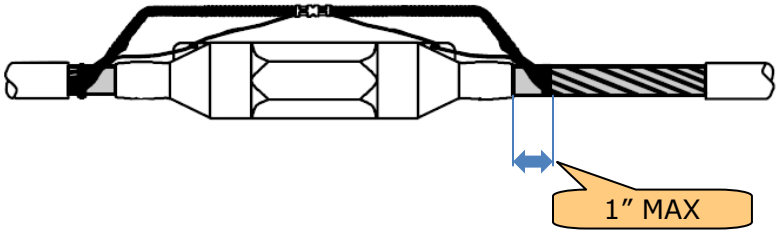
13. Tighten all hose clamps so that the splice body deflects so the outer surface of the hose clamp is even with the outer surface of the splice. Do not over-tighten hose clamps. Additional hose clamps may be installed on the splice body if desired.

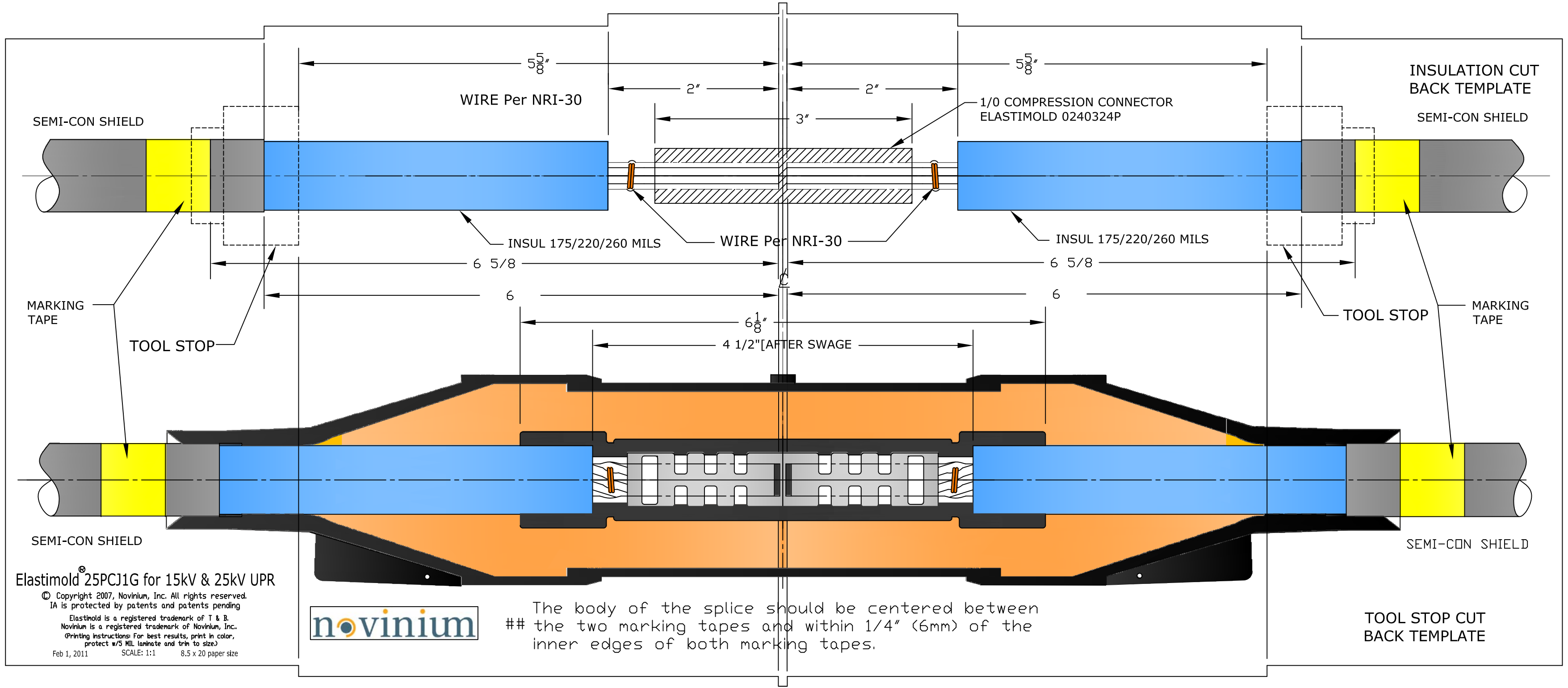


14. (Optionally) Perform a level 2 flow test between cable terminations to ensure that the splice will withstand the adjusted injection pressure (AIP). See NRI 50 for details of the flow and pressure testing procedure.

15. If a re-jacketing kit is being used on the cable, apply 4-5 wraps of self-vulcanizing rubber tape directly over the hose clamps to avoid sharp edges on hose clamps before installing the kit.

16. Connect the Neutrals per manufacturer's instructions. The full complement of neutrals must extend to within 1" of the splice body.





Elastimold® 25PCJ1G for 15kV & 25kV UPR

(Printing instructions: For best results, print in color, protect w/5 MIL laminate and trim to size.)

Feb 1, 2011 SCALE: 1:1 8.5 x 20 paper size

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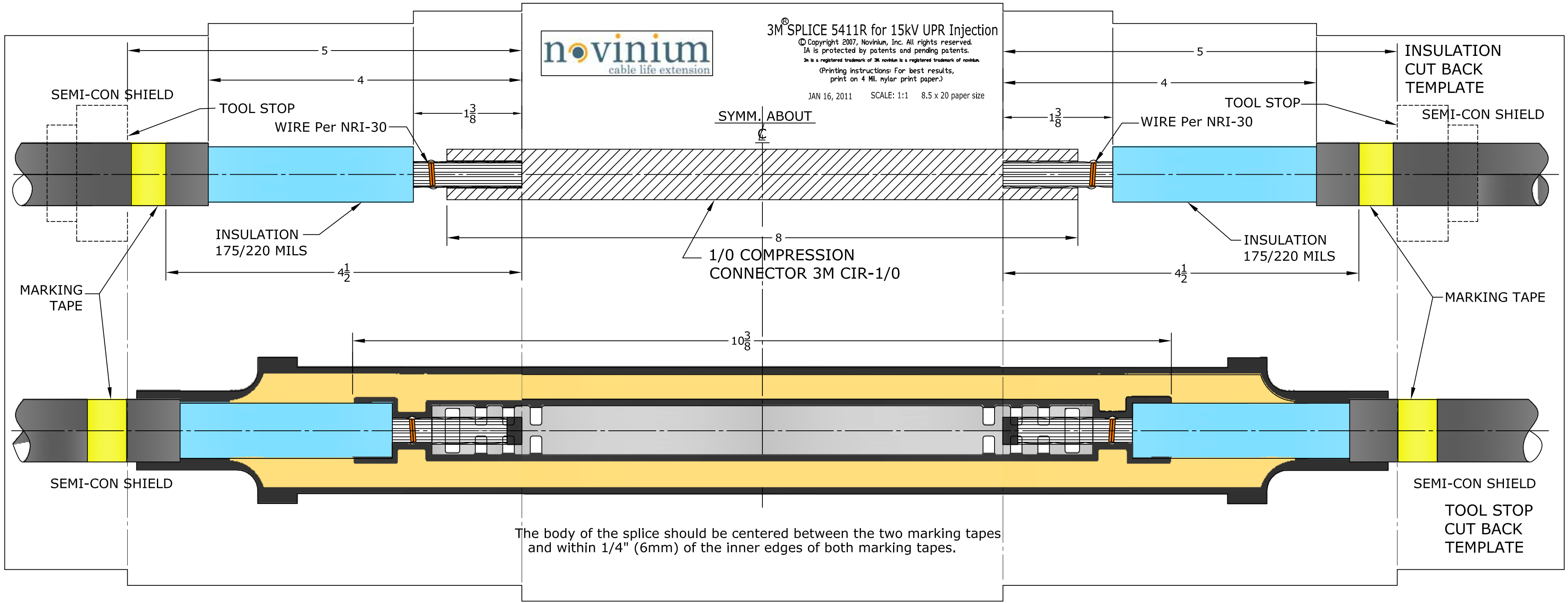
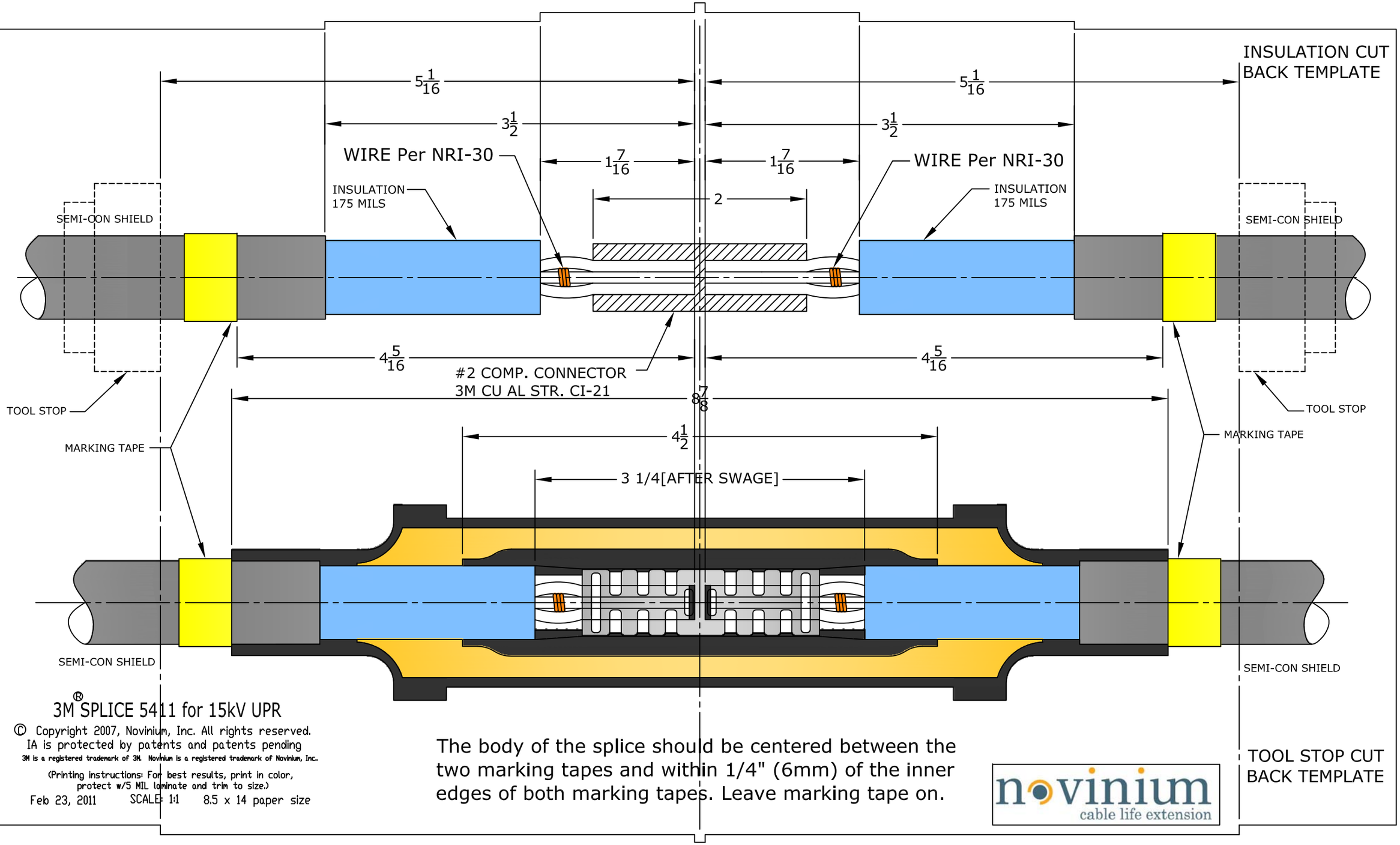
The body of the splice should be centered between the two marking tapes and within 1/4" (6mm) of the inner edges of both marking tapes.



The body of the splice should be centered between the two marking tapes and within 1/4" (6mm) of the inner edges of both marking tapes.


INSULATION CUT BACK TEMPLATE
5 1/16
5 1/16
3 1/2
3 1/2
WIRE Per NRI-30
1 7/16
1 7/16
WIRE Per NRI-30
INSULATION 175 MILS
2
INSULATION 175 MILS
SEMI-CON SHIELD
SEMI-CON SHIELD
4 5/16
4 5/16
#2 COMP. CONNECTOR
3M CU AL STR. CI-21
8 7/8
TOOL STOP
TOOL STOP
MARKING TAPE
MARKING TAPE
4 1/2
3 1/4[AFTER SWAGE]
SEMI-CON SHIELD
SEMI-CON SHIELD
3M® SPLICE 5411 for 15kV UPR
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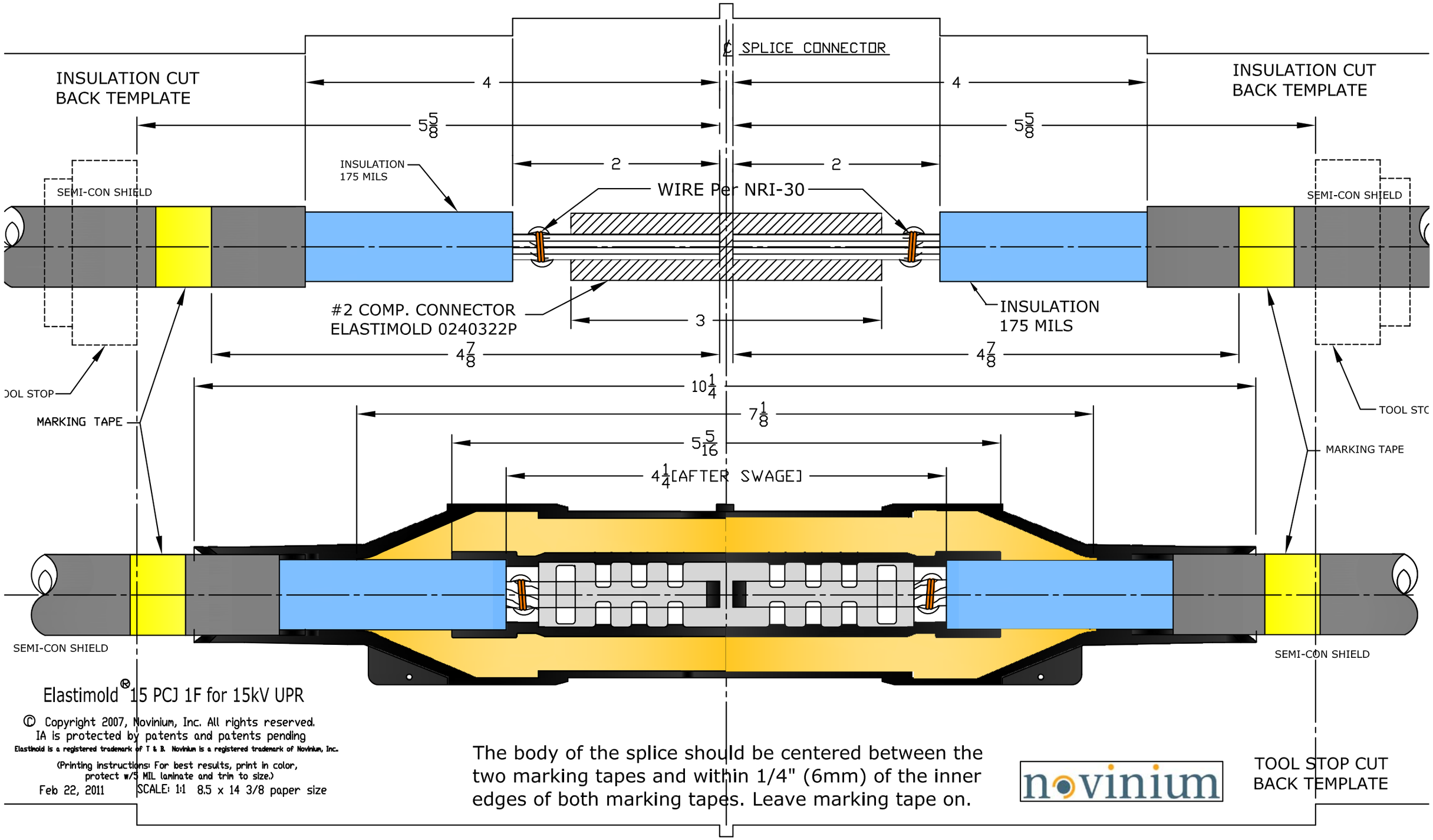
IA is protected by patents and patents pending
3M is a registered trademark of 3M. Novinium is a registered trademark of Novinium, Inc.
(Printing instructions: For best results, print in color, protect w/5 MIL laminate and trim to size.)
Feb 23, 2011 SCALE: 1:1 8.5 x 14 paper size
The body of the splice should be centered between the two marking tapes and within 1/4" (6mm) of the inner edges of both marking tapes. Leave marking tape on.
novinium cable life extension
TOOL STOP CUT BACK TEMPLATE



Elastimold® 15 PCJ 1F for 15kV UPR

(Printing instructions: For best results, print in color, protect w/5 MIL laminate and trim to size.)

Feb 22, 2011 SCALE: 1:1 8.5 x 14 3/8 paper size

The body of the splice should be centered between the two marking tapes and within 1/4" (6mm) of the inner edges of both marking tapes. Leave marking tape on.

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TOOL STOP CUT BACK TEMPLATE