



# Phastite<sup>®</sup> Tube Connectors Installation Manual

BULLETIN 5909



ENGINEERING YOUR SUCCESS.

# Original Instructions for the Installation of Phastite® Tube Connectors

## Contents

Page 4	The Concept
Page 5	Visual Index
Page 7	Safety and General Maintenance
Page 11	Instrument Tubing
Page 18	Tube Markers
Page 19	Connector-Tool Insert Selection Guide
Page 22	Phastite® Connector Assembly: Phastool®
Page 33	Phastite® Connector Assembly: Tri-Tool
Page 40	Complex Tube Runs with Tri-Tool
Page 41	Heat Code Traceability
Page 42	Appendix 1 - CE Declaration of Conformity

# Instructions

**WARNING:** Failure or improper use of the Phastool<sup>®</sup>, including its hose, fittings, assemblies and related accessories can cause death, personal injury and property damage.

It is essential to follow all safety and maintenance requirements listed in this document.

**All installers of Phastite<sup>®</sup> tube fittings must be trained and qualified** under the Phastite SBEx training programme.

**All installers must be familiar with Phastite<sup>®</sup> Installation Manual Bulletin 5909** and these must be followed in full at all times.

**Smart pumps and Tools are matched** at the factory and **MUST NOT** be intermixed with any other pumps or tools. Smart pumps monitor the life cycle of the matched tool and determines when the tool will expire. Refer to pages 23 and 32.

Phastite<sup>®</sup> tools require essential maintenance, smart pumps monitor the life cycle of the matched tool and provide scheduled servicing updates to the operator. Refer pages 23 and 32.

[prker.co/2VH4104](http://prker.co/2VH4104)

Instructions above have been compiled to ensure correct assembly of Phastite<sup>®</sup> and created from many years of instrumentation supply using Sound Engineering Practice (SEP). The warnings shown should be read in full and in conjunction with this document.

**Prior to assembly it is important that the appropriate Personal Protective Equipment (PPE) to include eye protection, is used. CAUTION must be used when working with machinery that has moving parts. All steps must be taken to ensure fingers, items of clothing etc are clear of the working area of the Phastite<sup>®</sup> tool.**

**WARNING, read all safety instructions contained in this document.**

## WARNING

FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyse all aspects of your application and review the information concerning the product or system in the current product catalogue. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

## Offer of sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. Any Order accepted by Parker Hannifin will be subject to our terms and conditions of sale, copy available on request.

# The Concept

## A Ferrule-less, Push-Fit Connector

Phastite® is a breakthrough in tube connection systems; its innovative design concept eliminates the costly requirement of welding and combines quick installation with a single assembly process achieving a tube connector that can be used in applications up to 22,500 psi (1550 bar) and temperatures ranging from -45°C to 93°C (-50°F to 200°F). Already being used on thousands of applications worldwide, Parker is confident that Phastite® can make your processes Smarter, Faster, Cleaner, Safer.

### Design

Phastite® has been specifically designed to meet ever-increasing industry standards and demands in tube connectors and pressure containment. The latest computer aided engineering (CAE) and finite element analysis (FEA) techniques have been employed to optimise the design of the connectors and assembly tooling.

**Note: Patent pending**

### Manufacturing

State of the art machining centres and over 100 years of connector manufacturing has been utilised for accurate and consistent manufacturing of Phastite® connectors. Phastite® is manufactured in Parker's facilities where strict quality controls are employed to ensure reliability and consistency.

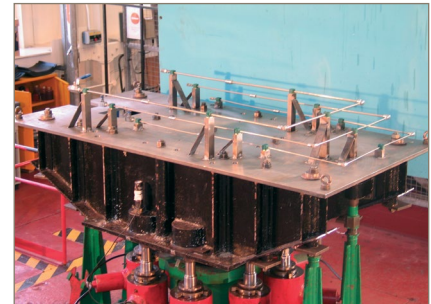
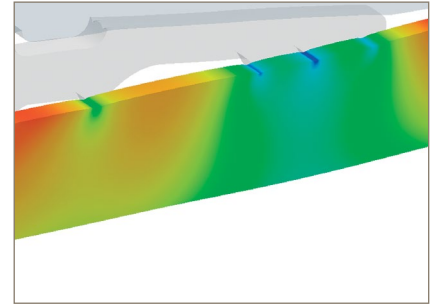
### Testing

Phastite® meets all the relevant performance and functional requirements of industry standards, including pressure containment. Throughout the development of Phastite®, product performance and integrity were paramount. The testing performed included a combination of hyperbaric, thermal cycling, vibration along different axes, flex fatigue, tensile pull test, torsion, helium leak, gas tight and hydrostatic testing.

### Materials

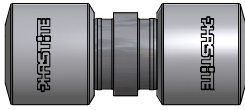
Phastite® can be manufactured in 316 Stainless Steel and corrosion resistant alloys including INCONEL® Alloy 625, INCOLOY® Alloy 825 and Super Duplex to cope with the most demanding environments, from subsea exploration in the north sea to natural gas drilling in Kazakhstan.

**Note: INCONEL® and INCOLOY® are registered trademarks of Special Metals Corporation.**



# Visual Index

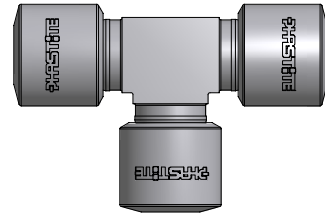
**PS\***  
Permanent Union  
Equal Straight



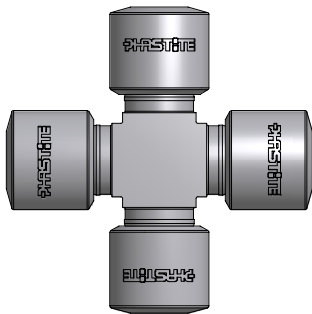
**PE\***  
Permanent Union  
Equal Elbow



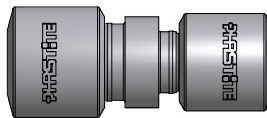
**PT\***  
Permanent Union  
Equal Tee



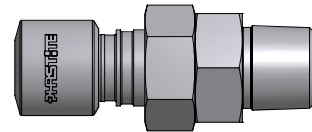
**PC\***  
Permanent Union  
Equal Cross



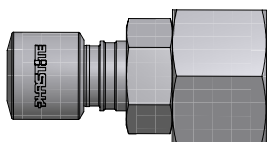
**PS**  
Permanent Union  
Drop Size



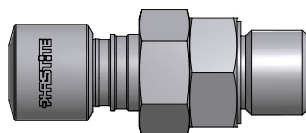
**TMS-N**  
Termination Male Straight  
-  
NPT



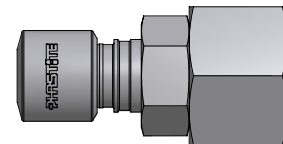
**TFS-N**  
Termination Female Straight  
-  
NPT



**TMS-R**  
Termination Male Straight -  
BSP



**TFS-R**  
Termination Female Straight  
-  
BSP

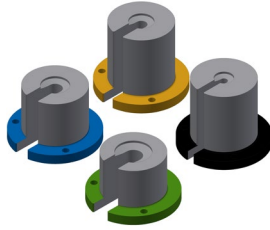


**Please note:** \*Indicates standard Phastite® connectors. For other connector shapes, please contact Parker.

**Phastool® Jaw Inserts**



**Tri-Tool Jaw Inserts**



**Tubemarkers**



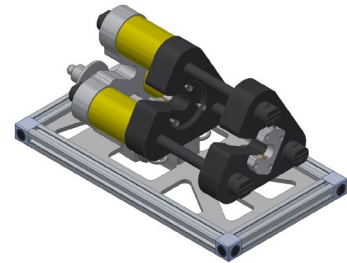
**Phastool® 3A  
PH-3A-TOOL**



**Phastool® 3B  
PH-3B-TOOL**



**Tri-Tool®**



**Hand Operated Pump  
(HP)**



**Battery Operated Pump  
(BP)**



**Mains Operated Pump  
(MP)**



# Safety and General Maintenance

WARNING: Failure or improper use of the Phastool®, including its hose, fittings, assemblies or related accessories can cause death, personal injury and property damage. Possible consequences of failure from improper selection or improper use of these products include but are not limited to:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocution from high voltage electric power lines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping hose. Hose arresters have been installed to keep operators and job sites safe.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity build up or other sources of electricity.
- Injuries resulting from inhalation, ingestion or exposure to fluids.

BEFORE USING THESE PRODUCTS, IT IS IMPORTANT THAT YOU READ AND FOLLOW THE INSTRUCTIONS BELOW.

## General Instructions

### Scope

This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) these products. For convenience, the assembly tool including the hydraulic cylinder is called the “tool”. The assembly made with hose and crimped on connectors is called the “Hose Assembly”. All products commonly called “fittings” or “couplings” are called “connectors”. All jaw inserts are called “inserts”. All related accessories are called “Related Accessories”. The complete assembly tool including but not limited to connectors and hose assembly is called the “tool assembly”. The system used to generate the hydraulic power for the tool assembly is called “the pump”.

### Fail-Safe

Hose Assemblies and related connectors can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Hose Assembly or Connector will not endanger persons or property. Parker provides a hose guard to protect the operator against hose burst. The hose connections are connected to the tool and pump with the use of a protective sleeve to avoid hose fitting disconnection. Detailed information is given in the Tool Assembly Section of this document.

### Distribution

Provide a copy of this safety guide to each person that is responsible for selecting or using any aspect of the tool assembly. Do not select or use the tool assembly without thoroughly reading and understanding this installation manual.

### User Responsibility

Due to the wide variety of operating conditions and applications for the tool assembly, this safety guide does not analyze all technical parameters that must be considered when using the tool assembly. The user, through their own analysis and testing, is solely responsible for:

- Assuring the requirements are met and the application presents no health or safety hazards.
- Ensuring all appropriate health and safety warnings on the equipment are legible and not damaged / removed.
- Assuring compliance with all applicable government and industry standards.

### Additional Questions

Call the appropriate Parker technical service department if you have any questions or require any additional information. Call 1-800-CPARKER, or go to [www.parker.com](http://www.parker.com), for telephone numbers of the appropriate technical service department.

# Safety and General Maintenance

## Important Receiving Instructions

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify the carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage during shipment.

## Safety

Prior to use, read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Parker cannot be held responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation.

Contact Parker when in doubt as to the safety precautions and operations. If you have never been trained on high-pressure hydraulic safety, consult your distribution or service centre for a hydraulic safety course.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

A CAUTION is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A WARNING indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A DANGER is only used when your action or lack of action may cause serious injury or even death.

## Pressure

WARNING: Do not exceed equipment ratings. Never attempt to assemble a product with an assembly load higher than the capacity of the tool assembly. Overloading causes equipment failure and possible personal injury. The tool assemblies are designed for a maximum pressure of 10,000 psi (700 bar). Do not connect a tool to a pump with a higher pressure rating.

WARNING: Whenever using hydraulic equipment, personal protective equipment (PPE), including eye protection, hard hat, gloves, and steel toe boots, should be utilized.

DANGER: Never set the pump/system relief valve to a higher pressure than the maximum rated pressure of the tool. Higher settings may result in equipment damage and/or personal injury. Do not remove the relief valve.

WARNING: The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. Recalibrate these pressure gauges as per supplier recommendations. Surge pressures or peak transient pressures in the system must be below the published maximum working pressure. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressures and cannot be used to determine surge pressures or peak transient pressures. Published burst pressure ratings for hose assemblies is for manufacturing test purposes only and is no indication that the hose assemblies can be used in applications at the burst pressure or otherwise above the published maximum recommended working pressure.

DANGER: DO NOT HANDLE PRESSURISED HOSES. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

## Temperature

CAUTION: KEEP HYDRAULIC EQUIPMENT AWAY FROM FLAMES AND HEAT. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. Be certain that fluid and ambient temperatures, both steady and transient, do not exceed 60°C [140°F], or fall below -20°C [-4°F]. Temperatures below and above the recommended limit can degrade hose and seals to a point where a failure may occur and release fluid.



# Safety and General Maintenance

CAUTION: PROPERLY INSULATE AND PROTECT THE HOSE ASSEMBLY WHEN ROUTING NEAR HOT OBJECTS (e.g. manifolds). Hose assemblies and seals can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the tool assembly.

CAUTION: PROTECT TOOL ASSEMBLIES FROM WELD SPATTER. When using a torch or arc welder in close proximity to tool assemblies, the tool assemblies should be removed or shielded with appropriate fire resistant materials. Flame or weld spatter could burn through the hose and possibly ignite escaping fluid resulting in a catastrophic failure. Heating of plated parts, including hose fittings and adapters, above 450°F (232°C) such as during welding, brazing, or soldering may emit deadly gases.

Do not use any Hose in applications where failure of the hose could result in the conveyed fluids (or vapors or mist from the conveyed fluids) contacting any open flame, molten metal, or other potential fire ignition source that could cause burning or explosion of the conveyed fluids or vapors.

## Hydraulic Fluid

Tool assemblies are supplied pre-filled with hydraulic oil; attached pumps must be used with compatible hydraulic oil. Use only genuine Enerpac hydraulic oil. The use of any other fluid will render your warranty null and void. The Safety Data Sheet of the hydraulic fluid used to pre-fill the tool assemblies is available upon request.

### Premium hydraulic oil

- Ensures effective lubricity
- Protects essential parts
- Prevents pump cavitation
- Maximum internal heat transfer
- Additives prevent rust, oxidation and sludge.

### HF-series, Hydraulic oil

Genuine Enerpac hydraulic oil to guarantee optimal performance and long life of your hydraulic equipment.

### HF-95 Hydraulic Oil Specification

- Viscosity Index 100 min
- Viscosity (cSt @ 40 °C) 32
- API Gravity 31-33
- Density (cSt @ 15 °C) 875
- Flash point 204 °C
- Pour point 32 °C
- Colour Blue
- Working Temperature Range 0 - 60 °C
- Ideal working temperature 40 °C

IMPORTANT: Do not exceed the maximum pressure.

## Mechanical Loads / Hose Routing

CAUTION: Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure. Attention must be given to optimum routing of the hose assembly to minimise inherent problems (kinking or flow restriction due to hose collapse, twisting of the hose, proximity to hot objects or heat sources).

CAUTION: External forces can significantly reduce tool and hose life or cause failure. Mechanical loads which must be considered include excessive flexing, twisting, kinking, tensile or side loads, bend radius, and vibration. Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.













IMPORTANT: Do not lift tool assemblies by the hoses or couplers. Use the hand grip or other means of safe transport.

# Safety and General Maintenance

## Physical Damage

**WARNING:** Immediately replace worn or damaged parts with genuine Parker parts. Phastite® assembly equipment is manufactured from extreme service materials. Standard grade parts will break causing personal injury and/or property damage. Parker Phastite® parts are designed to fit properly and withstand high pressure loads.

**IMPORTANT:** Phastite® assembly equipment must be serviced by a qualified Parker technician. For repair and/or service, contact the Authorised Parker Service Centre in your area, or by calling 1-800-CPARKER. Care must be taken to protect the tool assembly from wear, snagging, kinking, bending smaller than the minimum bend radius, and cutting, any of which can cause premature hose failure.

<b>WARNING</b>	<b>Indicates a potential danger that requires correct procedures or practices to avoid possible serious personal injury or death.</b>	<b>CAUTION</b>	<b>Is used to indicate correct operating or maintenance procedures and practices to prevent minor or moderate injury or damage to / destruction of equipment or other property.</b>
	Immediately replace worn or damaged parts with genuine Parker parts. Non genuine Parker parts may break, causing personal injury and property damage. Parker parts are designed to fit properly and withstand high loads.		Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose, leading to premature hose failure.
	Only use hydraulic equipment in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically, causing severe personal injury.		Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
	The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Always use the pressure gauge in the system to monitor operating pressure. It is your window to see what is happening in the system.		Do not lift hydraulic equipment by the hoses or swivel couplers.
	Do not exceed equipment ratings. Overloading causes equipment failure and possible personal injury. The system is designed for a maximum pressure of 10,000 psi (700 bar). Do not connect a pump with a higher pressure rating.		Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65 °C [150 °F] or higher. Protect all hydraulic equipment from weld spatter.
	Wear proper personal protective gear when operating hydraulic equipment.		Phastite® assembly tooling equipment must only be serviced by a Parker technician. For repair service, contact the Authorised Parker Service Centre in your area. To protect your warranty, use only ENERPAC oil.
	Entrapment risk, Keep all hands and any loose hair or clothing away from the tools when in operation.		
	Where supplied read and understand the safety and operation instructions provided separately with the ENERPAC pump and MILWAUKEE ELECTRIC TOOL battery and charger.		

# Instrument Tubing

## General selection criteria

Phastite® tube connectors have been designed to work in a wide variety of applications that demand the utmost in product performance. Although Phastite® connectors have been engineered and manufactured to consistently provide this level of reliability, no system integrity is complete without considering the critical link, tubing.

The Phastite® connector is designed to work with commercial tubing with standard wall thicknesses and is offered in 4 different materials:

- 316 Stainless Steel
- INCONEL® Alloy 625
- INCOLOY® Alloy 825
- Super Duplex

This guide is intended to assist the designer to properly select and order the correct tubing. Proper tube selection and installation are key ingredients in building leak-free reliable tubing systems. The most important consideration in the selection of suitable tubing for any application is the compatibility of the tubing material with the media to be contained. In addition, tubing compatibility with the connector is mandatory, as dissimilar materials in contact may be susceptible to galvanic corrosion. The differential in material hardness may also affect their ability to correctly hold onto and seal the tubing.

## Pressure ratings for combinations of tube and connector

The pressure rating of a Phastite® connection assembly is that of the tube with the highest-pressure rating to which it can be attached and is presented in Tables 1 to 4. The pressure rating of the tube has been calculated in accordance with ASME B31.3, Chemical Plant and Petroleum Refinery Piping Standard, assuming maximum diameter, minimum wall thickness and minimum Ultimate Tensile Strength (UTS).

In the case of an all tube-ended connector, such as a union tee, the properly selected tubing is the limiting factor in the system. A termination connector may, however, combine a Phastite® connector end with another end of different form, such as male or female pipe thread. Pressure ratings for other ends are determined in accordance with applicable standards and may, in fact, be lower than the rating for the Phastite® tube connector end.

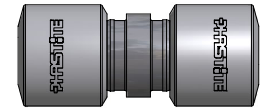
## Pressure rating and wall thickness of tubes

Tables 1 to 4 presents the pressure ratings for type 316 Stainless Steel, INCONEL® Alloy 625, INCOLOY® Alloy 825 and Super Duplex seamless tubes for temperatures up to 93°C (200°F). These tables also show the minimum and maximum wall thickness of tubes that shall be used within the scope of the Parker Phastite® design for each size of tube connector. If a user chooses a tube wall thickness outside those recommended in these tables, the user should first consult the technical department of Parker Instrumentation Products Division.

## Derivation of pressure ratings

The working pressure ratings for tubing shall be derived from stress values and methodologies listed in ASME B31.3.





Material	Tube O.D.	Wall Thickness - Maximum Tube Assembly Rating - PSI (bar)*						
		0.035	0.049	0.065	0.083	0.095	0.154	0.188
Stainless Steel 316 (ASTM A269)	1/4"	5,100 (350)	7,500 (510)	10,300 (710)	13,300 (910)			
	3/8"	3,300 (220)	4,800 (330)	6,600 (450)	8,600 (590)	10,000 (680)		
	1/2"	2,600 (170)	3,700 (250)	5,100 (350)	6,700 (460)	7,800 (530)		
	5/8"		2,950 (200)	4,000 (270)	5,200 (350)	6,050 (410)		
	3/4"		2,400 (160)	3,300 (220)	4,250 (290)	4,950 (340)	8,650 (590)	
	1"			2,400 (160)	3,150 (210)	3,650 (250)	6,250 (430)	7,750 (530)
INCONEL® Alloy 625 (ASTM B444-06)	1/4"	11,000 (750)	16,100 (1110)	22,500 (1550)				
	3/8"	7,100 (480)	10,200 (700)	14,000 (960)	18,700 (1280)			
	1/2"	5,200 (350)	7,500 (510)	10,200 (700)	13,400 (920)			
	5/8"			8,000 (550)	10,400 (710)			
	3/4"			6,600 (450)	8,500 (580)	9,900 (680)	17,400 (1190)	
INCOLOY® Alloy 825 (ASTM B423)	1/4"	6,400 (440)	9,300 (640)	13,100 (900)	17,900 (1230)			
	3/8"	4,100 (280)	5,900 (400)	8,200 (560)	10,900 (750)			
	1/2"	3,000 (200)	4,300 (290)	5,900 (400)	7,800 (530)			
	5/8"			4,600 (310)	6,100 (420)			
	3/4"			3,800 (260)	5,000 (340)	5,800 (390)		
Super Duplex (ASTM A789/A789M)	1/4"		14,600 (1000)	20,400 (1400)				
	3/8"	6,400 (440)	9,300 (640)	12,700 (870)	16,900 (1160)			
	1/2"	4,700 (320)	6,800 (460)	9,200 (630)	12,100 (830)			
	5/8"			7,200 (490)	9,500 (650)	11,000 (750)		
	3/4"			5,900 (400)	7,800 (530)			

Table 1 - Pressure Rating Permanent Connectors (Imperial)\*

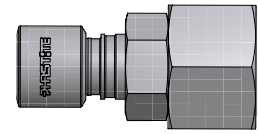
Material	Tube O.D.	Wall Thickness - Maximum Tube Assembly Rating - PSI (bar)*								
		1	1.2	1.5	1.8	2	2.2	3.5	4	4.5
Stainless Steel 316 (ASTM A269)	6mm	6,600 (450)	8,200 (560)	10,700 (730)	13,400 (920)	15,400 (1060)				
	10mm	3,800 (260)	4,600 (310)	5,900 (400)	7,300 (500)	8,300 (570)	9,200 (630)			
	12mm	3,100 (210)	3,800 (260)	4,800 (330)	5,900 (400)	6,700 (460)	7,500 (510)			
	16mm	2,300 (150)	2,800 (190)	3,500 (240)	4,300 (290)	4,800 (330)	5,400 (370)	6,200 (420)		
	20mm			2,800 (190)	3,400 (230)	3,800 (260)	4,200 (280)	7,100 (480)	8,300 (480)	
	25mm			2,200 (150)	2,700 (180)	3,000 (200)	3,300 (220)	5,500 (370)	6,400 (370)	7,300 (440)
INCONEL® Alloy 625 (ASTM B444-06)	6mm	13,300 (910)	16,400 (1130)	21,400 (1470)						
	10mm	7,600 (520)	9,300 (640)	11,900 (820)	14,700 (1010)	16,600 (1140)				
	12mm	6,300 (430)	7,600 (520)	9,700 (660)	11,900 (820)	13,400 (920)				
	16mm			7,100 (480)	8,700 (590)	9,700 (660)				
	20mm			5,600 (380)	6,800 (460)	7,600 (520)	8,500 (580)	14,300 (980)		
INCOLOY® Alloy 825 (ASTM B423)	6mm	7,700 (530)	9,500 (650)	12,500 (8660)	15,600 (1070)	17,900 (1230)				
	10mm	4,400 (300)	5,400 (370)	6,900 (470)	8,500 (580)	6,900 (660)				
	12mm	3,600 (240)	4,400 (300)	5,600 (380)	6,900 (470)	7,800 (530)				
	16mm			4,100 (280)	5,000 (340)	5,700 (390)				
	20mm			3,200 (220)	3,900 (260)	4,400 (300)	4,900 (330)			
Super Duplex (ASTM A789/A789M)	6mm			19,500 (1340)						
	10mm	6,900 (470)	8,400 (570)	10,800 (740)	13,300 (910)	15,000 (1030)				
	12mm	5,700 (390)	6,900 (470)	8,800 (600)	10,800 (740)	12,200 (840)				
	16mm			6,500 (440)	7,900 (540)	8,800 (600)	9,800 (670)			
	20mm				6,200 (420)	6,900 (470)				

Table 2 - Pressure Rating Permanent Connectors (Metric)\*

**Tooling**

- Phastool® 3A, 3B and Tri-Tool
- Phastool® 3B and Tri-Tool
- Tri-Tool®

\*The working pressure ratings for tubing in tables 1 and 2 are calculated directly from ASME B31.3.



Tube Material	Tube O.D.	Thread Size	Wall Thickness - Maximum Tube Assembly Rating - PSI (bar)*							
			0.035	0.049	0.065	0.083	0.095	0.154	0.188	
Stainless Steel 316 (ASTM A269)	1/4"	1/4"	5,100 (350)	7,500 (510)	9,130 (630)	9,130 (630)				
	3/8"	1/4"	3,300 (220)	4,800 (330)	6,600 (450)	8,600 (590)	9,130 (630)			
	3/8"	3/8"	3,300 (220)	4,800 (330)	6,600 (450)	8,600 (590)	8,700 (600)			
	1/2"	1/2"	2,600 (170)	3,700 (250)	5,100 (350)	6,700 (460)	7,250 (500)			
	5/8"	3/4"		2,950 (200)	4,000 (270)	5,200 (350)	5,800 (400)			
	3/4"	3/4"		2,400 (160)	3,300 (220)	4,250 (290)	4,950 (340)	5,800 (400)		
INCONEL® Alloy 625 (ASTM B444-06)	1/4"	1/4"			2,400 (160)	3,150 (210)	3,150 (210)	5,800 (400)	5,800 (400)	
	3/8"	1/4"	10,000 (690)	10,000 (690)	10,000 (690)					
	3/8"	3/8"	7,100 (480)	10,000 (690)	10,000 (690)	10,000 (690)				
	1/2"	1/2"	7,100 (480)	9,570 (660)	9,570 (660)	9,570 (660)				
	5/8"	3/4"	5,200 (350)	7,500 (510)	7,970 (550)	7,970 (550)				
	3/4"	3/4"			6,090 (420)	6,090 (420)	6,090 (420)	6,090 (420)		
INCOLOY® Alloy 825 (ASTM B423)	1/4"	1/4"	6,400 (440)	9,130 (630)	9,130 (630)	9,130 (630)				
	3/8"	1/4"	4,100 (280)	5,900 (400)	8,200 (560)	9,130 (630)				
	3/8"	3/8"	4,100 (280)	5,900 (400)	8,200 (560)	8,700 (600)				
	1/2"	1/2"	3,000 (200)	4,300 (290)	5,900 (400)	7,250 (500)				
	5/8"	3/4"			4,600 (310)	5,800 (400)				
	3/4"	3/4"			3,800 (260)	5,000 (340)	5,800 (400)			
Super Duplex (ASTM A789/A789M)	1/4"	1/4"		10,000 (690)	10,000 (690)					
	3/8"	1/4"	6,400 (440)	9,300 (640)	10,000 (690)	10,000 (690)				
	3/8"	3/8"	6,400 (440)	9,300 (640)	9,570 (660)	9,570 (660)				
	1/2"	1/2"	4,700 (320)	6,800 (460)	7,970 (550)	7,970 (550)				
	5/8"	3/4"			6,090 (420)	6,090 (420)	6,090 (420)			
	3/4"	3/4"			6,090 (420)	6,090 (420)				

Table 3 - Pressure Rating for BSPP and NPT Termination Connectors (Imperial)\*

Tube Material	Tube O.D.	Thread Size	Wall Thickness - Maximum Tube Assembly Rating - PSI (bar)*								
			1	1.2	1.5	1.8	2	2.2	3.5	4	4.5
Stainless Steel 316 (ASTM A269)	6mm	1/4"	6,600 (450)	8,200 (560)	9,130 (630)	9,130 (630)	9,130 (630)				
	10mm	1/4"	3,800 (260)	4,600 (310)	5,900 (400)	7,300 (500)	8,300 (570)	9,130 (630)			
	10mm	3/8"	3,800 (260)	4,600 (310)	5,900 (400)	7,300 (500)	8,300 (570)	8,700 (600)			
	12mm	1/2"	3,100 (210)	3,800 (260)	4,800 (330)	5,900 (400)	6,700 (460)	7,250 (500)			
	16mm	3/4"	2,300 (150)	2,800 (190)	3,500 (240)	4,300 (290)	4,800 (330)	5,400 (370)	5,800 (400)		
	20mm	3/4"			2,800 (190)	3,400 (230)	3,800 (260)	4,200 (280)	5,800 (400)	5,800 (400)	
INCONEL® Alloy 625 (ASTM B444-06)	25mm	1"			2,200 (150)	2,700 (180)	3,000 (200)	3,300 (220)	5,500 (370)	5,800 (400)	5,800 (400)
	6mm	1/4"	10,000 (690)	10,000 (690)	10,000 (690)						
	10mm	1/4"	7,600 (520)	9,300 (640)	10,000 (690)	10,000 (690)	10,000 (690)				
	10mm	3/8"	7,600 (520)	9,300 (640)	9,570 (660)	9,570 (660)	9,570 (660)				
	12mm	1/2"	6,300 (430)	7,600 (520)	7,970 (550)	7,970 (550)	7,970 (550)				
	16mm	3/4"			6,090 (420)	6,090 (420)	6,090 (420)				
INCOLOY® Alloy 825 (ASTM B423)	20mm	3/4"			5,600 (380)	6,090 (420)	6,090 (420)	6,090 (420)	6,090 (420)	6,090 (420)	
	6mm	1/4"	7,700 (530)	9,130 (630)	9,130 (630)	9,130 (630)	9,130 (630)				
	10mm	1/4"	4,400 (300)	5,400 (370)	6,900 (470)	8,500 (580)	6,900 (660)				
	10mm	3/8"	3,600 (240)	4,400 (300)	5,600 (380)	6,900 (470)	7,800 (530)				
	12mm	1/2"	3,600 (240)	4,400 (300)	5,600 (380)	6,900 (470)	7,250 (500)				
	16mm	3/4"			4,100 (280)	5,000 (340)	5,700 (390)				
Super Duplex (ASTM A789/A789M)	20mm	3/4"			3,200 (220)	3,900 (260)	4,400 (300)	4,900 (330)			
	6mm	1/4"			10,000 (690)						
	10mm	1/4"	6,900 (470)	8,400 (570)	10,000 (690)						
	10mm	3/8"	6,900 (470)	8,400 (570)	9,570 (660)	9,570 (660)	9,570 (660)				
	12mm	1/2"	5,700 (390)	6,900 (470)	7,970 (550)	7,970 (550)	7,970 (550)				
	16mm	3/4"			6,090 (420)	6,090 (420)	6,090 (420)	6,090 (420)			
20mm	3/4"				6,090 (420)	6,090 (420)					

Table 4 - Pressure Rating for BSPP and NPT Termination Connectors (Metric)\*

**Tooling**

Tri-Tool®

\* The working pressure ratings for tubing in tables 1 to 4 are calculated directly from ASME B31.3

## Pressure rating at elevated temperatures

To determine allowable pressure at elevated temperatures, multiply the allowable working pressure from Table 1 to 4 by the factor shown in Table 5.

Example: 1/2" x .065" wall 316 stainless steel tubing has a working pressure of 5,100 psi @ room temperature. If the system were to operate at 800°F, a factor of 80% or 0.80 would apply (see Table 5) and the "at temperature" system pressure would therefore be 5,100 x 0.80 = 4,080 psi.

These factors are based on ASME B31.3 derating factors for ASTM A269 tubing. They are derived from table A-1, basic allowable stresses in metals.

°F	°C	316 SS	INCONEL® Alloy 625	INCOLOY® Alloy 825	Super Duplex Z100
100	38	1	1	1	1
200	93	1	0.93	0.92	0.99
300	149	1	0.88	0.87	0.94
400	204	0.97	0.85	0.83	0.90
500	260	0.90	0.82	0.79	0.90
600	315	0.85	0.79	0.76	0.88
700	371	0.82	0.77	0.74	-
800	426	0.80	0.75	0.73	-
900	482	0.78	0.74	-	-
1000	537	0.77	0.73	-	-
1100	593	0.62	0.73	-	-
1200	649	0.37	0.72	-	-

Table 5 - Factors used to determine tubing pressure rating at elevated temperatures.

## Tubing ordering guidelines

Tubing for use with Parker instrument fittings must be carefully ordered to insure adequate quality for good performance. Each purchase order must specify the material, nominal outside diameter, and wall thickness. Ordering to ASTM specifications insures that the tubing will be dimensionally, physically, and chemically within strict limits. Also, more stringent requirements may be added by the user. All tubing should be ordered free of scratches and suitable for bending. A purchase order meeting the above criteria would read as follows: "1/2 x .049 316 stainless steel, seamless, or welded and redrawn per ASTM A-249. Fully annealed, 80 Rb or less. Must be suitable for bending; surface scratches, and imperfections (incomplete weld seams) are not permissible." Table 6 lists specific ordering information for each material.

Material	Type	ASTM Tubing Specification	Condition	Min. Recommended Hardness	Max. Recommended Hardness
Stainless Steel	304, 316, 316L	ASTM A269, A249, A213, A632	Fully Annealed	70 HRb	90 HRb
INCONEL® Alloy 625	625	ASTM B444	Grade 1 (Soft Annealed) and Grade 2 (Solution Annealed)	90 HRb	102 HRb
INCOLOY® Alloy 825	825	ASTM B423	Annealed	80 HRb	90 HRb
Super Duplex	Super Duplex	ASTM A269	Fully Annealed	23 HRC (240 HBW)	32 HRC (300 HBW)

Table 6

## Note on selection

The pressure rating information presented, is intended as a useful guide to demonstrate the performance potential of the Phastite® connector when properly installed according to Parker's recommended practices and to assist the user in the proper selection of tube and fitting for a particular application. Every effort has been made to ensure the information in this document has been clearly presented. It is the responsibility of the user and the system designer to ensure the appropriate selection and specification of tube and fitting and that the specified assembly meets the requirement of the system or application.

## Phastite® Assembly

- i) All tube pre-fabrication (cutting, bending and alignment) should be completed before Phastite® is fully assembled (Failure to do so may result in the Phastite® fitting being exposed to undesirable side loading).
- ii) Ensure that all other fittings in the tube-run are correctly assembled before Phastite® is fully assembled.
- iii) Free lengths of tube should be supported throughout Phastite® tube-run assembly procedure.
- iv) Care should be taken to minimise any additional stresses to Phastite® joints.

Tube end preparation is essential in assuring leak-free systems. Some important points to consider are:

- Tube handling
- Tube cutting with either a tube cutter or hacksaw
- Deburring the tube end
- Cleaning the tube end

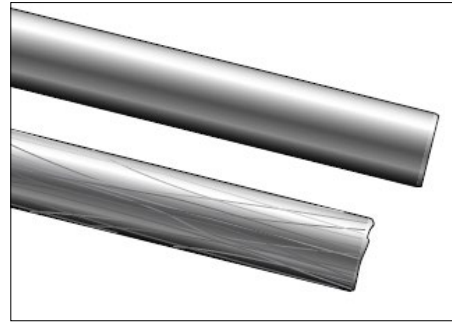


Figure 1

## Handling Tubing

From the receiving dock to point of installation, special attention is necessary to prevent scratching and burring the O.D. of the tubing. This is especially important for gas service. Low-density gases such as helium and argon cannot be sealed with damaged tubing.

Make certain not to drag tubing across any surfaces such as truck beds, shelves, or storage racks, the floor and (or) ground of any plant/ construction site. This is important for tubing of all materials, particularly for copper and aluminium. Besides scratching, improper handling can create out-of-round tubing. Out-of-round tubing will not fit the I.D. of the ferrule(s) or the body bore properly and will cause leakage (Figure 1).

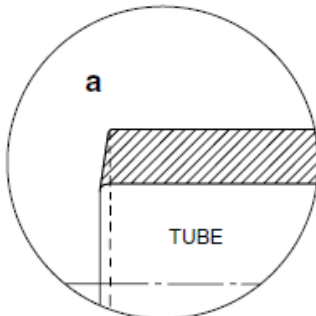


Figure 2

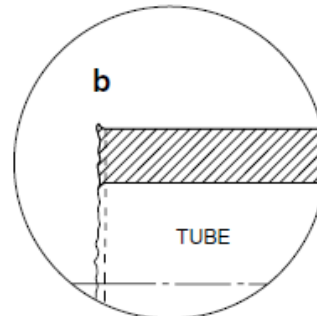


Figure 3

## Cutting the Tube End

To ensure a good joint, tube must be cut off square. This can be accomplished with either a tube cutter or hacksaw.

Figure 2 and Figure 3 - Enlarged section of tube showing differences in tubing cut with a tube cutter (a) and a hacksaw (b).

**Tubing Cutters** (Figure 4) are more commonly utilized on softer tubing such as copper, aluminium or even “soft” steel tubing. If a tube cutter is utilized with stainless steel tubing, remember that a special cutting wheel, designed for use with stainless steel tubing should be employed. The use of dull or improper cutting wheels can work harden the S.S. tubing near the cut area. This CAN adversely affect the fittings sealing ability.

Part Number: PT-C



Figure 4

**Cutting with a Hacksaw** requires careful attention. It is essential to use a guide to assure square cut offs. We recommend our sawing vice (see Figure 5). Further, to minimize the residual burrs, a hacksaw blade of 32 teeth per inch minimum is suggested.

Sawing Vice Part Number: PT-V

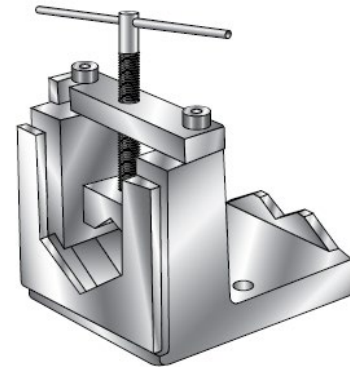


Figure 5

### Deburring the Tube End

The burrs formed by either the tube cutter or hacksaw must be removed prior to assembly to prevent those burrs from eventually damaging the system. O.D. burrs can prevent tubing from seating properly in a fitting body. I.D. burrs can restrict flow, as well as possibly break loose and damage fine filtration elements.

Note: Do not over deburr the O.D. of tubing.

You may deburr the tubing with your choice of file(s) or utilize Parker’s IN-EX De-burring tool. (Figure 6) This tool can be used to deburr both the I.D. and O.D. of tubing sizes 1/8” thru 1-1/2”.

IN-EX De-burring Tool Part Number: PT-D



Figure 6

### Cleaning the Tube End

After you deburr the tubing, it is essential to remove burrs from the tubing line. This can be accomplished by:

1. Flushing with solvent or low pressure compressed air.
2. Swab with lint-free cloth.

Again, this should prevent entrapping one of these small burrs down-stream where it might do some system damage.



## Minimum Tubing Lengths

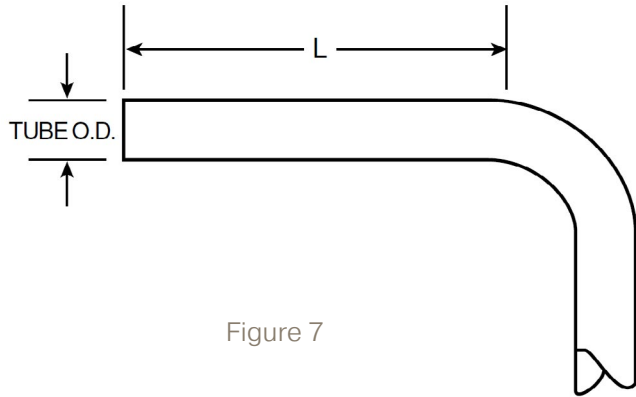


Figure 7

Note: Figure 7 illustrates the minimum straight length of tubing needed ahead of any bend to fit into the presetting tool. See the “L” dimension in Tables 5, 6 and 7 for each tube O.D. size.

Phastool® 3A			
Tube O/D		Length	
Inches	mm	Inches	mm
1/4	6	2.52	64
3/8	10	2.56	65
1/2	12	x	x
5/8	16	x	x
3/4	20	x	x
1	25	x	x

Table 7

Phastool® 3B			
Tube O/D		Length	
Inches	mm	Inches	mm
1/4	6	3.35	85
3/8	10	3.31	84
1/2	12	3.27	83
5/8	16	3.23	82
3/4	20	x	x
1	25	x	x

Table 8

Tri-Tool®			
Tube O/D		Length	
Inches	mm	Inches	mm
1/4	6	5.35	136
3/8	10	5.43	138
1/2	12	4.88	124
5/8	16	4.76	121
3/4	20	4.49	114
1	25	4.21	107

Table 9

# Tubemarkers

The tubemarker (Figure 8) is a mandatory part of the process to properly assemble Phastite®. It ensures adequate tube insertion and aids with inspecting for correct assembly. Proper tube insertion is essential.

To achieve proper tube insertion, a range of Phastite® tubemarkers are available. The Phastite® tubemarkers create two visible lines along the outside diameter of the tube. While rotating the tubemarker around the tube, enough pressure should be applied to create two visible lines. The lines are easily visible once the tube has been removed from the tubemarker. The tubemarker selected is dependent on the tubing O.D. and not the material.



Figure 8

## Tubemarker Part Numbers

Tube marker part numbers are as follows:

PH-#-TUBEMARKER

The # must be replaced with the tube size as follows:

See Table 10 for reference. Example: PH-4-TUBEMARKER

PH	4		TUBEMARKER	
Series	Tube Size		Item	
PH	Imperial	1/4"	4	TUBEMARKER
		3/8"	6	
		1/2"	8	
		5/8"	10	
		3/4"	12	
		1"	16	
		Metric	6mm	
10mm	M10			
12mm	M12			
16mm	M16			
20mm	M20			
25mm	M25			

Table 10

# Connector-Tool Insert Selection Guide

Phastite® connectors come in two types, permanent and termination. Permanent connectors are supplied completely assembled and disassembly of the collar should not be attempted. Termination connectors are also supplied completely assembled, however, collar and sealing sleeve can be removed from the assembly. The below connectors are suitable to use only with the Phastool® or the Tri-Tool®. Use of the connector or tool with any other application may result in equipment damage and/or personal injury. Figures 9 - 14 show the orientation of the inserts when they are installed into the Phastool® or the Tri-Tool®.

## PS - Permanent Union Equal Straight

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Colour
	Imperial	Metric				
PH-4-PS	1/4"	6mm	Phastool® 3A	PH-3A 4B	PHT-3A 4B	GREY
			Phastool® 3B	PHT-3B 4B	PHT-3B 4B	
			Tri-Tool®	PHT-16 4C	PHT-16 4A	
PH-6-PS	3/8"	10mm	Phastool® 3A	PHT-3A 6B	PHT-3A 6B	BLACK
			Phastool® 3B	PHT-3B 6B	PHT-3B 6B	
			Tri-Tool®	PHT-16 6C	PHT-16 6A	
PH-8-PS	1/2"	12mm	Phastool® 3B	PHT-3B 8B	PHT-3B 8B	RED
			Tri-Tool®	PHT-16 8C	PHT-16 8A	
PH-10-PS	5/8"	16mm	Phastool® 3B	PHT-3B 10B	PHT-3B 10B	YELLOW
			Tri-Tool®	PHT-16 10C	PHT-16 10A	
PH-12-PS	3/4"	20mm	Tri-Tool®	PHT-16 12C	PHT-16 12A	BLUE
PH-16-PS	1"	25mm	Tri-Tool®	PHT-16 16C	PHT-16 16A	GREEN

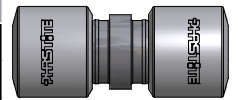


Figure 9

Table 11

## PE - Permanent Union Equal Elbow

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Colour
	Imperial	Metric				
PH-4-PE	1/4"	6mm	Phastool® 3A	PHT-3A 4S	PHT-3A 4A	GREY
			Phastool® 3B	PHT-3B 4S	PHT-3B 4A	
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 4A	
PH-6-PE	3/8"	10mm	Phastool® 3A	PHT-3A 6S	PHT-3A 6A	BLACK
			Phastool® 3B	PHT-3B 6S	PHT-3B 6A	
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 6A	
PH-8-PE	1/2"	12mm	Phastool® 3B	PHT-3B 8S	PHT-3B 8A	RED
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 8A	
PH-10-PE	5/8"	16mm	Phastool® 3B	PHT-3B 10S	PHT-3B 10A	YELLOW
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 10A	
PH-12-PE	3/4"	20mm	Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 12A	BLUE
PH-16-PE	1"	25mm	Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 16A	GREEN

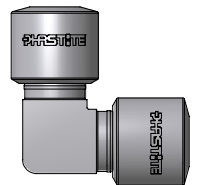


Figure 10

Table 12

## PT - Permanent Union Equal Tee (Through)

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Colour
	Imperial	Metric				
PH-4-PT	1/4"	6mm	Phastool® 3A	PHT-3A 4A	PHT-3A 4A	GREY
			Phastool® 3B	PHT-3B 4A	PHT-3B 4A	
			Tri-Tool®	PHT-16 4B	PHT-16 4A	
PH-6-PT	3/8"	10mm	Phastool® 3A	PHT-3A 6A	PHT-3A 6A	BLACK
			Phastool® 3B	PHT-3B 6A	PHT-3B 6A	
			Tri-Tool®	PHT-16 6B	PHT-16 6A	
PH-8-PT	1/2"	12mm	Phastool® 3B	PHT-3B 8A	PHT-3B 8A	RED
			Tri-Tool®	PHT-16 8B	PHT-16 8A	
PH-10-PT	5/8"	16mm	Phastool® 3B	PHT-3B 10A	PHT-3B 10A	YELLOW
			Tri-Tool®	PHT-16 10B	PHT-16 10A	
PH-12-PT	3/4"	20mm	Tri-Tool®	PHT-16 12B	PHT-16 12A	BLUE
PH-16-PT	1"	25mm	Tri-Tool®	PHT-16 16B	PHT-16 16A	GREEN



Figure 11

Table 13

## PT - Permanent Union Equal Tee (Branch)

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Colour
	Imperial	Metric				
PH-4-PT	1/4"	6mm	Phastool® 3A	PHT-3A 4S	PHT-3A 4A	GREY
			Phastool® 3B	PHT-3B 4S	PHT-3B 4A	
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 4A	
PH-6-PT	3/8"	10mm	Phastool® 3A	PHT-3A 6S	PHT-3A 6A	BLACK
			Phastool® 3B	PHT-3B 6S	PHT-3B 6A	
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 6A	
PH-8-PT	1/2"	12mm	Phastool® 3B	PHT-3B 8S	PHT-3B 8A	RED
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 8A	
PH-10-PT	5/8"	16mm	Phastool® 3B	PHT-3B 10S	PHT-3B 10A	YELLOW
			Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 10A	
PH-12-PT	3/4"	20mm	Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 12A	BLUE
PH-16-PT	1"	25mm	Tri-Tool®	PH-16BT-INSERT-SHAPES	PHT-16 16A	GREEN



Figure 12

Table 14

## PC - Permanent Union Equal Cross

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Color
	Imperial	Metric				
PH-4-PC	1/4"	6mm	Phastool® 3A	PHT-3A 4A	PHT-3A 4A	GREY
			Phastool® 3B	PHT-3B 4A	PHT-3B 4A	
			Tri-Tool®	PHT-16 4B	PHT-16 4A	
PH-6-PC	3/8"	10mm	Phastool® 3A	PHT-3A 6A	PHT-3A 6A	BLACK
			Phastool® 3B	PHT-3B 6A	PHT-3B 6A	
			Tri-Tool®	PHT-16 6B	PHT-16 6A	
PH-8-PC	1/2"	12mm	Phastool® 3B	PHT-3B 8A	PHT-3B 8A	RED
			Tri-Tool®	PHT-16 8B	PHT-16 8A	
PH-10-PC	5/8"	16mm	Phastool® 3B	PHT-3B 10A	PHT-3B 10A	YELLOW
			Tri-Tool®	PHT-16 10B	PHT-16 10A	
PH-12-PC	3/4"	20mm	Tri-Tool®	PHT-16 12B	PHT-16 12A	BLUE
PH-16-PC	1"	25mm	Tri-Tool®	PHT-16 16B	PHT-16 16A	GREEN



Figure 13

Table 15

## TMS-N - Termination Male Straight NPT

Part No	Size		Tool	Fixed Jaw	Moving Jaw	Insert Color
	Imperial	Metric				
PH-4-4N-TMS	1/4"	6mm	Tri-Tool®	PHT-16 4T	PHT-16 4A	GREY
PH-6-4N-TMS	3/8"	10mm	Tri-Tool®	PHT-16 6T	PHT-16 6A	BLACK
PH-8-4N-TMS	1/2"	12mm	Tri-Tool®	PHT-16 8T	PHT-16 8A	RED
PH-10-4N-TMS	5/8"	16mm	Tri-Tool®	PHT-16 10T	PHT-16 10A	YELLOW
PH-12-4N-TMS	3/4"	20mm	Tri-Tool®	PHT-16 12T	PHT-16 12A	BLUE
PH-16-4N-TMS	1"	25mm	Tri-Tool®	PHT-16 16T	PHT-16 16A	GREEN

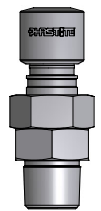


Figure 14

Table 16

# Phastite® Connector Assembly: Phastool®

**Pumps and Tools are matched at the factory and MUST NOT be intermixed with other pumps or tools.**

**The pumps count the amount of cycles and display critical end of life information.**

Phastite's unique design provides a secure leak tight grip on the tubing. The connector make-up can be completed using the compact Phastool®. The hydraulically actuated tools can be operated electrically or manually. The tool can either be used in the hand or in a vice.

Prior to placing the inserts into the Phastool®, the following should be completed:

1. Mark the tubing.
2. Select the correct Phastite® connector.
3. Select the correct Phastool®.
4. Select the correct inserts.
5. Select the pump type.
6. Verify tube marking.

## Phastool® 3A

**For 1/4" (6mm) and 3/8" (10mm) connections**

For the smallest sizes of Phastite® a compact portable tool is available for ease of installation in confined spaces. The portable tool (Figure 15) is supplied complete with a 12 ft (4 metre) hose and quick connectors. The unit is also supplied complete with hose guards and grips at both ends providing extra safety, vice mounts and all required inserts for assembling.

Part No: PH-3A-TOOL-BP  
PH-3A-TOOL-HP

Weight: 13lbs (6kg)

Note: BP denotes a battery operated hydraulic pump and HP denotes a hand operated hydraulic pump.

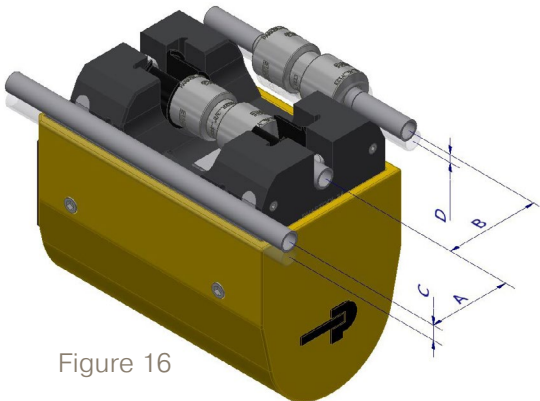


Figure 16

- A - Minimum gap between Phastool® centreline and tube run centreline.
- B - Minimum gap between Phastool® centreline and Phastite® centreline.
- C - Maximum height between Phastool® centreline and tube run centreline.
- D - Maximum height between Phastool® centreline and Phastite® centreline.

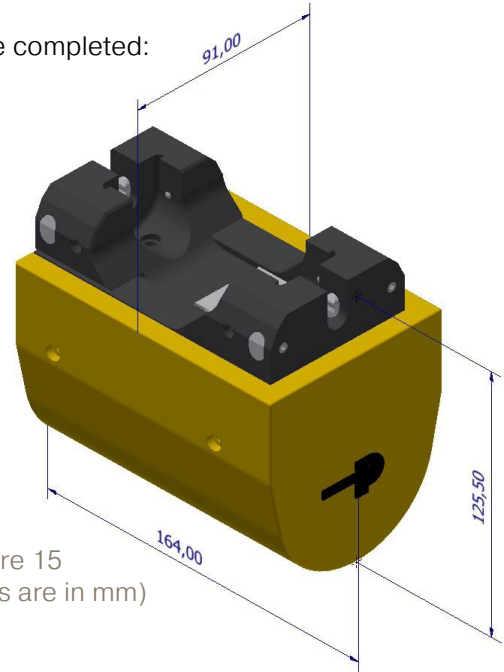


Figure 15  
(dimensions are in mm)

## Tube Clearance

There are minimum and maximum gaps between tube runs which must be available to install connectors using Phastool® 3A (Figure 16) / (Table 17)

Tube / Fitting Size			A	B	C	D
Size	Imperial	Metric				
4	1/4"	6mm	40.2 (1.625")	45.5 (1.8125")	8.8 (0.375")	3.5 (0.125")
6	3/8"	10mm	41.8 (1.75")	48 (1.89")	7.5 (0.29")	4 (0.16")
8	1/2"	12mm	43.4 (1.75")	49.5 (2")	6.5 (0.25")	3.3 (0.125")
10	5/8"	16mm	44.9 (1.75")	53 (2.5")	5.6 (0.25")	1.8 (0.0625")
12	3/4"	20mm	46.5 (1.875")	55 (2.1875")	4.7 (0.1875")	1 (0.0625")
16	1"	25mm	49.7 (2")	63 (2.5")	3.2 (0.125")	0 (0")

Table 17

## Phastool® 3B

**For 1/4" (6mm), 3/8" (10mm), 1/2" (12mm), 5/8" (16mm) connections**

For the intermediate sizes of Phastite® a larger portable tool is available for ease of installation. The portable tool (Figure 17) is supplied complete with a 12 ft (4 metre) hose and quick connectors. The unit is also supplied complete with hose guards and grips at both ends providing extra safety, vice mounts and all required inserts for assembling 1/4" [6mm], 3/8" [10mm], 1/2" [12mm] and 5/8" [16mm] permanent Phastite® connectors.

Part No: PH-3B-TOOL-BP  
PH-3B-TOOL-HP

Weight: 22 lbs. (9.5 Kg)

Note: BP denotes a battery operated hydraulic pump and HP denotes a manually operated hydraulic pump.

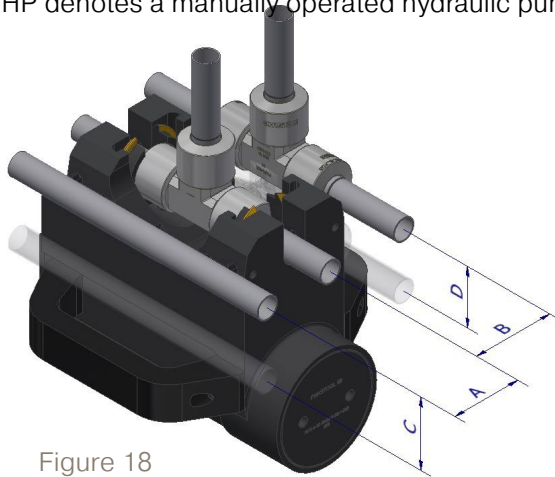


Figure 18

## Phastool® 3A and 3B Maintenance

Phastite® tools require Essential maintenance, the pumps count the amount of cycles of the matched tool giving times for scheduled servicing. Refer to pages 23 and 32.

NOTE: Caution should be taken. The Phastool® is a high pressure hydraulic system.

1. Inspect the hoses and connections regularly for damage. The hose connections are connected to the tool and pump. Replace if needed.
2. The hose is provided with cable socks. This helps to avoid hose fitting disconnection.
3. Service intervals for Phastool® are set at 5,000, 10,000, 20,000 and 30,000 cycles.

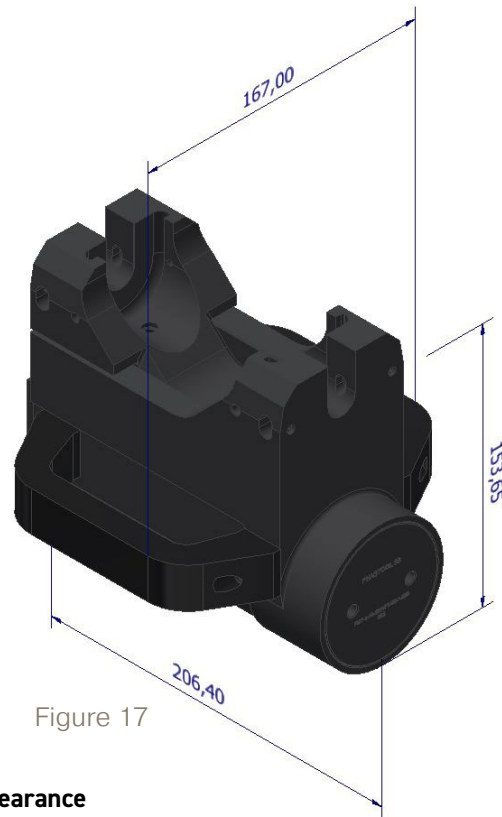


Figure 17

## Tube Clearance

There are minimum and maximum gaps between tube runs which must be available to install connectors using Phastool® 3B (Figure 18) / (Table 18).

Tube / Fitting Size			A	B	C	D
Size	Imperial	Metric				
4	1/4"	6mm	43.8 (1.72")	49.4 (1.94")	53.8 (2.12")	48.2 (1.90")
6	3/8"	10mm	45.3 (1.78")	51.9 (2.04")	52.2 (2.06")	45.7 (1.80")
8	1/2"	12mm	46.9 (1.85")	53.4 (2.10")	50.6 (1.99")	44.2 (1.74")
10	5/8"	16mm	48.5 (1.91")	56.8 (2.24")	49.1 (1.93")	40.7 (1.60")
12	3/4"	20mm	49.5 (1.95")	58 (2.28")	47.5 (1.87")	38.7 (1.52")
16	1"	25mm	52.7 (2.07")	65 (2.56")	44.3 (1.74")	31.7 (1.25")

Table 18

- A - Minimum gap between Phastool® centreline and tube run centreline.
- B - Minimum gap between Phastool® centreline and Phastite® centreline.
- C - Maximum height between Phastool® centreline and tube run centreline.
- D - Maximum height between Phastool® centreline and Phastite® centreline.

## Preparing Phastool® for Installation

### Phastool® 3A - Portable

When operating the Phastool 3A by hand it can be used in any orientation, however it is recommended that the supplied boot is used.

1. Place and slide supplied boot onto the tool (Figure 19).
2. The boot has four mounting holes - two on each side.
3. Install the retaining screws to secure the boot to the tool using a 3mm Allen key (Figure 20).

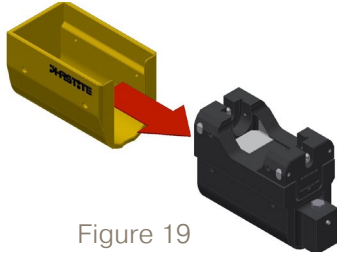


Figure 19

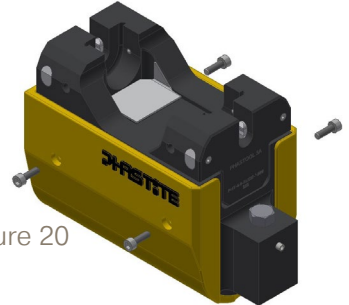


Figure 20

### Phastool® 3B - Portable

When operating the Phastool 3B by hand it can be used in any orientation, however it is recommended that the supplied handles are used.

1. Locate supplied handle (1 of 2) onto the tool (Figure 21).
2. Each handle has two mounting holes.
3. Install the retaining screws to secure the handle to the tool and repeat for handle 2 of 2 (Figure 22).

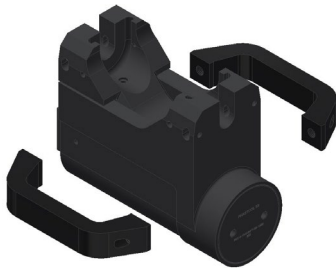


Figure 21

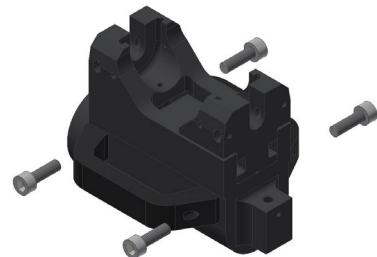


Figure 22

### Phastool® - Vice Mounted

When Phastite does not need to be assembled in-situ it is recommended that the Phastools' supplied vice plates are used to mount the tool securely in a bench vice.

This assembly process supports both Phastool® 3A and Phastool® 3B

1. Locate supplied vice plate (1 of 2) onto the tool (Figure 23).
2. Each vice plate has two mounting holes.
3. Install the retaining cap screws to secure the vice plate to the tool and repeat for vice plate 2 of 2 (Figure 24).



Figure 23

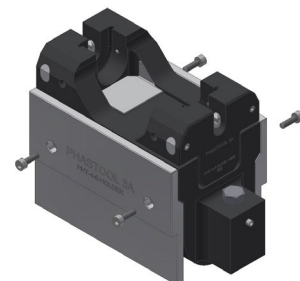


Figure 24



## Selecting Phastool® Inserts

Quick and easy interchangeable tooling inserts allows the Phastool® to install connectors from sizes 1/4" to 5/8". The insert selected is determined by the type of connector to be used and the size of the tubing. All inserts are etched with the part number and are color coded.

The two inserts are installed on the moving side of the tool and the fixed side of the tool (Figure 26).

1. One insert is installed on the moving jaw side of the hand tool (Figure 26). This is the side closest to the hand tool - hose interface.
2. The other insert is installed on the fixed jaw side (Figure 26). The fixed jaw is opposite the hand tool - hose interface.

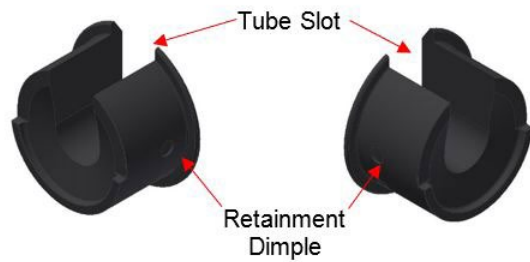


Figure 25

Phastool® Insert/Fitting Table		
Fixed Jaw	Style	Moving Jaw
B		B
Shapes		A
Shapes		A
A		A
A		A

Table 19

## Installing Inserts on the Phastool®

1. If the hand tool is being picked up, do not pick it up by the hose. This will damage the fitting to hose interface.
2. Ensure the jaws and inserts are free from damage or foreign objects.
3. Correct insert orientation is essential to correct assembly of Phastite® connectors, ensure that the dimples are orientated left and right (not up and down) (Figure 25).
4. For all inserts except the SHAPES, ensure that the tube slot is orientated upwards (Figure 25).
5. The inserts slot in and out of Phastool® 3A and Phastool® 3B, and click into place (Figure 26).

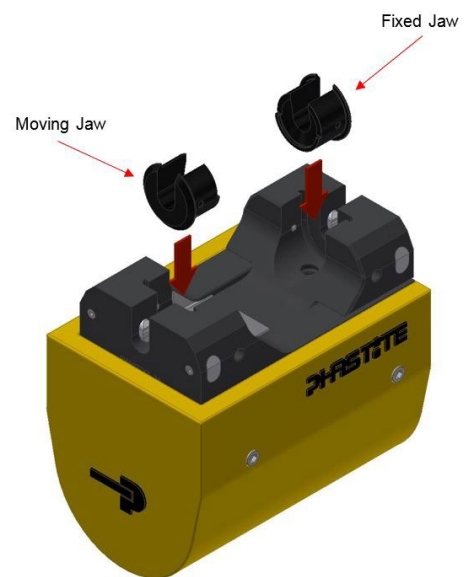


Figure 26

## Selecting the Correct Pump for Phastool®

There are two pumps for installing Phastite® connectors with the Phastool® 3A and 3B: The Battery-Operated Pump (BP) and the Hand-Operated Pump (HP).

### Battery Operated Hydraulic Pump (BP)

Part Number: PH-3-BP  
Weight: 20 lbs (9 Kg)  
Reference Manual Document Number L4004 (Instruction Manual)

### Battery Pump Setup

1. With the pump on a flat and stable work surface, remove all dust caps from the hose, tool and pump quick connects.
2. Connect the hose to the pump's hydraulic outlet using the quick connect (Figure 27).
3. Connect the downstream side of the hose to the tool's hydraulic inlet using the quick connect.
4. Check all system fittings and connections to be sure they are tight and leak free.
5. Link the digital touch screen controller to the pump via the connecting lead (Figure 28).
6. Install the battery onto the pump at the rear.

**NOTE:** Ensure that the quick links provided are fastened between the hose containment hoops and mounting bracket (there are 2 quick links for each end of the hose)(Figure 29).

### Not ATEX Certified



Figure 27

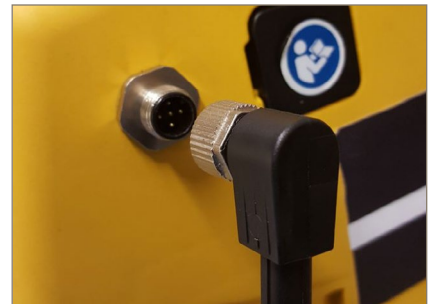


Figure 28

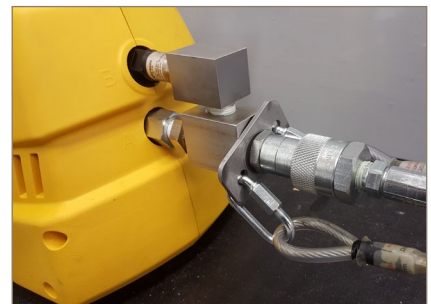


Figure 29

## Hand Operated Pump (HP)

Part Number: PH-HP  
Weight: 9 lbs (4 Kg)  
Reference Manual Document Number L1329 Rev B (Instruction Sheet)

### Hand Pump Setup

1. With the hand pump on a flat and stable work surface, unlatch the pump's handle locking hook from the hoop.
2. Remove all dust caps from the hose, tool and pump quick connects.
3. Connect the pressure gauge tee to the pump's hydraulic outlet using the quick connect for added safety and better control (Figure 30).
4. Connect the hose to the downstream side of the pressure gauge tee using the quick connect (Figure 31).
5. Connect the downstream side of the hose to the tool's hydraulic inlet using the quick connect.
6. Check all system fittings and connections to be sure they are tight and leak free.
7. Turn the mode wheel at the rear of the pump from 'CLOSE' to 'OPEN' (Figure 32) and remove the mode wheel from the pump and (Figure 33), the safety chain will ensure that the mode wheel is not misplaced.
8. The pump should always be handled with care, especially when the pump mode wheel has been removed as this provides a leak path for the hydraulic oil if the pump is not kept upright.

**NOTE:** Ensure that the quick links provided are fastened between the hose containment hoops and mounting bracket (there are 2 quick links for each end of the hose)(Figure 29).

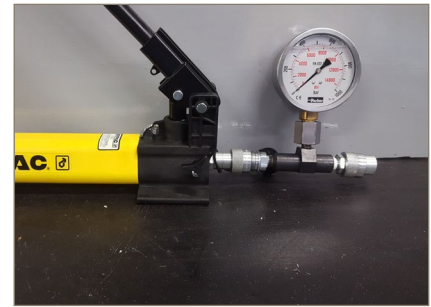


Figure 30



Figure 31



Figure 32



Figure 33

## Tube Marking and Installation of Connector in Assembly Tools

\*This procedure applies to all Phastool® assembly tools.  
\*\*If using a 3/8" tee connector, it is recommended to assemble the branch end first.

1. Select and prepare the tubing (pages 11 - 17).
2. Insert the tube into the tubemarker, the tube must rest against the bottom of the bore, (Figure 34) the inspection hole can be used to verify this. While holding the tube in position, apply positive pressure against the tubemarker and twist the tubemarker through 360°. The ball bearings inside the tubemarker polish the tubing, without scratching its surface (thus not allowing for corrosion to initiate). Two polished lines will be visible once the tube has been removed from the tubemarker.

NOTE: Direction of rotation is not important (Figure 35).

4. Install the inserts into the assembly tool. The orientation will depend on the type of connector to be assembled (Figure 36).
5. Place the chosen connector between the inserts (Figure 36). The orientation will depend on the type of connector to be assembled.
6. Ensure that the connector is abutted against the insert in the fixed jaw.
7. **BOTTOM OUT THE TUBING.** Place the tubing into the tool and ensure positive engagement of the tube grips. Slide the tubing into the Phastite® connector ends. The two lines produced by the tubemarker should not be visible. This ensures adequate tube insertion prior to assembly (Figure 36).

\*Please note that the marked tubing can also be inserted into the Phastite® connector before being placed into the tool.

8. If any lines are visible, it is an indication that either the tube is not abutted correctly at the bottom of the Phastite® connector body or the tube was marked incorrectly.
9. Check again to ensure the tube is correctly inserted into the Phastite® connector.

The tubing is now correctly inserted into the Phastite® connector and no tubemarker lines are visible:

For assembly using Phastool® 3A or 3B with a Battery-Operated Pump see pages 29-30). For assembly using Phastool® 3A or 3B with a Hand-Operated Pump see page 31. For assembly using Tri-Tool® with a Mains-Operated Pump see page 34.

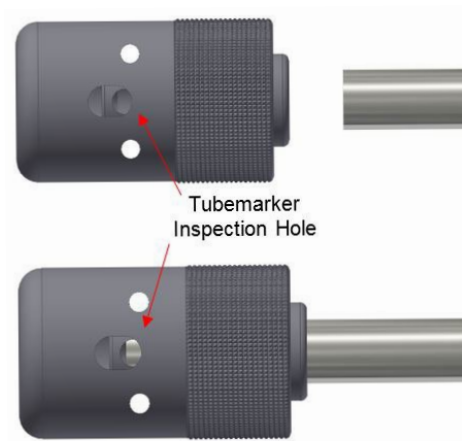


Figure 34



Figure 35

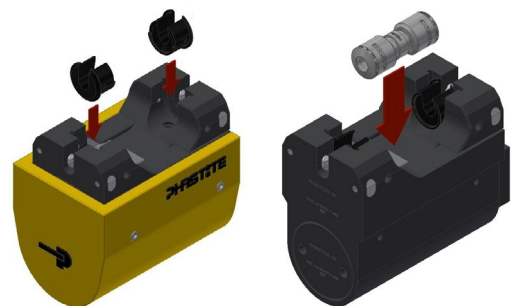


Figure 36

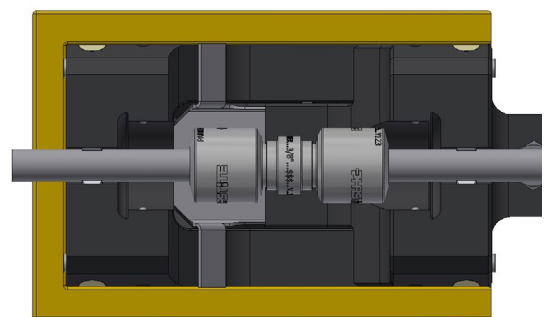


Figure 37

## Phastite® Installation Using Phastool® with Battery Operated Smart Pump

1. Check the charge state of the battery by pressing the button and observing the battery charge indicator lights. (if less than 3 lights are illuminated, the battery must be charged before any Phastite® assembly is attempted using the Battery-Operated Pump.)
2. If the battery is sufficiently charged, install it onto the pump, the controller screen will turn on automatically. The operator will be prompted to enter the 4-digit passcode assigned to them upon successful completion of Parker SBEx training (Figure 38).
3. Next, use the touch screen display to select from the pump menu the option to suit the Phastite® connector to be assembled (Figure 39). Each button on the menu corresponds to the correct pump setting required to assemble each specific Phastite® connector Material, Tube O.D. and Wall Thickness. This menu is provided with each tool and is also available on page 31.
4. You will be navigated to the pump's main screen, containing a digital pressure gauge, pump option, cycle count, battery life, and a START/STOP button (Figure 40).
5. Ensure that the pump mode lever is set to 'A'.
6. Press the 'START' button on the touch screen of the controller.
7. Once the 'START' button is pressed, the pump will automatically start, actuating the tool to traverse the moving jaw and permanently assemble the Phastite® connector.
8. The pump will automatically shut-off on complete assembly of the Phastite® connector. However, it is good practice to WATCH FOR METAL-TO-METAL CONTACT. Metal-to-metal contact is achieved when the Phastite® collar and body are touching (Figure 41).
9. Once the Phastite® connector is completely assembled, relieve the pressure from the pump by rotating the pump mode lever from 'A' to 'T'. This will allow the moving jaw to return to the open position. The Phastite® connection can now be removed from the tool by pulling upwards.

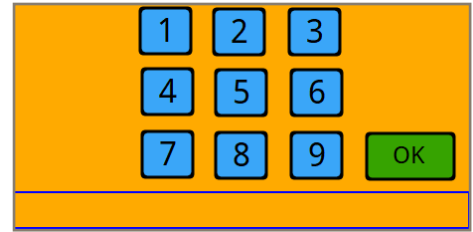


Figure 38

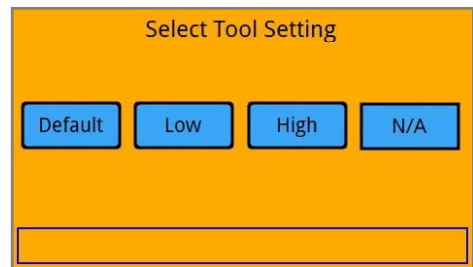


Figure 39

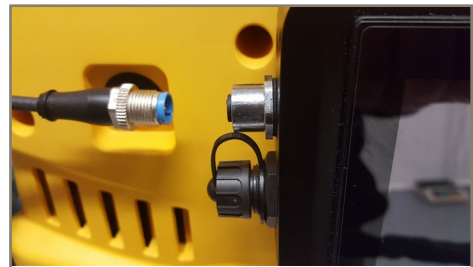


Figure 40

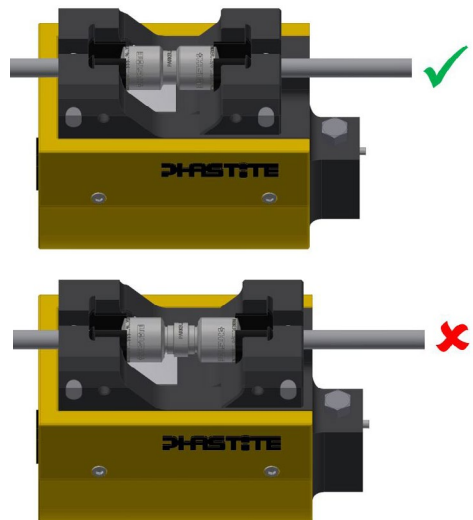


Figure 41

10. Inspect the assembled Phastite® connector and tubing for correct assembly and tube insertion:
  - a. Only one tubemarker line should be visible at each end of the connection (Figure 42). If two lines are visible and there is metal-to-metal contact, then a new connection (new connector and new tubing) is needed.
  - b. Check for metal-to-metal contact (visual). If there is no metal-to-metal contact, then a new connection (new connector and new tubing) is needed.
11. When the tool and battery operated pump are ready to be packed away ensure that the pump mode lever is set to 'T' and that the tool's moving jaw is fully retracted before removing the battery from the pump. It is recommended that the battery is removed and recharged, if necessary, as the first step of the pack-up process.
12. Next disconnect the hose from the tool and pump via the quick connects. It is normal to experience slight weeping of hydraulic oil during disconnection. Re-apply the dust caps to all quick connects.
13. Remove the inserts from the tool jaws and return them to their aperture in the tool travel case.
14. Remove the boot, handles or vice plates from the tool and return them to their aperture in the tool travel case.
15. Return the tool, hose and pump to their respective apertures in the tool and pump travel cases.
16. All travel cases should always be stored and transported in the upright position.



Figure 42

**If an emergency or error is identified by the operator, the following actions will stop the process;**

**ACTION** > Press the stop button in the bottom/right corner of the controller

**EFFECT** > The pump stops instantly, the jaw position is maintained from the point the stop button is pressed, the tool's moving jaw does not advance or retract any further. The pressure is held in the system until the manual lever on the pump is turned from 'A' to 'T' at this point the pressure is relieved and the tool's moving jaw returned to the open position.

Alternatively

**ACTION** > Unplug the battery from the pump

**EFFECT** > The pump stops instantly, the jaw position is maintained from the point the stop button is unplugged, the tool's moving jaw does not advance or retract any further. The pressure is held in the system until the manual lever on the pump is turned from 'A' to 'T' at this point the pressure is relieved and the tool's moving jaw returned to the open position.

### Tool Settings - PH-3A-TOOL-BP

Imperial Tube Material	Tube O.D.	Imperial Tubing Wall Thickness				
		0.035	0.049	0.065	0.083	0.095
Stainless Steel 316 (ASTM A269)	1/4"	Low	Default	Default	Default	
	3/8"	Default	Default	Default	Default	Default
INCONEL® Alloy 625 (ASTM B444-06)	1/4"	Default	Default	Default		
	3/8"	Default	Default	Default	High	
INCOLOY® Alloy 825 (ASTM B423)	1/4"	Low	Default	Default	Default	
	3/8"	Default	Default	Default	Default	

### Tool Settings

Low	<span style="background-color: #ADD8E6; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>
Default	<span style="background-color: #FFD700; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>
High	<span style="background-color: #DC143C; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>

### Tool Settings - PH-3B-TOOL-BP

Imperial Tube Material	Tube O.D.	Imperial Tubing Wall Thickness						
		0.035	0.049	0.065	0.083	0.095	0.154	0.188
Stainless Steel 316 (ASTM A269)	1/4"	Low	Default	Default	Default			
	3/8"	Default	Default	Default	Default	Default		
	1/2"	Default	Default	Default	Default	Default		
	5/8"		High	High	High	High		
INCONEL® Alloy 625 (ASTM B444-06)	1/4"	Default	Default	Default				
	3/8"	Default	Default	Default	High			
	1/2"	High	High	High	High			
	5/8"			High	High			
INCOLOY® Alloy 825 (ASTM B423)	1/4"	Low	Default	Default	Default			
	3/8"	Default	Default	Default	Default			
	1/2"	Default	Default	Default	Default			
	5/8"			Default	Default			
Super Duplex (ASTM A789/A789M)	1/4"		Default	Default				
	3/8"							
	1/2"							
	5/8"							

## Phastite® Installation Using Phastool® with Hand Pump

1. Ensure that the control wheel at the front of the pump is turned all the way clockwise to enable hydraulic pressure to build in the system before attempting to assemble any Phastite® connectors using the Hand Operated Pump (Figure 43). The pump is now ready to operate.
2. To operate the Phastool® using the Hand Operated Pump, lift the actuator handle all the way up, then press it all the way down, the hydraulic pressure will build in the system with every stroke, this can be monitored on the pressure gauge.
3. Repeat step 2 continuously as required until the Phastite® connector is completely assembled.
4. **WATCH FOR METAL-TO-METAL CONTACT.** Metal-to-metal contact is achieved when the Phastite® collar and body are touching (Figure 44).
5. Once the Phastite® connector is completely assembled, relieve the pressure from the pump by rotating the control wheel at the front of the pump all the way anti-clockwise. This will allow the moving jaw to return to the open position. The Phastite® connection can now be removed from the tool by pulling upwards.
6. Inspect the assembled Phastite® connector and tubing for correct assembly and tube insertion:
  - a. Only one tubemarker line should be visible at each end of the connection (Figure 45). If two lines are visible and there is metal-to-metal contact, then a new connection (new connector and new tubing) is needed.
  - b. Check for metal-to-metal contact (visual). If there is no metal-to-metal contact, then a new connection (new connector and new tubing) is needed.

When the tool and hand operated pump are ready to be packed away, ensure that the control wheel at the front of the pump is turned all the way anti-clockwise to allow the hydraulic pressure to vent from the pump, and the tool's moving jaw to fully retract. Only after this is done, re-attach the pump mode wheel and turn it to 'CLOSE' to stop the pump from leaking hydraulic oil when in transit or storage.

- a. Ensure that the pump's handle locking hook is latched to the hoop.
- b. Next disconnect the hose from the tool and pump via the quick connects. It is normal to experience slight weeping of hydraulic oil during disconnection. Re-apply the dust caps to all quick connects.
- c. Remove the inserts from the tool jaws and return them to their aperture in the tool travel case.
- d. Remove the boot, handles or vice plates from the tool and return them to their aperture in the tool travel case.
- e. Return the tool, hose, pressure gauge tee and pump to their respective apertures in the tool and pump travel cases.
- f. All travel cases should always be stored and transported in the upright position.



Figure 43

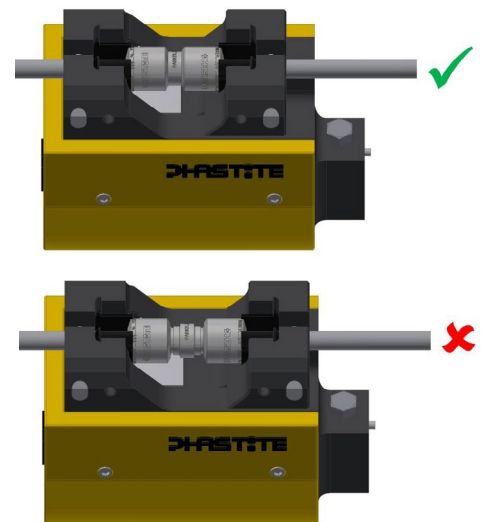


Figure 44



Figure 45



# Phastite® Connector Assembly: Tri-Tool®

The Tri-Tool® is ideal for all sizes of Phastite®. It is a bench tool supplied complete with a 5ft (1.5 metre) hose and quick connectors. The unit is also supplied complete with all required jaw inserts for assembling all Phastite® connectors including shapes and termination products (Figure 36).

Prior to placing the inserts into the Tri-Tool®, the following should be completed:

1. Mark the tubing.
2. Select the correct Phastite® connector.
3. Select the correct inserts.
4. Verify tube marking.

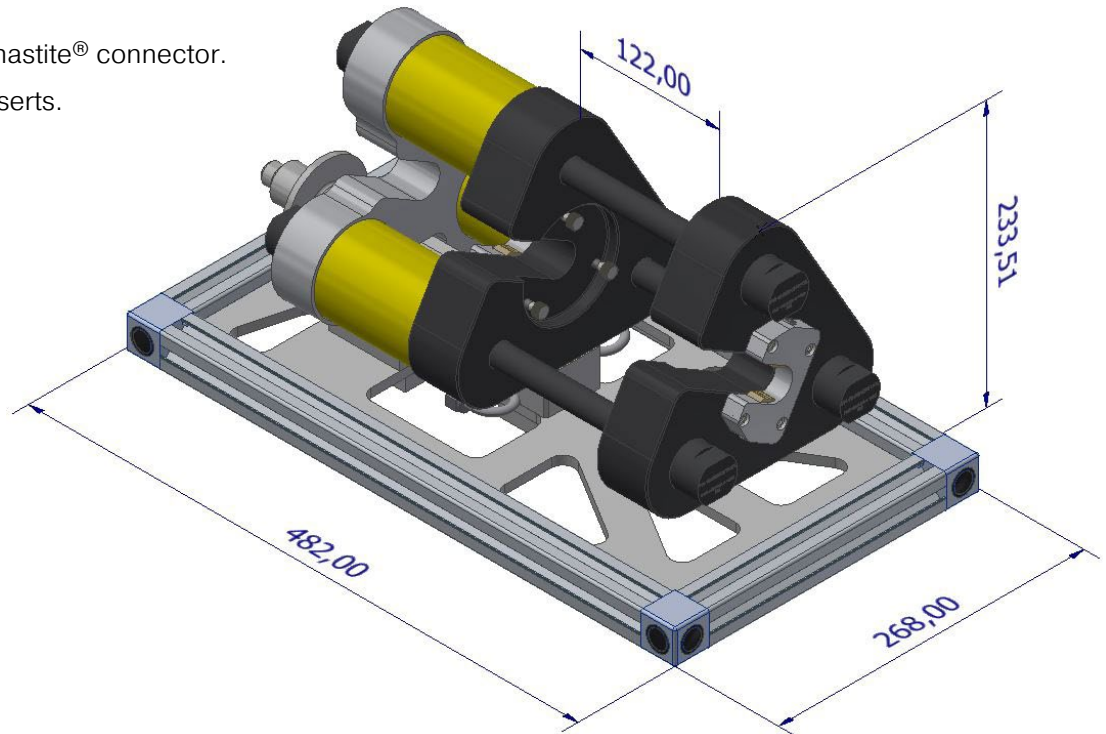


Figure 46

**For 1/4" (6mm), 3/8" (10mm), 1/2" (12mm), 5/8 (16mm), 3/4" (20mm), 1" (25mm) connections**

Part No: PH-16-TOOL

Weight: 71 lbs (32 Kg)

## Tri-Tool Maintenance

**NOTE:** Caution should be taken. The Tri-Tool® is a high pressure hydraulic tool - handle with care.

1. Inspect the hydraulic hose and connections regularly for damage and leaks.
2. Refer to the Enerpac maintenance manual for proper care.
3. In order to keep the equipment in good condition, we recommend the following:
  - a. Check inserts and jaws for damage and wear
  - b. Replace any damaged parts with Parker or Enerpac genuine parts.
  - c. Tri-Tool® service intervals are set at 5,000, 10,000, 20,000 and 30,000 cycles.
4. If the pump oil requires a top up, these are the ENERPAC order codes:  
HF95X for 1 litre  
HF95Y for 5 litres  
HF95T for 20 litres

## Selecting Inserts for the Tri-Tool®

The insert selected is determined by the type and size of the Phastite® connector to be assembled.

1. There are two inserts to select – one for the fixed jaw and one for the moving jaw (Figure 47). The long insert is installed on the moving jaw side of the tool. This is the side closest to the 3 yellow cylinders.

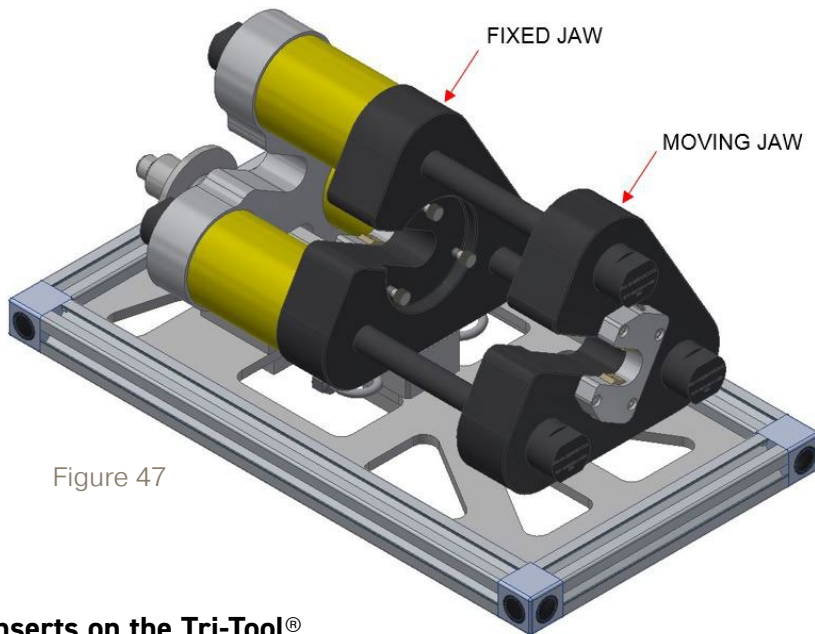


Figure 47

Tri-Tool® Insert/Fitting Table		
Fixed Jaw	Style	Moving Jaw
C		A
Shapes		A
Shapes		A
A		B
A		B
Term		C

Table 20

## Installing Inserts on the Tri-Tool®

1. With the Tri-Tool on a flat and stable work surface, select the inserts needed (each insert is colour coded and marked with the size). Note: the size of the inserts must match the fittings, tubing, and tubemarker.
2. Identify the 6 cap screws located on the inside faces of the fixed and moving jaws (3 per jaw) (Figure 48).
3. Remove the cap screws from each jaw using a 5mm Allen key. Mount the required insert into the jaw recess.
4. Ensure correct orientation of the inserts, where applicable the insert slot should align with the slot of its corresponding jaw (Figure 49).
5. Replace the cap head screws using the 5mm Allen key.

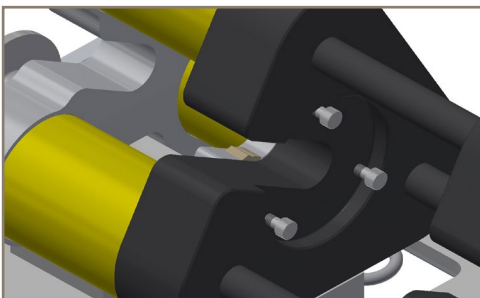


Figure 48

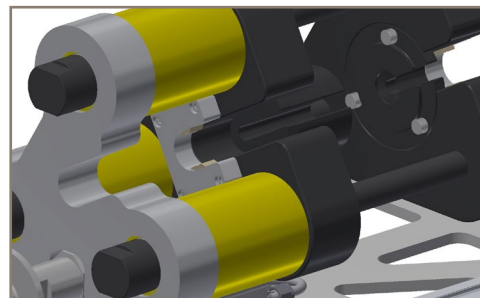


Figure 49

## Selecting the Correct Pump for the Tri-Tool®

There is only one pump for installing Phastite® connectors with the Tri-Tool®, this is the Mains Operated Pump (MP).

### Electric Hydraulic Pump (MP)

Part Number: PH-16-MP

Weight: 27 lbs (12 Kg)

Reference Manual Document Number L2062 Rev. G

### Mains Pump Setup

1. With the pump on a flat and stable work surface, Connect the hose to the pump's hydraulic outlet using the quick connect (Figure 50).
2. Connect the downstream side of the hose to the tool's hydraulic inlet using the quick connect. **NOTE:** Ensure that the quick links provided are fastened between the hose containment hoops and mounting bracket (there are 2 quick links for each end of the hose) (Figure 51).
3. Check all system fittings, hose and connections to be sure they are tight and free from damage and leaks.
4. Loosen the oil fill cap by 1 - 2 turns, to allow the pump to vent when in operation (Figure 52).
5. Link the digital touch screen controller to the pump via the connecting lead (Figure 53).

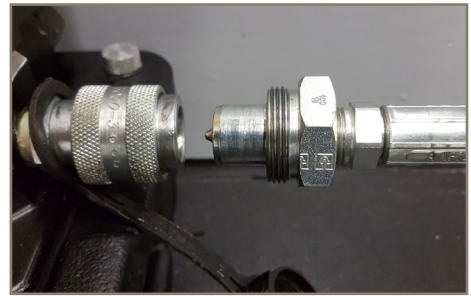


Figure 50

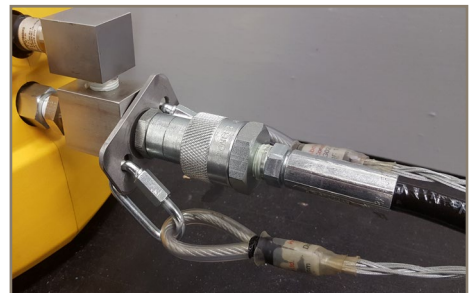


Figure 51



Figure 52



Figure 53

## Installing the Connector with the Tri-Tool®

\*This procedure applies to the Tri-Tool® only.

1. Refer to pages 12-14 for tube marking instructions.
2. Refer to page 33 for Tri-tool® insert installation instructions.
3. After selecting the connector and with the Tri-Tool on a flat and stable work surface take a connector and position between the fixed and moving jaw inserts. The orientation will depend on the type of connector being assembled. If a termination connector is being installed, remove the collar and sealing sleeve (Figure 54).
4. Ensure the Phastite® connector is abutted against either insert. Be sure to have proper orientation. Note: On the Tri-Tool® the position of the moving jaw can be moved manually to ensure insert retention of Phastite® connectors before the pump is actuated.
5. **BOTTOM OUT THE TUBING.** Place the tubing into the tool and ensure positive engagement of the tube grips. Slide the tubing into the Phastite® connector ends. The two lines produced by the tubemarker should not be visible. This ensures adequate tube insertion prior to assembly (Figure 55).
6. If a termination connector is being installed, insert and align the tube through the collar and sealing sleeve. \*Please note that the marked tubing can also be inserted into the Phastite® connector before being placed into the tool.
7. If any lines are visible, it is an indication that either the tube is not abutted correctly at the bottom of the Phastite® connector body or the tube was marked incorrectly.
8. Check again to ensure the tube is correctly inserted into the Phastite® connector.
9. Once the tubing is correctly inserted into the Phastite® connector and no tubemarker lines are visible plug the power lead into a mains socket and switch on, the controller screen will turn on automatically. The operator will be prompted to enter the 4-digit passcode assigned to them upon successful completion of Parker SBEx training (Figure 56).
10. Next, use the touch screen display to select from the pump menu the option to suit the Phastite® connector to be assembled (Figure 57). Each button on the menu corresponds to the correct pump setting required to assemble each specific Phastite® connector Material, Tube O.D. and Wall Thickness. This menu is provided with each tool and is also available on page 39.
11. You will be navigated to the pump's main screen, containing a digital pressure gauge, pump option, cycle count, battery life, and a START/STOP button (Figure 58).

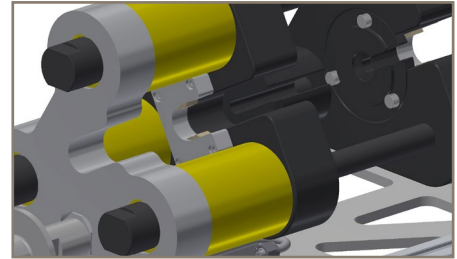


Figure 54

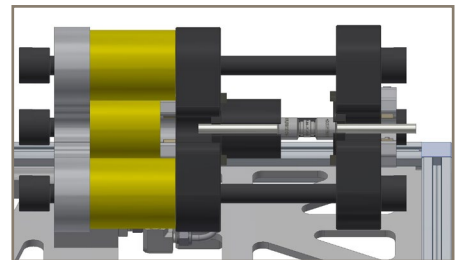


Figure 55

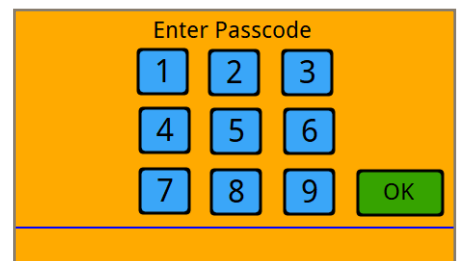


Figure 56

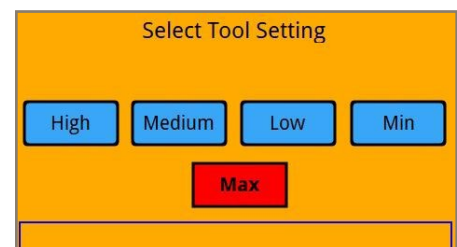


Figure 57

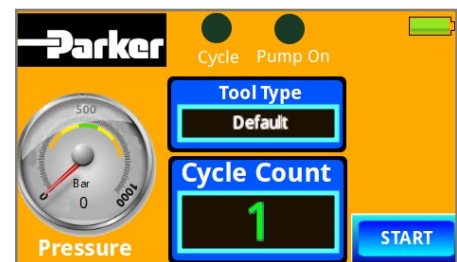


Figure 58

14. Ensure that the oil fill cap is unscrewed by 1 – 2 turns to allow air to vent.
15. Press the 'START' button on the touch screen of the controller.
16. Once the 'START' button is pressed, the pump will automatically start, actuating the tool to traverse the moving jaw and permanently assemble the Phastite® connector.
17. The pump will automatically shut-off on complete assembly of the Phastite® connector. However, it is good practice to WATCH FOR METAL-TO-METAL CONTACT. Metal-to-metal contact is achieved when the Phastite® collar and body are touching (Figure 60).
18. Once the pump has shut-off the moving jaw will retract automatically. The Phastite® connection can now be removed from the tool by pulling.
19. Inspect the assembled Phastite® connector and tubing for correct assembly and tube insertion:
  - a. Only one tubemarker line should be visible at each end of the connection (Figure 61). If two lines are visible and there is metal-to-metal contact, then a new connection (new connector and new tubing) is needed.
  - b. Check for metal-to-metal contact (visual). If there is no metal-to-metal contact, then a new connection (new connector and new tubing) is needed.
20. If a termination connector is being installed, ensure that the collar rotates freely around the tube. A slight tap may be required to allow collar movement. Ensure sealing sleeve cone is protected from damage. Tighten the collar onto the connector, until the collar abuts fully with the body. Tighten the nut until metal-to metal contact is achieved between body and nut.

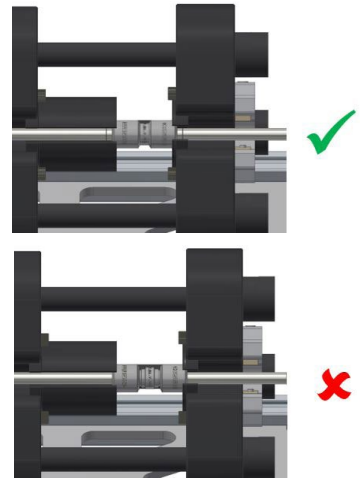


Figure 60



Figure 61

When the tool and mains operated pump are ready to be packed away ensure that the tool's moving jaw is fully retracted before removing the battery from the pump.

- a. Unplug the pump's power lead from the mains.
- b. Tighten the oil fill cap to stop the pump from leaking hydraulic oil when in transit or storage.
- c. Next disconnect the hose from the tool and pump via the quick connects. It is normal to experience slight weeping of hydraulic oil during disconnection. Re-apply the dust caps to all quick connects.
- d. Remove the inserts from the tool jaws and return them to their aperture in the tool travel case.
- e. Return the tool, hose and pump to their respective apertures in the tool and pump travel cases.
- f. All travel cases should always be stored and transported in the upright position.

**If an emergency or error is identified by the operator, the following actions will stop the process;**

**ACTION** > Press the stop button in the bottom /right corner of the controller.

**EFFECT** > The pump stops instantly, the moving jaw instantly begins to retract. The pressure is instantly relieved from the system.

Alternatively





**ACTION** > Switch off the mains supply at the power outlet.

**EFFECT** > The pump stops instantly, the moving jaw instantly begins to retract. The pressure is instantly relieved from the system.

## Tool Settings - PH-16-TOOL

Imperial Tube Material	Tube O.D.	Imperial Tubing Wall Thickness						0.154	0.188
		0.035	0.049	0.065	0.083	0.095			
Stainless Steel 316 (ASTM A269)	1/4"	Min	Low	Low	Low				
	3/8"	Low	Low	Low	Low	Low			
	1/2"	Low	Low	Low	Low	Low			
	5/8"		Medium	Medium	Medium	Medium			
	3/4"		Medium	Medium	Medium	Medium	High		
	1"			High	High	High	High	High	
INCONEL® Alloy 625 (ASTM B444-06)	1/4"	Low	Low	Low					
	3/8"	Low	Low	Low	Medium				
	1/2"	Medium	Medium	Medium	Medium				
	5/8"			Medium	Medium				
	3/4"			High	High	High	High		
INCOLOY® Alloy 825 (ASTM B423)	1/4"	Min	Low	Low	Low				
	3/8"	Low	Low	Low	Low				
	1/2"	Low	Low	Low	Low				
	5/8"			Low	Low				
	3/4"			High	High	High			
Super Duplex (ASTM A789/A789M)	1/4"		Low	Low					
	3/8"	Medium	Medium	Medium	Medium				
	1/2"	Medium	Medium	Medium	Medium				
	5/8"			High	High	High			
	3/4"			High	High				

### Tool Settings

Min	
Low	
Medium	
High	

# Complex Tube Runs with Tri-Tool®

In order to facilitate the assembly of complex tube runs the Tri-Tool's top shaft can be temporarily removed from the tool to provide access.

1. Use a pair of 30mm spanners, to hold the head of the top shaft while loosening the shaft nut. Remove the nut from the top shaft (Figure 62).
2. The top shaft can now slide out of the tool (Figure 63).
3. There is now access to install the complex tube run into the Tri-Tool®.
4. Re-install the top shaft back into tool and tighten the nut onto the shaft before use.

Warning: Tri-Tool® should never be used with the upper shaft removed. This will result in uneven loading of the tool (Figure 64).

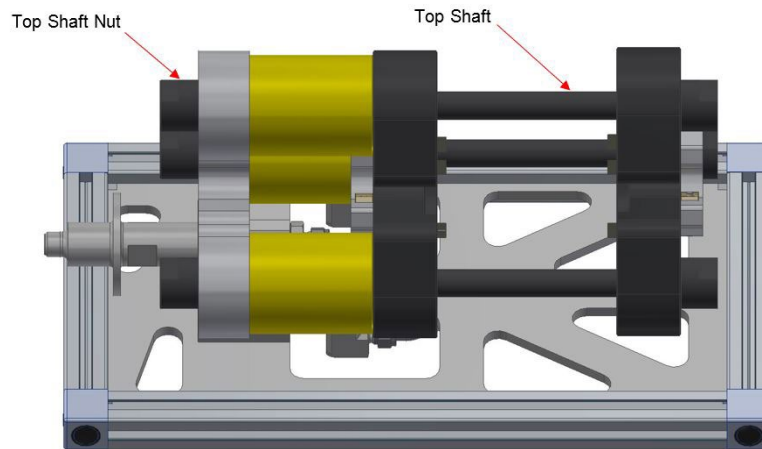


Figure 62

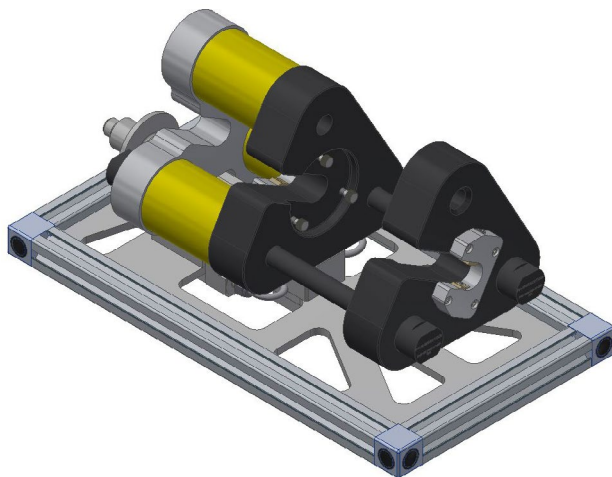


Figure 63 top shaft removed

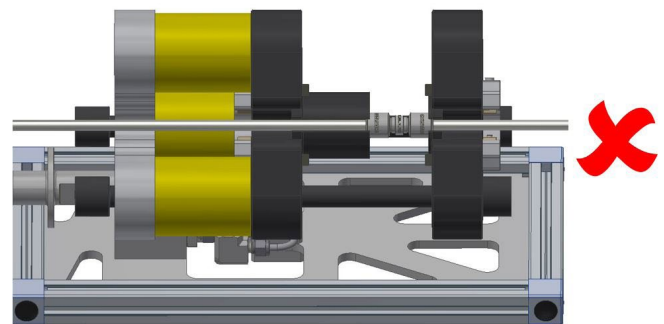


Figure 64



# Heat Code Traceability (HCT)

HCT refers to the fact that a specific part can be traced back to the original mill heat of metal from which it was made. Beginning with the original melt, a package of documents is created which completely describes the metal in physical and chemical terms. The end result is that a number, which is permanently stamped to the part, refers back to the document package. HCT offers these advantages:

- Raw materials for manufacture must meet code requirements. This can be verified through documentation so that the customer is certain that what is ordered is received.
- HCT provides a record of chemical analysis with the raw material.
- HCT relieves the user of Parker instrumentation fittings of any doubts. It acts as an assurance for today and for tomorrow.

In addition to the documentation of chemical and physical properties, great care is taken throughout the manufacture of Parker's connectors to ensure that potential stress corrosion will not be a problem in normal usage of the parts. Manufacturing processes avoid exposure of the parts to mercury or halogens, and control of thermal treatment avoids the condition known as continuous grain boundary carbide precipitation.

The following identification information is on the body and collar of every Phastite® connector:

- Part number
- HCT Number
- Raw Material
- OD size of tubing
- Trademark

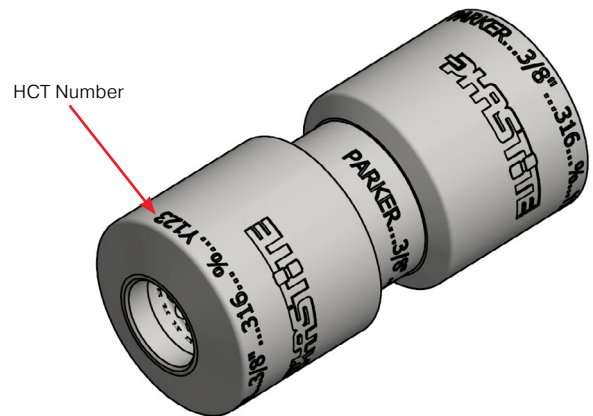


Figure 65

# Appendix 1



## EU DECLARATION OF CONFORMITY

*According to Annex VII of Directive 2006/42/EC*

**Name of Authorised Representative:** Parker Hannifin Corporation  
Instrumentation Products Division

**Address of Authorised Representative:** Riverside Road, Pottington Ind. Est.,  
Barnstaple, Devon. EX31 1NP - UK

**Equipment:** Phastool® Range of Assembly Tools  
**Part Numbers:** PH-3A-TOOL-BP, PH-3A-TOOL-HP  
PH-3A-TOOL-MP, PH-16-TOOL-BP,  
PH-16-TOOL-HP, PH-16-TOOL-MP

**Description of Equipment:** Hydraulically powered assembly tools  
operated by hydraulic pumps and  
controlled by an HMI interface.

**Year in which CE mark affixed:** 2020

The above apparatus conforms with the protection requirements of Council Directives 2006/42/EC, on the approximation of the laws of the Member States relating to Machinery Directive when installed, operated and maintained as intended.

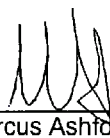
The above equipment also conforms to the requirements of Council Directive 2014/35/EU (Low Voltage Directive) and 2014/30/EU (Electromagnetic Compatibility) when installed, operated and maintained as intended.

The installation, operation and maintenance requirements are detailed in the User Guide supplied with the equipment

Compliance is demonstrated by the application of the following standards:

- EN-ISO 4413:2010 - Hydraulic fluid power. General rules and safety requirements for systems and their components.
- EN-ISO 12100:2011. Safety of Machinery – General Principles for design: Risk Assessment & Risk Reduction
- EN 61000-6-2: 2005. Electromagnetic Compatibility: Immunity Standards
- EN 61000-6-4: 2007. Electromagnetic Compatibility: Emission Standards

Signed:

  
Marcus Ashford

Date: March 2020



Position: Engineering Manager, Parker Hannifin IPDE, Barnstaple, Devon. UK

**Parker Instrumentation Products Division**

Riverside Road, Pottington Industrial Estate, Barnstaple, Devon, EX31 1NP. UK.



*European Product Information Centre  
Free phone: 00 800 27 27 5374  
(from AT, BE, CH, CZ, DE, DK, EE, EI, ES, FI,  
FR, IT, NL, NO, PL, RU, SE, SK, UK, ZA)*

---

© 2023 Parker Hannifin Corporation. All rights reserved



Parker Hannifin Manufacturing Ltd  
**Instrumentation Products  
Division Europe,**  
Riverside Road,  
Pottington Business Park,  
Barnstaple, Devon, EX31 1NP  
United Kingdom  
Tel.: +44 (0) 1271 313131  
Fax: +44 (0) 1271 373636  
[www.parker.com/ipd](http://www.parker.com/ipd)

Parker Hannifin Corporation  
**Instrumentation Products Division**  
16101 Vallen Drive  
Houston, TX 77041  
Tel: + 1 (713) 466-0056  
Fax: + 1 (713) 744-9892  
[www.parker.com/ipd](http://www.parker.com/ipd)

BULLETIN 5909 06/23