

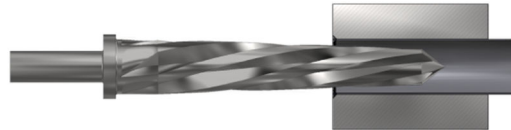
Procedure for Pop-A-Plug® P2P Installation with SRPTP Adapter

WARNING

- ⚠ Pop-A-Plug P2P plugs must be installed in the heat exchanger tube section where the tube has been expanded into the tubesheet. In cases where the heat exchanger tube has been removed, a Pop-A-Plug can be installed directly into the tubesheet.
- ⚠ Installed Pop-A-Plug P2Ps should not project beyond the tubesheet face unless on the perimeter or in a thin tubesheet. In cases where the pin of an installed plug extends beyond the tubesheet, extra caution must be taken to ensure the pin is not struck by another object.
- ⚠ Remove tube sleeves or shields prior to tube preparation and plugging.
- ⚠ Never hit the Pop-A-Plug P2P Pin with a hammer or heavy object.
- ⚠ Failure to remove weld droop prior to installing the Pop-A-Plug P2P will result in a false reading with the Go/No Go Gage. This false Go/No Go Gage reading will direct the user to install an undersized Pop-A-Plug P2P plug which will either leak initially or later.

Step/Action	Additional Action/Information/Result
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1. If tube is welded to sheet, remove any weld droop protruding into the tube ID with a Tapered Reamer. Removing weld droop is a fairly quick step and should only take 15 - 30 seconds to remove. Only remove the weld droop (burr) projecting into the tube ID.



Note A straight reamer should never be used. Extended Tapered reamers are available for Air Cooled Heat Exchanger (ACHE or Fin-Fan) applications.

Install tapered reamer in a variable speed drill and lightly lubricate. The small end of tapered reamer should fit into tube ID and large end should not. The reamer should be operated in the following manner:
 Keep reamer axis parallel to tube axis and lightly squeeze the trigger on the drill to a low rpm in short intervals.
 Use slight forward pressure. If too much pressure is used the reamer may catch.
 Never force the reamer into the tube ID.

2. Service permitting, puncture both ends of the tube to be plugged just beyond the tubesheet to minimize the potential of trapped pressure.

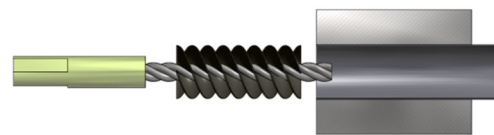


3. Take initial tube ID measurement with Go/No-Go Gage.



Small end of gage should fit in tube to installation depth and large end should not.

4. Operate the brush furnished in the Pop-A-Plug kit with a power drill for at least 30 seconds (5 seconds for 90/10 Cu/Ni and Brass tubes) back and forth from the tube opening to the installation depth evenly to prevent a tapered condition.
 If, as a result of uneven brushing, the tube entrance is smaller, the installed plug may be undersized and leak.



Do not use an oversized brush, force the brush into the tube, or bend the stem. These actions may break the stem and cause deep grooves in the tube. Do not reverse drill because bristles will fall out. A Brush lubricant/Spark inhibitor Lube-A-Tube is available from the factory if required. This should be used when brushing stainless steel tubes or brush may wear out quickly. Brush lubricant/Spark inhibitor should be cleaned from tube before plugging.

5. Carefully inspect tube for scale, pitting or other defects. These conditions must be corrected for plug to seal properly.

A properly brushed tube should have a shiny metallic finish. Deeply pitted tubes may require using larger preparation brushes and plugs.
 After brushing, remove any residual material and clean the inside of the tube.

Questions? Contact EST Group Customer Service at any of the following locations.



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Step/Action

Additional Action/Information/Result

- 6. Take a second measurement with Go/No-Go Gage to installation depth.

Note: If No-Go (larger) end of gage fits into tube to installation depth, the next larger plug size is needed.



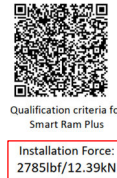
Brushing may remove enough tube material to require the next larger size gage and Pop-A-Plug. This step is to confirm original plug size choice is still valid.

- 7. Prepare the Smart ram to be used.
- 8. Ensure that the Smart Ram is set as close as possible to the correct installation force. The required force value for the plugs can be found in the top right corner of the Certificate of Test & Inspection below the QR code.

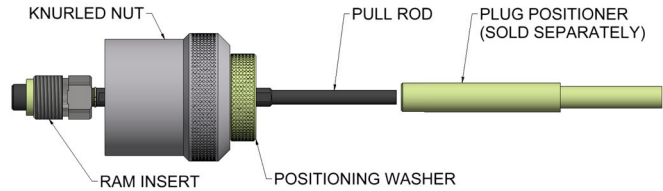
See DC1230 for detailed Smart Ram instructions.



From unit selection, press and hold both buttons to select the current set maximum force. Use the left and right buttons to adjust to the desired value, then press and release the trigger to confirm and return to the main menu. Ram cycle will stop automatically when installation force has reached the set maximum.

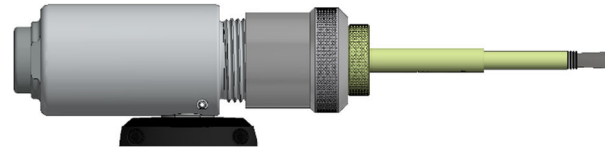


- 9. Remove standard Knurled Nut, Positioning Washer, and Pull Rod from Smart Ram if necessary. Fully thread the SRPTP Adapter's Ram Insert into Smart Ram piston; finger tighten. Fully thread Knurled Nut onto Smart Ram cylinder; do not tighten. Insert the Plug Positioner onto the Pull Rod and seat it in the Positioning Washer. The O-ring in the Positioning Washer holds the Positioner in place during installation. All arrows on SRPTP Adapter parts should point toward the Pop-A-Plug.

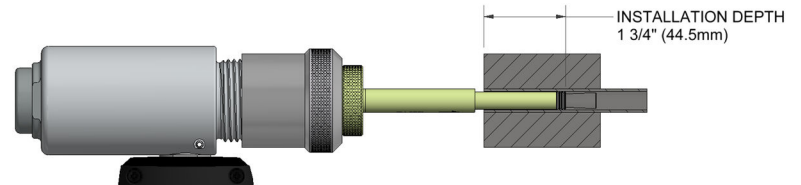


Align the slot in the hole of the Positioning Washer with the flats on the Pull Rod when installing the Knurled Nut on the Smart Ram.

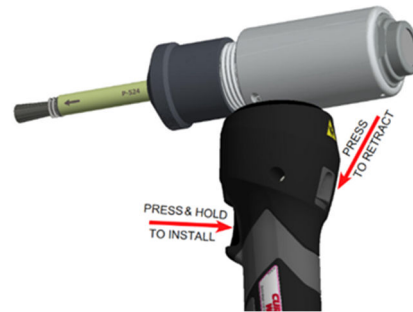
- 10. Holding the Positioning Washer still, fully thread the Pop-A-Plug into the Pull Rod, then back off by 1/4 turn. Unthread the Knurled Nut to remove all slack from the system.



- 11. Insert Pop-A-Plug into prepared tube to 1 3/4" (44.5 mm) installation depth. If the thickness of the tubesheet or the expanded length of the tube cannot accommodate a 1 3/4" (44.5 mm) installation depth, install the plug as deep as possible while keeping the Pop-A-Plug positioned within the tubesheet.



- 12. Squeeze Smart Ram trigger and begin installation of plug. Smart Ram will stop automatically upon reaching the set installation force.



- 13. After Pop-A-Plug installation, thread the Knurled Nut fully onto the Smart Ram cylinder. It may be necessary to rotate the Positioning Washer to re-align its slot with the flats on the Pull Rod. Retract the Smart Ram piston. Remove the installed P2P plug from the Pull Rod by turning the Positioning Washer counter-clockwise.

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Table 1: Operator Troubleshooting Guide

Problem	Cause	Solution
Imperfections such as pitting, gouges or scratches still exist within the tube ID after brushing.	Deep imperfections can exist from normal heat exchanger operation or maintenance work.	Continue brushing with Tube Preparation Brush until little or no resistance is encountered. If imperfections still exist, move up to the next Pop-A-Plug size and repeat tube preparation steps.
Plug Positioner flares or becomes stuck on installed plug. Threaded portion of plug fractures.	Pop-A-Plug is undersized. The Pop-A-Plug was installed beyond the thickness of the tubesheet. Heat Exchanger tube is not expanded (rolled or similar) into the tubesheet.	Gage or measure tube ID at location where Pop-A-Plug will be installed. Refer to heat exchanger datasheet to determine tubesheet thickness. Install Pop-A-Plug within the tubesheet length. Roller expand heat exchanger tube at Pop-A-Plug installation depth otherwise contact EST for assistance.
Go/No-Go Gage indicates proper Pop-A-Plug size, but problems related to an undersized Pop-A-Plug occur.	Weld droop has not been removed. Heat exchanger tube is only “soft rolled” for a short distance and is expanded to a larger tube ID beyond the “soft roll” length.	Remove weld droop using tapered reamer. Using Tube Preparation Brush, enlarge the heat exchanger tube so that the tube entrance and “soft roll” area has same ID as at the Pop-A-Plug installation depth.
Stem of Tube Preparation Brush fractures.	Brush size is too large. The brush was forced or advanced too quickly.	Gage the heat exchanger tube using Go/No-Go Gage and select corresponding brush size. Slowly feed the Tube Preparation Brush into the heat exchanger tube if significant resistance is encountered.
Bristles fall out of Tube Preparation Brush.	The brush was run counter-clockwise in the drill.	Obtain a new brush and operate brush clockwise.
Positioning Washer is difficult to rotate.	The adapter assembly is not held straight. Ram Insert and Positioning Washer are interfering.	Support the adapter assembly while rotating Positioning Washer. Unthread Knurled Nut by one full turn.
The Pull Rod is too deep within the Positioner to fully thread the Plug.	Smart Ram piston is not retracted. Knurled nut is not fully threaded.	Depress the relief trigger on the back of the Smart Ram. Fully thread the Knurled Nut onto the Smart Ram cylinder.

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Table 2: Plug Sizing and Installation Equipment

Pop-A-Plug P2 Kit	Plug Size	Plug Positioner	Pull to Pressure Adapter	Tapered Reamer	Tube I.D.			
					Min	Max	Min	Max
					(in)		(mm)	
P2P-200-Q	0.200	P2PP-200	SRPTP-200-240	REM-200-285	0.201	0.220	5.105	5.588
P2P-205-Q	0.205	P2PP-205			0.206	0.225	5.232	5.715
P2P-210-Q	0.210	P2PP-210			0.211	0.230	5.359	5.842
P2P-215-Q	0.215	P2PP-215			0.216	0.235	5.486	5.969
P2P-220-Q	0.220	P2PP-220			0.221	0.240	5.613	6.096
P2P-225-Q	0.225	P2PP-225			0.226	0.245	5.740	6.223
P2P-230-Q	0.230	P2PP-230			0.231	0.250	5.867	6.350
P2P-235-Q	0.235	P2PP-235			0.236	0.255	5.994	6.477
P2P-240-Q	0.240	P2PP-240			0.241	0.260	6.121	6.604
P2P-245-Q	0.245	P2PP-245			SRPTP-245-285	0.246	0.265	6.248
P2P-250-Q	0.250	P2PP-250	0.251	0.270		6.375	6.858	
P2P-255-Q	0.255	P2PP-255	0.256	0.275		6.502	6.985	
P2P-260-Q	0.260	P2PP-260	0.261	0.280		6.629	7.112	
P2P-265-Q	0.265	P2PP-265	0.266	0.285		6.756	7.239	
P2P-270-Q	0.270	P2PP-270	0.271	0.290		6.883	7.366	
P2P-275-Q	0.275	P2PP-275	0.276	0.295		7.010	7.493	
P2P-280-Q	0.280	P2PP-280	0.281	0.300		7.137	7.620	
P2P-285-Q	0.285	P2PP-285	0.286	0.305		7.264	7.747	
P2P-290-Q	0.290	P2PP-290	SRPTP-290-315	REM-290-395		0.291	0.310	7.391
P2P-295-Q	0.295	P2PP-295			0.296	0.315	7.518	8.001
P2P-300-Q	0.300	P2PP-300			0.301	0.320	7.645	8.128
P2P-305-Q	0.305	P2PP-305			0.306	0.325	7.772	8.255
P2P-310-Q	0.310	P2PP-310			0.311	0.330	7.899	8.382
P2P-315-Q	0.315	P2PP-315			0.316	0.335	8.026	8.509
P2P-320-Q	0.320	P2PP-320			0.321	0.340	8.153	8.639
P2P-325-Q	0.325	P2PP-325			0.326	0.345	8.280	8.763
P2P-330-Q	0.330	P2PP-330			0.331	0.350	8.407	8.890
P2P-335-Q	0.335	P2PP-335			0.336	0.355	8.534	9.017
P2P-340-Q	0.340	P2PP-340	SRPTP-320-395	0.341	0.360	8.661	9.144	
P2P-345-Q	0.345	P2PP-345		0.346	0.365	8.788	9.271	
P2P-350-Q	0.350	P2PP-350		0.351	0.370	8.915	9.398	
P2P-355-Q	0.355	P2PP-355		0.356	0.375	9.042	9.525	
P2P-360-Q	0.360	P2PP-360		0.361	0.380	9.169	9.652	
P2P-365-Q	0.365	P2PP-365		0.366	0.385	9.296	9.779	
P2P-370-Q	0.370	P2PP-370		0.371	0.390	9.423	9.906	
P2P-375-Q	0.375	P2PP-375		0.376	0.395	9.550	10.033	
P2P-380-Q	0.380	P2PP-380		0.381	0.400	9.677	10.160	
P2P-385-Q	0.385	P2PP-385		0.386	0.405	9.804	10.287	
P2P-390-Q	0.390	P2PP-390	0.391	0.410	9.931	10.414		
P2P-395-Q	0.395	P2PP-395	0.396	0.415	10.058	10.541		

The suffix "Q" in the Pop-A-Plug P2P Kit part number is the material designator.

Pop-A-Plug P2P Kits contain ten (10) Plugs, a Tube Preparation Brush, and a Go/No-Go Gage. Brushes are marked with plug size on the swage. Ensure size marked on brush matches plug size before installation.

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