

COMPOSITE FITTING RANGE PRODUCT OVERVIEW



Agenda

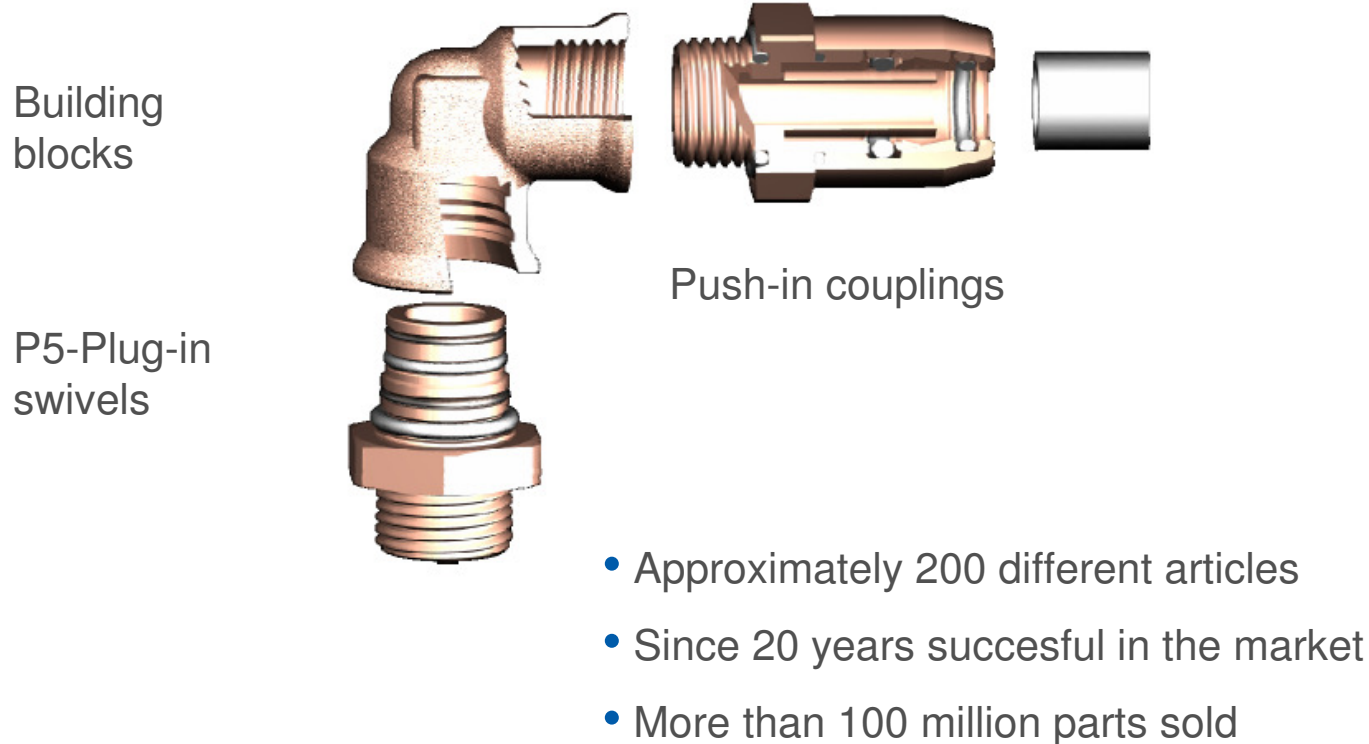
- Composite System Introduction
- Product Information
 - Product structure and function
 - Assembly information
- General Information

SYSTEM INTRODUCTION

Product Overview

Current Brass System

The *Raufoss BRK P5* System

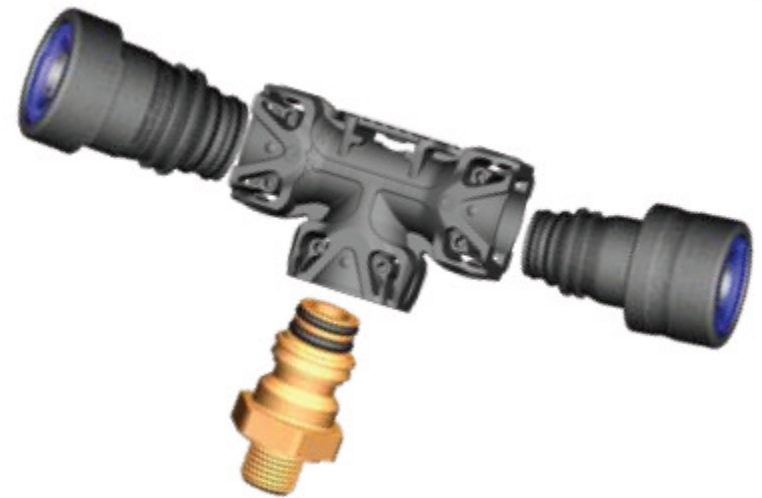


Composite System Introduction

A new generation of couplings based on composite materials in combination with leading coupling technology.

BENEFITS OF COMPOSITE MATERIALS:

- Reduced system cost
- Reduced system weight
- Increased Design Flexibility
- Brass components secure structural integrity



The system will provide significant improvement in all essential coupling areas.

One standardized system for truck, Bus, Trailer & off-road applications

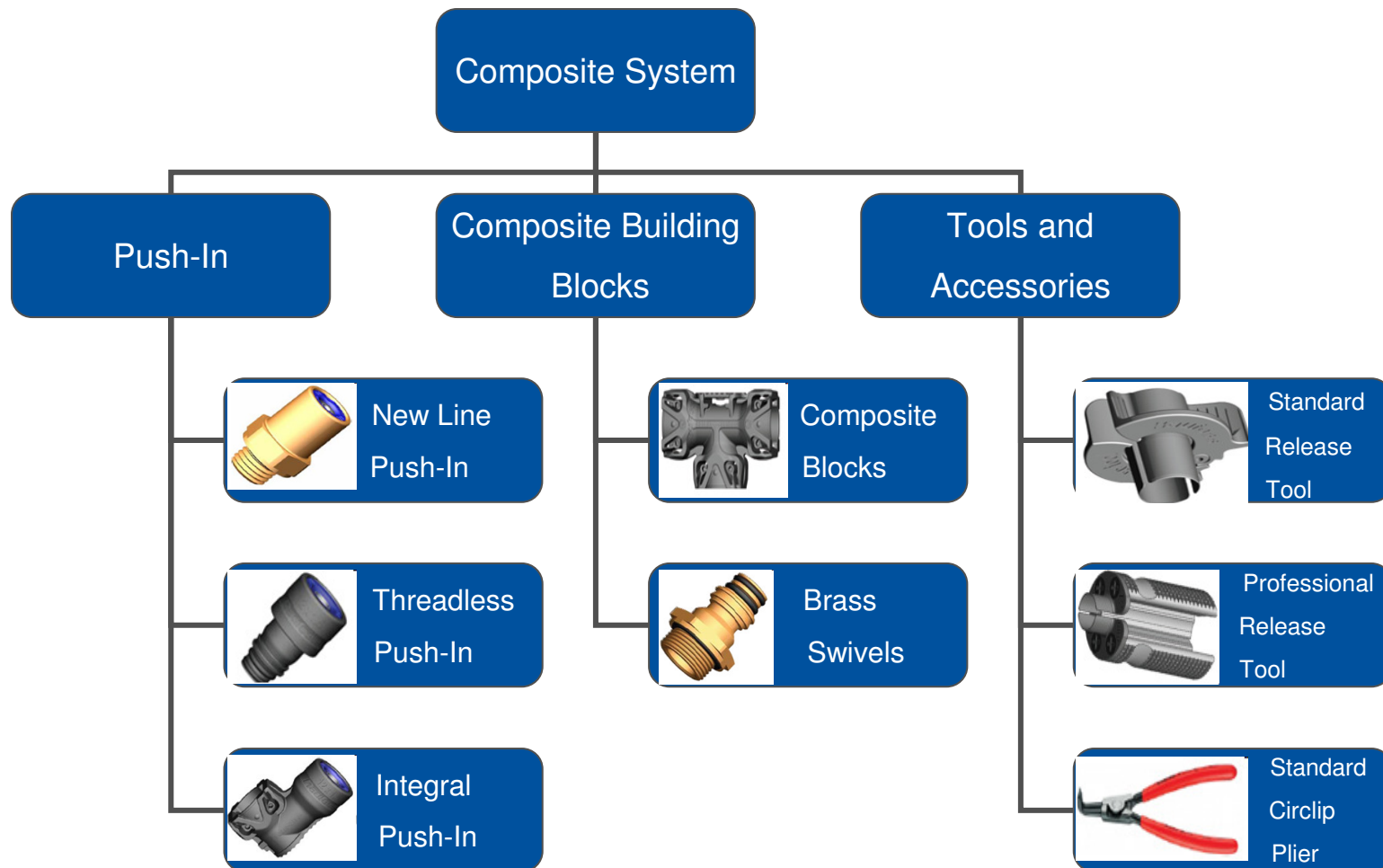
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Composite System Introduction (2)

The benefits & functionality of the Composite system is given through:

1. Extensive use of advanced composite materials.
2. Consequent focus on producibility, process stability and integrated assembly.
3. Maximum modularity by
 - high building flexibility with few articles.
 - increased single article production volumes.
 - one standardized system fulfilling different engineering philosophies.

Composite System Components



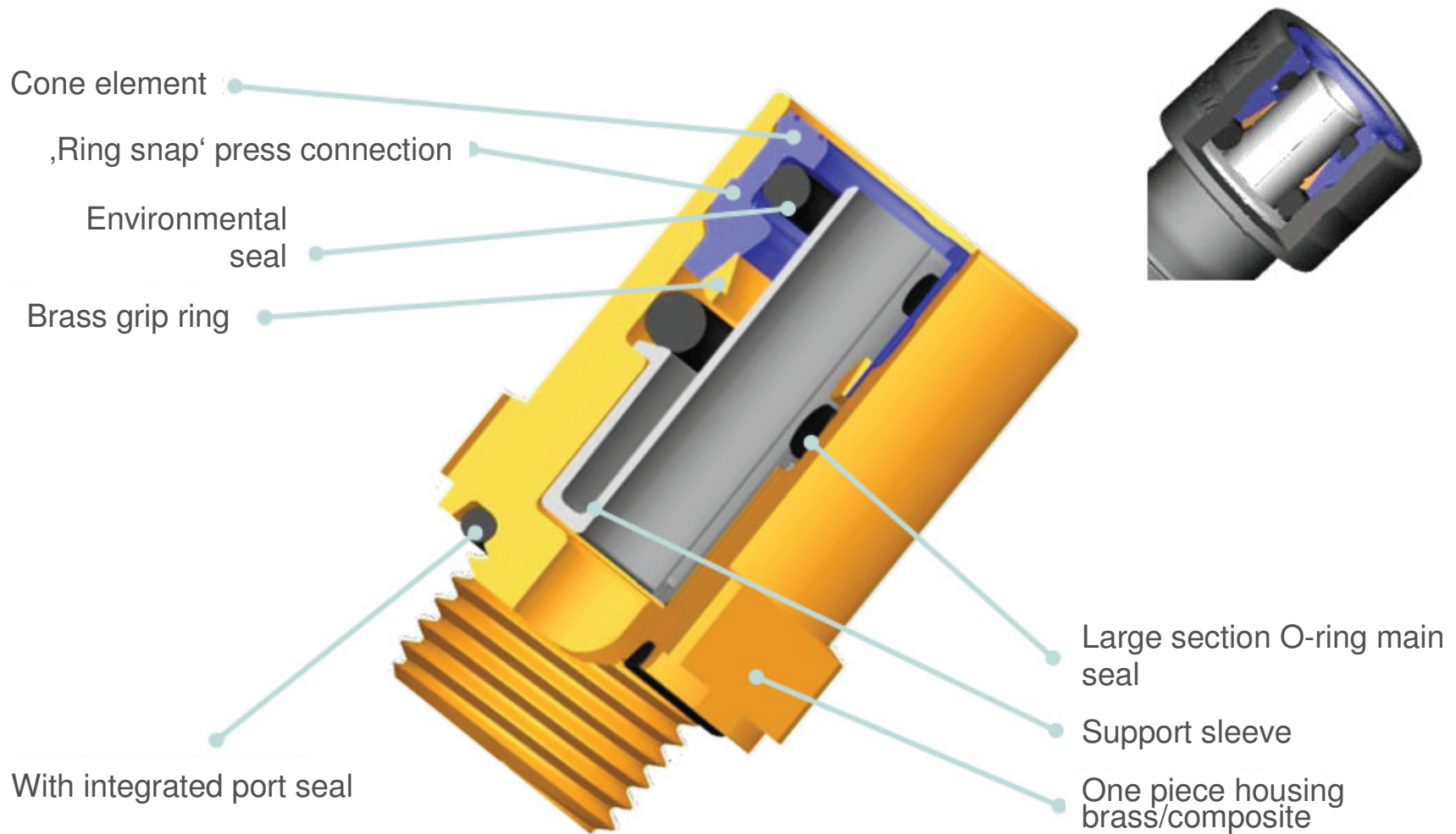
Different components from Composite System.

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PRODUCT INFORMATION

Product Structure and Function

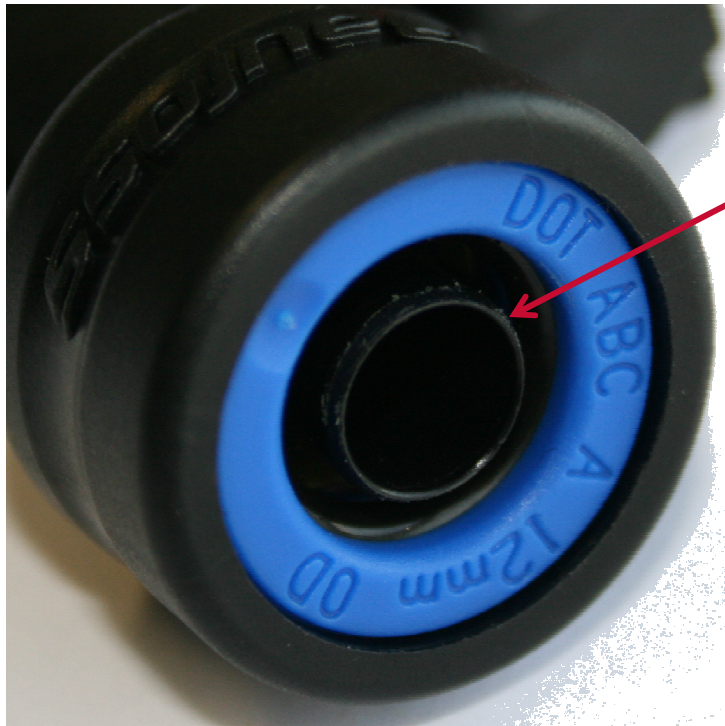
New Line Push-in Geometry



Color of tubular stiffener

WHY: Colored tubular stiffeners prevent from swapping different tube sizes.

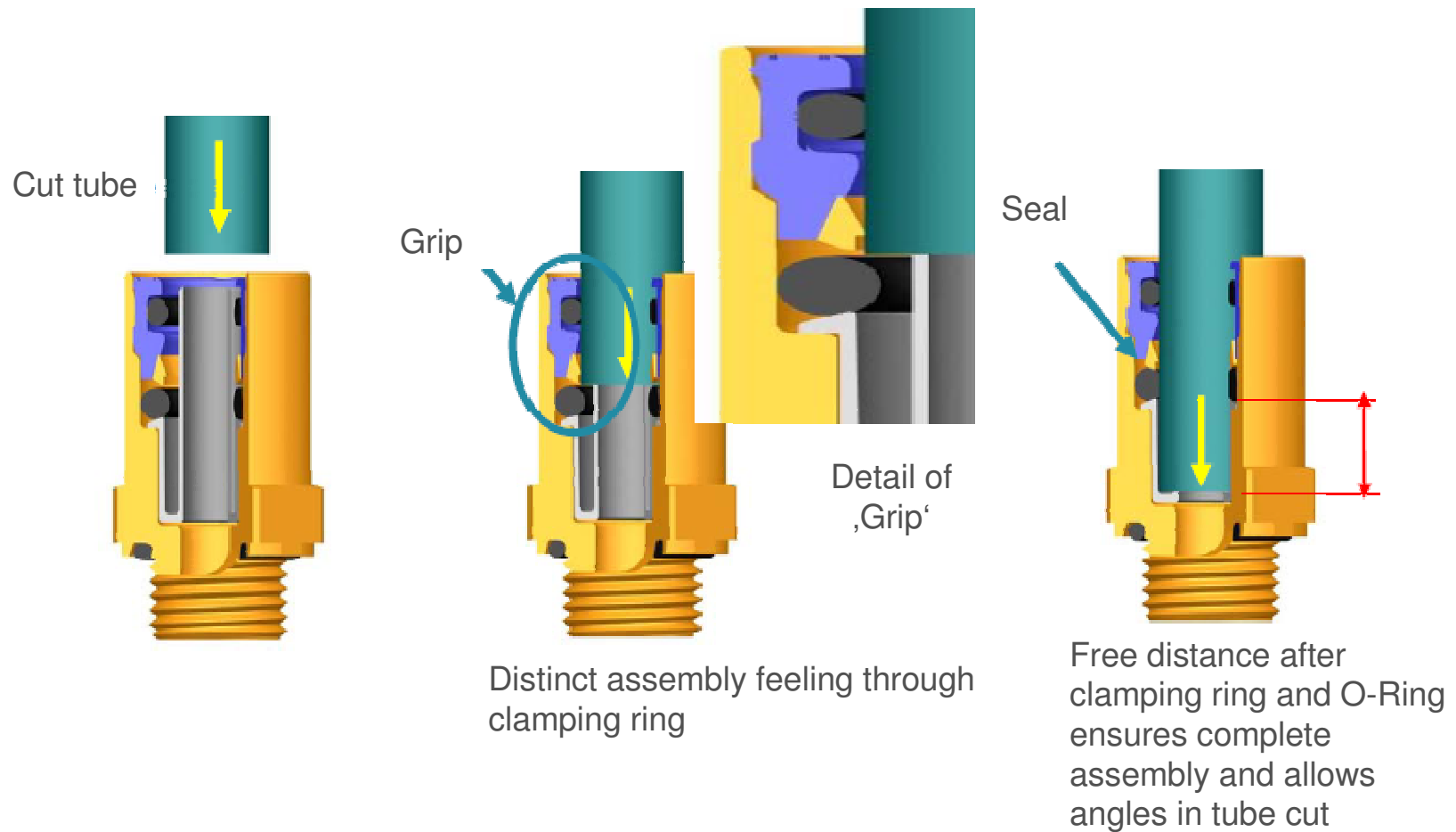
Standard Composite



Tubular stiffener

Pipe size	Color of tubular stiffener
10x1.0	Light grey (RAL7035)
10x1.5	Dark grey (7030)
Others, incl. 10x1.25	Black

‘First grip then seal’ functionality

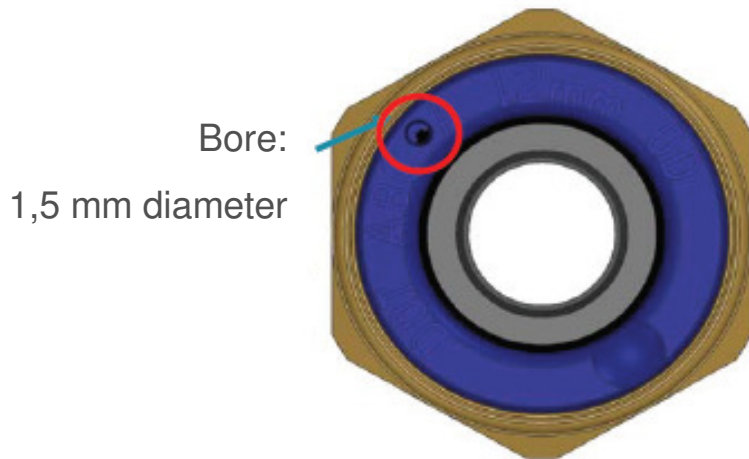


If the connection is sealed, no slip out of tubing is possible

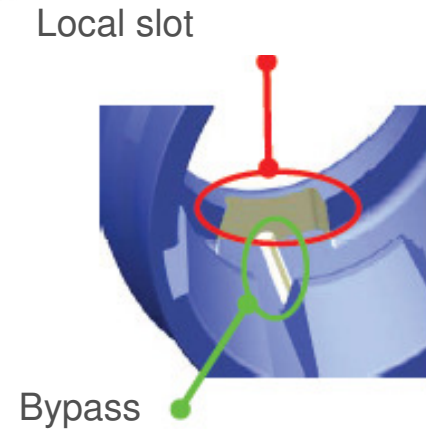
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'Check Valve' functionality

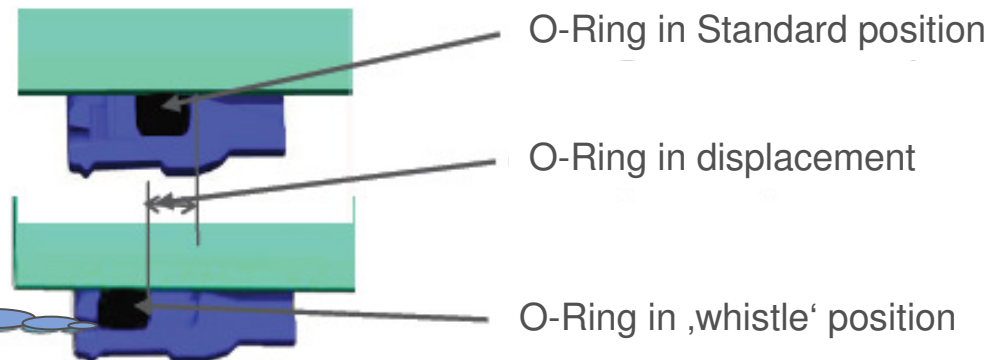
From outside



From inside



Tube can be re-pushed under pressure



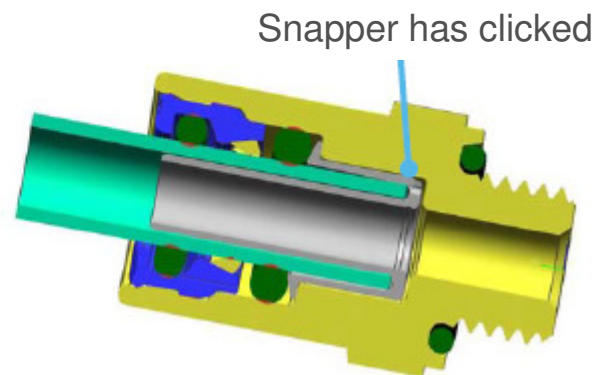
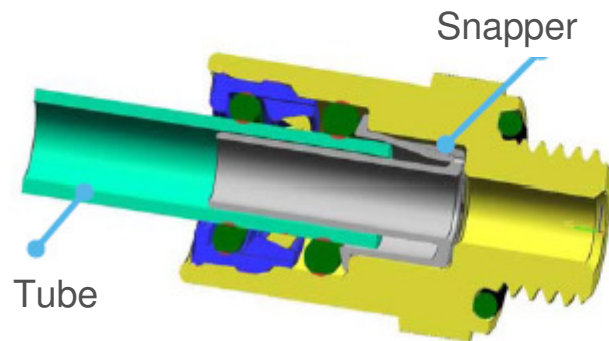
Integrated security check for correct assembled tubes

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'Feedback Signal' functionality

The operator gets a distinct 'Feed Back Signal' to verify correct assembly of tube.

- Click element integrated in support sleeve



Support sleeve



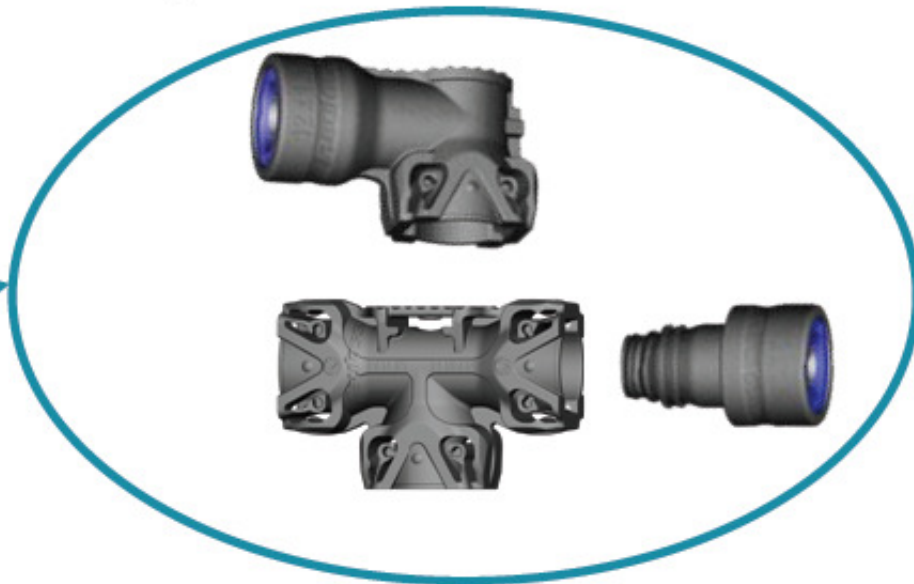
Snapper

Composite Building Block System

The composite building block system consists of two parts:

- Building block = 90° elbows, Union „F“, „L“, „T“, three way blocks...
- Brass swivels for structural integrity

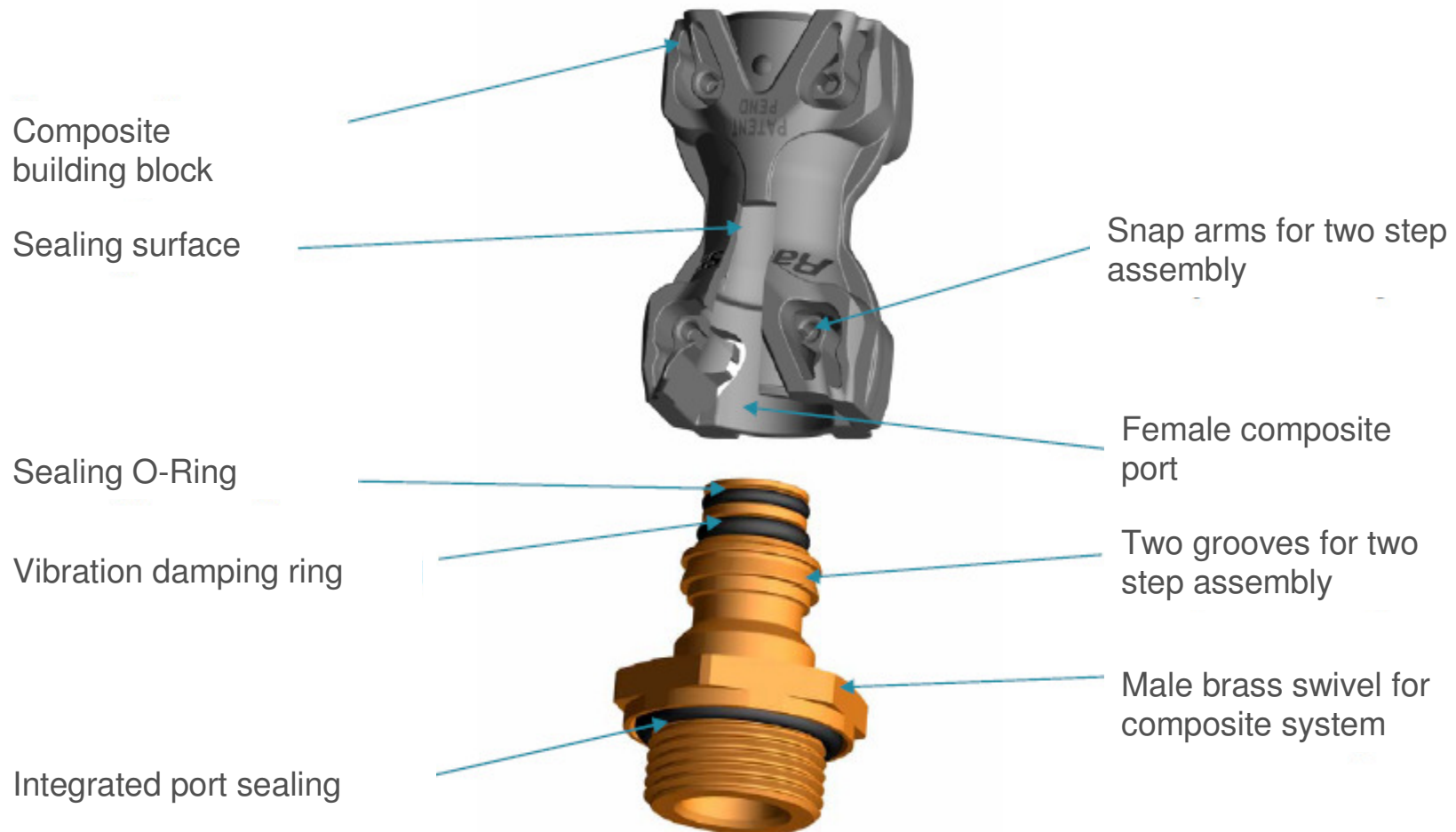
Building block parts



Swivel

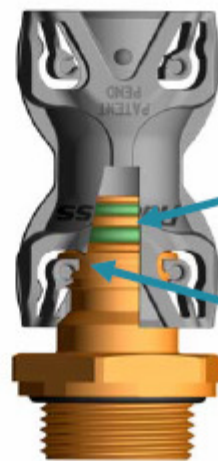


Composite Building Block Geometry



'First grip then seal' functionality

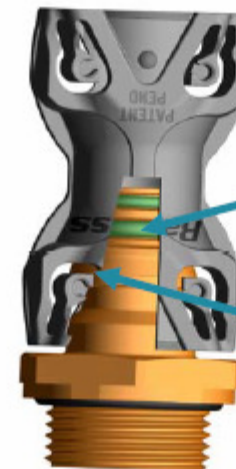
1. (safety) position



O-Rings not compressed

Snap-arms in first groove

2. (seal) position



O-Rings compressed

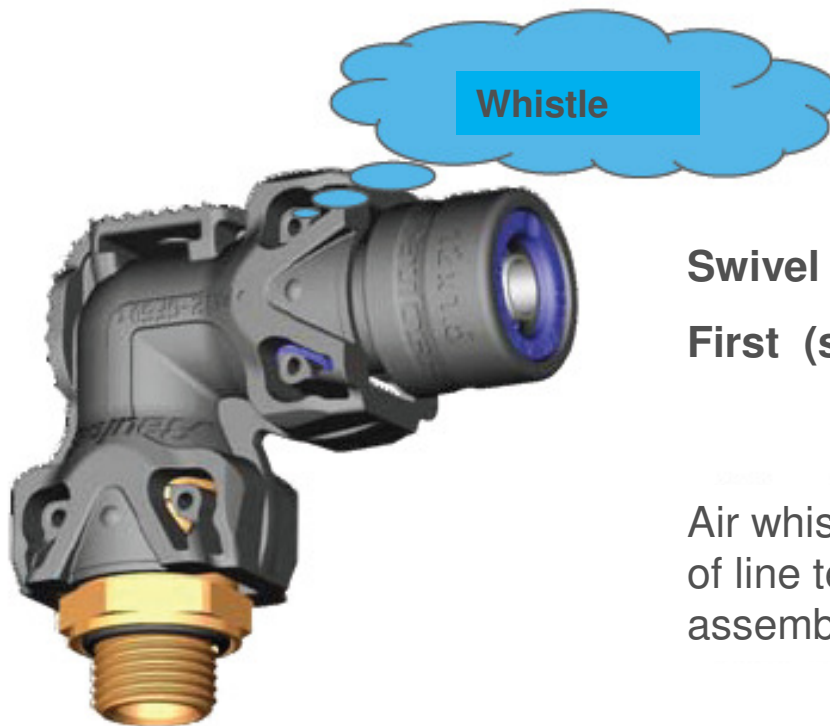
Snap-arms in second groove

Two-step assembly

Distinct assembly feeling by passing first step

'First grip then seal' functionality (2)

Safety position



Swivel or Push-in

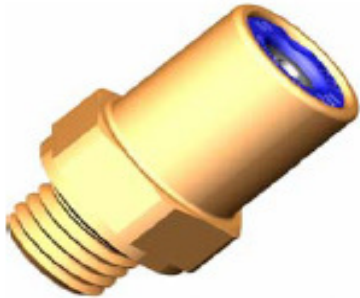
First (safety) position

Air whistle and small pressure drop in 'End of line test' indicates not complete assembly.

PRODUCT INFORMATION

Assembly Information

Push-in Forces



Tube	Push-in force (average values) [N]	Push-in force (maximum values) [N]
6x1	50	80
8x1	50	90
10x1	60	100
10x1.25	60	100
12x1.5	70	110
15x1.5	85	130
16x2	85	130

Low push-in forces secure correct assembly

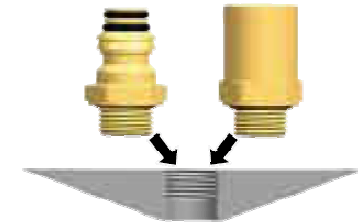
Accepted by leading OEM manufacturers

Push-in forces are depending on:

- Tolerances of tube and coupling (O-Ring)
- Tube quality (,y'-quality = 10% higher push-in force)

Fastening torque HEX - 1

The straight push-in fittings, ABC connectors, counter nuts etc. are mounted to the thread without any preparation (DIN 3852, ISO 6149, ISO 4039-1, ISO 4039-2, Voss Geometry). Fastening torque is listed in the following table:



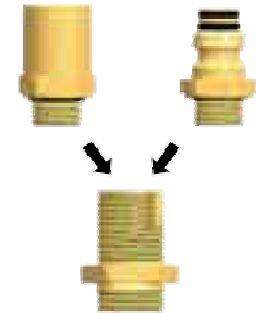
Threat	Recommended fastening torque 1) 2)	Max. fastening torque 2)
G 1/8"	15 Nm	18 Nm
G 1/4"	24 Nm	28 Nm
M 10 x 1.0	15 Nm	18 Nm
M 12 x 1.5	20 Nm	24 Nm
M 14 x 1.5	24 Nm	28 Nm
M 16 x 1.5	30 Nm	35 Nm
M 22 x 1.5	34 Nm	40 Nm
M 26 x 1.5	43 Nm	50 Nm

Explanation for 1) and 2) on next slide

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Fastening torque HEX - 2

Using push-in fittings and ABC connectors the following reduced fastening torque is effective.

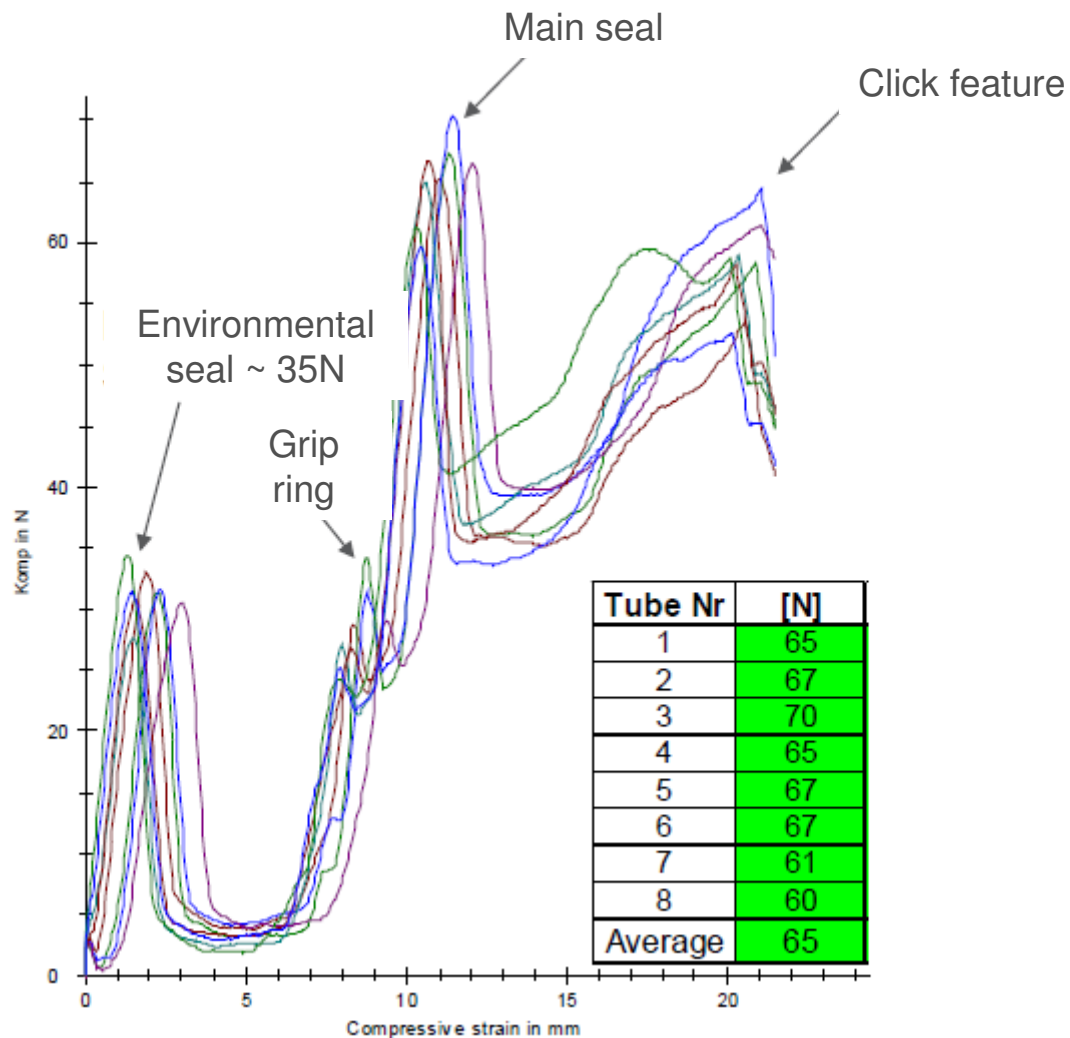


Threat	Recommended fastening torque 1) 2)	Max. fastening torque 2)
M 10 x 1.0	10 Nm	12 Nm
M 12 x 1.5	14 Nm	16 Nm
M 16 x 1.5	20 Nm	24 Nm

1) The recommended fastening torque is not valid for pretreated threats. The recommended fastening torque is valid for threats of aluminum, brass, or steel. The application of a torque key is recommended.

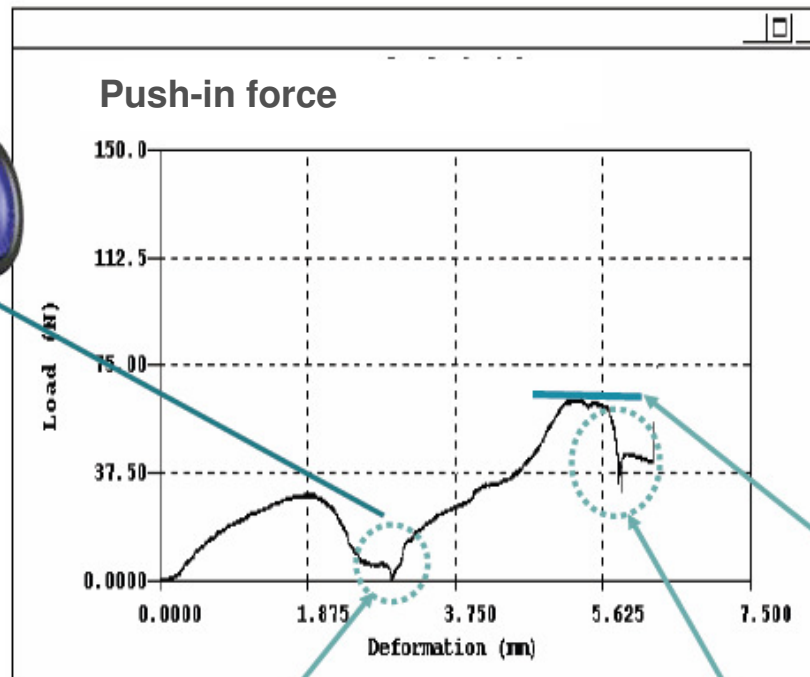
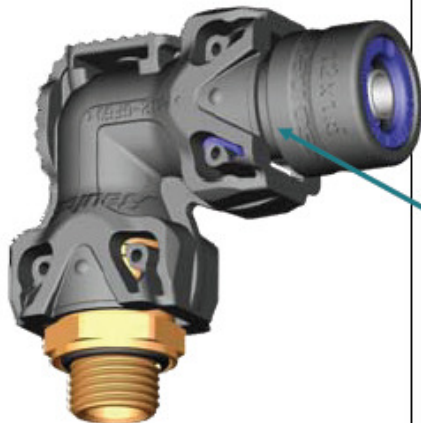
2) Please consider the permitted fastening torque of valve, air cartridge, etc.

Distinct assembly feeling during tube push-in



'Assembly' Force

1. (safety) position



2. (seal) position

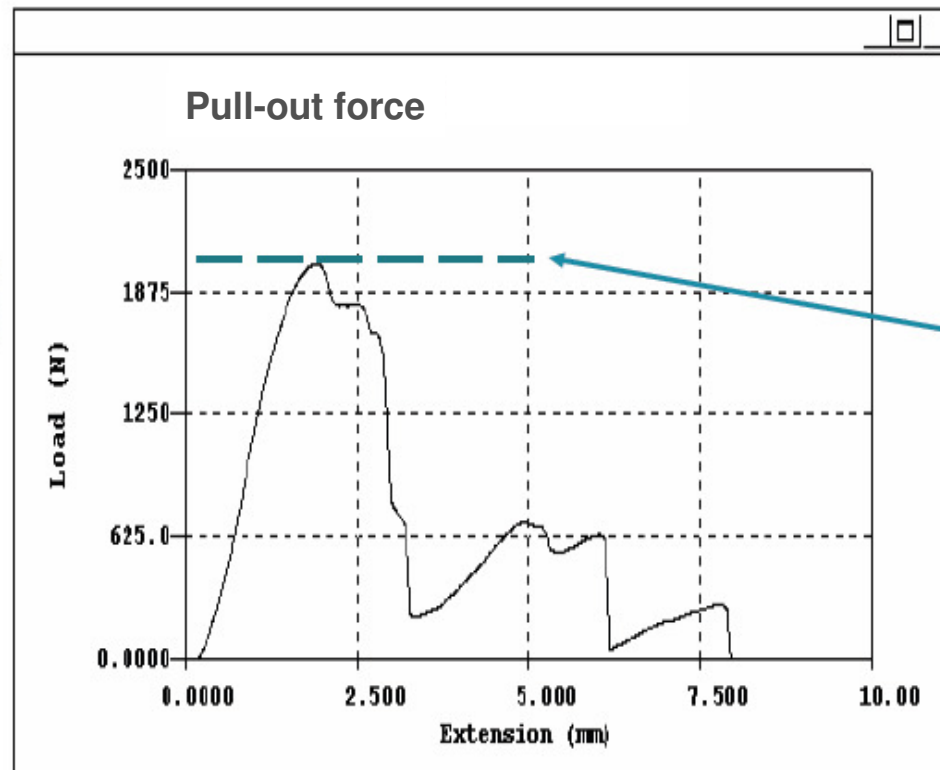


Push-in force: 70 N

Safety position: 0 N

Distinct assembly feeling

'Pull-out' Force

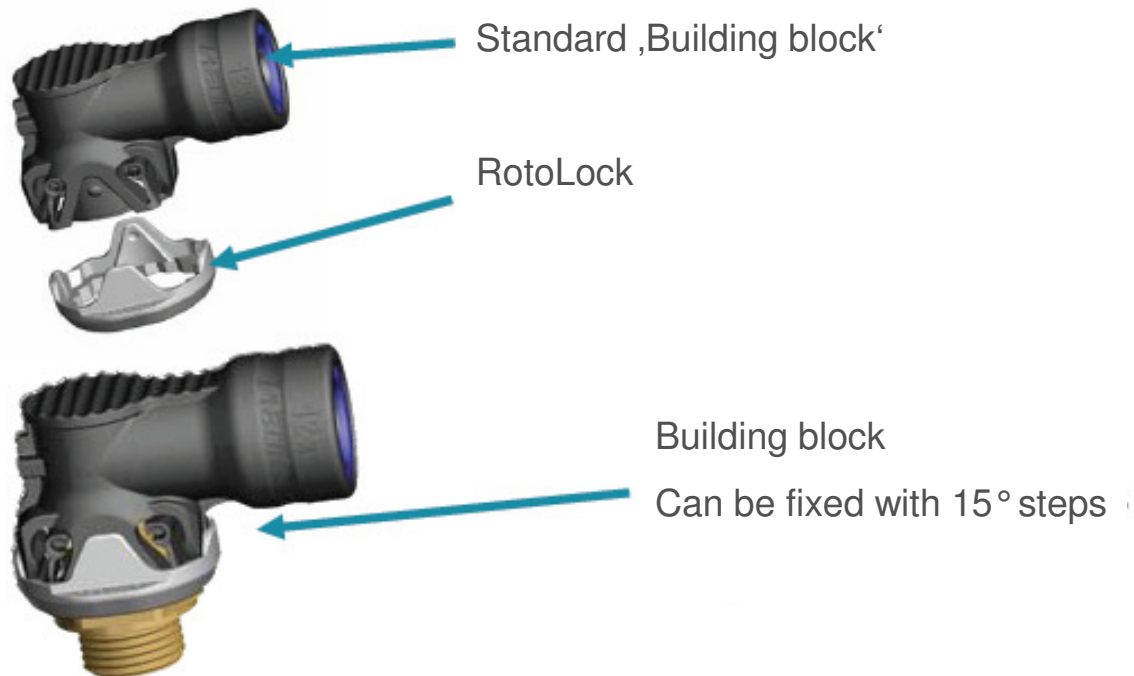


Pull-out force
1875 N =
2x Rohr
12x1,5

‘Fixed Orientation’

In cases:

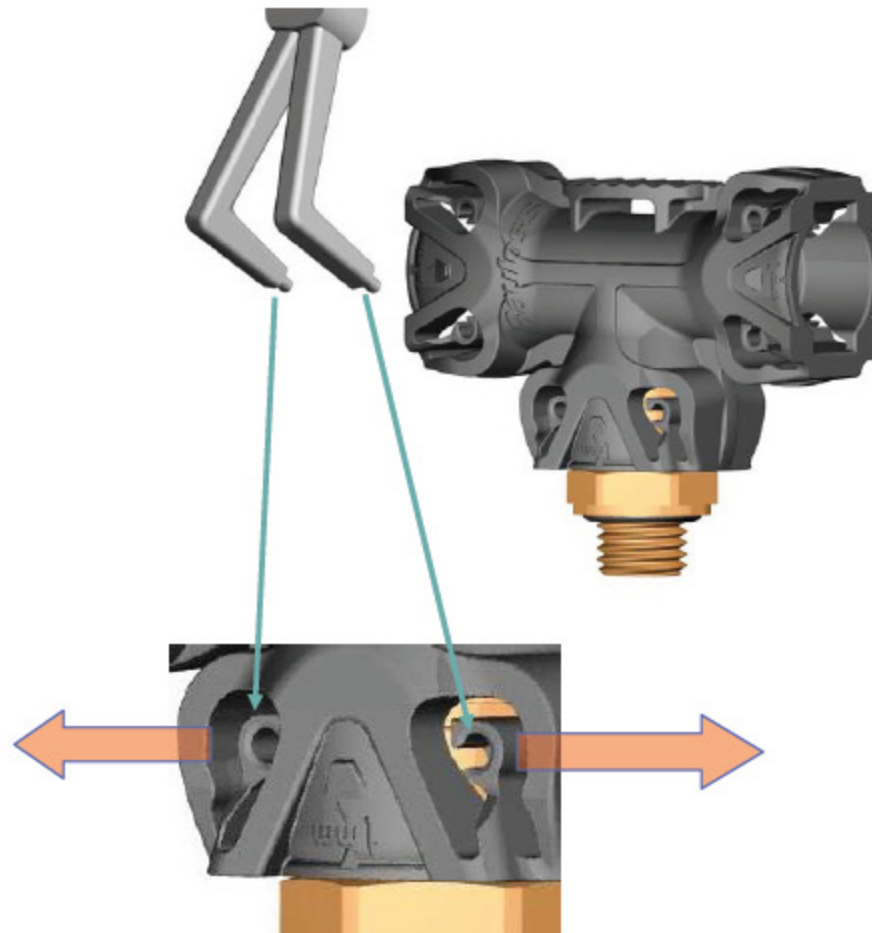
- A fixed orientation of the tube is requested
- Use of the Composite Building block between frame and axle



Repair of Composite Building Block

Standard circlip plier

- Straight
- 90° elbow

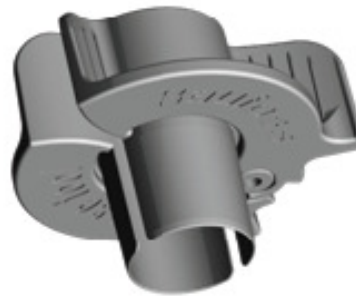


Circlip plier not currently in WABCO portfolio

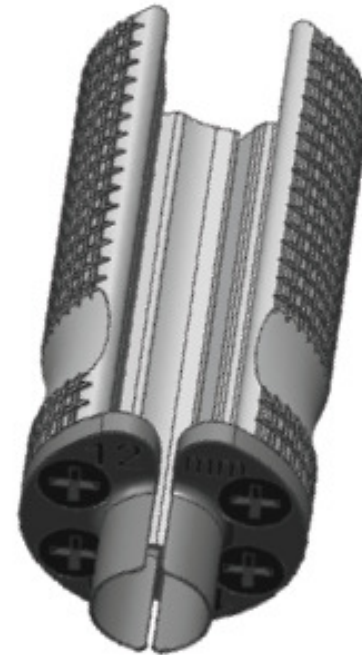
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Tube release tool

- It is possible to release the assembled tube from the coupling
- ,Tube releaser' are available in two versions:



Standard release tool



Professional release tool

GENERAL INFORMATION



Composite System (Brass Swivels) – Sizes



Swivel / building block size	Tube	Comment	Threat (Depending on size)
SMALL	6x1 / 8x1	Mainly for Truck / Bus OEM	M10x1
REGULAR	8x1 / 12x1,5	Truck / Bus + Trailer OEM	M12x1,5
HEAVY DUTY	15x1,5 / 16x2	Truck / Bus + Trailer OEM	M14x1,5
			M16x1,5
			M22x1,5

Composite Building Block – Program overview



45° Elbow



Union F



3-Way block



Union Female



Test Point



90° Elbow



Union T&L



Cross



Union Male



Threadless
Female thread



90° integral



Union Y



4-Way block

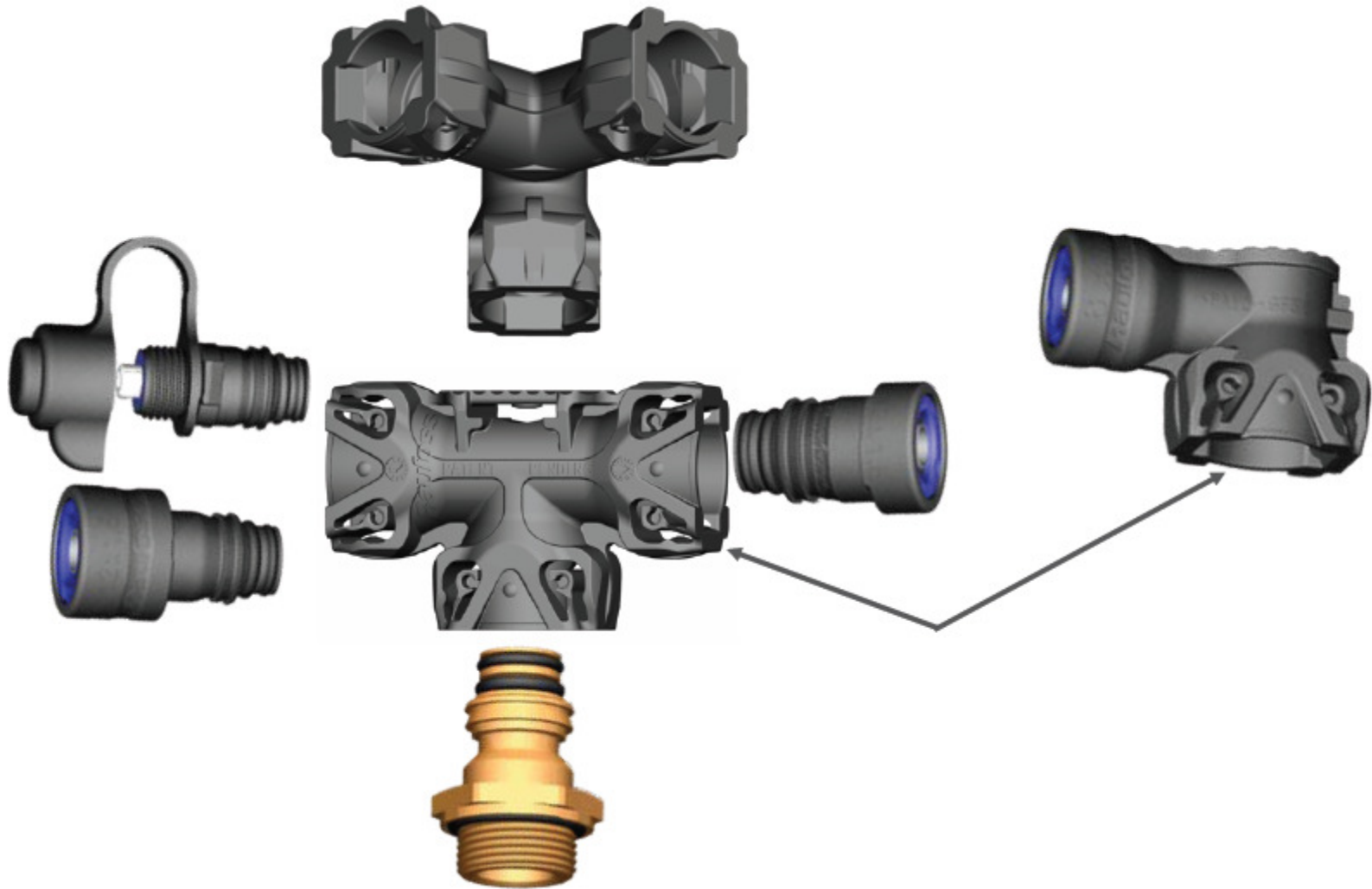


Reducer



Threadless
Push-In

Composite Building Block – Samples



Composite System Comparison Against Brass System



Composite System General Info

Operating temperature:

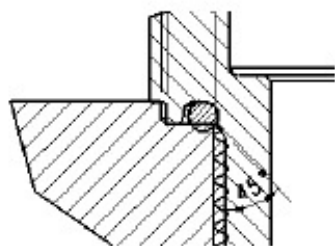
-40°C bis +100°C

Can be used with Hytrel and nylon tubing (PA11/PA12) in accordance with

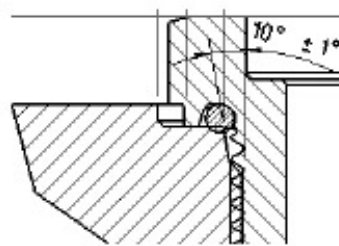
DIN 74324 / 73378 – Polyamide tubings used in motorvehicles

ISO 7628 – Road vehicles, thermoplastic tubing for air braking systems

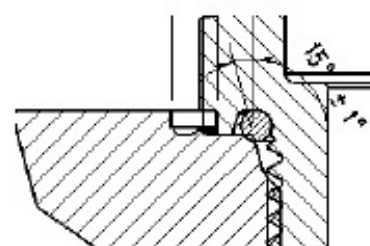
Sealing towards standard ports:



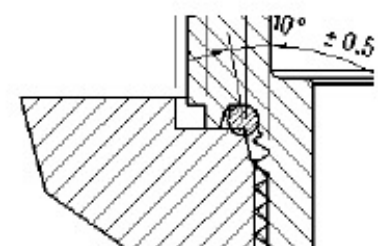
DIN 3852
ISO 4039-1
ISO 9974-1



ISO 4039-2



ISO 6149



Voss



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OF DIFFERENCE