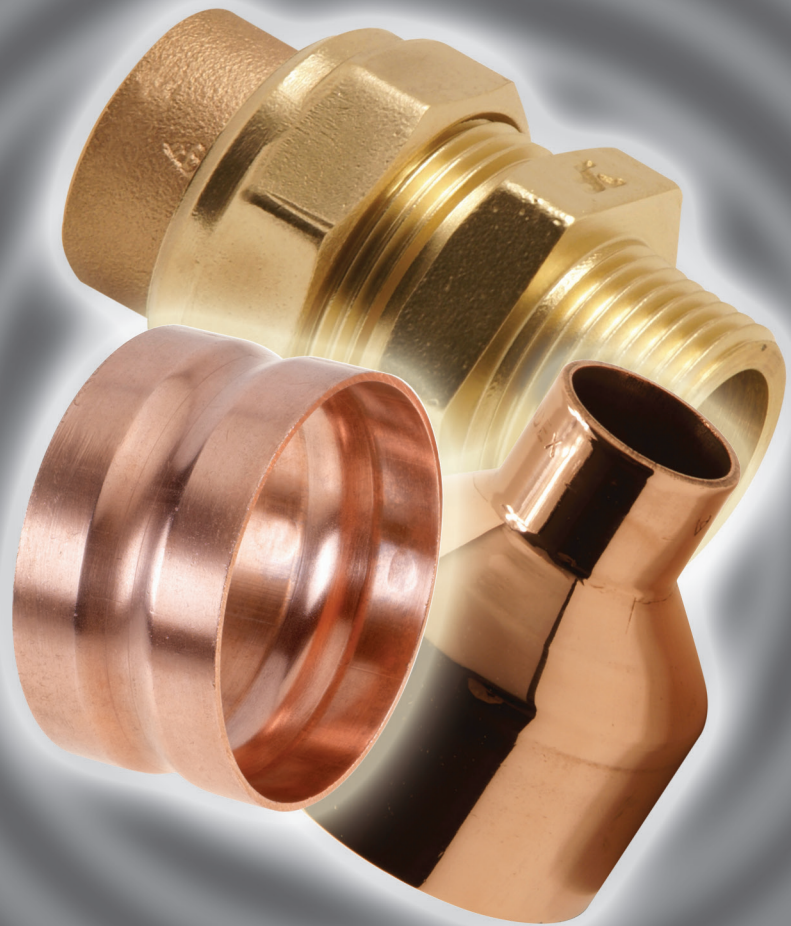
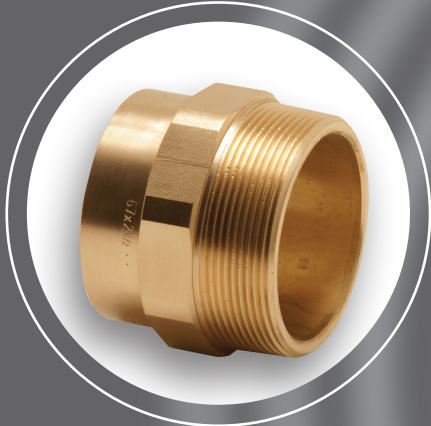




Brazing Fittings



An introduction to the range and applications

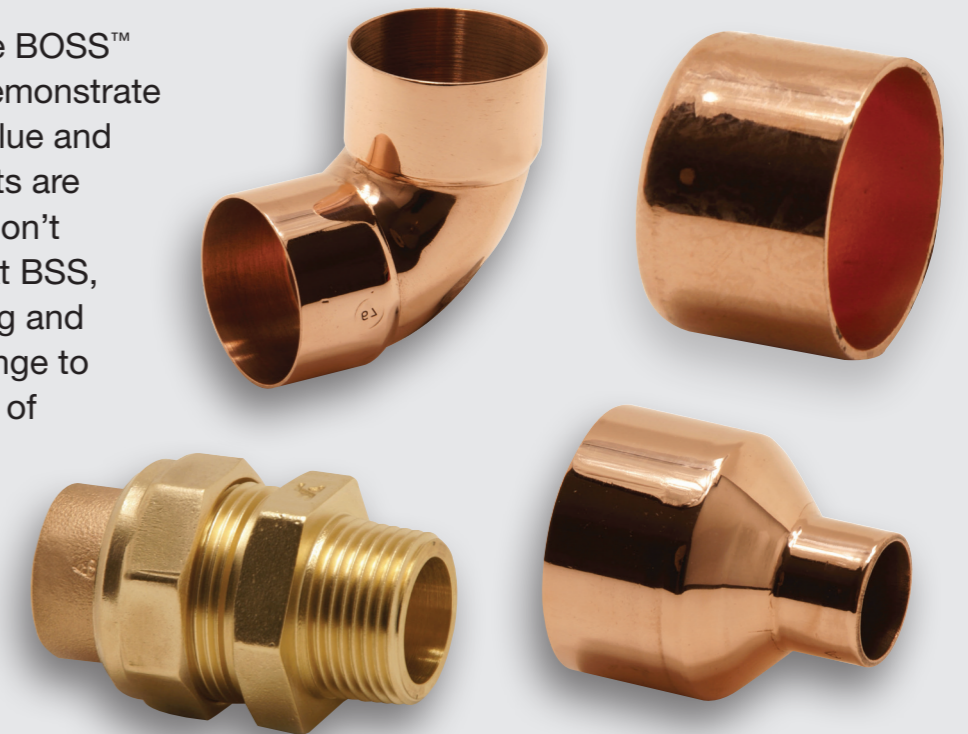
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Introduction

BSS offers a wide range of products from leading manufacturers, but our own-brand BOSS™ has been established as a premier alternative for more than a century.

Since the early 1900's, the BOSS™ brand has been able to demonstrate a reputation for quality, value and reliability. BOSS™ products are competitively priced but don't compromise on quality. At BSS, we are constantly updating and developing the BOSS™ range to ensure it meets the needs of today's customer.



BOSS™ Brazing is the latest addition to the BOSS™ brand portfolio.

BOSS™ Brazing fittings are suitable for jointing copper tube, which must meet the requirements of BS EN 1057.

BS EN 1057 Specification for copper and copper alloy – seamless round copper tubes for water (and gas) in sanitary and heating applications. BS EN 1057 includes specified temper conditions (material strength) expressed as an “R” number. Quite simply, the higher the number, the harder the material. As a result, tube diameter, wall thickness, length and the material temper must all be specified for full product designation.

R220 Annealed condition with a tensile strength of 220N/mm² supplied in coils and suitable for connection by push-fit, capillary and compression fittings. Can be bent with suitable bending tools.

R250 Half hard condition with a tensile strength of 250N/mm² supplied in straight lengths and suitable for connection by push-fit, press-fit, capillary and compression fittings. Can be bent with suitable bending tools.

R290 Hard condition with a tensile strength of 290N/mm² supplied in straight lengths suitable for connection by push-fit, press-fit, capillary and non-manipulative compression fittings. *Not suitable for bending.*

The information contained in this publication is believed to be correct and complete at the time of printing but it is an approximate guide only. Due to limitations in the printing process, images may not be representative of their true colours and colour variations may occur due to the natural origin of the products. Stock may vary from branch to branch and is subject to availability. Any industry accreditations portrayed (eg WRAS, BBA etc) are correct at time of going to press but may be subject to change without prior notice. All photographs are a guide only and do not necessarily represent the products available. BSS Industrial reserves the right to change product details and designs without prior notice. To the fullest extent permitted by law, BSS Industrial assumes no liability or responsibility for typographical and clerical errors and omissions in this publication (which may be corrected by us without liability) and this publication does not form the basis of any contract. All products sold are subject to our Group Sale Terms, a copy of which are available on request or are otherwise available at www.bssindustrial.co.uk. Travis Perkins Group is the owner of the registered trademark BOSS™.

BOSS™ Brazing fittings

Imperial copper tube

BOSS™ Brazing fittings with metric or BSP ends are not compatible with imperial copper tube. However, the BOSS™ brazing range includes a number of imperial x metric adaptors, which are specifically designed for the purpose of connecting to imperial copper tube found in an existing installation.

BS EN 1057 Copper Tube Specifications Compatible With BOSS™ Brazing Fittings

| Outside Diameter | 0.6mm | 0.7mm | 0.8mm | 0.9mm | 1.0mm | 1.2mm | 1.5mm | 2.0mm | 2.5mm |
|------------------|-------|-------|-------|-------|-----------|-----------|-------|-------|-------|
| 15mm | | R250 | | | R220/R250 | | | | |
| 22mm | | | | R250 | | R220/R250 | | | |
| 28mm | | | | R250 | | R220/R250 | | | |
| 35mm | | | | | R290 | R250/R290 | | | |
| 42mm | | | | | R290 | R250/R290 | | | |
| 54mm | | | | | R290 | R250/R290 | | R250 | |
| 66.7mm | | | | | | R250/R290 | | R250 | |
| 76.1mm | | | | | | | R290 | R250 | |
| 108mm | | | | | | | R290 | | R250 |
| 133mm | | | | | | | R290 | | |
| 159mm | | | | | | | | R290 | |

BOSS™ Brazing fittings

BOSS™ Brazing fittings should be assembled with silver brazing alloys to BS EN 1044 (formerly BS 1845). When correctly assembled with copper tube to BS EN 1057, BOSS™ Brazing fittings are designed for the working temperatures and pressures shown in Tables 1 and 2.

Stainless steel tube

The use of BOSS™ Brazing fittings with stainless steel tube is not recommended.

Working temperatures and pressure

BOSS™ Brazing 66.7mm performance when correctly assembled with copper tube to BS EN 1057 using tin/copper soft solder BS EN 29453 S-Sn99cu1 or tin/silver soft solder BS EN29453 L-SnAg5 DIN1707

BOSS™ Brazing 66.7mm performance when correctly assembled with copper tube to BS EN 1057 using tin/lead soft solder BS EN 29453 D-Pb60Sn40
Not suitable for use in potable water systems

Table 1

Service Temperature

| Size | Min -40°C | 30°C | 65°C | Max 110°C |
|--------|-----------|--------|--------|-----------|
| 66.7mm | 16 bar | 16 bar | 16 bar | 10 bar |

Table 2

Service Temperature

| Size | Min -15°C | 30°C | 65°C | Max 110°C |
|--------|-----------|--------|-------|-----------|
| 66.7mm | 10 bar | 10 bar | 6 bar | 4 bar |

BOSS™ Brazing fittings

Achieving low temperatures

For products used in water systems, working temperatures of less than 4°C can only be achieved if antifreeze is added to the system. **Antifreeze must not be added to potable water systems.**

High performance

BOSS™ Brazing fittings used with copper tube to BS EN 1057 will withstand pressure ratings far exceeding normal service conditions.

Pressure Equipment Directive (P.E.D.)

From 30th May 2002 most pressure equipment and assemblies on the market in the United Kingdom must comply with the Pressure Equipment Directive (P.E.D.) 1999. Fittings are exempt from the P.E.D. unless they are incorporated into pressure equipment, falling within its scope.

Gas Families

There are three gas families

- 1st Family - Manufactured gas
- 2nd Family - Natural gas
- 3rd Family - LPG, compressed propane and butane

Performance and equipotential bonding

Equipotential Bonding

Ensure all metallic pipework systems comply with the equipotential bonding requirements of the current edition of the IEE electrical wiring regulations (BS 7671:2001).

All BOSS™ Brazing fittings provide electrical continuity when the joint has been completed with copper tube.

After all plumbing work has been completed; always ensure continuity checks are conducted by a qualified electrician in accordance with regulations.

Maximum hydraulic working pressure for BOSS™ Brazing fittings when assembled with copper tube to BS EN 1057 using hard solder (brazing alloy) to BS EN 1044 (formerly BS1845)*

| Size | Min † -196°C | 65°C | 120°C | 150°C | 175°C | Max 200°C |
|------|-----------------|---------|---------|---------|---------|--------------|
| 15mm | 40.3bar | 40.3bar | 37.9bar | 30.1bar | 22.8bar | 15.0bar |
| 22mm | 35.6bar | 35.6bar | 33.5bar | 26.6bar | 20.2bar | 13.3bar |
| 28mm | 28.2bar | 28.2bar | 26.5bar | 21.1bar | 16.0bar | 10.5bar |
| 35mm | 25.2bar | 25.2bar | 23.7bar | 18.8bar | 14.3bar | 9.4bar |
| 42mm | 23.2bar | 23.2bar | 21.8bar | 17.3bar | 13.1bar | 8.6bar |
| 54mm | 19.8bar | 19.8bar | 18.6bar | 14.7bar | 11.2bar | 7.4bar |

BOSS™ Brazing performance when correctly assembled with copper tube to BS EN 1057 with silver brazing alloy to BS EN 1044 (formerly BS1845)

| Size | Min † -196°C | 65°C | 120°C | 150°C | Max 200°C |
|--------|-----------------|---------|---------|---------|--------------|
| 66.7mm | 18.6bar | 18.6bar | 17.5bar | 14.0bar | 6.9bar |
| 76.1mm | 18.6bar | 18.6bar | 17.5bar | 14.0bar | 6.9bar |
| 108mm | 17.2bar | 17.2bar | 16.2bar | 12.9bar | 6.4bar |
| 133mm | 10.5bar | 10.5bar | 8.5bar | 7.7bar | 4.1bar |
| 159mm | 11.7bar | 11.7bar | 9.7bar | 8.6bar | 4.6bar |

† Copper and gunmetal fittings only. * Not applicable to products containing non-metallic components.



System design considerations and tube expansion

Here are details of some of the specific design considerations it is important to take account of when designing and installing pipework systems containing BOSS™ Brazing fittings.

Thermal movement

Thermal movement is major consideration when designing and installing plumbing and heating systems and should be taken into account. Pipework systems expand and contract with changes in temperature. If they are fixed too rigidly and their movement restricted the installation will be subject to stress. Stress concentrations between “fixed points” – typically found at radiators, valves and other fittings – should be avoided wherever possible.

Correct anchoring

Always ensure the free length of tube between the branch of the tee and the first anchor point (bracket or radiator valve) is long enough to allow normal thermal movement. Not doing this can lead to installation failure.

Expansion of copper tube

Copper has a coefficient of linear expansion of $17 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$. For example, a 10 metre length of copper tube carrying hot water at 60°C will increase in length by almost 7mm when heated from 20°C . Assuming that temperature cycling of the system is 20°C , there will be a continuous cycle of expansion and contraction of 3.4mm. Refer to table (below).

COPPER TUBE EXPANSION

| Temperature Change | Tube Length | | | | | | | | | |
|--------------------|-------------|--------|---------|--------|---------|--------|---------|--------|--------|---------|
| | 3m | 4m | 5m | 6m | 7m | 8m | 9m | 10m | 12m | 25m |
| 10°C | 0.5mm | 0.7mm | 0.9mm | 1.0mm | 1.2mm | 1.4mm | 1.5mm | 1.7mm | 2.0mm | 4.3mm |
| 20°C | 1.0mm | 1.4mm | 1.7mm | 2.0mm | 2.4mm | 2.7mm | 3.0mm | 3.4mm | 4.0mm | 8.5mm |
| 30°C | 1.5mm | 2.0mm | 2.6mm | 3.1mm | 3.6mm | 4.1mm | 4.6mm | 5.1mm | 6.1mm | 13.0mm |
| 40°C | 2.0mm | 2.7mm | 3.4mm | 4.1mm | 4.8mm | 5.4mm | 6.1mm | 6.8mm | 8.2mm | 17.0mm |
| 50°C | 2.6mm | 3.4mm | 4.3mm | 5.1mm | 6.0mm | 6.8mm | 7.7mm | 8.5mm | 10.2mm | 21.0mm |
| 60°C | 3.1mm | 4.1mm | 5.1mm | 6.1mm | 7.1mm | 8.2mm | 9.2mm | 10.2mm | 12.2mm | 26.0mm |
| 70°C | 3.6mm | 4.8mm | 6.0mm | 7.1mm | 8.3mm | 9.5mm | 10.7mm | 11.9mm | 14.3mm | 30.0mm |
| 80°C | 4.1mm | 5.4mm | 6.8mm | 8.2mm | 9.5mm | 10.9mm | 12.2mm | 13.6mm | 16.3mm | 34.0mm |
| 90°C | 4.6mm | 6.1mm | 7.7mm | 9.2mm | 10.7mm | 12.2mm | 13.8mm | 15.3mm | 18.4mm | 38.0mm |
| 100°C | 5.1mm | 6.8mm | 8.5mm | 10.2mm | 11.9mm | 13.6mm | 15.3mm | 17.0mm | 20.4mm | 43.0mm |
| 100°C | 5.1mm | 6.8mm | 8.5mm | 10.2mm | 11.9mm | 13.6mm | 15.3mm | 17.0mm | 20.4mm | 43.0mm |
| 150°C | 7.65mm | 10.2mm | 12.75mm | 15.3mm | 17.85mm | 20.4mm | 22.95mm | 25.5mm | 30.6mm | 63.75mm |
| 200°C | 10.2mm | 13.6mm | 17.0mm | 20.4mm | 23.8mm | 27.2mm | 30.6mm | 34.0mm | 40.8mm | 85.0mm |

Pipeline supports

Pipelines should always be assembled so that the joints are under neutral or compressive stress. Clipping to support the assembled pipeline is essential and tube manufacturer’s recommendations should be adhered to.

BSS Industrial offers a wide range of pipe clips and brackets to ensure safe and secure installations. Pipe joint clips are also available and are designed to protect pipework against accidental piercing when nailing or screwing down floorboards. For the maximum spacing of supporting brackets refer to the table (opposite).

Maximum spacing of support brackets for copper tube to BS EN 1057 R250 and R290

| Size | Wall Thickness | Horizontal Pitch | Vertical Pitch |
|---------------|----------------|------------------|----------------|
| 15mm | 0.7mm | 1.20m | 1.80m |
| 22mm, 28mm | 0.9mm | 1.80m | 2.40m |
| 35mm, 42mm | 1.2mm | 2.40m | 3.00m |
| 54mm | 1.2mm | 2.70m | 3.00m |
| 66.7mm | 1.2mm | 3.00m | 3.60m |
| 76.1mm, 108mm | 1.5mm | 3.00m | 3.60m |

System design considerations and tube expansion

Insulation

For all BOSS™ Brazing installations, we recommend you adhere to the insulation requirements for copper tube as specified by The Water Supply (Water Fittings) Regulations 1999. These can be downloaded from www.hmsso.gov.uk.

Phenolic foam

When using rigid phenolic foam (or other thermal insulation) to lag pipework, always remember to refer to the lagging manufacturer's fixing instructions. To avoid the risk of external corrosion of pipework, the European Phenolic Foam Association recommends that such insulation products be installed with a moisture barrier, such as Densopaste or a plastic covering applied by the tube manufacturer. If you need to add a barrier product, we recommend that all BOSS™ Brazing fittings are fully installed and are completely coated before these are applied.

Covered pipework

Making provision for thermal movement is vital where pipe-work is installed under screed or plaster, or passes through brick or blockwork. The preferred practice is to pass tubes and pipes through sleeves or conduits or to lay them in ducts surrounded by loose, non-rigid material such as vermiculite or glass wool. For further information, consult the standard BS 6700.

Pipework accessibility

It's wise to take advice from the local water authority when it comes to pipework accessibility.

Chemicals

Some contracts may require the use of proprietary chemicals to cleanse and flush pipework before full commissioning.

Installation instructions for brazing alloys

Preliminaries

Select the correct size of tube and fitting for the job. Ensure that both are clean, in good condition and free from damage and imperfections. If the tube is oval or damaged, use a re-rounding tool.

Unmade Ends

If one or more ends of a BOSS™ Brazing fitting are to remain unmade, a short length of correctly sized, uncleaned tube should be inserted into the unjointed end. Keep this section cool by wrapping a wet rag around it while heating the remaining end.

Taking apart and remaking BOSS™ Brazing joints

Remaking of BOSS™ Brazing fitting joints is generally not recommended. However, in some situations, joints can be remade by fluxing the tinned portion of the tube and reinserting this into the fitting. Then, heat the joint and end feed the solder. If a new tube is to be used, clean and flux the tube before assembly.

If it is necessary to break into existing pipes for repairs or to fit new branches, slip couplings or tees which have no tube stops make the job easier and avoid disturbing the rest of the system.

Adapting imperial to metric with BOSS™ Brazing

BOSS™ brazing fittings can be easily connected to older imperial sized tube installations through the use of a BOSS™ imperial to metric adaptor coupling. One end of the adaptor fits onto imperial pipe and the other onto metric pipe. Adaptors are available in a variety of size combinations.

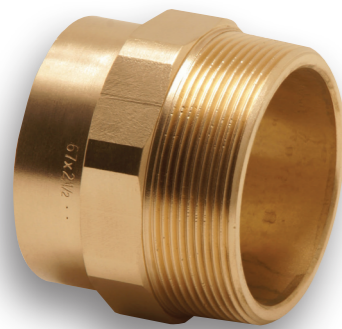
Brazing alloy (hard solder) installation – BOSS™ Brazing

The same preliminaries and preparation guidelines apply as for soft soldering.

Blowtorches and their use

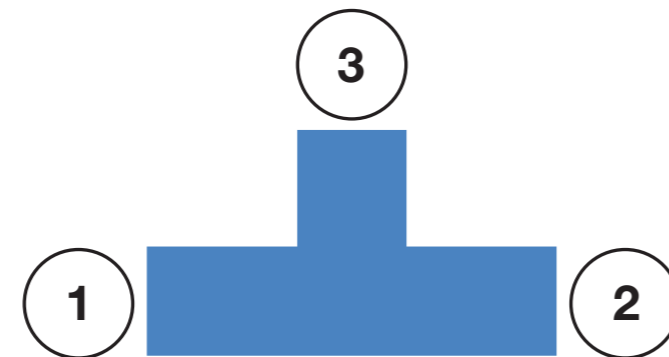
For brazing joints, an oxy-propane, oxy-acetylene or other torch with a large soft, neutral or slightly reducing flame should be used. This should be kept moving throughout the making of the joint to avoid excessive local heating. It is better to melt the alloy by conduction than by heating it directly with the torch, although a combination of the two techniques can be used to aid the flow of alloy into the joint. The gap between the socket and the tube should be filled with the brazing alloy to leave a small uniform bead of this alloy around the mouth of the socket.

Connectors



Male connectors

BOSS™ Brazing fittings male connectors have threads to ISO 7/EN 10226-1. Inert jointing compounds or PTFE tape should be applied to taper threads and good quality jointing washers should be used with parallel threaded fittings.



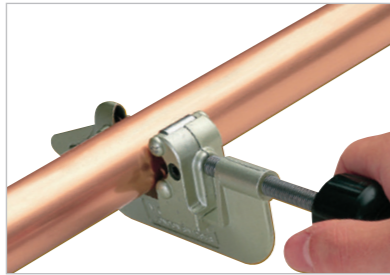
Tee Specification

UK SPECIFICATION
First quote the ends on the run (larger end first) and then the branch.

Preparation

1.

Cut the tube square using a rotary tube cutter wherever possible. If a hacksaw is used to cut the tube, a fine toothed blade should be used.



2.

Remove any burrs from the inside and outside of the tube ends using a fine toothed file or a deburring tool.



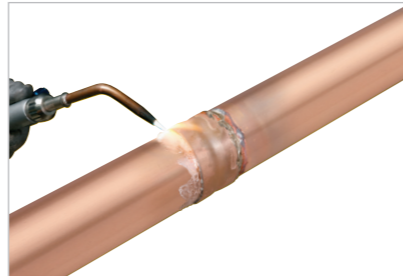
3.

Clean the inside of the fitting socket and outside of the tube with a cleaning pad, fine sandpaper or steel wool.



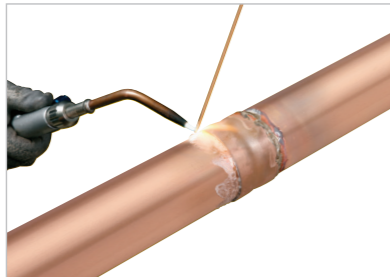
4.

Heat the assembled joint evenly on all sides to 700–750°C (red heat in poor daylight).



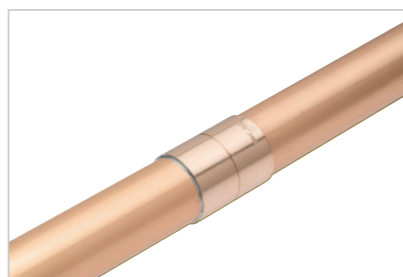
5.

Apply the filler rod to the mouth of the fitting, allowing the brazing alloy to melt and flow into the annular gap.



6.

Allow the joint to cool without disturbance. Clean the joint generally and flush out the pipework.



Use of flux with brazing alloys

Refer to Table 1 below for details of which fittings and brazing alloys require the use of a flux.

Table 1

Type of brazing alloys

| Type of brazing alloys | Copper/phosphorous brazing alloy to BS EN 1044 CP104, CP105 (formerly BS1845 CP4 CP2) | Silver brazing alloy to BS EN 1044 Ag103 (formerly BS 1845 Ag14) |
|------------------------|---|--|
| Tube to fitting | Copper/phosphorous brazing alloy to BS EN 1044 CP104, CP105 (formerly BS1845 CP4 CP2) | Silver brazing alloy to BS EN 1044 Ag103 (formerly BS 1845 Ag14) |
| Copper to Copper | No flux | Flux |
| Copper to Gunmetal | Flux | Flux |

System testing

We recommend all systems are thoroughly tested upon completion. In hydraulic based installations the system may be tested to 1.5 times the working pressure of the system (see table 1 on page 4 for data). If higher test pressures are required advice should be sought from BSS Industrial.

On completion, compressed air pipeline systems must be properly tested. The system designer and installation contractor must ensure safe methods are selected for system testing which will comply with all current Health and Safety regulations.

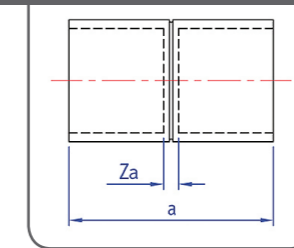
This may include testing compressed air lines with fluids or compressed air at a limited pressure, or a combination. In any event we do not recommend the maximum working pressure of the product be exceeded during this procedure.

N.B. The maximum temperature and pressure range in any system is dictated by the component with the lowest performance rating.

Product Range

BOSS™ Brazing Straight Coupling

Copper x copper

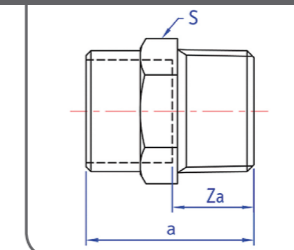


DIMENSIONS (mm)

| BOSS™ | BSS CODE | DESCRIPTION | a | Za |
|-------|----------|--|-----|----|
| 89280 | 62210006 | BB1 66.7 BOSS™ Straight Coupling | 83 | 29 |
| 89281 | 62210017 | BB1 76.1 BOSS™ Straight Coupling | 49 | 29 |
| 89282 | 62210028 | BB1 108 BOSS™ Straight Coupling | 62 | 23 |
| 89283 | 62210039 | BB1 133 BOSS™ Straight Coupling | 90 | 20 |
| 89284 | 62210050 | BB1 159 BOSS™ Straight Coupling | 90 | 20 |
| 89285 | 62210327 | BB1IMP 76.1 x 3mm Met x Imp BOSS™ Coup | 109 | 42 |
| 89286 | 62210338 | BB1IMP 108 x 4mm Met x Imp BOSS™ Coup | 109 | 14 |



BOSS™ Brazing Male Coupling



DIMENSIONS (mm)

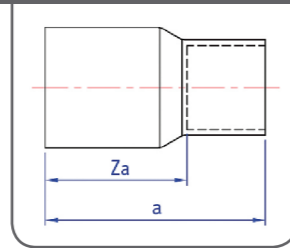
| BOSS™ | BSS CODE | DESCRIPTION | a | Za | s |
|-------|----------|-----------------------------------|----|----|-----|
| 89287 | 62210061 | BB3 66.7 x 2½ BOSS™ Male Coupling | 64 | 30 | 80 |
| 89288 | 62210072 | BB3 76.1 x 3 BOSS™ Male Coupling | 69 | 51 | 93 |
| 89289 | 62210083 | BB3 108 x 4 BOSS™ Male Coupling | 76 | 55 | 119 |



Product Range

BOSS™ Brazing Reducer

Larger end male copper for insertion into fitting x female copper



DIMENSIONS (mm)

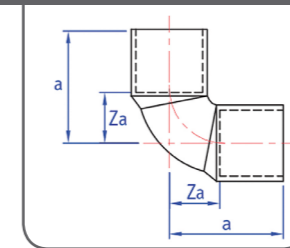


| BOSS™ | BSS CODE | DESCRIPTION | a | Za |
|-------|----------|-------------------------------|-----|----|
| 89290 | 62210094 | BB6 66.7 x 28mm BOSS™ Reducer | 77 | 54 |
| 89291 | 62210102 | BB6 66.7 x 35mm BOSS™ Reducer | 77 | 51 |
| 89292 | 62210113 | BB6 66.7 x 42mm BOSS™ Reducer | 77 | 50 |
| 89293 | 62210124 | BB6 66.7 x 54mm BOSS™ Reducer | 77 | 51 |
| 89294 | 62210135 | BB6 76.1 x 35mm BOSS™ Reducer | 57 | 41 |
| 89295 | 62210146 | BB6 76.1 x 42mm BOSS™ Reducer | 53 | 38 |
| 89296 | 62210157 | BB6 76.1 x 54mm BOSS™ Reducer | 48 | 31 |
| 89297 | 62210168 | BB6 76.1 x 67mm BOSS™ Reducer | 44 | 26 |
| 89298 | 62210179 | BB6 108 x 42mm BOSS™ Reducer | 79 | 61 |
| 89299 | 62210190 | BB6 108 x 54mm BOSS™ Reducer | 70 | 52 |
| 89300 | 62210209 | BB6 108 x 67mm BOSS™ Reducer | 60 | 44 |
| 89301 | 62210220 | BB6 108 x 76mm BOSS™ Reducer | 58 | 42 |
| 89347 | 62210231 | BB6 133 x 42mm BOSS™ Reducer | 91 | 65 |
| 89302 | 62210242 | BB6 133 x 54mm BOSS™ Reducer | 91 | 65 |
| 89303 | 62210253 | BB6 133 x 67mm BOSS™ Reducer | 91 | 65 |
| 89304 | 62210264 | BB6 133 x 76mm BOSS™ Reducer | 95 | 65 |
| 89305 | 62210275 | BB6 133 x 108mm BOSS™ Reducer | 97 | 65 |
| 89306 | 62210286 | BB6 159 x 54mm BOSS™ Reducer | 91 | 65 |
| 89307 | 62210297 | BB6 159 x 67mm BOSS™ Reducer | 95 | 65 |
| 89308 | 62210305 | BB6 159 x 76mm BOSS™ Reducer | 95 | 65 |
| 89309 | 62210316 | BB6 159 x 108mm BOSS™ Reducer | 97 | 65 |
| 89310 | 62210349 | BB6 159 x 133mm BOSS™ Reducer | 100 | 65 |

Product Range

BOSS™ Brazing Elbow

Copper x copper

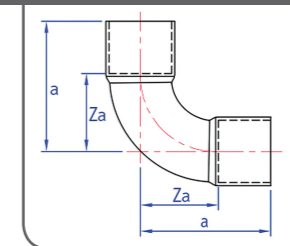


DIMENSIONS (mm)



| BOSS™ | BSS CODE | DESCRIPTION | a | Za |
|-------|----------|-----------------------|----|----|
| 89311 | 62210349 | BB12 66.7 BOSS™ Elbow | 77 | 43 |
| 89312 | 62210360 | BB12 76.1 BOSS™ Elbow | 80 | 51 |

BOSS™ Brazing Bend

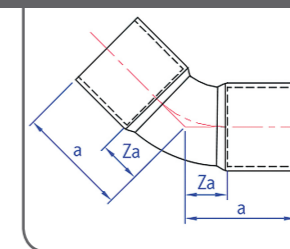


DIMENSIONS (mm)



| BOSS™ | BSS CODE | DESCRIPTION | a | Za |
|-------|----------|----------------------|-----|-----|
| 89313 | 62210371 | BB18 66.7 BOSS™ Bend | 114 | 33 |
| 89314 | 62210382 | BB18 76.1 BOSS™ Bend | 97 | 79 |
| 89315 | 62210393 | BB18 108 BOSS™ Bend | 135 | 114 |
| 89316 | 62210401 | BB18 133 BOSS™ Bend | 225 | 190 |
| 89317 | 62210412 | BB18 159 BOSS™ Bend | 275 | 240 |

BOSS™ Brazing 45° Bend



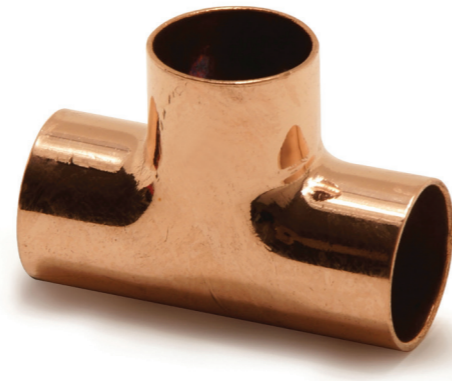
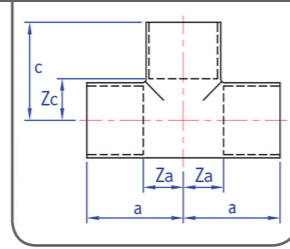
DIMENSIONS (mm)



| BOSS™ | BSS CODE | DESCRIPTION | a | Za |
|-------|----------|--------------------------|-----|-----|
| 89318 | 62210423 | BB21 66.7 BOSS™ 45° Bend | 59 | 21 |
| 89319 | 62210434 | BB21 76.1 BOSS™ 45° Bend | 43 | 25 |
| 89320 | 62210445 | BB21 108 BOSS™ 45° Bend | 64 | 44 |
| 89321 | 62210456 | BB21 133 BOSS™ 45° Bend | 120 | 85 |
| 89322 | 62210467 | BB21 159 BOSS™ 45° Bend | 135 | 100 |

Product Range

BOSS™ Brazing Equal Tee

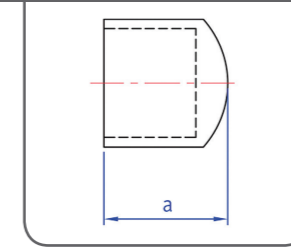


DIMENSIONS (mm)

| BOSS™ | BSS CODE | DESCRIPTION | a | c | Za | Zc |
|-------|----------|---------------------------|-----|-----|----|----|
| 89323 | 62210478 | BB24 66.7 BOSS™ Equal Tee | 73 | 73 | 32 | 32 |
| 89324 | 62210489 | BB24 76.1 BOSS™ Equal Tee | 82 | 70 | 47 | 52 |
| 89325 | 62210508 | BB24 108 BOSS™ Equal Tee | 90 | 96 | 68 | 74 |
| 89326 | 62210519 | BB24 133 BOSS™ Equal Tee | 130 | 130 | 95 | 95 |
| 89327 | 62210530 | BB24 159 BOSS™ Equal Tee | 135 | 135 | 95 | 95 |

Product Range

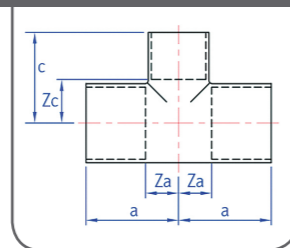
BOSS™ Brazing Stop End



DIMENSIONS (mm)

| BOSS™ | BSS CODE | DESCRIPTION | a |
|-------|----------|--------------------------|----|
| 89343 | 62210700 | BB61 66.7 BOSS™ Stop End | 37 |
| 89344 | 62210711 | BB61 76.1 BOSS™ Stop End | 21 |
| 89345 | 62210722 | BB61 108 BOSS™ Stop End | 26 |

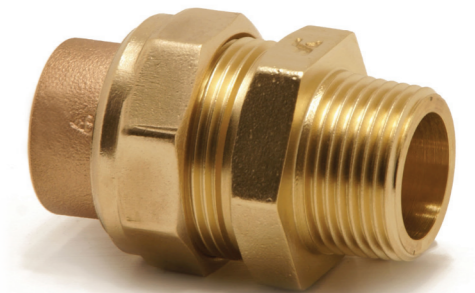
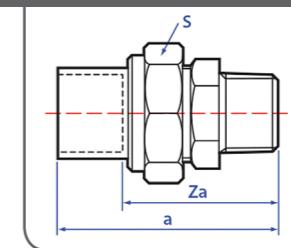
BOSS™ Reduced Branch Tee



DIMENSIONS (mm)

| BOSS™ | BSS CODE | DESCRIPTION | a | c | Za | Zc |
|-------|----------|--|-----|-----|-----|-----|
| 89328 | 62210541 | BB25 66.7 x 66.7 x 28mm BOSS™ Reduced Br Tee | 54 | 66 | 19 | 47 |
| 89329 | 62210552 | BB25 66.7 x 66.7 x 35mm BOSS™ Reduced Br Tee | 57 | 63 | 57 | 35 |
| 89330 | 62210563 | BB25 66.7 x 66.7 x 42mm BOSS™ Reduced Br Tee | 60 | 68 | 60 | 35 |
| 89331 | 62210574 | BB25 66.7 x 66.7 x 54mm BOSS™ Reduced Br Tee | 65 | 72 | 66 | 35 |
| 89332 | 62210585 | BB25 76.1 x 76.1 x 28mm BOSS™ Reduced Br Tee | 55 | 66 | 55 | 40 |
| 89333 | 62210596 | BB25 76.1 x 76.1 x 35mm BOSS™ Reduced Br Tee | 46 | 67 | 28 | 52 |
| 89334 | 62210604 | BB25 76.1 x 76.1 x 42mm BOSS™ Reduced Br Tee | 51 | 69 | 34 | 52 |
| 89335 | 62210615 | BB25 76.1 x 76.1 x 54mm BOSS™ Reduced Br Tee | 55 | 69 | 38 | 52 |
| 89336 | 62210626 | BB25 108 x 108 x 35mm BOSS™ Reduced Br Tee | 160 | 89 | 80 | 56 |
| 89337 | 62210648 | BB25 108 x 108 x 76mm BOSS™ Red Br Tee | 70 | 85 | 48 | 68 |
| 89338 | 62210637 | BB25 108 x 108 x 54mm BOSS™ Red Br Tee | 61 | 90 | 39 | 73 |
| 89339 | 62210659 | BB25 133 x 133 x 54mm BOSS™ Red Br Tee | 90 | 130 | 55 | 85 |
| 89340 | 62210670 | BB25 133 x 133 x 108mm BOSS™ Red Br Tee | 110 | 130 | 75 | 95 |
| 89341 | 62210681 | BB25 159 x 159 x 54mm BOSS™ Red Br Tee | 90 | 145 | 55 | 110 |
| 89342 | 62210692 | BB25 159 x 159 x 133mm BOSS™ Red Br Tee | 220 | 145 | 185 | 110 |

BOSS™ Male Union



DIMENSIONS (mm)

| BOSS™ | BSS CODE | DESCRIPTION | a | Za | S |
|-------|----------|-----------------------------------|----|----|----|
| 89346 | 62210733 | BB69 66.7 x 2½mm BOSS™ Male Union | 93 | 60 | 96 |

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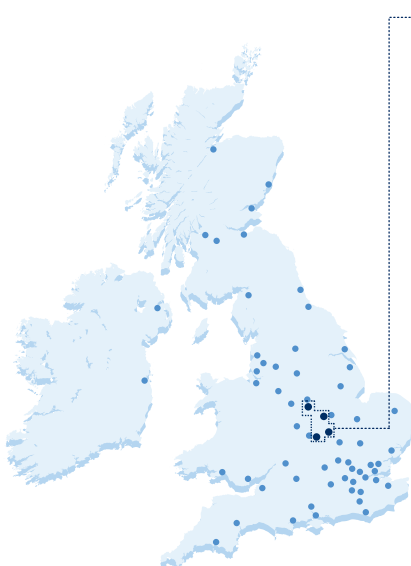
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