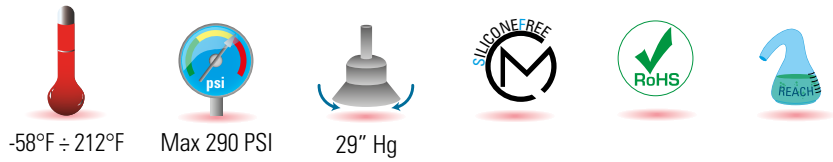




Push in fittings for Vehicles applications complying with DOT FMVSS §571.106, SAE J2493-3 and SAE J1131 specs.

PT

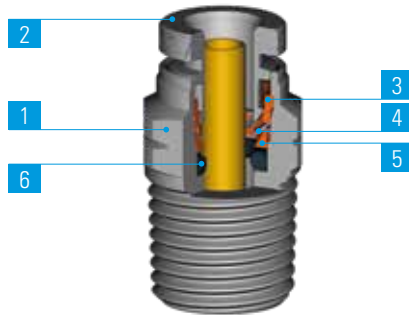
| 1 - 2 | 3 | 4 | 5 | 6 |
|---|--------------|--------------------------|-----------------|-----------------------|
| Body and Release Ring | Holding Ring | Gripping collet | Protection Ring | Seals |
| Brass UNI EN 12164 CW614N - UNI EN 12165 CW617N Nickel Plated | Resin (PEI) | Stainless steel AISI 301 | Resin (PEI) | NBR (Low Temperature) |



DATA SHEET

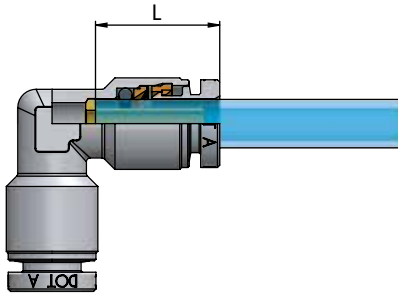
Recommended tubings:
PA Tubings complying with SAE (DOT).

Application fields:
Application Fields: Pneumatic circuits for truck and Trailers: Air Suspension, Braking Systems, Transmissions, locking doors and windows, Seat adjustment, Instrumentation, Air conditioning systems, horn, wiper motors, valves, cylinders and accessories.



| | 10-32 UNEF | 1/8 NPTF | 1/4 NPTF | 3/8 NPTF | 1/2 NPTF | 3/4 NPTF |
|------|------------|----------|----------|----------|----------|----------|
| 5/32 | ● | ● | ● | | | |
| 1/4 | ● | ● | ● | ● | | |
| 3/8 | | ● | ● | ● | ● | |
| 1/2 | | | ● | ● | ● | |
| 5/8 | | | | ● | ● | |
| 3/4 | | | | ● | ● | ● |

Tubing insertion depth



| Tube OD | L |
|---------|------|
| 5/32 | .547 |
| 1/4 | .642 |
| 3/8 | .720 |
| 1/2 | .775 |
| 5/8 | .917 |
| 3/4 | .988 |

ASSEMBLY INSTRUCTIONS

1. Cut the tube square (by means of a hose cutter i.e. our TCUT) making sure that no burrs are left and that the tube is not oval.
2. Insert the tube into the fitting until it bottoms.

Tube release

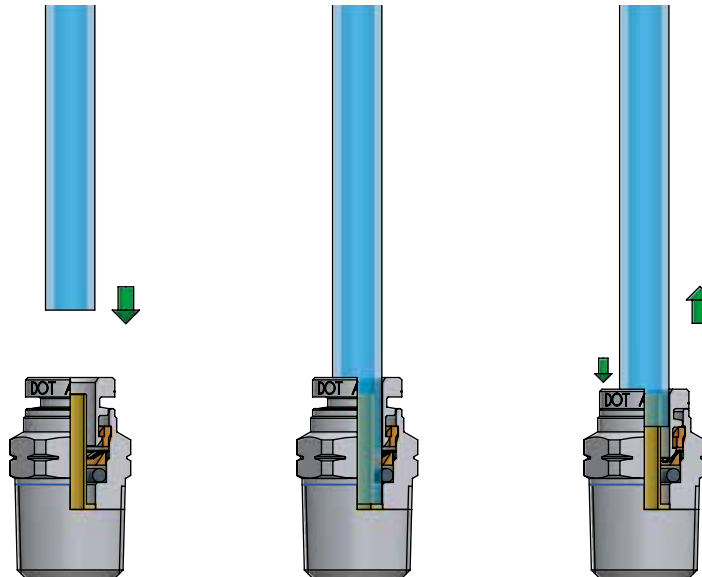
While pressing on the release ring, pull out the tube from the fitting.



Once the tubing is connected to the fitting, make sure that the tubing is not subject to any tensile strength and that the min. recommended bending radius stated in the tubing section of this catalogue is complied with (see page 121).

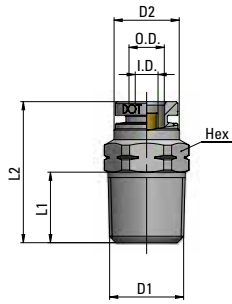
To prevent any accidental tube release, no components have to come in touch with the release ring and exercise any unwanted pressure on the same. Indeed however lateral, any load on the release ring may cause the tube disconnection.

To tighten threads, please check out our tightening torque chart illustrated at page 6.



PT 11

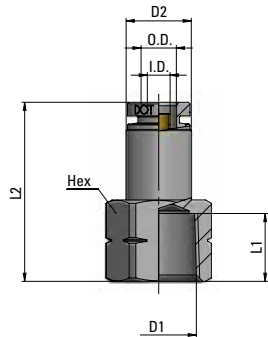
Straight, male



| Part Number | Tube OD | Tube ID | D1 NPTF | D2 | L1 | L2 | HEX | oz Δ |
|---------------|---------|---------|---------|-------|------|-------|----------|-------------|
| 11 5/32 10-32 | 5/32" | .087 | .087 | .374 | .197 | .846 | 3/8 | - |
| 11 5/32 1/8 | 5/32" | .087 | .087 | .374 | .335 | .827 | 7/16 | - |
| 11 5/32 1/4 | 5/32" | .087 | .087 | .374 | .512 | 1.004 | 9/16 | - |
| 11 1/4 10-32 | 1/4" | .165 | .165 | .472 | .197 | .984 | 1/2" | - |
| 11 1/4 1/8 | 1/4" | .165 | .165 | .472 | .335 | .925 | 1/2" | .415 |
| 11 1/4 1/4 | 1/4" | .165 | .165 | .472 | .512 | 1.024 | 9/16" | .700 |
| 11 1/4 3/8 | 1/4" | .165 | .165 | .472 | .512 | 1.063 | 11/16" | 1.178 |
| 11 3/8 1/8 | 3/8" | .244 | .244 | .630 | .335 | 1.161 | 11/16" | .846 |
| 11 3/8 1/4 | 3/8" | .244 | .244 | .630 | .512 | 1.299 | 11/16" | 1.075 |
| 11 3/8 3/8 | 3/8" | .244 | .244 | .630 | .512 | 1.043 | 11/16" | 1.002 |
| 11 3/8 1/2 | 3/8" | .244 | .244 | .630 | .669 | 1.240 | 7/8" | 2.127 |
| 11 1/2 1/4 | 1/2" | .362 | .362 | .787 | .512 | 1.406 | 13/16" | 1.423 |
| 11 1/2 3/8 | 1/2" | .362 | .362 | .787 | .512 | 1.209 | 13/16" | 1.229 |
| 11 1/2 1/2 | 1/2" | .362 | .362 | .787 | .669 | 1.248 | 7/8" | 1.794 |
| 11 5/8 3/8 | 5/8" | .433 | .433 | .925 | .512 | 1.594 | 1" | - |
| 11 5/8 1/2 | 5/8" | .433 | .433 | .925 | .669 | 1.496 | 1" | - |
| 11 3/4 3/8 | 3/4" | .559 | .559 | 1.043 | .512 | 1.713 | 1" 1/16" | - |
| 11 3/4 1/2 | 3/4" | .559 | .559 | 1.043 | .669 | 1.791 | 1" 1/16" | - |
| 11 3/4 3/4 | 3/4" | .559 | .559 | 1.043 | .669 | 1.535 | 1" 1/16" | - |

PT 13

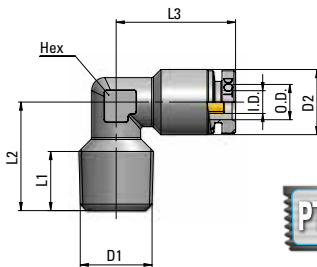
Female Straight



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | HEX | oz Δ |
|-------------|---------|---------|-----|------|------|-------|--------|-------------|
| 13 5/32 1/8 | 5/32" | .087 | 1/8 | .335 | .335 | 1.043 | 1/2 | - |
| 13 1/4 1/8 | 1/4" | .165 | 1/8 | .472 | .335 | 1.122 | 1/2 | .564 |
| 13 1/4 1/4 | 1/4" | .165 | 1/4 | .472 | .492 | 1.299 | 11/16" | .995 |
| 13 3/8 1/4 | 3/8" | .165 | 1/4 | .630 | .492 | 1.378 | 11/16" | .774 |
| 13 3/8 3/8 | 3/8" | .244 | 3/8 | .630 | .492 | 1.378 | 13/16" | 1.421 |
| 13 3/8 1/2 | 3/8" | .244 | 1/2 | .630 | .492 | 1.516 | 1" | - |
| 13 1/2 1/4 | 1/2" | .362 | 1/4 | .787 | .472 | 1.386 | 13/16" | - |
| 13 1/2 3/8 | 1/2" | .362 | 3/8 | .787 | .472 | 1.445 | 7/8" | - |
| 13 1/2 1/2 | 1/2" | .362 | 1/2 | .787 | .472 | 1.543 | 1" | - |

PT 14

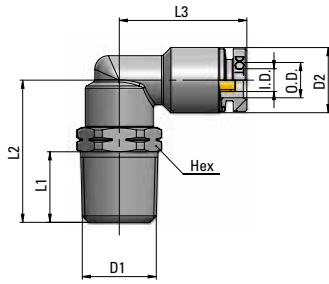
Elbow Fitting, male



| Part Number | Tube OD | D1 NPTF | D2 | L1 | L2 | L3 | HEX | oz Δ |
|-------------|---------|---------|------|------|------|------|------|-------------|
| 14 5/32 1/8 | 5/32" | 1/4 | .374 | .331 | .630 | .748 | .394 | - |
| 14 1/4 1/8 | 1/4" | 1/8 | .472 | .335 | .630 | .807 | .394 | .517 |
| 14 1/4 1/4 | 1/4" | 1/4 | .472 | .433 | .787 | .807 | .394 | - |
| 14 3/8 1/4 | 3/8" | 1/4 | .630 | .472 | .886 | .984 | .472 | 1.146 |
| 14 3/8 3/8 | 3/8" | 3/8 | .630 | .433 | .886 | .984 | .472 | 1.258 |

PT 15

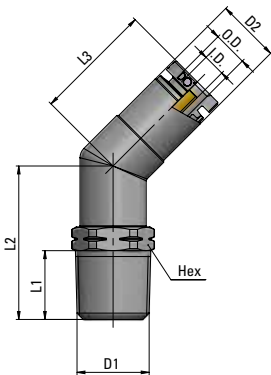
Swivelling Elbow Fitting, male



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | L3 | HEX | oz Δ |
|--------------|---------|---------|-------|-------|------|-------|-------|---------|-------------|
| 15 5/32 1/8 | 5/32" | .087 | 1/8 | .354 | .335 | .728 | .748 | 7/16" | - |
| 15 5/32 1/4 | 5/32" | .087 | 1/4 | .354 | .512 | 1.031 | .827 | 9/16" | - |
| 15 1/4 10-32 | 1/4" | .165 | 10-32 | .472 | .197 | .728 | .866 | 7/16" | - |
| 15 1/4 1/8 | 1/4" | .165 | 1/8 | .472 | .335 | .835 | .925 | 1/2" | .741 |
| 15 1/4 1/4 | 1/4" | .165 | 1/4 | .472 | .512 | 1.031 | .925 | 9/16" | .904 |
| 15 1/4 3/8 | 1/4" | .165 | 3/8 | .472 | .512 | 1.051 | .925 | 11/16" | 1.142 |
| 15 3/8 1/8 | 3/8" | .244 | 1/8 | .630 | .335 | .945 | 1.063 | 11/16" | 1.461 |
| 15 3/8 1/4 | 3/8" | .244 | 1/4 | .630 | .512 | 1.122 | 1.063 | 11/16" | 1.562 |
| 15 3/8 3/8 | 3/8" | .244 | 3/8 | .630 | .512 | 1.122 | 1.063 | 11/16" | 1.613 |
| 15 3/8 1/2 | 3/8" | .244 | 1/2 | .630 | .669 | 1.339 | 1.063 | 7/8" | 2.256 |
| 15 1/2 1/4 | 1/2" | .362 | 1/4 | .787 | .512 | 1.260 | 1.169 | 13/16" | 2.592 |
| 15 1/2 3/8 | 1/2" | .362 | 3/8 | .787 | .512 | 1.260 | 1.169 | 13/16" | 2.409 |
| 15 1/2 1/2 | 1/2" | .362 | 1/2 | .787 | .669 | 1.437 | 1.169 | 7/8" | 2.880 |
| 15 5/8 3/8 | 5/8" | .433 | 3/8 | .945 | .512 | 1.398 | 1.417 | 7/8" | - |
| 15 5/8 1/2 | 5/8" | .433 | 1/2 | .945 | .669 | 1.555 | 1.417 | 7/8" | - |
| 15 5/8 3/4 | 5/8" | .433 | 3/4 | .945 | .669 | 1.555 | 1.417 | 1" 1/16 | - |
| 15 3/4 3/8 | 3/4" | .559 | 3/8 | 1.063 | .512 | 1.398 | 1.496 | 7/8" | - |
| 15 3/4 1/2 | 3/4" | .559 | 1/2 | 1.063 | .669 | 1.555 | 1.496 | 7/8" | - |
| 15 3/4 3/4 | 3/4" | .559 | 3/4 | 1.063 | .669 | 1.555 | 1.496 | 1" 1/16 | - |

PT 15-45

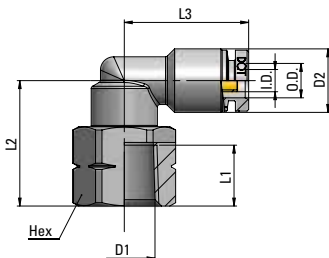
Swivelling Elbow Fitting, male 45°



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | L3 | HEX | oz Δ |
|----------------|---------|---------|-----|------|------|-------|-------|--------|-------------|
| 15 1/4 1/8 45° | 1/4" | .165 | 1/8 | .472 | .335 | .906 | .886 | 1/2" | - |
| 15 1/4 1/4 45° | 1/4" | .165 | 1/4 | .472 | .512 | 1.102 | .886 | 9/16" | - |
| 15 3/8 1/4 45° | 3/8" | .244 | 1/4 | .630 | .512 | 1.142 | 1.024 | 11/16" | - |
| 15 3/8 3/8 45° | 3/8" | .244 | 3/8 | .630 | .512 | 1.161 | 1.024 | 11/16" | - |
| 15 3/8 1/2 45° | 3/8" | .244 | 1/2 | .630 | .669 | 1.378 | 1.024 | 7/8" | - |
| 15 1/2 3/8 45° | 1/2" | .362 | 3/8 | .787 | .512 | 1.260 | 1.130 | 13/16" | - |
| 15 1/2 1/2 45° | 1/2" | .362 | 1/2 | .787 | .669 | 1.437 | 1.130 | 7/8" | - |

PT 17

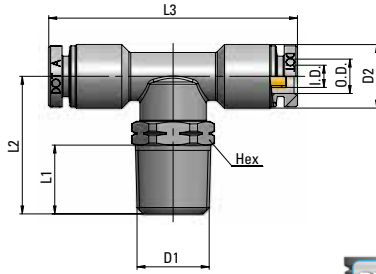
Swivelling Elbow Fitting, female



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | L3 | HEX | oz Δ |
|-------------|---------|---------|-----|------|------|-------|-------|--------|-------------|
| 17 5/32 1/8 | 5/32" | .087 | 1/8 | .354 | .295 | .776 | .748 | 9/16" | - |
| 17 5/32 1/4 | 5/32" | .087 | 1/4 | .354 | .453 | .933 | .827 | 11/16" | - |
| 17 1/4 1/8 | 1/4" | .165 | 1/8 | .472 | .295 | .776 | .925 | 9/16" | - |
| 17 1/4 1/4 | 1/4" | .165 | 1/4 | .472 | .453 | .933 | .925 | 11/16" | - |
| 17 3/8 1/4 | 3/8" | .244 | 1/4 | .630 | .453 | 1.004 | 1.063 | 11/16" | - |
| 17 3/8 3/8 | 3/8" | .244 | 3/8 | .630 | .453 | 1.004 | 1.063 | 13/16" | - |
| 17 1/2 3/8 | 1/2" | .362 | 3/8 | .787 | .453 | 1.102 | 1.169 | 13/16" | - |
| 17 1/2 1/2 | 1/2" | .362 | 1/2 | .787 | .531 | 1.220 | 1.169 | 1" | - |

PT 20

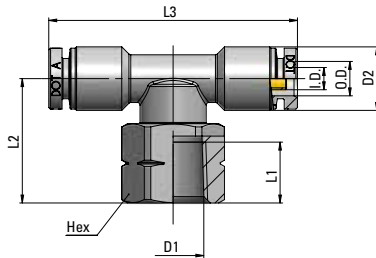
Swivelling Tee fitting, male



| Part Number | Tube OD | Tube ID | D1 NPTF | D2 | L1 | L2 | L3 | HEX | oz Δ |
|-------------|---------|---------|---------|------|------|-------|-------|--------|-------------|
| 20 5/32 1/8 | 5/32" | .087 | 1/8 | .354 | .335 | .835 | 1.654 | 1/2" | - |
| 20 5/32 1/4 | 5/32" | .087 | 1/4 | .354 | .512 | 1.031 | 1.654 | 9/16" | - |
| 20 1/4 1/8 | 1/4" | .165 | 1/8 | .472 | .335 | .835 | 1.850 | 1/2" | 1.217 |
| 20 1/4 1/4 | 1/4" | .165 | 1/4 | .472 | .512 | 1.031 | 1.850 | 9/16" | 1.184 |
| 20 1/4 3/8 | 1/4" | .165 | 3/8 | .472 | .512 | 1.051 | 1.850 | 11/16" | - |
| 20 3/8 1/8 | 3/8" | .244 | 1/8 | .630 | .335 | .945 | 2.126 | 11/16" | - |
| 20 3/8 1/4 | 3/8" | .244 | 1/4 | .630 | .512 | 1.122 | 2.126 | 11/16" | 2.111 |
| 20 3/8 3/8 | 3/8" | .244 | 3/8 | .630 | .512 | 1.122 | 2.126 | 11/16" | 2.159 |
| 20 3/8 1/2 | 3/8" | .244 | 1/2 | .630 | .669 | 1.339 | 2.126 | 7/8" | - |
| 20 1/2 1/4 | 1/2" | .362 | 1/4 | .787 | .512 | 1.260 | 2.339 | 13/16" | - |
| 20 1/2 3/8 | 1/2" | .362 | 3/8 | .787 | .512 | 1.260 | 2.339 | 13/16" | 3.183 |
| 20 1/2 1/2 | 1/2" | .362 | 1/2 | .787 | .669 | 1.437 | 2.339 | 7/8" | 3.634 |

PT 20-F

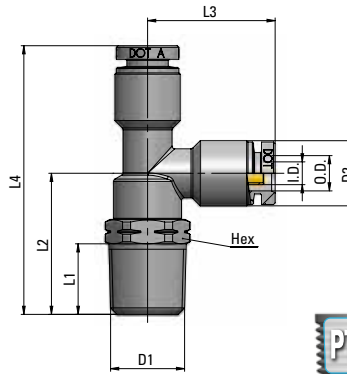
Swivelling Tee fitting, female



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | L3 | HEX | oz Δ |
|---------------|---------|---------|-----|------|------|-------|-------|--------|-------------|
| 20 1/4 1/4 -F | 1/4" | .165 | 1/4 | .472 | .453 | .933 | 1.850 | 11/16" | - |
| 20 3/8 1/4 -F | 3/8" | .244 | 1/4 | .630 | .453 | 1.004 | 2.126 | 11/16" | - |
| 20 3/8 3/8 -F | 3/8" | .244 | 3/8 | .630 | .453 | 1.004 | 2.126 | 13/16" | - |
| 20 1/2 3/8 -F | 1/2" | .362 | 3/8 | .787 | .453 | 1.102 | 2.339 | 13/16" | - |
| 20 1/2 1/2 -F | 1/2" | .362 | 1/2 | .787 | .531 | 1.220 | 2.339 | 1" | - |

PT 23

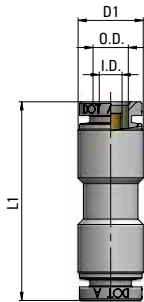
Lateral Swivelling Tee fitting



| Part Number | Tube OD | Tube ID | D1 NPTF | D2 | L1 | L2 | L3 | L4 | HEX | oz Δ |
|-------------|---------|---------|---------|------|------|-------|-------|-------|--------|-------------|
| 23 5/32 1/8 | 5/32" | .087 | 1/8 | .354 | .335 | .835 | .827 | 1.654 | 1/2" | - |
| 23 5/32 1/4 | 5/32" | .087 | 1/4 | .354 | .512 | 1.031 | .827 | 1.850 | 9/16" | - |
| 23 1/4 1/8 | 1/4" | .165 | 1/8 | .472 | .335 | .835 | .925 | 1.752 | 1/2" | 1.026 |
| 23 1/4 1/4 | 1/4" | .165 | 1/4 | .472 | .512 | 1.031 | .925 | 1.949 | 9/16" | 1.192 |
| 23 1/4 3/8 | 1/4" | .165 | 3/8 | .472 | .512 | 1.051 | .925 | 1.969 | 11/16" | - |
| 23 3/8 1/4 | 3/8" | .244 | 1/4 | .630 | .512 | 1.122 | 1.063 | 2.185 | 11/16" | - |
| 23 3/8 3/8 | 3/8" | .244 | 3/8 | .630 | .512 | 1.122 | 1.063 | 2.185 | 11/16" | 2.151 |
| 23 3/8 1/2 | 3/8" | .244 | 1/2 | .630 | .669 | 1.339 | 1.063 | 2.402 | 7/8" | - |
| 23 1/2 1/4 | 1/2" | .362 | 1/4 | .787 | .512 | 1.260 | 1.169 | 2.429 | 13/16" | - |
| 23 1/2 3/8 | 1/2" | .362 | 3/8 | .787 | .512 | 1.260 | 1.169 | 2.429 | 13/16" | 3.214 |
| 23 1/2 1/2 | 1/2" | .362 | 1/2 | .787 | .669 | 1.437 | 1.169 | 2.606 | 7/8" | 3.650 |

PT 26

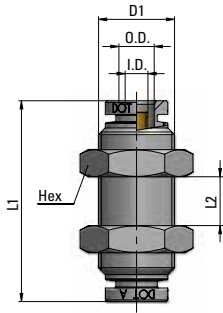
Union



| Part Number | Tube OD | Tube ID | D2 | L1 | oz Δ |
|--------------|---------|---------|-------|-------|-------------|
| 26 5/32 5/32 | 5/32" | .087 | .354 | 1.220 | - |
| 26 1/4 1/4 | 1/4" | .165 | .472 | 1.323 | 1.021 |
| 26 3/8 3/8 | 3/8" | .244 | .630 | 1.520 | 1.111 |
| 26 1/2 1/2 | 1/2" | .362 | .787 | 1.614 | 3.214 |
| 26 5/8 5/8 | 5/8" | .433 | .945 | 2.047 | - |
| 26 3/4 3/4 | 3/4" | .559 | 1.102 | 2.244 | - |

PT 27

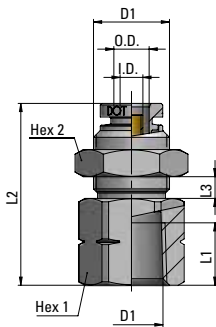
Bulkhead union



| Part Number | Tube OD | Tube ID | D1 | L1 | L2 | HEX | oz | ⚖️ |
|--------------|---------|---------|---------|-------|------|-------|-------|----|
| 27 5/32 5/32 | 5/32" | .087 | M12x1 | 1.220 | .571 | .709 | - | |
| 27 1/4 1/4 | 1/4" | .165 | M14x1 | 1.457 | .571 | .709 | .623 | |
| 27 3/8 3/8 | 3/8" | .244 | M18x1 | 1.614 | .689 | .866 | 2.120 | |
| 27 1/2 1/2 | 1/2" | .362 | M22x1,5 | 1.709 | .728 | 1.024 | 2.969 | |
| 27 5/8 5/8 | 5/8" | .433 | M26x1,5 | 2.047 | .866 | 1.260 | - | |

PT 27-F

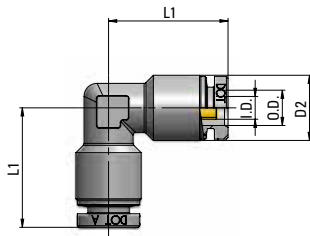
Bulkhead, female



| Part Number | Tube OD | Tube ID | D1 | D2 | L1 | L2 | L3 | HEX1 | HEX2 | oz | ⚖️ |
|----------------|---------|---------|------|---------|-------|------|------|--------|------|----|----|
| 27 5/32 1/4 -F | 5/32" | .087 | 1/4" | M12x1 | 1.220 | .453 | .276 | 11/16" | .630 | - | |
| 27 1/4 1/8 -F | 1/4" | .165 | 1/8" | M14x1 | 1.122 | .295 | .315 | 11/16" | .709 | - | |
| 27 1/4 1/4 -F | 1/4" | .165 | 1/4" | M14x1 | 1.319 | .453 | .315 | 11/16" | .709 | - | |
| 27 3/8 1/4 -F | 3/8" | .244 | 1/4" | M18x1 | 1.378 | .453 | .394 | 7/8" | .866 | - | |
| 27 3/8 3/8 -F | 3/8" | .244 | 3/8" | M18x1 | 1.417 | .453 | .394 | 7/8" | .866 | - | |
| 27 3/8 1/2 -F | 3/8" | .244 | 1/2" | M18x1 | 1.535 | .531 | .394 | 1" | .866 | - | |
| 27 1/2 3/8 -F | 1/2" | .362 | 3/8" | M22x1,5 | 1.465 | .453 | .472 | 1" | .945 | - | |
| 27 1/2 1/2 -F | 1/2" | .362 | 1/2" | M22x1,5 | 1.583 | .531 | .472 | 1" | .945 | - | |

PT 28

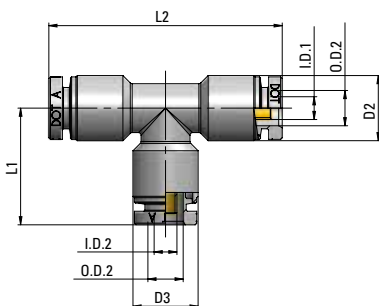
Union Elbow



| Part Number | Tube OD | Tube ID | D2 | L1 | oz | ⚖️ |
|--------------|---------|---------|------|-------|-------|----|
| 28 5/32 5/32 | 5/32" | .087 | .354 | .748 | - | |
| 28 1/4 1/4 | 1/4" | .165 | .472 | .866 | .639 | |
| 28 3/8 3/8 | 3/8" | .244 | .630 | 1.024 | 1.347 | |
| 28 1/2 1/2 | 1/2" | .362 | .787 | 1.110 | 2.161 | |
| 28 5/8 5/8 | 5/8" | .433 | .945 | 1.378 | - | |

PT 29

Union Tee

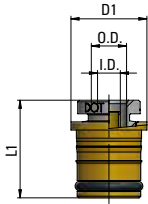


| Part Number | Tube OD ₁ | Tube ID ₁ | Tube OD ₂ | Tube ID ₂ | D2 | D3 | L1 | L2 | oz | ⚖️ |
|--------------|----------------------|----------------------|----------------------|----------------------|------|------|-------|-------|-------|----|
| 29 5/32 5/32 | 5/32" | .087 | 5/32" | .087 | .354 | .354 | .748 | 1.496 | - | |
| 29 1/4 1/4 | 1/4" | .165 | 1/4" | .165 | .472 | .472 | .846 | 1.693 | .882 | |
| 29 3/8 3/8 | 3/8" | .244 | 3/8" | .244 | .630 | .630 | 1.004 | 2.008 | 1.852 | |
| 29 1/2 1/2 | 1/2" | .362 | 1/2" | .362 | .787 | .787 | 1.063 | 2.220 | 2.948 | |
| 29 5/8 5/8 | 5/8" | .433 | 5/8" | .433 | .945 | .945 | 1.378 | 2.756 | - | |
| 29 3/8 1/4 | 3/8" | .244 | 1/4" | .165 | .945 | .472 | .945 | 2.008 | - | |
| 29 1/2 1/4 | 1/2" | .362 | 1/4" | .165 | .945 | .472 | 1.024 | 2.220 | - | |
| 29 1/2 3/8 | 1/2" | .362 | 3/8" | .244 | .945 | .630 | 1.102 | 2.220 | - | |

PT 10

Press-in Cartridge

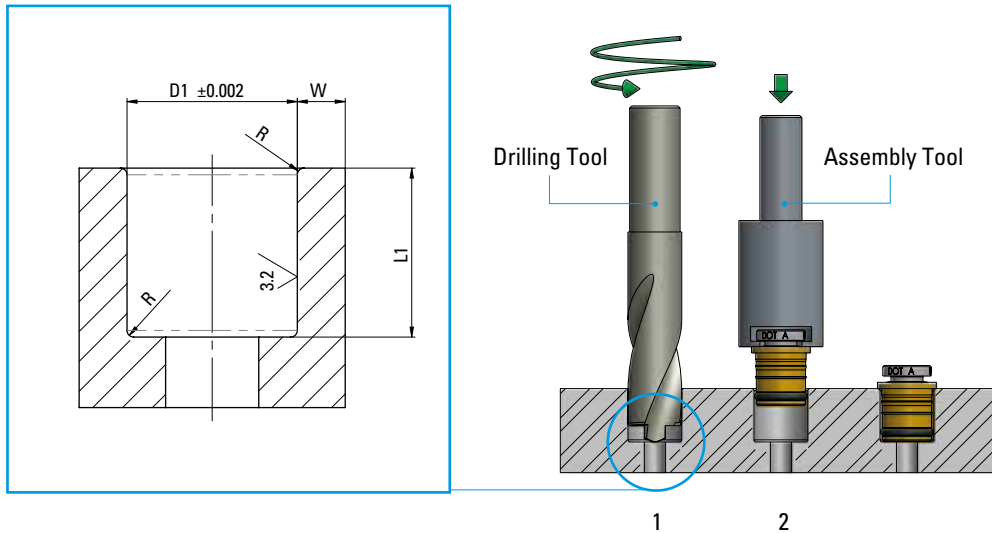
PT10 is C.matic push in cartridge solution developed for applications where compactness is required and designed to be installed into Aluminium T6061 cavities according to SAE J2494-4 Standard. Cavities made from materials other than T6061 T6 SHALL be adjusted dimensionally so that when installed the tube/cartridge/cavity assembly will pass the applicable tests in SAE J1131 and SAE J2494-3.



| Part Number | Tube O.D. | Tube I.D. | D1 | L1 | oz $\Delta\Delta$ |
|-------------|-----------|-----------|------|------|-------------------|
| 10 5/32 00 | 5/32" | 2,2 | .394 | .677 | - |
| 10 1/4 00 | 1/4" | 4,2 | .551 | .728 | - |
| 10 3/8 00 | 3/8" | 6,2 | .701 | .878 | - |

Cartridge cavity size according to SAE J2494-4

| Tube O.D. | D1 | L1 | W | R |
|-----------|------|------|------|------|
| 5/32" | .346 | .449 | .079 | .020 |
| 1/4" | .504 | .500 | .079 | .020 |
| 3/8" | .650 | .650 | .079 | .020 |



- 1 Drill the cartridge cavity seat, following the instructions given.
- 2 Before insert the cartridge into the cavity please apply some lubricant on the external cartridge O-ring.
- 3 Manually press the cartridge into the seat and by means of the assembly tool push it all the way down until it bottoms; this will guarantee the proper cartridge assembly.

"Drilling and Assembly Tool" available upon request.