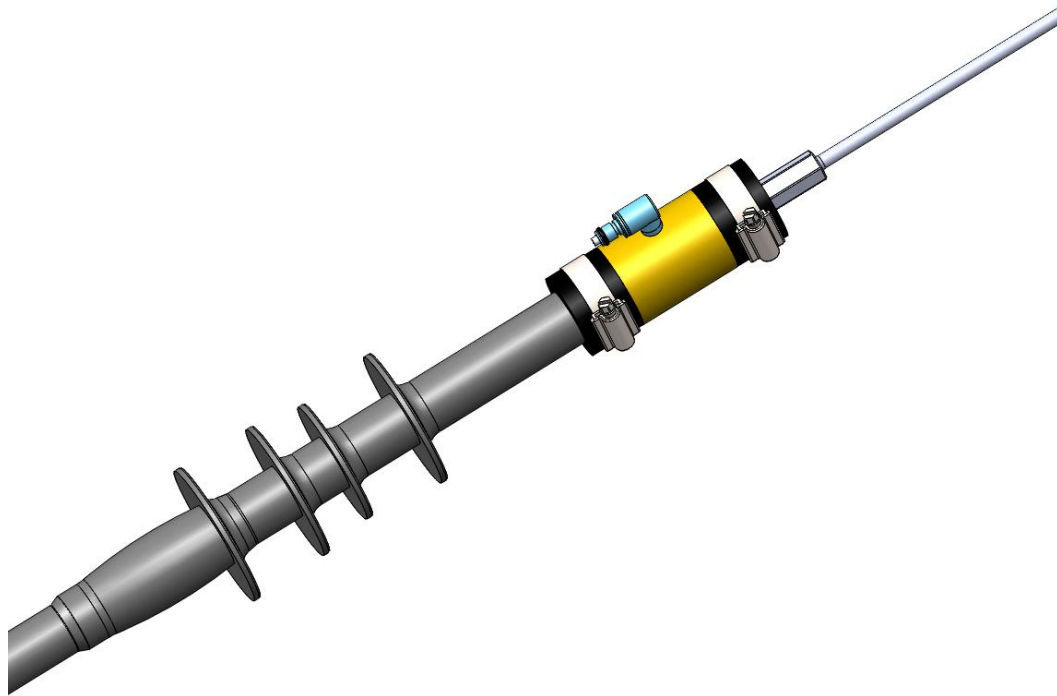


Rejuvenation Instructions

#541 – 200A Live-Front Terminations – UPR



This NRI covers the following:

- How to prepare 200amp live-front terminations for injection.
- How to install the two approved live-front termination seal kits.
- How to size a seal kit and stress control termination to match the cable system.

Trademarks: <http://www.novinium.com/trademarks/>

Patents: <http://www.novinium.com/patents/>



WARNING: It is dangerous working around energized high-voltage systems, pressurized systems, and chemicals. Always work in accordance to the Novinium Field Operations Safety Handbook (FOSH) or other local governing safety standards.

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Introduction

There are two seal kit options for live-front terminations installed on small diameter (URD or 200A) cables.

Elastimold Injection Adapter:

A quick to install seal kit that is ideal for pin-style terminals consisting of:

- A pre-molded rubber and brass housing that slips over most existing pin-style terminals.
- Quick-disconnect fitting for injection.
- Hose clamps to ensure a leak-proof seal.

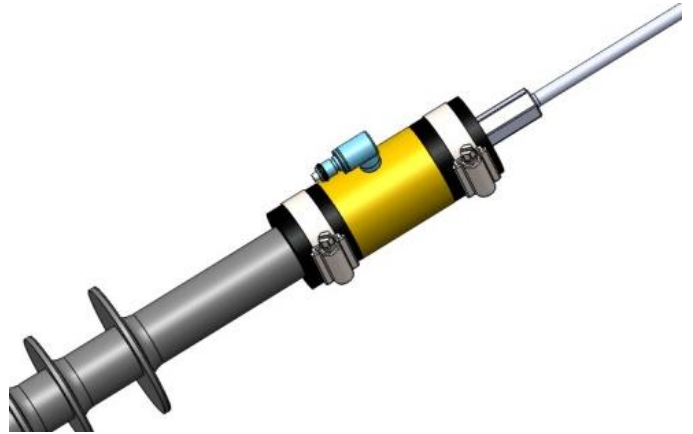


Figure 1: Threaded live-front seal kit.

Heat-Shrink Live-Front Adapter (HLFA):

A range taking seal kit that is ideal for both pin-style and spade-style terminations from 5-35kV consisting of:

- A saddle support that spans the gap between the connector and insulation.
- An adhesive-lined cross-linked polyethylene heat-shrink sleeve that creates the fluid seal on both the insulation and connector.
- A saddle support that anchors the quick-disconnect (QD) fitting and allows for injection to take place.

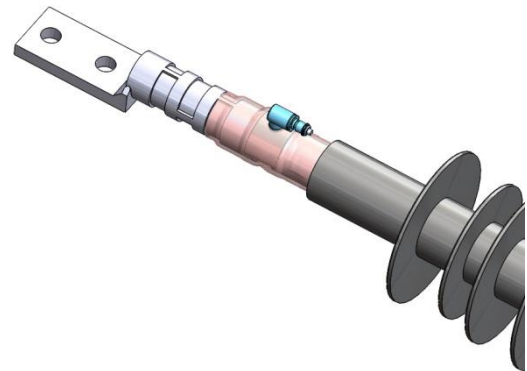


Figure 2: Heat-shrink live-front adapter.

1. Applications.

Elastimold Injection Adapter	HLFA
<ul style="list-style-type: none"> ● URD cables with pin-style live-front terminals. 	<ul style="list-style-type: none"> ● URD cables with live-front terminations.

2. Pressure rating.

Elastimold Injection Adapter	HLFA
<ul style="list-style-type: none"> 30psi while the cable is energized. 120psi while the cable is de-energized. 	<ul style="list-style-type: none"> 30psi while the cable is energized. 100psi while the cable is de-energized.

3. Limitations.

Elastimold Injection Adapter	HLFA
<ul style="list-style-type: none"> Maximum insulation diameter 0.98”. Maximum connector diameter 0.95”. Connector must be sealed at the end and be free of leaks. 	<ul style="list-style-type: none"> Not intended to be used on circuits with sustained heavy loads and must never be used above 194°F. Requires a torch for installation. Not compatible with porcelain style terminations. Connector must be sealed at the ends and be free of leaks.

4. Required equipment.

Elastimold Injection Adapter	HLFA
<ul style="list-style-type: none"> Elastimold Injection Adapter. Quick disconnect (QD) fitting. Stress-control termination. Silicone non-tracking tape. 	<ul style="list-style-type: none"> Heat-shrink tube. Teflon installation tool. Counterbore tool. Raychem torch, regulator, and hose. Saddle support. Quick-disconnect (QD) fitting. Stress-control termination. Silicone non-tracking tape.

Installing the Elastimold Injection Adapter

1. Prepare the cable.

- If you are starting from an existing installation, remove the old stress control termination and examine the lug. The seal kit requires a connector that is leak free.

NOTE: Most existing pin-style connectors will be solder blocked and leak free. However, most existing 2-hole lugs will need to be replaced with a solid block connector.

- b. Determine the jacket removal or neutral pullback lengths by adding the length of the conductor cutback and the seal kit to the dimension found in the stress cone manufacturer’s instructions.

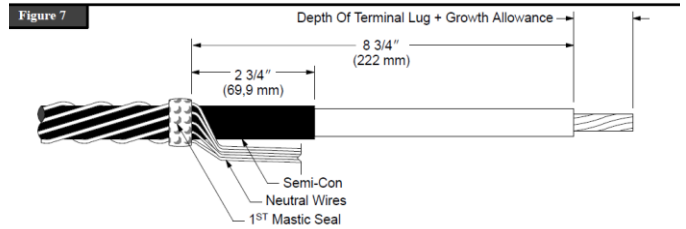
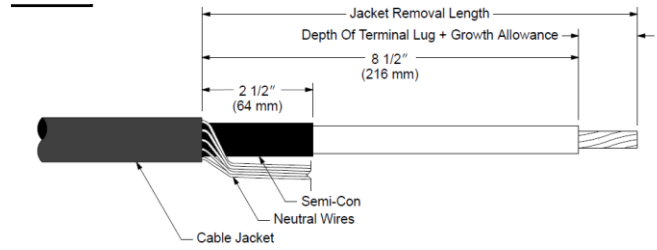


Figure 3: Adjust the jacket removal/neutral pullback distances to accommodate the seal kit.

- c. For the 3M QTIII stress control kits (5-28kV), these dimensions are found in Table 1.
- d. For other stress control terminations, the dimension can be calculated as follows:
 - **UPR Jacket Cutback** = 3M Cutback + Seal Kit + Insulation Cutback
 - **UPR Neutral Pullback** = 3M Pullback + Seal Kit + Insulation Cutback

AWG	Insulation Cutback		Neutral Pullback	Jacket Cutback
	Pin-style	2-hole		
#2	2 ¼"	2 ¼"	12 ¾"	13"
#1	2 ¼"		12 ¾"	13"
1/0	2 ¼"	2 ¼"	12 ¾"	13"
2/0	2 ½"	2 ½"	13"	13 ¼"
3/0	2 ¾"	2 5/8"	13 ¼"	13 ½"
4/0	2 ¾"	2 5/8"	13 ¼"	13 ½"

Table 1: Cable-prep dimensions.

- e. Prepare the jacket, ground wires, and insulation shield accordingly.
- f. Use the wire brush (819362) and corrosion inhibiting grease (819361) to prepare the conductor strands for crimping.
- g. Crimp the connector and leave ample surface at the end of the connector for the injection adapter to seal (minimum of about 3/8").

- h. Verify that there is between $\frac{1}{4}$ " to $\frac{1}{2}$ " of gap between the connector and insulation after crimping. Correct as necessary.

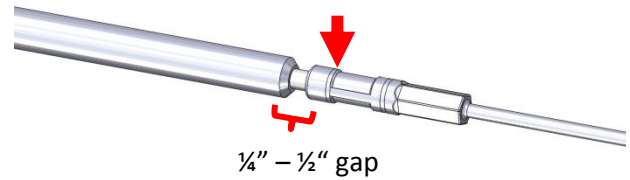


Figure 4: Leave an adequate gap for injection.

2. Complete the installation.

- a. Clean the cable's surface and finish installing the stress-control termination by following the manufacturer's instructions.
- b. Verify that there is a minimum of 1" sealing surface left on the insulation above the stress control for the injection adapter to seal.
- c. Lightly lubricate the surface of the injection adapter and the pin-style connector.

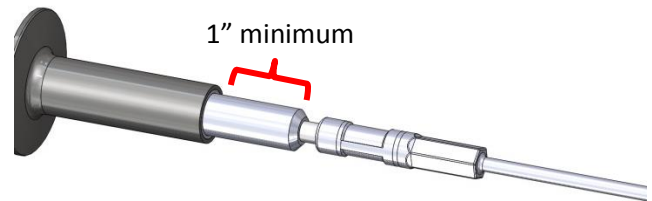


Figure 5: Collapse the cold-shrink and verify that there is ample sealing surface.

- d. Slide the injection adapter over the end of the terminal so that it is seated against the stress control.
- e. Align the hose clamps over the sealing surfaces on the cable insulation and the connector and tighten snugly.



Figure 6: Slide the injection adapter over the terminal and tighten the hose clamps.

- f. Use Teflon tape on the threads and thread the QD fitting into the injection adapter until it seals.
- g. Use good line worker practice to install silicone non-tracking tape (818662) over the injection adapter and any exposed insulation.



Figure 7: Install the quick-disconnect fitting.

Installing the Heat-Shrink Live-Front Adapter (HLFA)

1. Prepare the cable.

- a. If you are starting from an existing installation, remove the old stress control termination and examine the lug. The seal kit requires a connector that is leak free.

NOTE: Most existing pin-style connectors will be solder blocked and leak free. However, most existing 2-hole lugs will need to be replaced with a solid block connector.

- b. Determine the jacket removal or neutral pullback lengths by adding the length of the conductor cutback and the seal kit to the dimension found in the stress cone manufacturer's instructions.

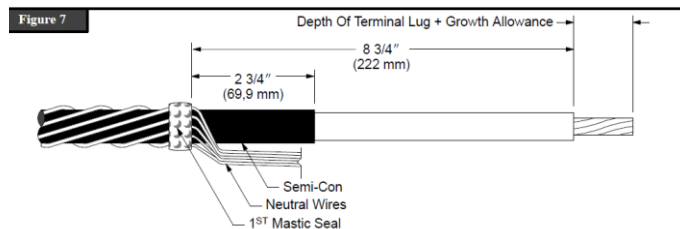
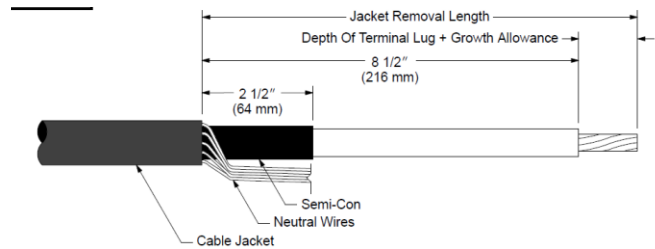


Figure 8: Adjust the jacket removal/neutral pullback distances to accommodate the seal kit.

- c. For the 3M QTIII stress control kits (5-28kV), these dimensions are found in Table 2.
- d. For other stress control terminations, the dimension can be calculated as follows:

UPR Jacket Cutback = 3M Cutback + Seal Kit + Insulation Cutback

UPR Neutral Pullback = 3M Pullback + Seal Kit + Insulation Cutback

AWG	Insulation Cutback		Neutral Pullback	Jacket Cutback
	Pin-style	2-hole		
#2	2 1/4"	2 1/4"	12 3/4"	13"
#1	2 1/4"		12 3/4"	13"
1/0	2 1/4"	2 1/4"	12 3/4"	13"
2/0	2 1/2"	2 1/2"	13"	13 1/4"
3/0	2 3/4"	2 5/8"	13 1/4"	13 1/2"
4/0	2 3/4"	2 5/8"	13 1/4"	13 1/2"

Table 2: Cable-prep dimensions.

- e. Prepare the jacket, ground wires, and insulation shield accordingly.
- f. Use the wire brush (819362) and corrosion inhibiting grease (819361) to prepare the conductor strands for crimping.

- g. Crimp the connector and leave ample surface at the end of the connector for the saddle support to rest and for the heat-shrink tube to seal (minimum of about 3/8").

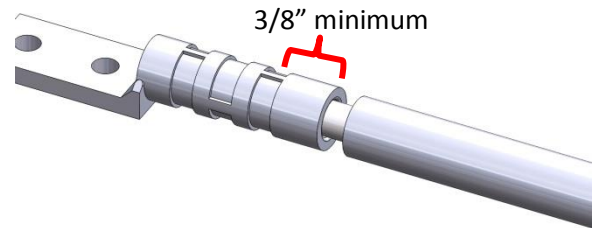


Figure 9: Leave 3/8" of sealing surface at the base of the connector.

2. Install the heat shrink.

- a. Test fit the saddle support for proper fit on the connector and insulation. It should slip easily into position and rest evenly.



Figure 10: Test fit the saddle support.

- b. Insert the Teflon Installation Tool through the heat shrink tube and thread it onto the support saddle.
 - The Teflon tool can be used to hold the saddle support in position and will prevent adhesive from running into the threads.

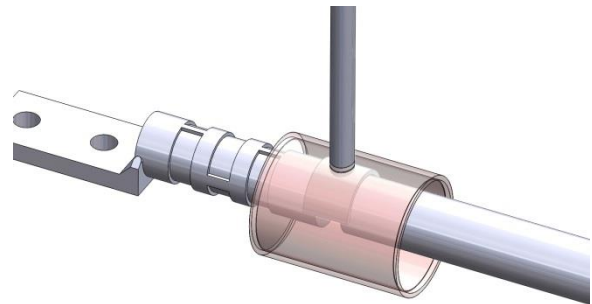


Figure 11: Use the Teflon tool to hold the heat shrink and saddle in place.

- c. Position the heat shrink over the cable with the center of the saddle in the insulation gap.
- d. Use the Raychem torch to collapse the heat shrink so that it seals on the connector and insulation.

- e. Start heating at the center of the heat shrink tube and move toward the edges.
 - Heating from the edges may cause the heat shrink to split.
- f. Continue heating until the entire tube is clear and you can see the adhesive flowing.

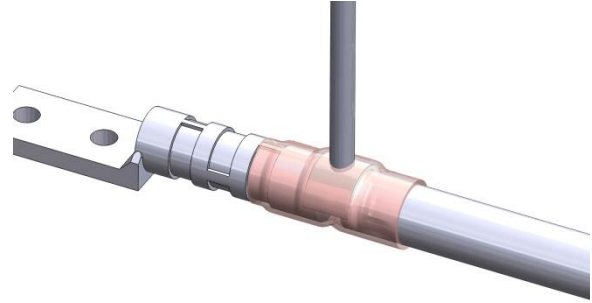


Figure 12: Shrink the heat shrink tube from the center out.

- g. Apply a little extra heat to the connector to bring it up to the melting temperature of the adhesive.
 - This is especially important in cold temperatures where the conductor acts as a heat sink.
- h. Allow the HLFA to cool until the tube is white and the adhesive has set.

3. Complete the assembly.

- a. Remove the Teflon installation tool from the saddle support.
- b. Use the counterbore tool (11637-1) to open up the hole by removing the heat shrink and adhesive from around the threads.

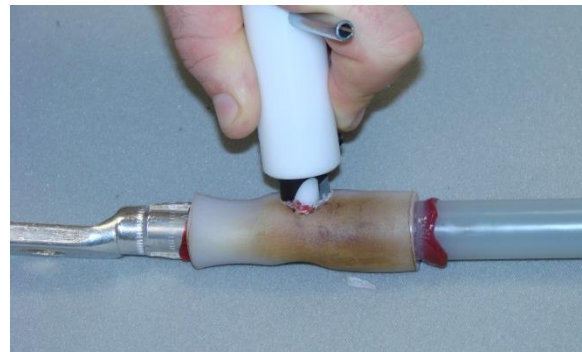


Figure 13: Clean the adhesive from around the threads.

- c. Install the QD fitting using several wraps of Teflon tape on the pipe threads to create a leak-proof seal.
- d. Install the stress-control termination by following the manufacturer's instructions.
- e. Cover the white heat shrink and any exposed insulation with silicone non-tracking tape (818662) using good lineworker practices.

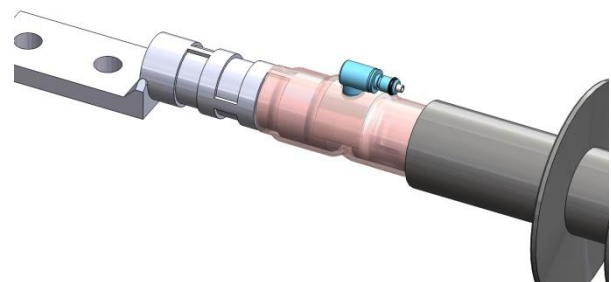


Figure 14: Install the QD fittings.

Sizing Instructions

1. Elastimold injection adapter.

- Reference the Table 3 for proper sizing of the kit based on the connector and insulation diameters and for selecting the desired QD fitting type.

Selection Criteria		Injection Adapter P/N		Seal Kit P/N		
Insulation Dia.	Connector Dia.*	Elastimold	Novinium	Straight Female QD	90 Deg. Male QD	Straight Male QD
.67" - .78"	.54" - .66" (No.4 - 2/0 AWG)	300 TFIC-FB	818964	11352-1	11352-2	11352-3
.77" - .88"	.54" - .66" (No.4 - 2/0 AWG)	300 TFIC-FG	818768	11273-1	11273-2	11273-3
.87" - .98"	.54" - .66" (No.4 - 2/0 AWG)	300 TFIC-GB	818890	11298-1	11298-2	11298-3
.84" - .95"	.83" - .95" (3/0 - 4/0 AWG)	300 TFIC-GB-30/40	819818	11735-1	11735-2	11735-3

Table 3: Proper kit sizing and QD fitting type.

2. Select the heat-shrink live-front adapter.

- Select the saddle support from Table 4 by measuring the outer diameter of the connector and the cable insulation.
- Select the heat shrink tube using Table 4.
- Select the QD that best fits the application using Table 4.
- If necessary, select the 2-hole lug from Table 7.
- Select the stress control termination from Table 5.

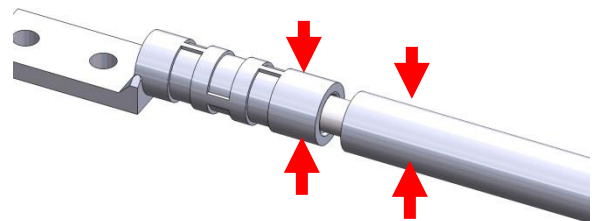






Figure 15: Measure the outer diameter of the connector.

inches	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3
0.7	1	19	26	35	-	-	-	-	-	-	-	-	-	-	-	-	-
0.8	19	2	20	27	36	-	-	-	-	-	-	-	-	-	-	-	-
0.9	26	20	3	21	28	37	-	-	-	-	-	-	-	-	-	-	-
1.0	35	27	21	4	22	29	38	-	-	-	-	-	-	-	-	-	-
1.1	-	36	28	22	5	17	30	39	-	-	-	-	-	-	-	-	-
1.2	-	-	37	29	17	6	23	31	40	-	-	-	-	-	-	-	-
1.3	-	-	-	38	30	23	11	18	32	41	-	-	-	-	-	-	-
1.4	-	-	-	-	39	31	18	12	24	33	7	-	-	-	-	-	-
1.5	-	-	-	-	-	40	32	24	13	25	34	42	-	-	-	-	-
1.6	-	-	-	-	-	-	41	33	25	14	9	8	43	-	-	-	-
1.7	-	-	-	-	-	-	-	7	34	9	15	10	44	47	-	-	-
1.8	-	-	-	-	-	-	-	-	42	8	10	16	45	48	51	-	-
1.9	-	-	-	-	-	-	-	-	-	43	44	45	46	49	52	55	-
2.0	-	-	-	-	-	-	-	-	-	-	47	48	49	50	53	56	59
2.1	-	-	-	-	-	-	-	-	-	-	-	51	52	53	54	57	60
2.2	-	-	-	-	-	-	-	-	-	-	-	-	55	56	57	58	61
2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	59	60	61	62

Support saddle sizing chart 11031-

Heat Shrink Tubes

	11030-1
	11030-1 & 11030-2
	11030-2
	11030-3

Quick Disconnect (QD)

Male-straight	816547
Male-90deg	818036
Female	816546

Table 4: Saddle support sizing chart.

3. Stress-control terminations.

Selection Criteria		5-28kV		5-35kV	
Insulation Dia. (in.)	Jacket Dia. (in.)	3M p/n	Novinium p/n	3M p/n	Novinium p/n
0.64 – 1.08	0.97 – 1.48	7652-S-4	819792		
0.72 – 1.29	1.04 – 1.60	7653-S-4	819793	7663-S-8	819797
0.83 – 1.53	1.12 – 1.87	7654-S-4	819794	7664-S-8	819798
1.05 – 1.80	1.39 – 2.40	7655-S-4	819795	7665-S-8	819799
1.53 – 2.32	1.84 – 2.80	7656-S-4	819796	7666-S-8	819800

Table 5: Stress-control selections.

4. Connectors

AWG	Part No.
#2 & #1	819193
1/0	819194
2/0	819195
3/0	819196
4/0	819197

Table 6: Pin-style connectors.

AWG	Part No.
#2	819078
#1	
1/0	819077
2/0	819377
3/0	819375
4/0	819019

Table 7: 2-hole connectors.