




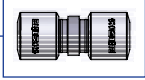
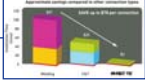
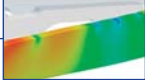




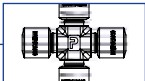
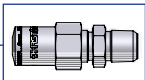
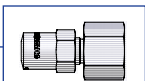


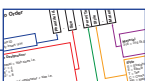



# **Phastite Tube Connectors**

*Catalog 4235-PH  
March 2007*



# Phastite Tube Connectors

## Contents

<b>Page 3</b>	Phastite : The Concept	
<b>Page 4/5</b>	Phastite : The Benefits	
<b>Page 6</b>	Value Proposition	
<b>Page 7/8</b>	Design & Test Data	
<b>Page 9</b>	Visual Index	
<b>Page 10</b>	Phastite Unions (Permanent)	
<b>Page 11</b>	Phastite Elbows (Permanent)	
<b>Page 12</b>	Phastite Tees (Permanent)	
<b>Page 13</b>	Phastite Crosses (Permanent)	
<b>Page 14</b>	Phastite Male Straight Connectors (Termination)	
<b>Page 15</b>	Phastite Female Straight Connectors (Termination)	
<b>Page 16</b>	Phastite Assembly Tooling	
<b>Page 17</b>	Pumps, Pre-assembly Inserts and Tube Markers	
<b>Page 18</b>	How to Order	
<b>Page 19-21</b>	Tube Selection and Pressure Ratings	
<b>Page 22</b>	Heat Code Traceability	
<b>Page 23</b>	Assembly Instructions	

## Phastite : The Concept

### A Ferrule-less, Push-Fit Connector.

Phastite is a breakthrough in tube connection systems; its innovative design concept combines quick installation with a simple assembly process achieving a tube connector that can be used in applications up to 20,000 psi/1380 bar (see pages 19, 20 & 21).

The product is manufactured from standard materials and requires no special processes to be adopted.

Phastite makes the perfect replacement for other fitting methods currently being utilised and performance parameters are such that it is suitable for pressure applications up to 20,000 psi/1380 bar (see pages 19, 20 & 21). Specifically, Phastite is a reliable alternative to cone & thread and/or welded connectors in these applications.

### Design

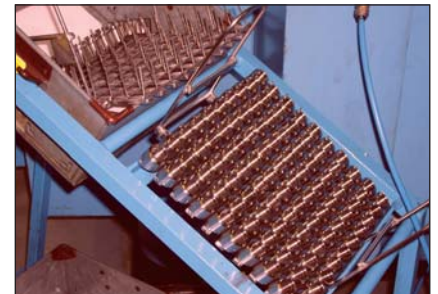
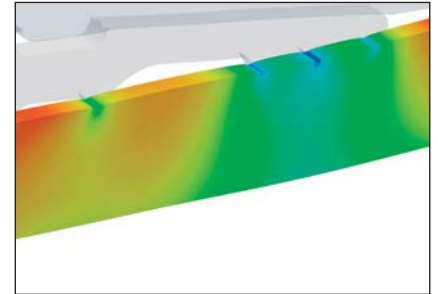
Phastite has been specifically designed to meet ever-increasing industry standards and demands with regards to tube connectors and pressure containment. The latest CAE and FEA techniques have been employed to optimise the design of the connectors and assembly tooling.

### Manufacturing

State of the art machining centres and over 40 years of connector manufacturing has been utilised for accurate and consistent manufacturing of Phastite connectors. Manufactured in Parker's European manufacturing headquarters 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 to a safety factor of a minimum of 4:1, proven by actual tubing burst tests. Throughout the development of Phastite, product performance and integrity were paramount. A rigorous testing program including Thermal Cycling, Shock, Vibration, Helium Leak, Gas Tight and Hydrostatic testing has been completed.



### 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 analyze all aspects of your application and review the information concerning the product or system in the current product catalog. 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

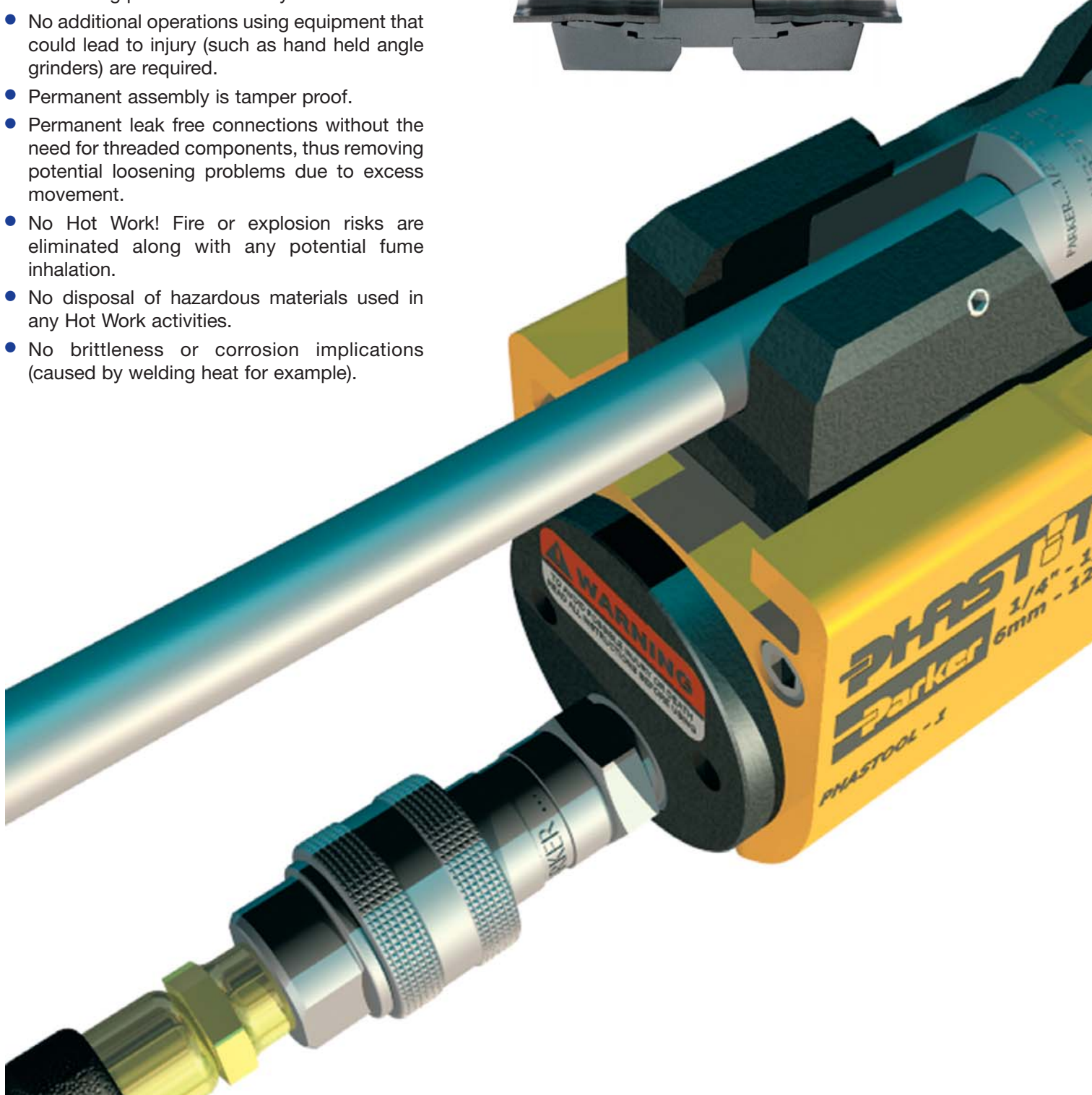
The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale" located in Catalog 4190-U Needle Valves (U Series).

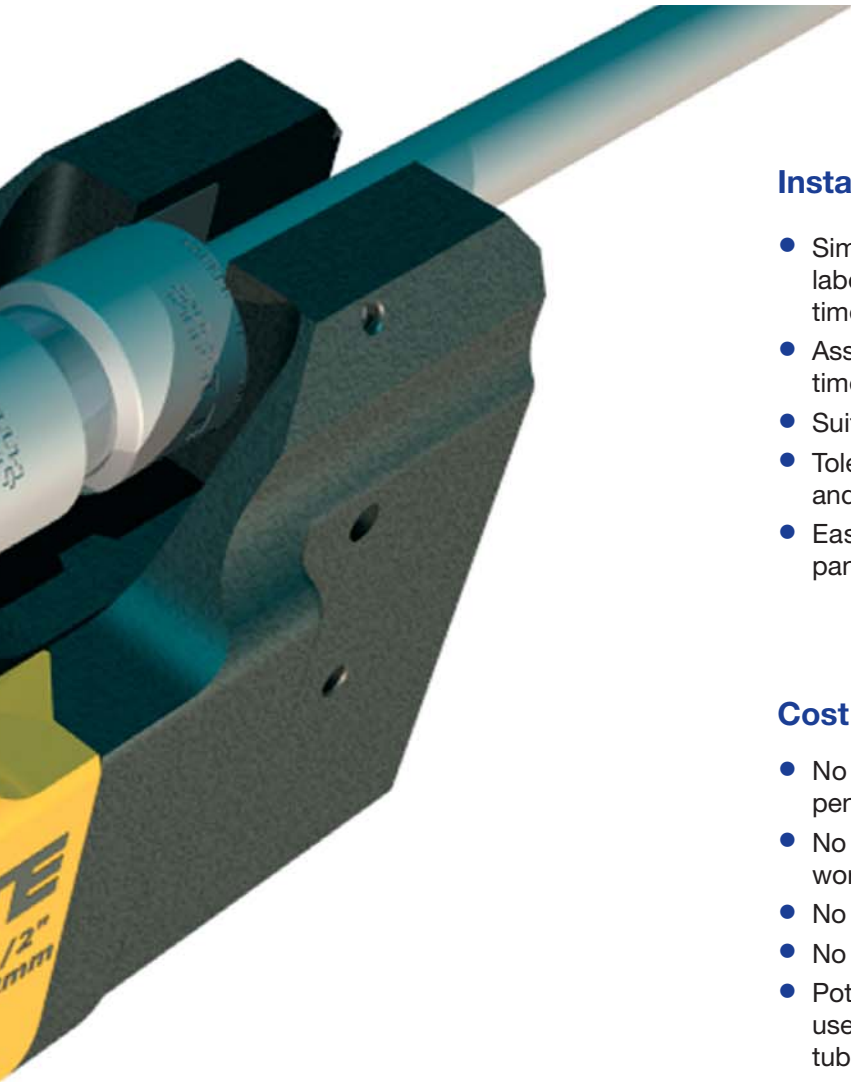
# Phastite Tube Connectors

## Phastite : The Benefits

### Safety

- Supplied pre-assembled, no loose parts thus eliminating potential assembly errors.
- No additional operations using equipment that could lead to injury (such as hand held angle grinders) are required.
- Permanent assembly is tamper proof.
- Permanent leak free connections without the need for threaded components, thus removing potential loosening problems due to excess movement.
- No Hot Work! Fire or explosion risks are eliminated along with any potential fume inhalation.
- No disposal of hazardous materials used in any Hot Work activities.
- No brittleness or corrosion implications (caused by welding heat for example).



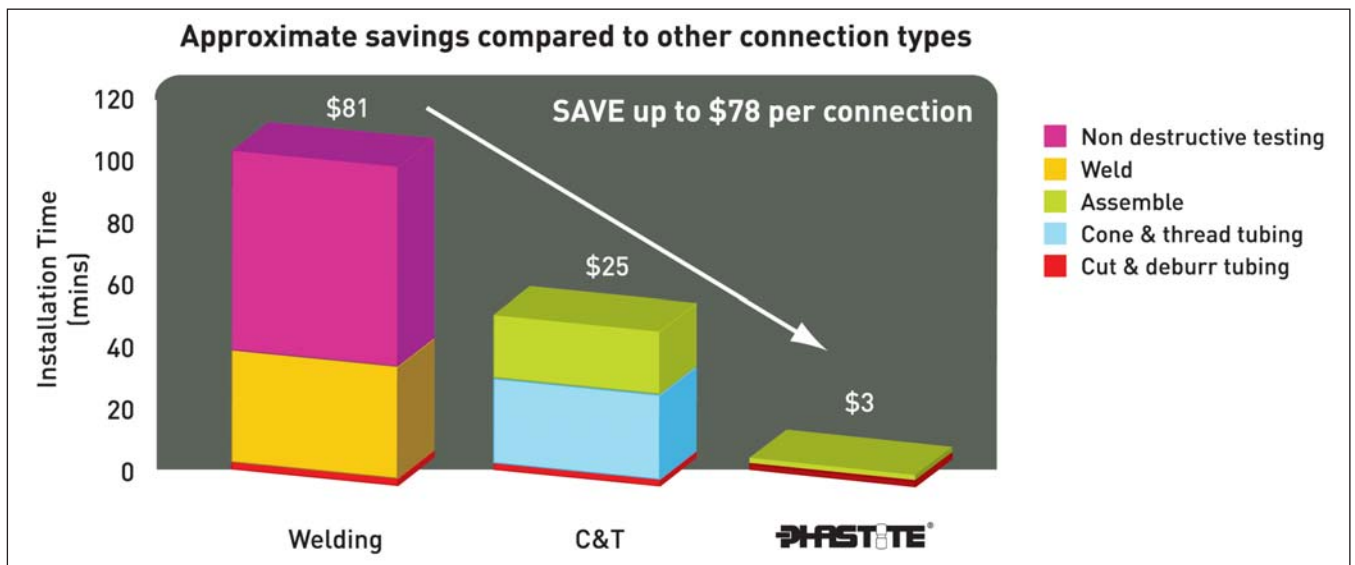


## Installation

- Simple installation process removes the need for skilled labour. The Phastite tool assures connections are right first time, every time.
- Assembled in seconds, reducing assembly and project lead times.
- Suitable for a wide variety of markets and applications.
- Tolerant of tubing variation and defects, reducing re-work and re-testing.
- Easy in situ assembly, even close up against panels/bulkheads.

## Cost of Ownership

- No inspection requirements such as X-Ray or Dye penetrant testing during installation.
- No re-work, just fit and forget, Phastite connectors will not work loose.
- No consumables such as welding rods, gases or cutting oil.
- No Hot Work permits required.
- Potential tube cost & weight savings (Phastite is suitable for use on a wide range of wall thicknesses – including thin wall tube for gas applications).



# **Phastite Tube Connectors**

## **Value Proposition**

### **Reduced Installation Costs**

Phastite offers an extremely quick, easy and simple way of connecting tubing. When considering how much time it takes to either weld or cone and thread tubing, Phastite delivers a huge reduction in total cost.

#### **Simple assembly process**

The Phastite tooling, together with the connector's unique design ensures a leak free connection first time, every time. This enables assembly time to be reduced from hours down to seconds.

#### **No need to re-make or re-test**

Phastite delivers a leak free connection with no need for costly and time consuming re-making or re-testing.

#### **No welding required**

With Phastite a permanent connection can be made in seconds without the need for certified labour or costly testing requirements.

#### **Reduced tubing costs**

Phastite is used with standard tubing material. Controlled chemical composition or special tubing tolerances are not needed.

#### **No special requirements**

Standard ASTM A-269 or equivalent tubing is all that is needed for Phastite.

#### **Weight reduction**

The need for extra wall thickness to allow threading is eliminated, meaning that weight as well as the tubing costs are reduced.

### **Increased Safety**

Phastite's simple assembly process dramatically reduces the number of operations needed to assemble a leak free joint. Simply insert the tubing into the pre-assembled connector. The Phastite tooling delivers a leak free connection.

#### **No loose parts**

Phastite connectors are supplied pre-assembled, no loose parts and no disassembling needed by the installer. This eliminates errors when assembling, as there are no parts to lose or to incorrectly assemble.

#### **Simple make-up**

Consistent make-up to a pre-determined stop face on the body. No measuring, no marking, simply insert the tube into the connector and let the tool do the rest. This removes the possibility of any incorrect make-up.

#### **Vibration tolerant**

Phastite provides a permanent leak free connection. There are no threaded components, removing potential loosening problems in vibration applications.

#### **No need for hot work**

Phastite provides a leak free connection suitable for replacing welded systems, removing the associated risks with welding.

## Design & Test Data

During the development of Phastite a very rigorous testing programme was undertaken. Phastite met or exceeded all requirements including, but not limited to, the following tests.

### Pressure containment

Hydrostatic testing was carried out for all tube sizes on the thickest and thinnest wall tubing as laid out in the tube selection guide on pages 19-21. The tests ensured that tube burst was achieved on all sizes without any movement and a 4:1 safety factor is applied to give the relevant safe working pressure.

### Gas testing

Pressure testing using nitrogen gas at 100 bar (1500 psi) to ensure gas tight sealing is achieved followed by a high pressure gas test at full cold working pressure.

### Vibration

Vibration tested to BS 4368:Pt4:1984 at 20 million cycles at between 23 and 47Hz.

### Helium vacuum test

A vacuum is achieved by removing the contents of the contained volume by means of a vacuum pump. The pump maintains the required level of vacuum within the test piece by operating continually. Helium gas is subjected to the connector joints of the test piece assembly and using a mass spectrometer the level of leakage is determined. Phastite exhibits leak rates of less than  $1 \times 10^{-9}$  cc Atm/sec.



### Deflection test

Phastite was tested to prove its holding power by securing connectors at each end of two half-metre lengths of tubing joined by a Phastite connector in the middle of the assembly. A load was applied to deflect the middle connector by a distance of 60mm (Fig 1) whilst pressurised at 180 bar with no leakage experienced.

A more stringent test was also completed deflecting the assembly by 300mm. Pressure was increased until tube burst was achieved (Fig 2).



Fig 1



Fig 2

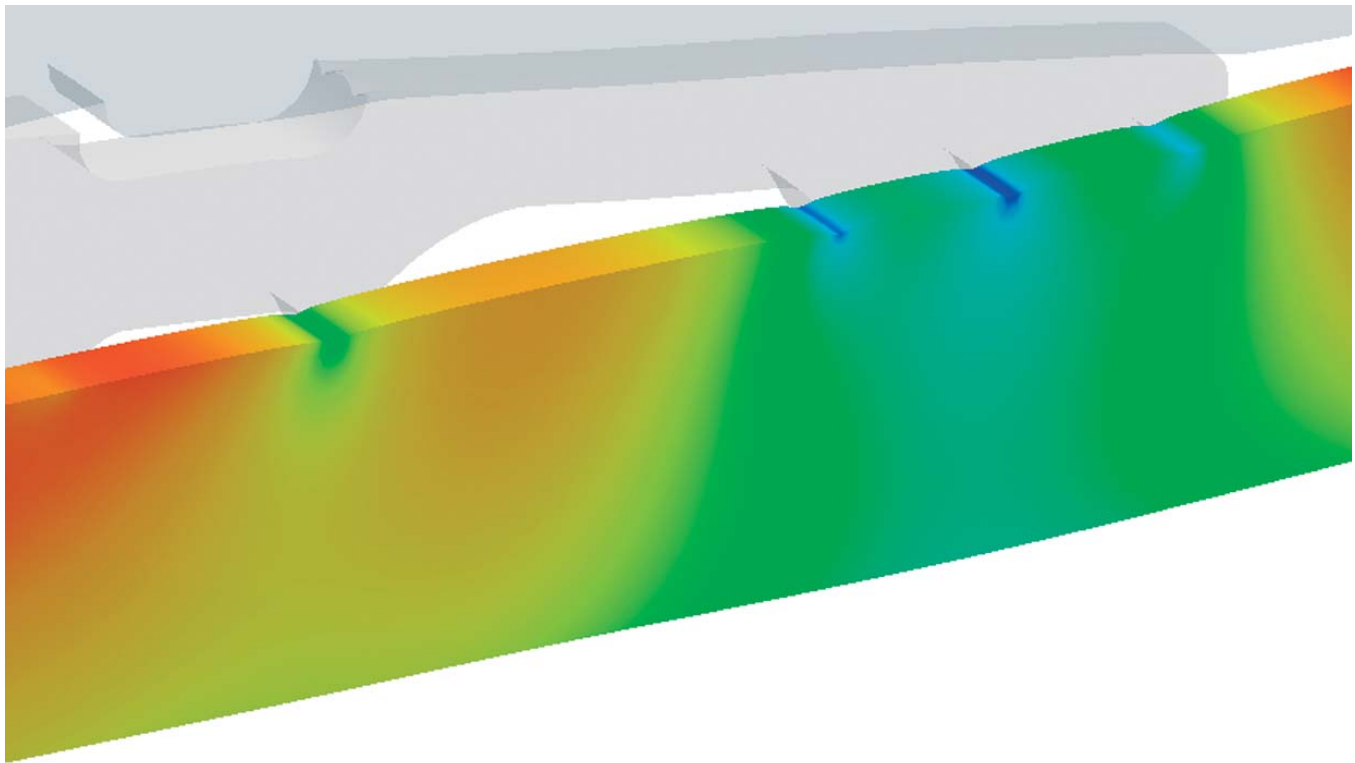
# **Phastite Tube Connectors**

## **Features & Technical Data**

### **Typical raw material specifications**

<b>Basic connector material</b>	<b>Bar Stock</b>	<b>Forging</b>	<b>Common Tubing specification</b>
Stainless Steel (Type 316)	ASME-SA-479 Type 316-SS	ASME-SA-182 Type 316	ASTM-A-269
	BS970 316-S31	BS970 316-S31	ASTM-A-249
	DIN 4401	DIN 4401	ASTM-A-213
	ASTM A276 Type 316		

### **Finite Element Analysis**



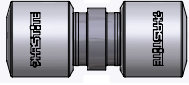
**The latest FEA techniques have been employed to optimise the design of Phastite.**

The excellent sealing and holding properties of Phastite is achieved by its unique design. It not only secures metal to metal sealing points onto the tubing from its unique formed peaks within the bore of the connector body but allows the tubing to expand into the pre-machined cavities giving additional holding properties.

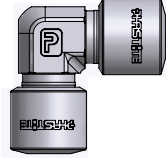


## Visual Index

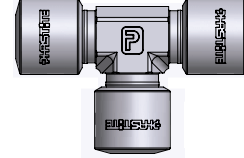
**PS**  
Permanent Union Straight  
page 10



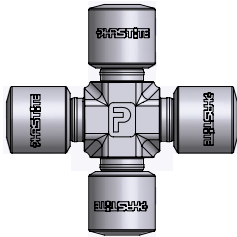
**PE**  
Permanent Union Elbow  
page 11



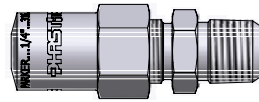
**PT**  
Permanent Union Tee  
page 12



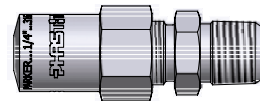
**PC**  
Permanent Union Cross  
page 13



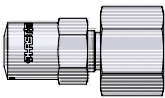
**TMS-N**  
Termination Male Straight - NPT  
page 14



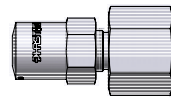
**TMS-K**  
Termination Male Straight - BSPT  
page 14



**TFS-N**  
Termination Female Straight - NPT  
page 15



**TFS-K**  
Termination Female Straight - BSPT  
page 15



**Phastool**  
Hand Held  
page 16



**Phastool**  
Bench Mounted  
page 16



**Pumps**  
page 17

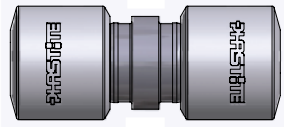


**Pre-Assembly Dies and Tool Inserts**  
page 17

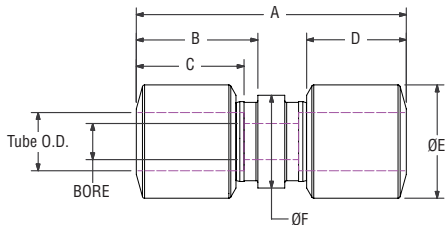


# Phastite Tube Connectors

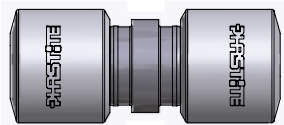
## PS Permanent Union Straight Imperial



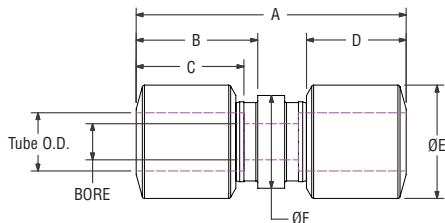
Part No.	Tube O.D	A	B	C	D	E	F	Bore
PH-4-PS	1/4	2.12	0.93	0.82	0.75	0.67	0.61	0.16
PH-6-PS	3/8	2.12	0.93	0.82	0.75	0.86	0.67	0.24
PH-8-PS	1/2	2.32	1.05	0.94	0.86	0.98	0.81	0.31



## PS Permanent Union Straight Metric

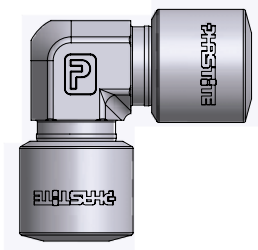


Part No.	Tube O.D	A	B	C	D	E	F	Bore
PH-M6-PS	6	54.0	23.6	20.9	19.0	17.0	15.9	4.0
PH-M8-PS	8	56.0	24.7	21.9	20.0	19.0	15.4	5.0
PH-M10-PS	10	58.0	25.6	22.9	21.0	22.0	17.0	6.0
PH-M12-PS	12	59.0	26.8	23.8	22.0	25.0	20.5	8.0

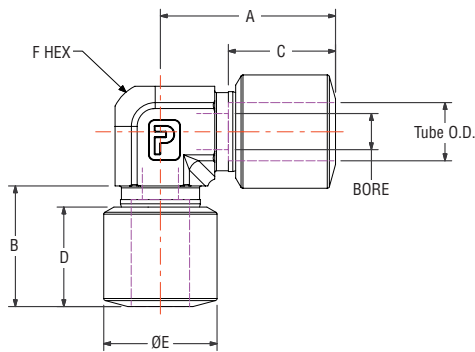


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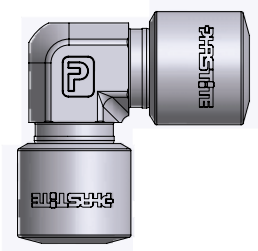
## PE Permanent Union Elbow Imperial



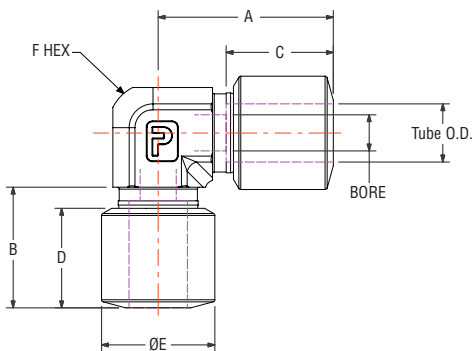
Part No.	Tube O.D	A	B	C	D	E	F HEX	Bore
PH-4-PE	1/4	1.46	0.93	0.82	0.75	0.67	13/16	0.16
PH-6-PE	3/8	1.46	0.93	0.82	0.75	0.86	13/16	0.24
PH-8-PE	1/2	1.52	1.05	0.94	0.86	0.98	13/16	0.31



## PE Permanent Union Elbow Metric



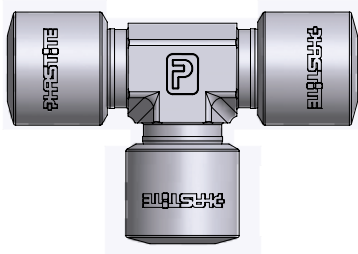
Part No.	Tube O.D	A	B	C	D	E	F HEX	Bore
PH-M6-PE	6	37.0	23.6	20.9	19.0	17.0	20.5	4.0
PH-M8-PE	8	38.2	24.7	21.9	20.0	19.0	20.5	5.0
PH-M10-PE	10	39.2	25.6	22.9	21.0	22.0	20.5	6.0
PH-M12-PE	12	39.4	26.8	23.8	22.0	25.0	20.5	8.0



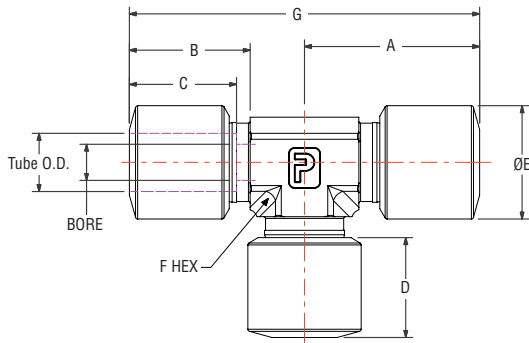
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# Phastite Tube Connectors

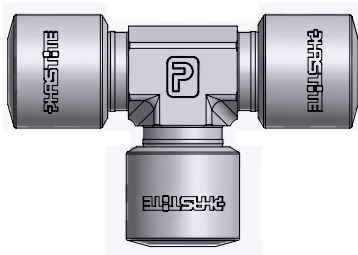
## PT Permanent Union Tee Imperial



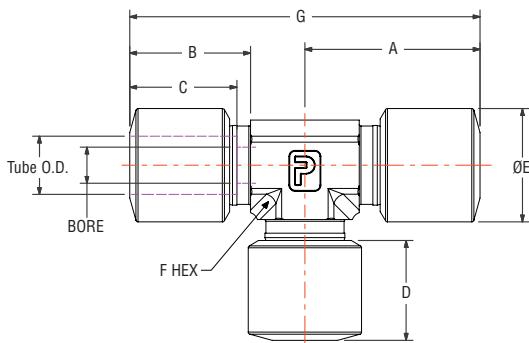
Part No.	Tube O.D	A	B	C	D	E	F HEX	G	Bore
PH-4-PT	1/4	1.46	0.93	0.82	0.75	0.67	13/16	2.92	0.16
PH-6-PT	3/8	1.46	0.93	0.82	0.75	0.86	13/16	2.92	0.24
PH-8-PT	1/2	1.52	1.05	0.94	0.86	0.98	13/16	3.04	0.31



## PT Permanent Union Tee Metric

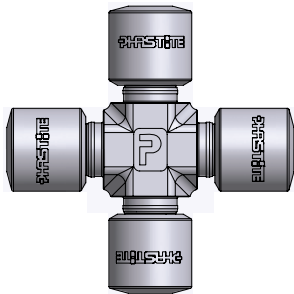


Part No.	Tube O.D	A	B	C	D	E	F HEX	G	Bore
PH-M6-PT	6	37.0	23.6	20.9	19.0	17.0	20.5	74.0	4.0
PH-M8-PT	8	38.2	24.7	21.9	20.0	19.0	20.5	76.4	5.0
PH-M10-PT	10	39.2	25.6	22.9	21.0	22.0	20.5	78.4	6.0
PH-M12-PT	12	39.4	26.8	23.8	22.0	25.0	20.5	78.8	8.0

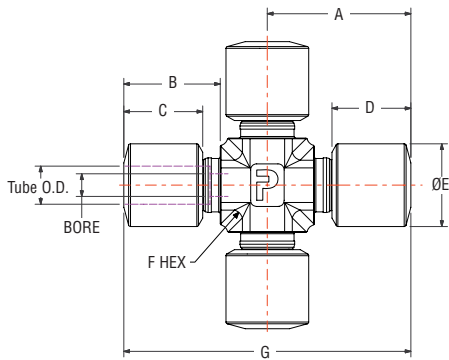


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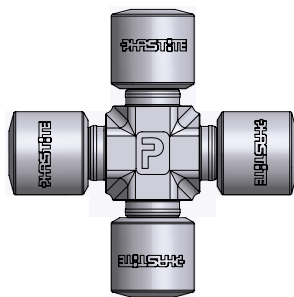
## PC Permanent Union Cross Imperial



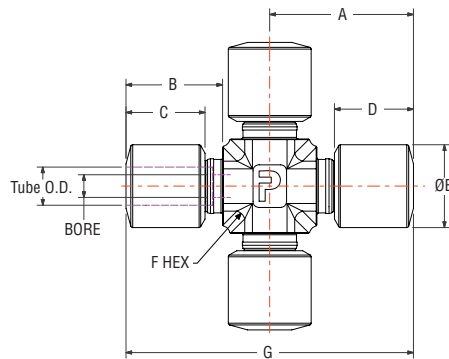
Part No.	Tube O.D	A	B	C	D	E	F HEX	G	Bore
PH-4-PC	1/4	1.42	0.93	0.82	0.75	0.67	13/16	2.84	0.16
PH-6-PC	3/8	1.42	0.93	0.82	0.75	0.86	13/16	2.84	0.24
PH-8-PC	1/2	1.59	1.05	0.94	0.86	0.98	7/8	3.18	0.31



## PC Permanent Union Cross Metric



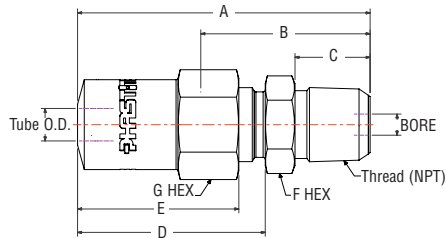
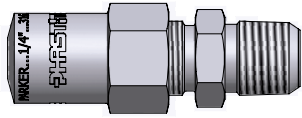
Part No.	Tube O.D	A	B	C	D	E	F HEX	G	Bore
PH-M6-PC	6	35.9	23.6	20.9	19.0	17.0	20.5	74.0	4.0
PH-M8-PC	8	37.1	24.7	21.9	20.0	19.0	20.5	76.4	5.0
PH-M10-PC	10	38.2	25.6	22.9	21.0	22.0	20.5	76.3	6.0
PH-M12-PC	12	40.3	26.8	23.8	22.0	25.0	22.2	80.6	8.0



Dimensions for reference only, subject to change.

# Phastite Tube Connectors

## TMS-N Termination Male Straight - NPT



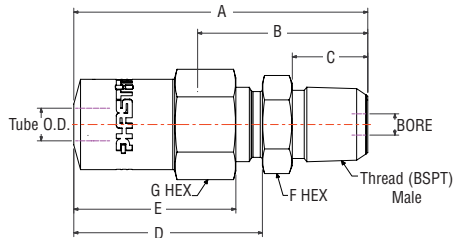
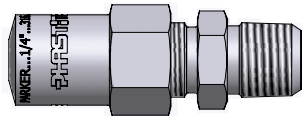
### Imperial

Part No.	Tube O.D	Thread NPT	A	B	C	D	E	F HEX	G HEX	Bore
PH-4-4N-TMS	1/4	1/4	2.18	1.26	0.56	1.40	1.20	0.63	0.71	0.16
PH-6-6N-TMS	3/8	3/8	2.32	1.33	0.56	1.46	1.28	0.71	0.88	0.24
PH-8-8N-TMS	1/2	1/2	2.56	1.54	0.75	1.50	1.30	0.88	1.00	0.31

### Metric

Part No.	Tube O.D	Thread NPT	A	B	C	D	E	F HEX	G HEX	Bore
PH-M6-4N-TMS	6	1/4	55.4	32.1	14.2	35.5	30.5	16.0	18.0	4.0
PH-M8-4N-TMS	8	1/4	56.2	32.1	14.2	36.4	31.5	16.0	19.1	5.0
PH-M10-6N-TMS	10	3/8	58.8	33.8	14.2	37.3	32.5	18.0	22.2	6.0
PH-M12-8N-TMS	12	1/2	65.2	39.2	19.1	38.2	33.2	22.2	25.0	8.0

## TMS-K Termination Male Straight - BSPT



### Imperial

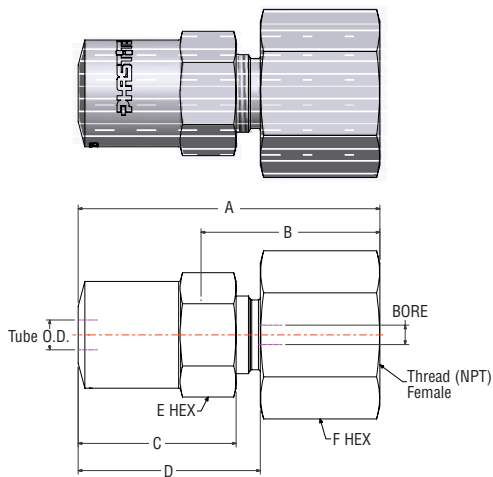
Part No.	Tube O.D	Thread BSPT	A	B	C	D	E	F HEX	G HEX	Bore
PH-4-4K-TMS	1/4	1/4	2.18	1.26	0.56	1.40	1.20	0.63	0.71	0.16
PH-6-6K-TMS	3/8	3/8	2.32	1.33	0.56	1.46	1.28	0.71	0.88	0.24
PH-8-8K-TMS	1/2	1/2	2.56	1.54	0.75	1.50	1.30	0.88	1.00	0.31

### Metric

Part No.	Tube O.D	Thread BSPT	A	B	C	D	E	F HEX	G HEX	Bore
PH-M6-4K-TMS	6	1/4	55.4	32.1	14.2	35.5	30.5	16.0	18.0	4.0
PH-M8-4K-TMS	8	1/4	56.2	32.1	14.2	36.4	31.5	16.0	19.1	5.0
PH-M10-6K-TMS	10	3/8	58.8	33.8	14.2	37.3	32.5	18.0	22.2	6.0
PH-M12-8K-TMS	12	1/2	65.2	39.2	19.1	38.2	33.2	22.2	25.0	8.0

Dimensions for reference only, subject to change.

## TFS-N Termination Female Straight - NPT



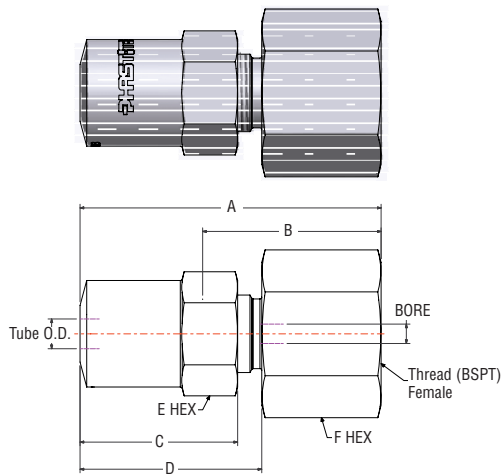
### Imperial

Part No.	Tube O.D	Thread NPT	A	B	C	D	E HEX	F HEX	Bore
PH-4-4N-TFS	1/4	1/4	2.22	1.30	1.20	1.40	0.71	1.13	0.16
PH-6-6N-TFS	3/8	3/8	2.44	1.35	1.28	1.46	0.88	1.19	0.24
PH-8-8N-TFS	1/2	1/2	2.60	1.58	1.30	1.50	1.00	1.50	0.31

### Metric

Part No.	Tube O.D	Thread NPT	A	B	C	D	E HEX	F HEX	Bore
PH-M6-4N-TFS	6	1/4	56.6	33.0	30.5	35.5	18.0	28.6	4.0
PH-M8-4N-TFS	8	1/4	57.0	33.0	31.5	36.4	19.1	28.6	5.0
PH-M10-6N-TFS	10	3/8	62.1	34.9	32.5	37.3	22.2	30.0	6.0
PH-M12-8N-TFS	12	1/2	66.1	40.1	33.2	38.2	25.0	38.1	8.0

## TFS-K Termination Female Straight - BSPT



### Imperial

Part No.	Tube O.D	Thread BSPT	A	B	C	D	E HEX	F HEX	Bore
PH-4-4K-TFS	1/4	1/4	2.22	1.30	1.20	1.40	0.71	1.13	0.16
PH-6-6K-TFS	3/8	3/8	2.44	1.35	1.28	1.46	0.88	1.19	0.24
PH-8-8K-TFS	1/2	1/2	2.60	1.58	1.30	1.50	1.00	1.50	0.31

### Metric

Part No.	Tube O.D	Thread BSPT	A	B	C	D	E HEX	F HEX	Bore
PH-M6-4K-TFS	6	1/4	56.6	33.0	30.5	35.5	18.0	28.6	4.0
PH-M8-4K-TFS	8	1/4	57.0	33.0	31.5	36.4	19.1	28.6	5.0
PH-M10-6K-TFS	10	3/8	62.1	34.9	32.5	37.3	22.2	30.0	6.0
PH-M12-8K-TFS	12	1/2	66.1	40.1	33.2	38.2	25.0	38.1	8.0

Dimensions for reference only, subject to change.

# **Phastite Tube Connectors**

## **Phastool**

Phastite's unique design provides a secure leak tight grip on the tubing even with varying tolerances or surface finishes.

The connector make-up is completed by the use of either a hand held or bench mounted Phastool.

The tools have built-in hydraulic cylinders, which are operated by means of a pump. The pump can be either air, electrically or manually operated.

### **Hand Held Tool**

**Part No:** PH-8-HANDTOOL

**Dimensions:** 150mm x 85mm

**Weight:** 4.5kg



### **Bench Mounted Tool**

**Part No:** PH-8-BENCHTOOL

**Dimensions:** 150mm x 90mm

**Weight:** 5.0kg



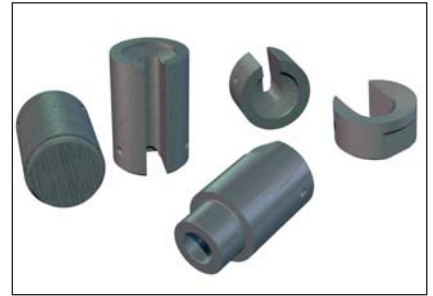


## Pre-assembly Dies and Tool Inserts

### Tool assembly dies

A complete set of insert dies are included with each tool kit (hand held or bench mounted) to enable assembly of all sizes and shapes of Phastite from 6mm to 12mm and from 1/4" to 12" tube diameters. If additional inserts are required please use the information shown below.

Termination Connector Pre-assembly Tools			
Imperial		Metric	
Tube size	Part Number	Tube Size	Part Number
1/4	PH-TPAT-4	6mm	PH-TPAT-M6
3/8	PH-TPAT-6	8mm	PH-TPAT-M8
1/2	PH-TPAT-8	10mm	PH-TPAT-M10
		12mm	PH-TPAT-M12



## Pumps

### Lightweight hand pump

Part number: 82C-2HP

- Lightweight and compact.
- Two speed operation reducing the number of handle strokes required.
- Lower handle effort required to operate.
- Handle lock and lightweight construction for easy carrying.
- Internal pressure relief valve for overload protection.



### Electric pump

Part number: 82CE-OEP

- Lightweight and compact design.
- Large easy carry handle.
- Two speed operation reduces cycle time.
- 230 VAC 50/60 cycle motor will operate on voltages as low as 115 volts.
- High strength moulded cover, with built in handle, protects the motor from contamination and damage.



### Air pump

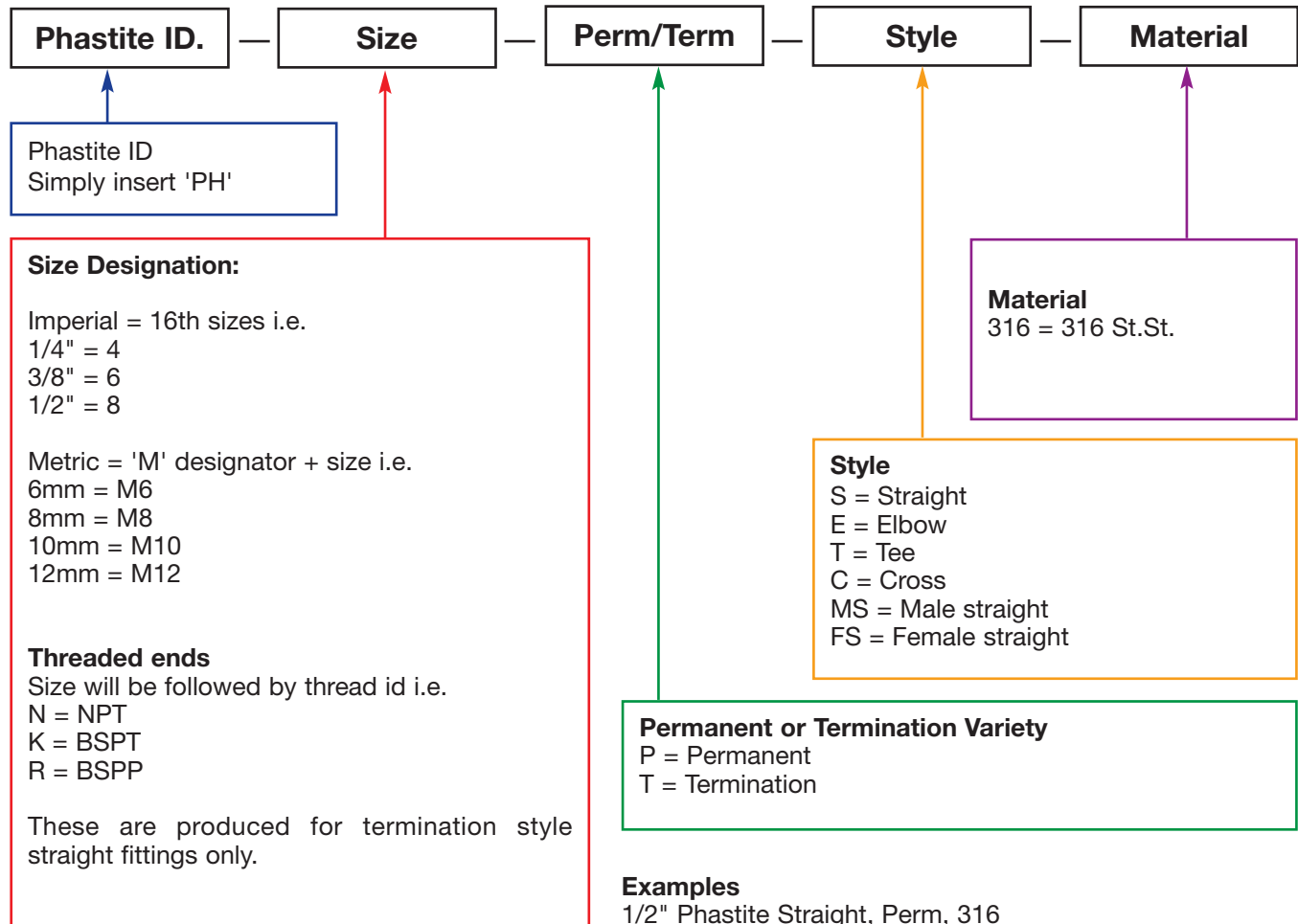
Part number: 82CE-OAP

- Low air consumption and operating costs.
- Internal pressure relief valve provides override protection.
- Quiet operation.
- Operating pressure 1.7 to 8.6 bar.
- High efficiency cast aluminium air motor.



# Phastite Tube Connectors

## How to Order



### Examples

1/2" Phastite Straight, Perm, 316

**PH-8-PS-316**

1/2" Phastite termination to 1/2 NPT (Male), Straight, 316

**PH-8-8N-TMS-316**

6mm Phastite Tee, Perm, 316

**PH-M6-PT-316**

### **Tube selection and pressure ratings for ASTM A-269 tubing in 304/316 stainless steel used with Phastite connectors**

#### **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.

This guide is intended to assist the designer to properly select and order the correct quality tubing. **Correct 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 should be considered, 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 through 4 of this guide. The pressure rating of the tube has been calculated in accordance with ANSI 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.



# Phastite Tube Connectors

## Pressure rating and wall thickness of tubes.

Tables 1 to 4 present the pressure ratings for type 304 or 316 stainless steel 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, for whatever reason, a user chooses a tube wall thickness outside those recommended in tables 1 to 4, the user should first consult the technical department of Parker Instrumentation Products Division on +44 (0)1271 313 111 or at ipde\_technical@parker.com.

## Derating factors for Welded and drawn tubing.

For welded and drawn tubing, a derating factor shall be applied for weld integrity. For double – welded tubing pressure ratings in tables 1 though 4 by a factor of 0.85 and for single – welded tubing multiply ratings in the tables by 0.80.

## Derivation of pressure ratings.

The working pressure ratings for stainless steel tubing shall be derived from stress values and methodologies listed in ASME B31.3, Chemical Plant and Petroleum Refinery Piping standard.

Table 1		Wall Thickness in inches									
Tube OD	Phastite Maximum Product Rating **	Maximum Tube Assembly Rating - PSI*									
		0.028"	0.035"	0.049"	0.065"	0.083"	0.095"	0.109"	0.120"	0.125"	
1/4"	<b>20000</b>	4000	5100	7500	10300	13300					
3/8"	<b>15500</b>		3300	4800	6600	8600	10000				
1/2"	<b>15000</b>		2600	3700	5100	6700	7800	9100	10100	10500	

\* Calculated Pressure Rating to ASME B31.3 Based on ASTM A269 - 316

\*\* Pressure Rating verified by test based on 4:1 FOS. Utilising ASTM A269 - 316 tube with a typical UTS of 600 Mpa and typical hardness of Rb 80 - 90.

Table 2		Wall Thickness in inches									
Tube OD	Phastite Maximum Product Rating **	Maximum Tube Assembly Rating - BAR*									
		0.028"	0.035"	0.049"	0.065"	0.083"	0.095"	0.109"	0.120"	0.125"	
1/4"	<b>1380</b>	276	352	517	710	917					
3/8"	<b>1069</b>		226	331	455	593	690				
1/2"	<b>1034</b>		179	255	351	462	540	626	697	724	

Table 3		Wall Thickness in mm										
Tube OD	Phastite Maximum Product Rating **	Maximum Tube Assembly Rating - PSI*										
		0.5mm	0.8mm	1.0mm	1.2mm	1.5mm	1.8mm	2.0mm	2.2mm	2.5mm	2.8mm	3.0mm
6mm	<b>20000</b>	2900	4800	6200	7600	9800	11900	13300				
8mm	<b>17000</b>			4500	5500	7200	8800	9900	10900			
10mm	<b>15500</b>			3600	4300	5600	6900	7700	8600	9900		
12mm	<b>15000</b>			2900	3600	4600	5600	6300	7000	8100	9200	9900

Table 4		Wall Thickness in mm										
Tube OD	Phastite Maximum Product Rating **	Maximum Tube Assembly Rating - BAR*										
		0.5mm	0.8mm	1.0mm	1.2mm	1.5mm	1.8mm	2.0mm	2.2mm	2.5mm	2.8mm	3.0mm
6mm	<b>1379</b>	200	331	426	524	676	821	917				
8mm	<b>1172</b>			310	379	497	607	683	752			
10mm	<b>1069</b>			248	297	386	476	531	593	683		
12mm	<b>1034</b>			200	248	317	386	434	483	557	634	683

## Note on selection.

The pressure rating information presented here, is intended as a useful guide to demonstrate the performance potential of the Phastite fitting when properly installed according to Parker recommended practices and to assist the user in the proper selection of tube and fitting for a particular application. Every effort is made to ensure this information is clearly presented but 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 requirements of the system or application.

## Pressure ratings at elevated temperatures

Factors used to determine tubing pressure ratings at elevated temperatures:

°C	°F	304 St. St.	316 St. St.
93	200	1.00	1.00
204	400	0.93	0.96
315	600	0.82	0.85
426	800	0.76	0.79
537	1000	0.69	0.76

Table 5

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

**Example:** 12mm x 1.5mm wall 316 stainless steel tubing has a working pressure of 300 bar @ room temperature. If the system were to operate at 400°C, a factor of 79% or 0.79 would apply (see table 5) and the “at temperature” system pressure would therefore be  $300 \times 0.79 = 237$  bar.

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.

## Tubing ordering suggestions.

Stainless steel tubing for use with Phastite connectors should be ordered to insure adequate quality for good performance. Each request for tubing should specify the material, nominal outside diameter, and wall thickness. Ordering to the correct ASTM specifications ensures that the tubing will be dimensionally, physically and chemically within the strict limits as laid down in the standard. In addition to this, the tubing should be ordered as, free from scratches and imperfections and suitable for bending or flaring. The tubing should be fully annealed, 80Rb or less (Rb 90 absolute maximum) and delivered in a proper manner to preserve the product quality.

The following grades and standards can be used successfully with Phastite 316 stainless steel fittings:

**Materials:**  
304, 316 or 316L

**ASTM tubing spec.**  
ASTM A-269, A-249, A-213 or A-632

# Phastite Tube Connectors

## 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 pipe fittings of any doubts. It acts as an assurance for today and for tomorrow.

The material used in Phastite connectors is AISI 316.

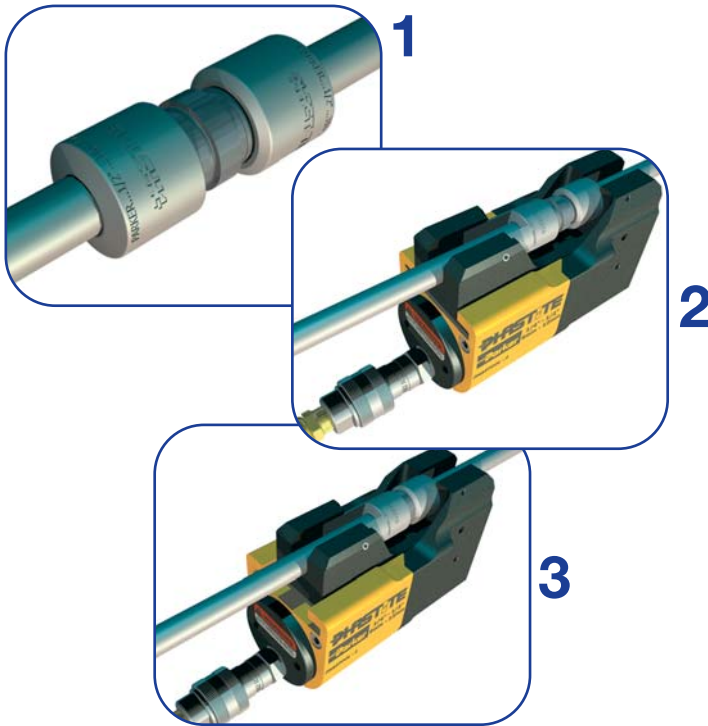
The American Society of Mechanical Engineers (ASME) Boiler and Vessel Code, Section III, latest issue, entitled Rules for Construction of Nuclear Power Plant Components, is the principal document covering this type of fitting in the nuclear field. ANSI Standard B.31.1.0, Power Piping, and ANSI Standard B.31.7, Nuclear Power Piping, are also important documents in the field

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.

HCT Numbers



## Phastite Tube Connectors



### Assembly instructions for permanent products.

#### Step 1

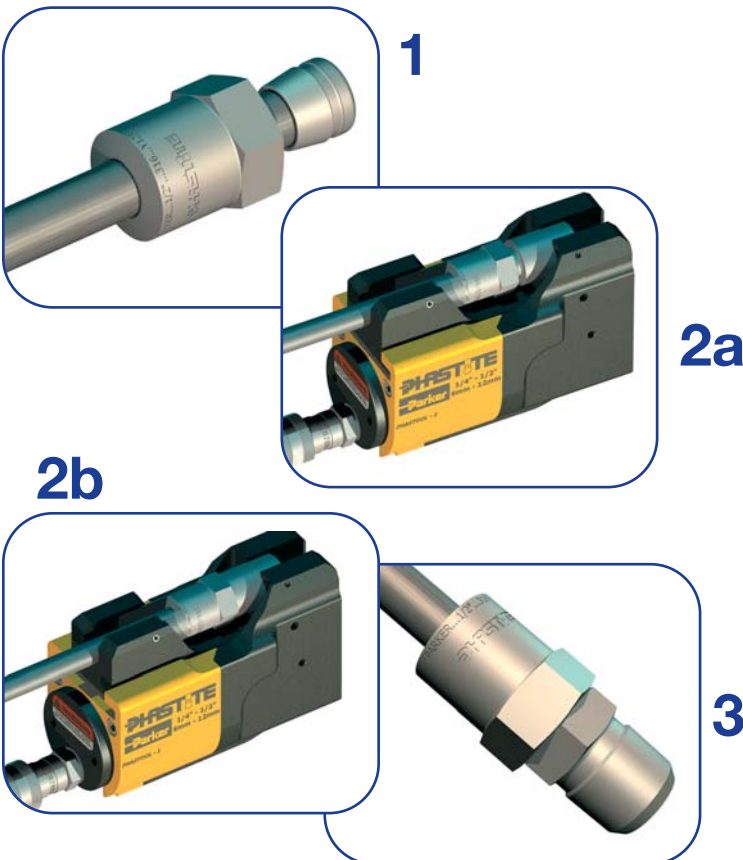
Cut the tubing squarely, de-burr and clean away any loose swarf and insert the tubing into the connector.

#### Step 2

Place the tubing and fitting into the Phastool jaws.

#### Step 3

Operate the chosen pump until the collars touch the connector body shoulder (metal to metal).



### Assembly instructions for termination fittings.

#### Step 1

Cut the tubing squarely, de-burr and clean away any loose swarf and insert the tubing into the connector sleeve.

#### Step 2

Place the tubing and fitting into the Phastool pre-assembly inserts (2a) and operate the chosen pump until the collar hits the dead stop (2b).

#### Step 3

Screw the threaded collar onto the connector body until the collar touches the connector body shoulder (metal to metal).

Dimensions for reference only, subject to change.

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