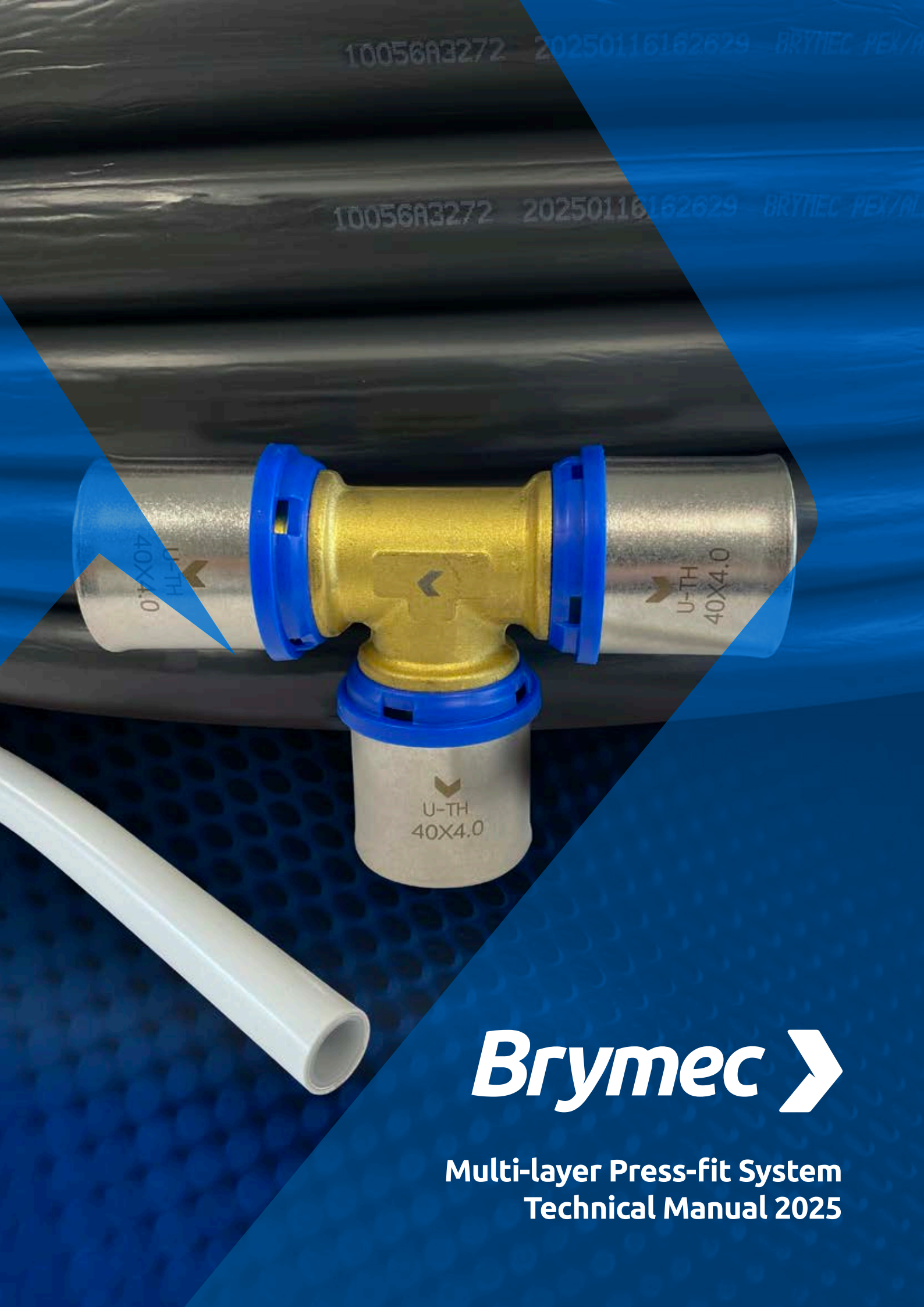


Brymec

Multi-layer Press-fit System
Technical Manual 2025

Introducing Brymec Products

A proud family business with almost 50 years of experience, we understand the challenges you face and the solutions you require.

From a humble beginning based in south London, Brymec has grown to become one of the country's leading manufacturers and suppliers of quality products to the construction industry.

Our philosophy is to always provide the ultimate service and peace of mind to our customers. A key feature of our pledge to you is to ensure that we always have the best possible range of products for you to choose from.

By investing in innovation, we have been able to engineer our own range of products, all manufactured to our exacting specifications, to deliver quality solutions for the building services industry.

Each one of Brymec's products is not only manufactured to the highest quality standards, but they are also all backed up by robust quality controls, Brymec's industry-leading guarantees and all are supported by our in-house Technical Support team.

Our efficient approach of 'direct supply' enables you to buy a full range of products straight from the manufacturer, Brymec. This innovative approach simplifies your supply chain, speeds up your deliveries, provides greater support and gives you greater control.

This complete understanding of industry products and systems enables us to collaborate with you more effectively and efficiently. We partner with our customers, offering our knowledge and service, allowing us to deliver a more comprehensive range of products that are just what you want, where you want them and exactly when you need them.

Contents

CERTIFIED ISO 9001:2015 COMPANY

Cert. 288342018

Constructionline Material Suppliers Premier Verified Member

Cert. 1313072

Constructionline Social Value Completed

Sustainability
General information

The '2021 Global Status Report for Buildings and Construction' by the UN states that "The buildings and construction sector accounted for 36% of global energy demand and 37% of energy and energy-related carbon dioxide (CO2) emissions in 2020". Currently, data for the UK shows that the construction industry is responsible for 40% of total emissions, so we all have a major part to play in achieving the UK's goals.

Brymec's commitment to a sustainable future

Cert. 459902024

Our Vision

'To be the greenest, most environmentally friendly supplier to the Building Services industry.'

Our Business

As a leading manufacturer and distributor of quality valves, tubes and fittings we are always seeking ways to improve our operations to lower our environmental impact and to better serve the industries we supply.

Our signature phrase 'Built for Tomorrow' underpins what we do as a business, whether that be through innovative products which are more environmentally friendly, or by adopting ever more efficient processes.

Certification

Working with accredited independent assessors, our UK based facilities and operations identified key areas of improvement. By enacting these recommended changes, since June 2022 Brymec has been awarded the status of 'Carbon Neutral Organisation' by Carbon Neutral Britain*.

* Certified for scope 1, 2 & 3.6 emissions

Core sustainability goals

In 2021 Brymec's board set our goals to focus the activities of our sustainability agenda.

Sustainability goals set in January 2021 - Brymec operations and core product ranges					
Goal	40.1% reduction in emissions per £ million by 2030	Core product ranges from 50% recycled feedstock by 2030	50% reduction of single use plastic packaging	All wooden products certified as sustainable FSC approved	30% of company vehicles to be electric by 2030

Key areas of focus

Our journey towards an ever more environmentally friendly solution continues, and our focus falls in to several key categories;

- Sustainable packaging solutions including plastic packaging.
- Development of product ranges to include sustainable materials and processes.
- UK based operations heating and energy from renewable technologies.
- New software to optimise efficiencies for onward logistics.
- Shortening of the supply chain (below) ;.

Our environmentally friendly business model

Standard models of distribution in the UK can involve up to 6 movements of products by the time they are delivered from the manufacturing facility to the construction location. Brymec's model is to shorten this process to make all deliveries as efficient as possible so as to reduce emissions.

With over 99 % of orders being delivered fully complete with no balances, transport emissions are kept to a bare minimum by avoiding the need for follow-on deliveries to complete the order. This further drives efficiencies by reducing the need for extra packaging and also by reducing on-site waste.

1. Brymec Multilayer Press-fit System

1.1 System Overview

Whether it's supplying hygienic drinking water, or for connecting a heating system, the Brymec Multilayer Press-fit system is the ideal solution. Installation of our system is flame-free, safe, fast and economical.

This next generation plumbing system unites the advantages of a plastic and a metal pipe into one high performance product. Old traditional systems are now able to be replaced by systems more capable of adapting to modern building designs.

Our Multilayer system is based on a core of an aluminium pipe, which is then bonded both inside and out with a layer of PE-Xb (cross-linked polyethylene). The combination of the two materials makes the pipe extremely strong, flexible and durable and is 100% oxygen diffusion tight.

The comprehensive range of the Brymec Multilayer Press-fit system covers sizes from 16-75mm, with pipes available in either flexible coils (16-32mm) or straight lengths (16-75mm). The pipe is 'form-stable' and can easily be formed into the best profile to suit the installation. This flexible pipe approach is at the heart of the MLC concept. Don't add a connection, make a bend instead.

Advantages

- Sizes from 16-50mm to suit most designs
- Entirely corrosion resistant
- Highly flexible and form-stable
- No hot-works
- Low thermal expansion, similar to metal pipes
- Lightweight
- Hygienic
- Ideal for manifold type installations
- 50 year design life

Applications

The Brymec Multilayer pipe system can be used for a broad range of applications such as;

- Hot and cold domestic services
- Domestic and commercial heating
- Underfloor heating systems
- Chilled water and cooling
- HVRF air conditioning systems
- Compressed air (class 1 only)

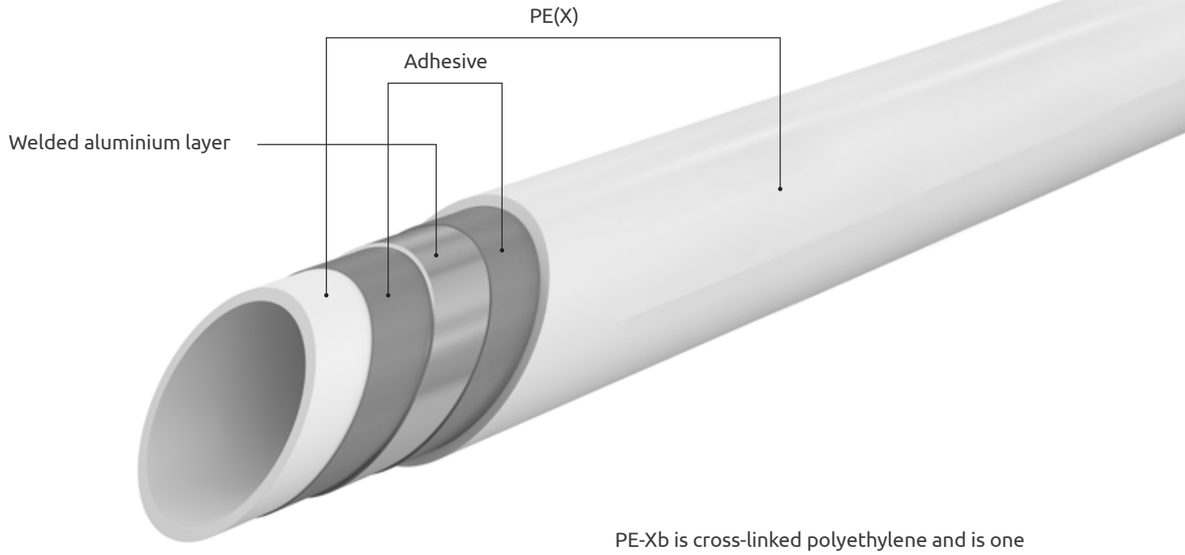
WARRANTY 25 YEAR WARRANTY

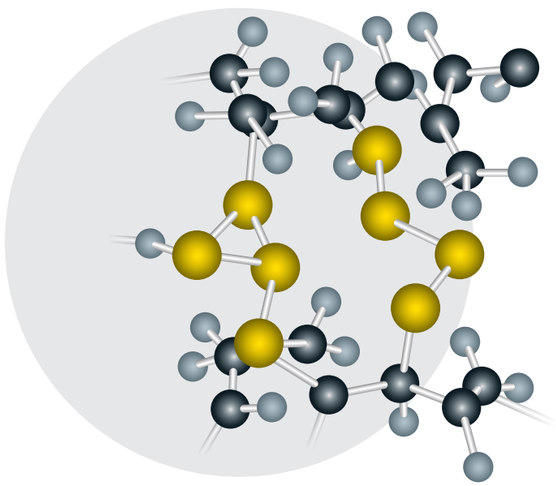
Brymec Warranty

1.2 Brymec Multilayer pipes

Our range of 5 layer composite pipes are manufactured using the highest quality materials to the internationally recognised BS EN ISO 21003-2:2008 *'Multilayer piping systems for hot and cold water installations inside buildings.'* Part 2 – Pipes.

The Multilayer system is comprised of a core aluminium pipe, which is then bonded both inside and out with a layer of PE-Xb (cross-linked polyethylene).





PE-Xb is cross-linked polyethylene and is one of the most widely used forms of PE-X in the plumbing industry.

Crosslinking involves creating bonds between the individual molecules of polyethylene, forming a three-dimensional network of connected chains. This process improves the Polyethylene's properties, such as flexibility, durability, resistance to heat and chemicals, and longevity. The process used to form PE-Xb is known as the "Silane" or "Moisture Cure" method.

The material characteristics of PE-Xb make it an ideal choice for use in hygienic domestic water supply installations and for domestic and commercial heating systems.

1.3 Pre-insulated Multilayer Pipes

The Brymec range of pre-insulated Multilayer pipe coils are pre-assembled in the factory to provide an excellent insulating layer to prevent unwanted heat losses or heat gain and to prevent condensation forming on cold and chilled water lines.

The pipes are assembled with a round extruded insulation made of closed cell Polyethylene foam. The whole assembly is then wrapped with a continuous, flexible, hard wearing, moisture-proof PE foil outer layer.

Factory assembled pre-insulated pipes offer a distinct advantage over pipes which need to have the insulation added on-site. Firstly, the installation of the pre-insulated system can provide an unbroken insulation and vapour barrier between the point of supply to the point of use. Secondly, as the insulation has already been applied to the pipes, the installation process is fast, clean and efficient, reducing time and cost.

1.4 Multilayer fittings

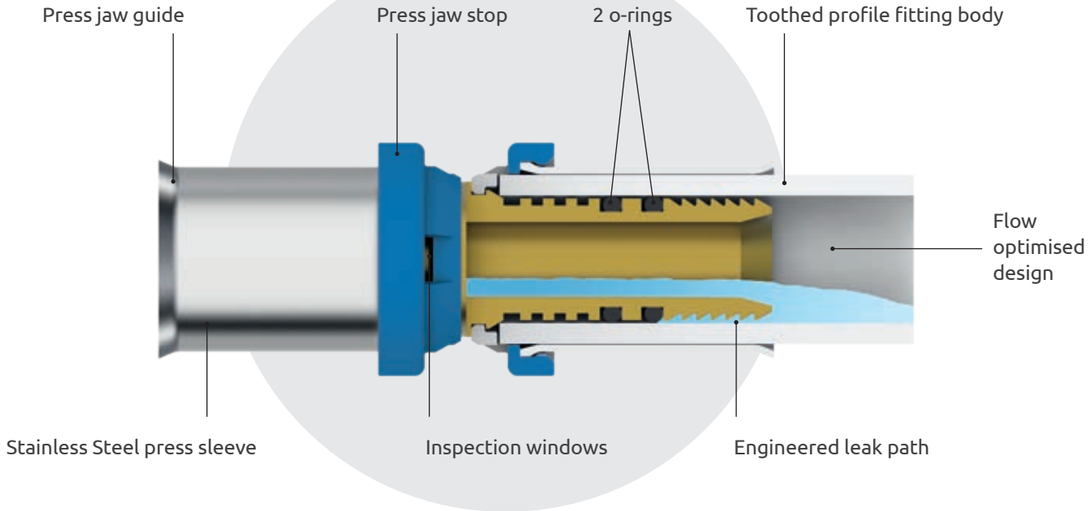
The Brymec Multilayer Press Fittings are manufactured to the international standard BS EN ISO 21003-3:2008 which specifies the characteristics of fittings for *multilayer piping systems intended to be used for hot and cold water installations inside buildings for the conveyance of water.*

Each fitting is manufactured using the highest quality materials to ensure a reliable, strong connection when used with Brymec Multilayer pipes.

The body of the fitting is made from a sturdy DZR brass to prevent corrosion and stress fractures.

The press sleeves are manufactured from 1.4301 (304) stainless-steel and are resistant to almost every environmental condition found on a modern construction project. Two O-rings on every connection provide optimum security a peace of mind.

The flow-optimised design of each fitting ensures that there is minimal pressure losses throughout the installation. The high performance of the Brymec system offers the designer greater flexibility when calculating the system pressure losses and the relevant pump pressure characteristics.



One of the key features of the Brymec Multilayer product range is the wide range of hydraulic press tools that can be used to make the secure, reliable connections.

The specially profiled press sleeves and the special plastic tool guide ensures that the jaws are always positioned correctly during the pressing process.

Prior to starting the pressing of the connection, the 4 observation windows on the plastic tool guide can be used to ensure the pipe is fully inserted to the correct depth. Unlike some other manufacturers' products, the observation windows are easily visible even when the jaws are located onto the pressing sleeve. Following the pressing of the connection, the connection can be reviewed to confirm the correct insertion depth of the pipe into the fitting, giving peace of mind that the connection is 100% correct.

Each fitting has been fully tested by an independent laboratory for both it's hygienic properties and the mechanical performance when used in combination with the Brymec Multilayer pipes.

1.5 Un-pressed leak-path

A essential stage of any plumbing installation is testing of the system prior to the pipes being closed in within the buildings' structure. These tests can either be done using water or an inert gas (see pressure testing on page 48).

The special design of the Brymec fittings provides an engineered leak-path between the two sealing elements, the inner layer of PE-Xb and the two O-rings. If the connection has not been pressed, the fitting is designed to allow a small amount of water to egress from the assembly.

The leak-path is an important feature in order that the pressure testing process can demonstrate that the pipe work is installed correctly, and that the whole system is 100% secure and water-tight.

See pressure testing on page 48

1.6 Multilayer Tools

When installing any plumbing, whether it's for drinking water or heating, the security and durability of the system is of the utmost importance. In addition to the high-quality items such as the pipe and fittings, we also place a high importance on using the correct tools to make the connections.

For this reason, Brymec only recommend the use of the approved pressing equipment and the correct press jaws and press collars (see the recommended tool list on page 40).

Modern hydraulic pressing tools can be either battery or mains powered depending on the model. However, whatever machine is to be used, each tool must be regularly maintained, calibrated and certificated in line with the tool manufacturers' requirements.

It is strongly advised that you undertake the Brymec installation training to not only ensure that you have a trouble-free installation, but also to ensure that you are familiar with the safe handling procedures of the hydraulic pressing equipment being used.

To arrange your free, certificated installation training, please contact sales@brymec.com

1.7 Operating conditions

The 'operating conditions' associated with plumbing systems refer to the range of temperatures that can be applied to the whole installation, and quite importantly, the maximum operating pressures that can be applied to each area of the system.

It's important to note that not all sections of a system are able to operate at the same temperatures and pressures. For example, although our Multilayer system is capable of operating constantly at 10 bar for either hot or cold applications, many valves and pieces of equipment connected to our Multilayer pipes may only be rated at a maximum pressure of 5 bar. Each area within a building should be designed with this in mind and system designers should provide adequate protection for areas where they need to operate at reduced pressures.

Brymec Multilayer has a design life of 50 years. The specified operating conditions found within BS EN ISO 21003-1 : 2008 table 1 need to be observed in order that we can ensure a long life with decades of trouble-free service.

Brymec Multilayer Press-fit Operating Conditions (BS EN 21003:2008 Table 1)			
Application	**Comments**	**Pressure**	**Temperature**
Mains cold water (MCW) / Boosted Cold Water (BCW)	Water main, tank fed or pump boosted systems	10 Bar	7°C - 20°C
Domestic Hot Water (DHW) - Class 1 & 2 BS EN 21003:2008	Hot water services, typically supplied from a stored water source	10 Bar	50°C -70°C
Low Temperature Hot Water (LTHW) - Class 5 BS EN 21003:2008	Underfloor heating and low-temperature radiators	10 Bar	45°C - 80°C
Chilled water (CHW) and cooling	For use in space cooling and cooling processes	10 Bar	5°C - 18°C
Private Water Supply	Must contact Brymec for advice	-	-
The above applications are typical industry conditions of use. Please refer to Brymec Technical for any applications other than those mentioned in the above table.			
Maximum permissible system operating conditions -20°C - 80°C at 10 Bar (Tmax class 1 & 2 - 80°C, class 5 - 90°C)			

Brymec Multilayer is suitable for DHW secondary return systems proving the operating temperatures and pressures do not exceed the maximum conditions detailed under 'Domestic Hot Water'.

1.8 Certification

After air, water is the second most important compound required for life to exist. Safe drinking water is a priority for every person, home and business.

It is a matter of law that all products installed for the conveyance of drinking water can clearly demonstrate they can both maintain the hygiene of the water they carry and prevent undue wastage of this precious resource. These requirements are clearly defined under regulation 4 of the 'Water Supply (Water Fittings) Regulations 1999'.

For the Brymec range of products intended for use in drinking water systems, we demonstrate the hygienic and mechanical performance of our products by presentation of a WRAS certification.

WRAS (Water Regulations Approval Scheme) is an independent UK certification body for plumbing products and materials, helping business and consumers choose compliant products that keep water safe.

To gain certification, we undertake independent testing in an approved UKAS approved laboratory, to the required standards defined by DEFRA (Department for Environment, Food and Rural Affairs). The test results are then submitted to WRAS (or an alternative Reg4 approval scheme) to confirm compliance with the standards and to issue a certificate of compliance.

Brymec Multilayer is manufactured, tested and approved to the standards as laid out within BS EN ISO 21003-1 : 2008.

2. General design principals

2.1 Drinking water systems

For drinking water to be considered as 'wholesome' and fit for human consumption, it must be free from pathogens, and it's quality must be such that it does not adversely affect human health. This is why the strictest demands are made on the quality of drinking water. No other foodstuff is checked as regularly or frequently.

Globally, there is good agreement amongst experts on the science behind the setting of health-based standards for drinking water and this expert evidence is documented by the WHO (World Health Organisation) in the Guidelines for Drinking Water Quality.

In the UK, it is the responsibility of the Government's DWI (Drinking Water Inspectorate) to ensure that the water we drink is of the highest standard. However, the defined water quality regulations are just a part of the process for delivering hygienic water. There are many other parties that must also bear the responsibility to ensure that we maintain the water quality to every tap and outlet. These parties should really be consulted as part of project's Water Safety Plan (WSP) and should include the water undertaker, building designers, installers and even the property owners. Each role within the risk management approach process of the WSP have a crucial role to ensure the safety of a drinking water supply.

Measures to control Legionella growth

Left untreated, Legionella can propagate in both hot and cold drinking water systems. Pipe work designs should use principals that prevent a concentration of Legionella that can be hazardous to health.

Legionella are rod-shaped bacteria which occur naturally in small amounts in fresh water, e.g. in lakes, rivers and occasionally also in tap water. The group 'Legionella' includes some 40 known forms of the bacteria. Some Legionella species can cause infections by the inhalation of contaminated aerosols (fine water droplets) into the lungs, for example while showering or from humidifiers in ventilation systems.

Legionnaires' disease is a potentially fatal form of pneumonia, and everyone is susceptible to infection. In a person with health limitations such as a weakened immune system or chronic bronchitis, an infection can lead to Legionella pneumonia (Legionnaires' disease) or Pontiac fever.

2.1 Drinking water systems

The risk of serious illness is increased for the very young and the elderly. However, people are also at higher risk including;

- People over 45 years of age
- Smokers and heavy drinkers
- People suffering from chronic respiratory or kidney disease
- Diabetes, lung and heart disease
- Anyone with an impaired immune system

Signs and symptoms include cough, shortness of breath, high fever, muscle pains, and headaches. Nausea, vomiting, and diarrhea may also occur. These symptoms generally begin approximately 2–10 days after exposure.

The fatality rate is around 10% for healthy persons and 25% for those with underlying conditions *(source – CDC, Center for Disease Control and Prevention).*

2.1 Drinking water systems

Standards and design practices

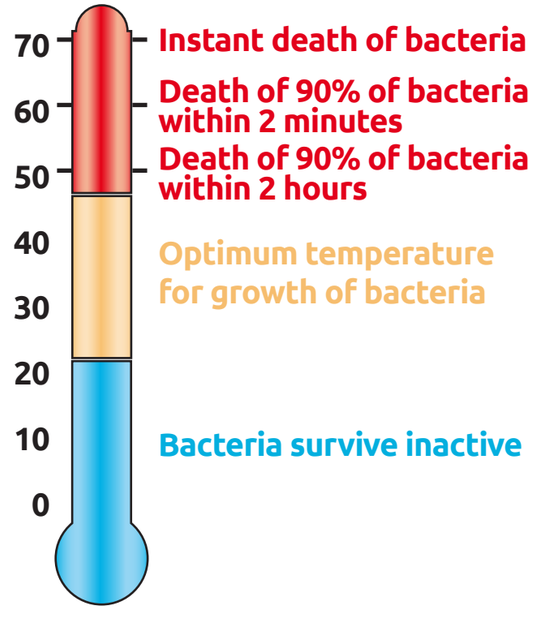
According to the Government's HSE ACOP L8 document, the risk of infection is directly related to the temperature of the tap water within the drinking water distribution system and the length of time that the water stays in the system. The temperature range at which Legionella growth occurs is between 20°c and 45°C. The code of practice describes the technical measures needed to reduce Legionella growth in drinking water distribution systems.

When planning and sizing drinking water pipes, the following points are important from a hygienic (microbiological) point of view:

- Stagnation of tap water in parts of the system that are not used regularly should be avoided – 'dead legs'
- Unused parts of the network must be emptied and disconnected – 'blind ends'
- The shortest possible pipelines and the smallest, but hydraulically sufficient, pipe diameters should be used in order to achieve the shortest possible time of the tap water remaining in the system.
- Unwanted heat gain within cold tap water distribution systems must be avoided.

The HSE L8 code of practice, as well as other guidelines and regulations, often refer to generally recognised engineering practices. These include national standards and industry best practice guidance e.g. HTM-04, BS, CIBSE, etc. or international standards such as EN & ISO. These documents are used by observers to assess whether an installation is designed, built and operated in accordance with expected regulations and guidance.

The generally accepted guidance for the construction and operation of drinking water distribution systems are covered in the European basic standards BS EN 806: 1 - 5, and the national supplementary standards BS 8558 "Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. (Complementary guidance to BS EN 806)"



2.2 Design principals for drinking water distribution

Designing for safety and comfort

Planning a drinking water installation is vital to ensure that it complies with current standards to ensure tap water hygiene, and to also be energy efficient and prevent undue waste of wholesome water.

The demands for faster delivery of drinking water to the point of use has also increased in recent years. Modern outlets with low flow rates, combined with strict requirements for hot water output times, can be a challenge for the designer. There are many sources of guidance regarding hot water delivery times such as HSE L8, CIBSE or TM13 (hot water should be delivered to outlet 50°C within 30 seconds), or a particular specification may present its own requirement for hot water delivery time.

In order to meet all specified outcomes, detailed planning is necessary. In these situations, a comprehensive specification should be provided by the system designer. This should include at least the following details:

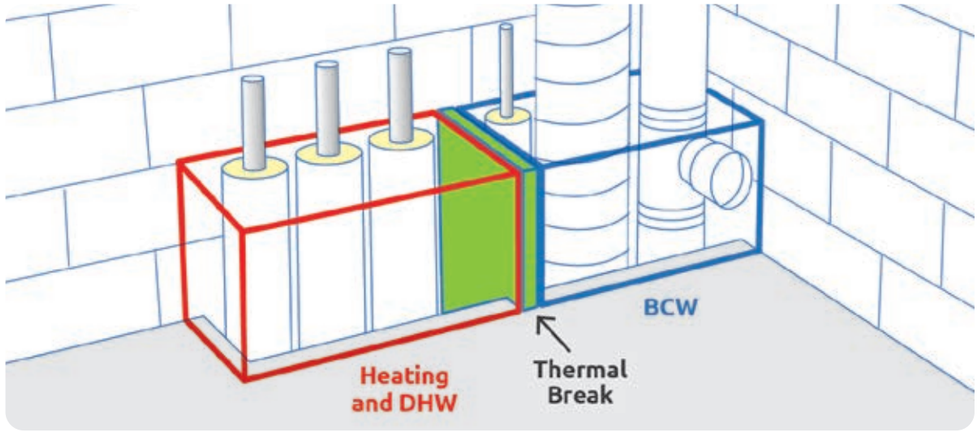
- A detailed description of the equipment or outlets to be installed
- Specifications for intended use including expected flow/loading units
- The concept for drinking water distribution with pipe routing and outlet points
- Expected times for hot water delivery

Protection of cold-water pipes from heating pipes

A key principal to maintain the hygiene of cold drinking water is to avoid close proximity of the cold water pipes to any pipe carrying domestic hot water or heating water. For example, if hot water circulation lines are installed together with cold water lines in shafts or cavities, the danger here is that the water in the cold water pipe could warm-up to a point above the maximum permissible value of 25°C, the point at which bacteria such as Legionella will propagate.

To reduce the risk for cold potable water pipes to be exposed to unwanted thermal gain from other hot water services, designers should follow some simple rules, for example:

- Where possible, separate cold water pipes (DCW & BCW) from heating and DHW pipes
- Allow for sufficient insulation of both the hot and cold-water lines (BS 5422:2023)



2.3 Water treatments and disinfection

It is the responsibility of the system designer to ensure that the installation of the drinking water system maintains the hygiene of the drinking water being delivered, and it is the responsibility of the building's operator to ensure that the system is operated as intended.

As required by HSE ACoP L8 and COSHH, building operators should undertake risk assessments to ensure that the building's occupants are not exposed to risk of someone acquiring legionellosis. A part of this assessment may require testing of water quality to ensure that the hygiene of the water is maintained. This testing must be carried out by a competent person and requires specialist laboratory facilities.

Should the assessment identify that a system requires a periodic disinfection, the best method of treatment should be identified and recorded. However, prior to making the disinfection, the presence of unacceptable levels of bacteria generally means that there has been some failure of the system, either within the design, installation or operation. The cause of the failure should be identified and rectified so as not to cause an on-going repetitive risk.

2.3 Water treatments and disinfection

Thermal disinfection

The most efficient method of treatment is via thermal disinfection. At 50°C, 90% of legionella bacteria will die off within two hours. If the temperature is raised to 60°C, the same percentage of bacteria will die off within two minutes, and at 70°C all legionella bacteria will die off almost instantly.

The thermal disinfection cycle must be conducted in a safe way so as not to place any of the building occupants at risk of scalding, and the maximum temperature must not exceed the maximum permissible system operating temperature as detailed on page 11.

Chemical disinfection

Chemical disinfection treatments are possible and should follow guidance from national standards such as BS 8558, BS EN 806 or DVGW W557 and must be conducted in accordance with the *Water Supply (Water Quality) Regulations 2018* – Regulation 26. However, these treatments must only be considered as a short-term disinfection. Chemical treatments can stress all materials within a water system and regular repeated disinfection cycles will influence the lifespan of all materials and components within a system.

Short term disinfection to DVGW W557 Table 1				
Treatment	**Standard**	**Application**	**Comments**	**Concentration / Duration**
Hydrogen Peroxide H_2O_2	BS EN 902:2013	Aqueous solution	Use as a dosing solution for system disinfection	150mg H_2O_2/l 24 hours
Sodium Chlorite NaOCl	BS EN 902:2016	Aqueous solutions with max 150g/l free chlorine	Use as a dosing solution for system disinfection	50mg Cl_2/l 12 hours
Chlorine Dioxide ClO_2	BS EN 12671:2016	Two components of sodium chlorite, persulfates and/or acidic	Use as a dosing solution with a maximum of 3g ClO2/l for system disinfection	6mg ClO_2/l 12 hours
Conditions to be observed from Worksheets W290 & W291				

Due to the harmful nature of the chemicals used in a disinfection process, these treatments must be conducted by an experienced trained engineer and the process should be documented and recorded.

Continuous treatment of a drinking water system is not recommended under any circumstances. Long-term exposure to aggressive oxidising chemicals will shorten the life of the whole system and may affect warranties.

The maximum permissible time for extended water treatments should follow the details within the table below;

Intermittent disinfection treatments			
Description*	**Max. treatment concentration**	**Max. treatment duration**	**Max. treatment temperature**
Chlorine Cl_2	0.3 mg/l	4 months**	60ºC
	OR***		
Chlorine Dioxide ClO_2	0.2 mg/l	4 months**	60ºC

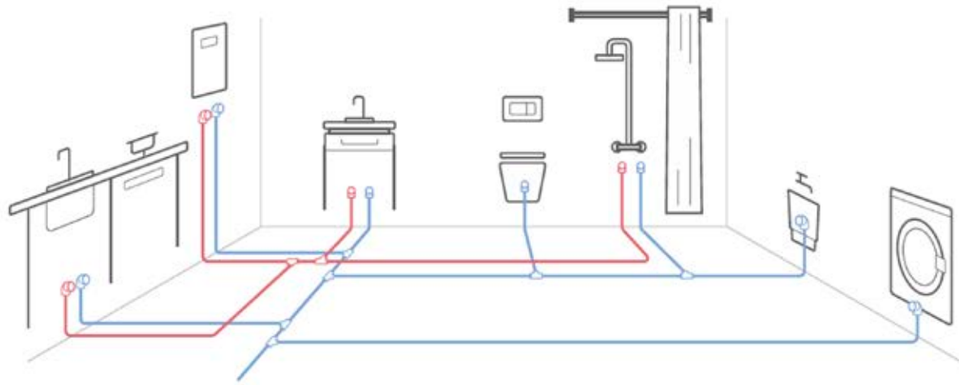
* Any treatments undertaken must use a qualified engineer and correct equipment to approved principals
** Maximum accumulated treatment duration over the entire life of the system (50 years)
*** Even if different treatments are used, the combined maximum period must not exceed 4 months

Stock No. 14070

2.4 Manifold plumbing schemes

T (branch) type installations

Traditional plumbing schemes would often be installed using metal pipe systems and the ‘T’, or branch, type connection principal. Copper in it’s modern form has been used in buildings since the early 20th century, and has largely not developed significantly since it’s inception.



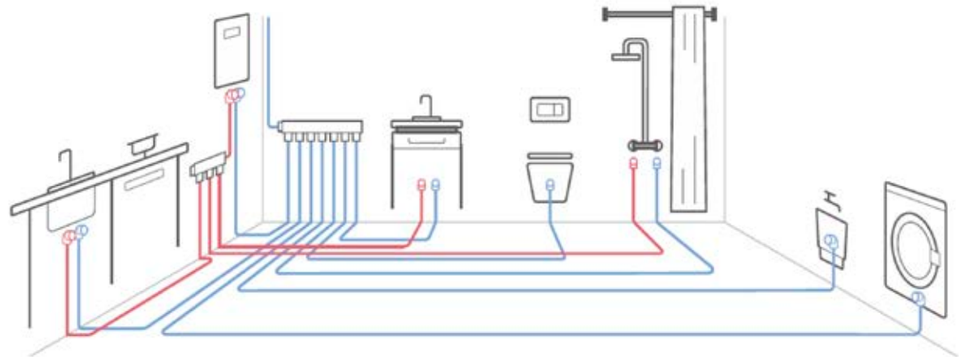
Using this method, the pipe layout in typical apartments or bathrooms generally consists solely of straight and rigid pipes. Where pipes cross on the same surface usually requires the use of additional or special fittings.

The design principal requires that the main supply pipe that feeds water to all sanitary fixtures starts larger and gradually reduces in size as fewer fixtures are connected.

This traditional type of installation is often adopted by installers as it is a tried and tested principal and is easy to calculate. However, this method does not always offer the best performance for hygiene or for fast delivery of hot water and is also the worst performance with regards to wasting potable water.

Manifold type installations

When it comes to pipe systems in modern single-family homes and modern apartment buildings, the Brymec Multilayer system offers the designer a more efficient, more hygienic and higher performance alternative to traditional T (branch) pipe installations.



Our Multilayer pipe system can combine the use of our manifolds and coiled pipes to give joint free connection from the point of supply and the point of use. This solution offers a more secure system with no joints in the walls, floors or ceilings and also reduces cost due to less fittings being used.

Manifold plumbing schemes reduce the sizes of the pipes needed to supply an outlet, meaning the pipes are faster and easier to install, provide a more hygienic delivery of hot water, reduces pressure loss and provides a balanced water pressure when multiple outlets are opened simultaneously.

With smaller pipes used to connect an outlet, less potable water is wasted which is essential to comply with Water Supply (Water Fittings) Regulations and also Part G Building Regulation 2010 - *Sanitation, hot water safety and water efficiency.*

Studies have proven that manifold plumbing schemes are also more energy efficient and are therefore an effective method or reducing overall CO2 emissions for hot water usage.

This method of design involves installing the manifold as close as possible to the heat source with each valved manifold outlet being a dedicated supply to just one outlet. Pipes are generally fed through the fabric of the building and are concealed within the ceilings, the floors or the walls.

2.5 DHW recirculating systems

These systems (known as recirculating, secondary return or ring main systems) carry pumped hot potable water to outlets and is replenished by an incoming water supply to replace the water drawn by hot-water outlets. These systems are very different from intermittent systems for hot water distribution which are only hot when water is being drawn.

In larger DHW schemes, DHW recirculation is used to ensure a fast delivery of hot water to small groups of outlets (i.e. one bathroom) and to avoid excessive water draw off before the hot water to the tap is at the correct temperature.

The required speed of hot water delivery can vary somewhat depending on different standards. However, most standards including NHBC 8.1.5, BS 8558 and CIBSE CP1 state that the temperature requirement for water draw-off should be a minimum of 50°C which is required for the purposes of maintaining the hygiene of both the water and the outlet.

Brymec's Multilayer system is suitable for use in DHW secondary return systems as long as the maximum DHW Operating Conditions found on page 11 are observed.

2.6 Use of trace heating

Electric heat tracing, heat tape or surface heating, is a system used to maintain or raise the temperature of pipes and vessels, either to prevent freezing, or to maintain water temperature to ensure hygiene.

Trace heating is an electrical heating element run in contact along the length of a pipe. The assembly should then be covered with thermal insulation to prevent heat loss from the pipe. Heat generated by the element then maintains the temperature of water within the pipe.

In order for these electric trace heating systems to be used in combination with Brymec MLC, the following conditions should be followed:

- The maximum permissible operating temperature for the trace heating must not exceed 60°C. Thermostatic control, independent to control provided by a self-limiting heating element, must be used to ensure that temperatures are never able to exceed the maximum permissible temperature of 60°C.
- Fixing of the trace heating system should follow the manufacturer's guidelines for connections to MLC systems. Certain adhesives may contain products that could be damaging to the MLC materials. The adhesion of trace heating to the Brymec MLC pipe must have no detrimental effect on the materials and connections within the system.
- Supplementary heating can cause an increase in pressure localised to the area being treated by the trace heating tape. Care must be taken not to exceed the maximum designed operating pressure of the MLC system. If there is potential for pressure to exceed the maximum operating pressure, safety equipment such as expansion vessels and pressure release valves should be added the system.

↑
Electric trace heating

2.7 Connections to equipment and plant

When connecting Brymec Multilayer to a boiler, cylinder or water heating device, always seek advice from the equipment manufacturer as to their guidance for connecting to plastic pipes.

Brymec Multilayer pipes should not be directly connected to boiler, or heaters, that have a constant operating temperature above 70°C (malfunction temperature 95°C for 100h) for tap water, and constant operating temperature above 80°C (malfunction temperature of 100°C for 100h) for heating.

Due to the potential for excessive high temperatures within their systems, Brymec Multilayer should not be used in a bio-mass or solar systems unless satisfactory safety equipment is added to control water temperature.

2.8 Thermal expansion

It is natural for materials to expand in the heat and contract in the cold, and pipes are not immune to nature's laws of physics. Thermal expansion and contraction of pipework is one of the largest dynamic forces acting upon piped services.

Within a building, some of the pipes will inevitably carry hot water to serve the taps and for the heating system. The temperature of the hot water within the system will cause linear expansion of the pipes and will need to be considered so as not to cause unnecessary stresses and potential damage. If left untreated, forces created by thermal expansion can be large enough to cause pipes to bow and buckle, can damage connected equipment or sometimes even damage to the building's fabric.

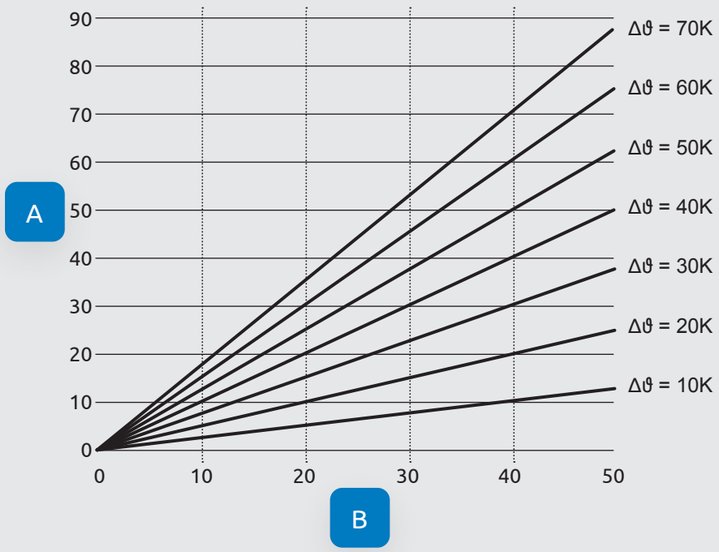
Thermal expansion in our Multilayer system can be compensated in the traditional ways such as Omega loops, expansion bellows, bending legs and changes of direction (depending on the diameter of the pipe).

For pipe sizes 16-32mm low force expansion methods should be used, such as expansion loops, bending legs or changes of direction. For pipe diameters 40mm and above, all methods can be used including expansion bellows. When using either a set metal or rubber bellows, these items are tested to a prescribed number of expansion cycles. For this reason, bellows should always be accessible to allow inspection and replacement if necessary.

The change in length can be determined using a diagram or calculated using the following formula:

$$\Delta L = a \times L \times \Delta\vartheta$$

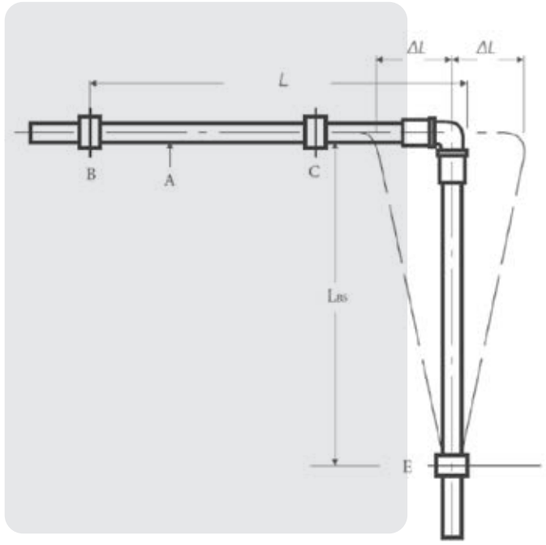
- ΔL = Linear expansion (mm)
- a = Coefficient of linear expansion
- L = length of pipe run
- $\Delta\vartheta$ = Temperature difference (K)



Item	Description
A	Change in length ΔL [mm]
B	Line length L [m]

Change of length diagram for Brymec Multilayer pipes

←



Item	Description
A	Expansion leg
B	Line length L [m]
C	Sliding clamp
D	Bending leg
E	Fixed point
L	Length of bending leg in m
L_{BS}	Bending leg length in mm

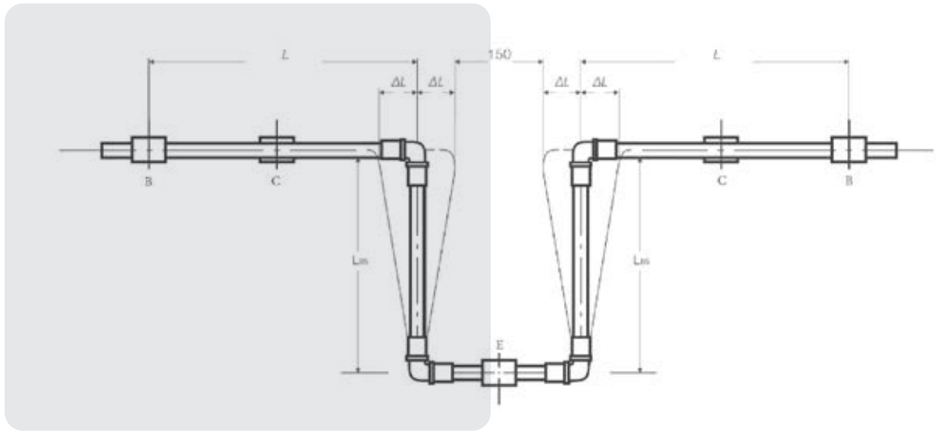
Expansion relief using a bending leg

When planning expansion relief using a bending leg, calculations must be made to ensure that the movement capability of the free leg is sufficient to compensate the required expansion movement without placing too much stress on the system components or the building fabric.

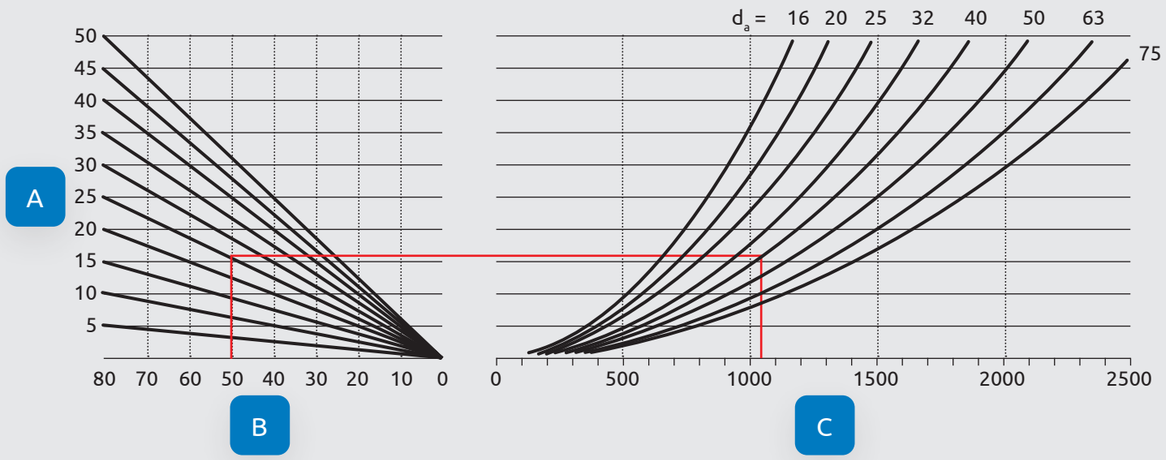
Brymec Multilayer composite pipes to be used for any heated water services must not be installed rigidly (without expansion relief) between two fixed points. The change in length of the pipes must always be absorbed or guided.

Pipe schemes which are exposed to thermal expansion must be provided with a corresponding expansion compensation method. This requires knowledge of the location of all fixed points. Compensation is always performed between two fixed points (FP) or a fixed point and a change of direction (bending leg).

When installing bracketry to provide control of expansion via an expansion loop or a bending leg, the guide bracket 'C' should be mounted close to the bending leg, taking into account leaving space for the expansion or contraction of the Expansion Leg.



2.8 Thermal expansion



Item	Description
A	Length of expansion leg L (m)
B	Temperature difference Δϑ
C	Bending leg length L_{BS} [mm]

Example calculation

Description	Value
Installation temperature	20 °C
Operating temperature	70 °C
Temperature difference Δϑ	50 K
Length of pipe run	25 m
Pipe dimension OD x s	40 mm
Required bending length LBS	approx.1060 mm

Description	Value
L_{BS}	$k \cdot \sqrt{OD \cdot (\Delta\vartheta \cdot a \cdot L)}$
OD	Pipe outer diameter in mm
L	Length of bending leg in m
L_{BS}	Bending leg length in mm
a	Coefficient of linear expansion [0.025 mm/mK
Δϑ	Temperature difference in K
K	30 (material constant)

2.9 Pipe Insulation

Insulation of pipelines is primarily used to reduce heat loss from DHW and LTHW systems and also to prevent unwanted heat gain that can warm cold drinking water in DCW and BCW pipes. However, insulation can also be useful, or even necessary, to avoid freezing, corrosion, condensation and sound transmission.

The insulation requirements for new and existing buildings must be detailed by the project's engineers to comply with the requirements of the Building Regulation - Part L - *Conservation of fuel and power* (or equivalent national standards for Scotland and Wales). Guidance for the specific required performance for each service, in each area of a construction project, is clearly stated within BS5422: 2023.

Where the level of insulation offered by Brymec pre-insulated coils suits the application, they can offer distinct advantages over pipes which require insulation to be added on site. On the one hand, they ensure a rapid installation, whilst at the same time they provide an unbroken thermal insulation with and a sturdy colour coded vapour barrier to provide protection.

With project build times always being reduced, there is an ever-increasing demand for a fast, high-quality installation of the pipe system. Using Brymec pre-insulated pipes means that the installation can be completed by the pipe installation engineers and so there is no need for additional expense employing a specialist contractor to follow and add the insulation once the pipes are in-situ. This also leads to less trades on site, which makes a safer working environment for everyone.

2.10 Fire protection requirements

Building regulations in the United Kingdom are statutory instruments, or statutory regulations, that seek to ensure that the policies set out in the relevant legislation are carried out. Building regulation approval is required for most building work in the UK.

In the UK, the requirements for fire protection are detailed in the relevant government documents:

- **England** - *Fire Safety, Approved Document B - fire safety volume 1: Dwellings, 2019 edition incorporating 2020 and 2022 amendments or Fire Safety Approved Document B - 2019 edition incorporating 2020 and 2022 amendments.*
- **Scotland** – *Building standards technical handbook June 2023: Domestic and Building standards technical handbook June 2023: non-domestic*
- **Wales** - *Welsh Building Regulations 2010, Volume 1 - Dwellinghouses, Approved Document incorporating 2010, 2016 and 2020 amendments or Welsh Building Regulations 2010, Volume 2 - Buildings other than Dwellinghouses, Approved Document incorporating 2010, 2013, 2016, 2017 and 2020 amendments.*

In modern buildings, there are strict regulations governing fire safety and the protection of all areas of a building.

It is sometimes necessary for pipes and other services to pass through fire-separating elements. If a fire-separating element is to be effective, every opening to allow services to pass through should be adequately protected by sealing with appropriate fire-stopping methods so that the fire resistance of the element is not impaired.

In order to guarantee preventive fire protection, the choice of the right building materials is very important. The selection of building materials is regulated and detailed in the above national standards and these standards also contain a list of technical building regulations which must be observed.

In addition to the relevant national standards, product information to the European standard *BS EN 13501-1 'Fire Classification of Construction Products and Building Elements'* and the British National standard *BS 476 'Fire tests on building materials and structures - methods of test to determine the classification of the surface spread of flame of products'* are also important information required by the projects' engineers.

With regards to the Brymec Multilayer pipe system and the use fire stopping measures, our advice is to always follow the guidance from the project's engineers. If deemed suitable by the engineers, fire collars and fire bandages available from the Brymec range of products may be used if any adhesive or methods of application do not damage or compromise the materials of the pipe system.

In many circumstances, intumescent sealants need to be applied. Unless the sealant has been approved by Brymec for use in direct contact with our products, we do not recommend they are applied directly onto our pipe. In some cases, these sealants can damage our pipe materials and may restrict movement.

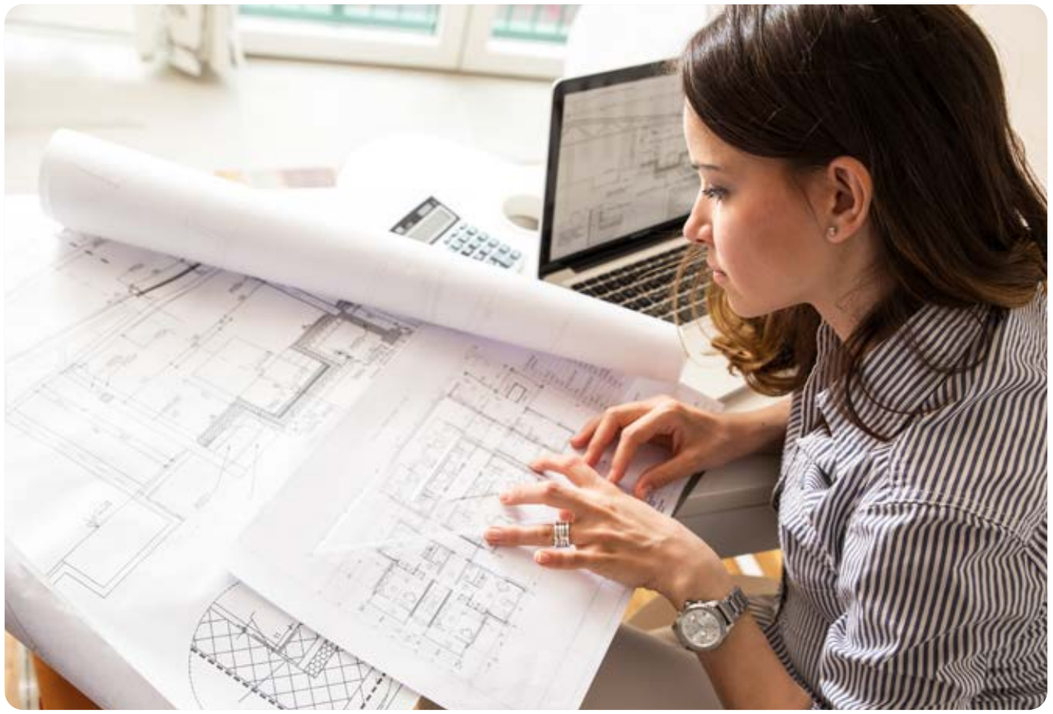
In all instances, any fire-stopping solutions used must demonstrate the ability to provide the correct fire rating by means of certificated 3rd party fire test data.

In a fire situation, different types of plastics perform differently. Any fire stop solutions must therefore be tested on specific pipe types, and this performance testing can then provide engineers with the necessary evidence and information to maintain the correct fire rating for that specific sealing element.

3. Pipe sizing and calculation

When designing a pipe system for any application such as heating, cooling, or for the supply of drinking water, one of the main considerations must be for the use of the correct sized pipe work. If a system is designed with pipes that are too small, it could cause discomfort when using a drinking water system, or in the case of a heating system, the heating performance may not be adequate to suit the building. On the other hand, pipe work that is too large mat cause stagnation within a system, or in the case of a heating system, may cause the loss of too much energy.

Guidance regarding the correct methods of sizing a system should be sought from a recognised standard such as BS EN806-3 or BS 8558.



3.1 Pipe flow rates and pressure loss

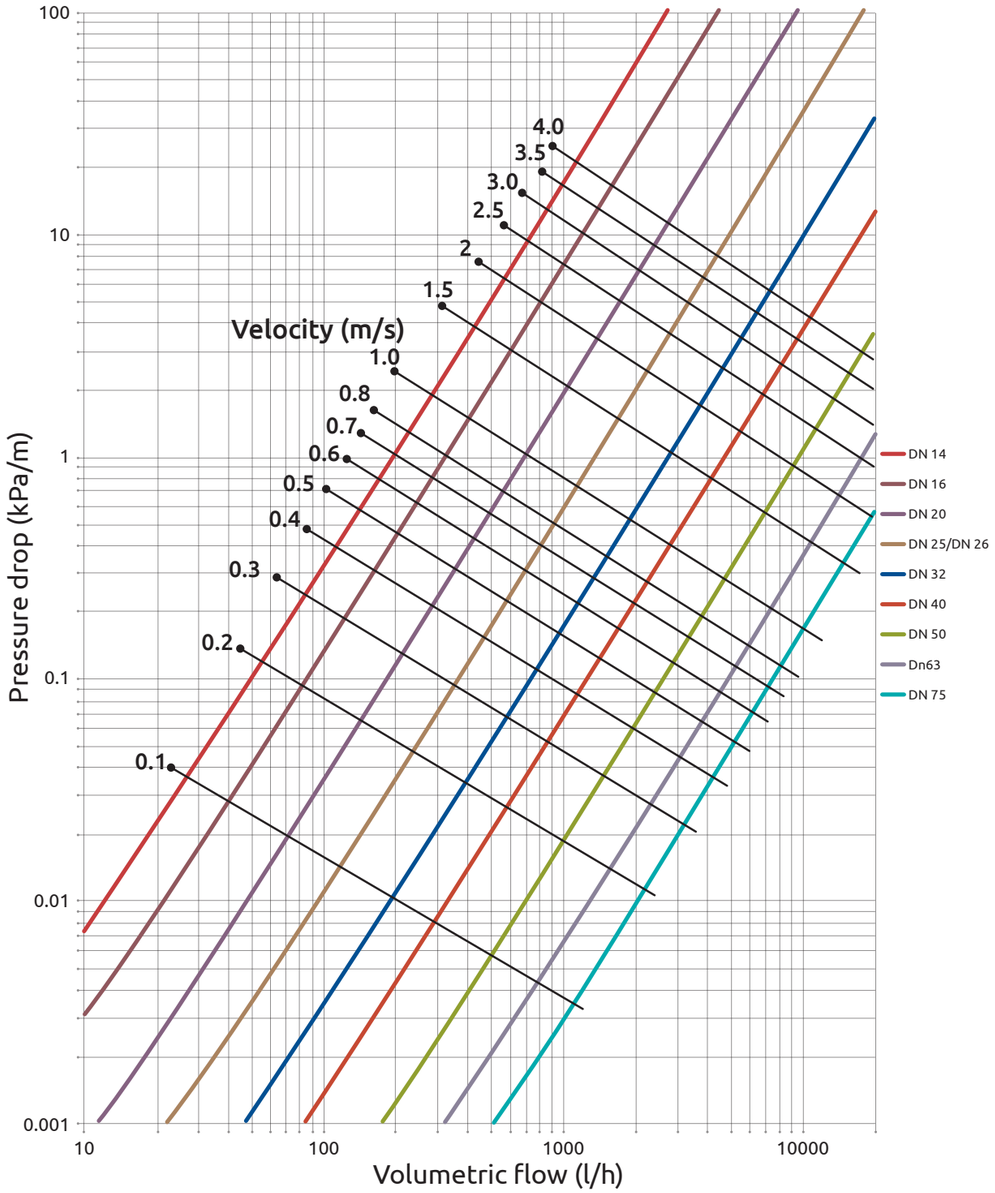
Pressure loss table of PEX/AL/PEX Pipe water temperature = 25° C

	14mm		16mm		20mm		25mm		32mm		40mm		50mm		63mm		75mm	
Q L/S	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s
0.02	0.15	0.26	0.06	0.18	0.02	0.10												
0.04	0.50	0.52	0.21	0.36	0.05	0.20	0.02	0.13										
0.06	1.01	0.79	0.42	0.54	0.11	0.31	0.04	0.19	0.01	0.11								
0.08	1.66	1.05	0.69	0.73	0.18	0.41	0.06	0.25	0.02	0.15	0.01	0.10						
0.10	2.45	1.31	1.02	0.91	0.26	0.51	0.09	0.32	0.02	0.19	0.01	0.13						
0.12	3.37	1.57	1.40	1.09	0.36	0.61	0.12	0.38	0.03	0.23	0.01	0.15						
0.14	4.41	1.84	1.83	1.27	0.47	0.71	0.15	0.45	0.04	0.26	0.02	0.18						
0.16	5.58	2.10	2.32	1.45	0.59	0.82	0.19	0.51	0.06	0.30	0.02	0.20	0.01	0.12				
0.18	6.86	2.36	2.85	1.63	0.72	0.92	0.24	0.57	0.07	0.34	0.03	0.23	0.01	0.13				
0.20	8.27	2.62	3.43	1.81	0.87	1.02	0.28	0.64	0.08	0.38	0.03	0.26	0.01	0.15				
0.30	16.96	3.94	7.01	2.72	1.78	1.53	0.58	0.95	0.17	0.57	0.07	0.38	0.02	0.22	0.01	0.15		
0.40			11.69	3.63	2.96	2.04	0.96	1.27	0.28	0.76	0.11	0.51	0.03	0.30	0.01	0.19	0.00	0.14
0.50					4.39	2.55	1.43	1.59	0.41	0.95	0.16	0.64	0.05	0.37	0.02	0.24	0.01	0.17
0.60					6.08	3.05	1.97	1.91	0.57	1.13	0.22	0.77	0.06	0.45	0.02	0.29	0.01	0.21
0.70					8.00	3.57	2.59	2.23	0.75	1.32	0.29	0.89	0.08	0.52	0.03	0.34	0.01	0.24
0.80					10.15	4.08	3.29	2.55	0.95	1.51	0.37	1.02	0.10	0.60	0.04	0.39	0.02	0.28
0.90							4.05	2.86	1.17	1.70	0.46	1.15	0.13	0.67	0.05	0.44	0.02	0.31
1.00							4.89	3.18	1.41	1.89	0.55	1.28	0.15	0.75	0.05	0.49	0.02	0.35
1.20							6.78	3.82	1.95	2.27	0.76	1.53	0.21	0.90	0.08	0.58	0.03	0.41
1.40									2.56	2.65	1.00	1.79	0.28	1.05	0.10	0.68	0.04	0.48
1.60									3.26	3.03	1.27	2.04	0.35	1.20	0.13	0.78	0.06	0.55
1.80									4.02	3.40	1.56	2.30	0.44	1.35	0.15	0.87	0.07	0.62
2.00									4.86	3.78	1.89	2.55	0.53	1.50	0.19	0.97	0.08	0.69
2.20									5.49	4.16	2.24	2.81	0.62	1.65	0.22	1.07	0.10	0.76
2.40											2.62	3.06	0.73	1.80	0.26	1.16	0.12	0.83
2.60											2.88	3.32	0.84	1.95	0.30	1.26	0.13	0.90
2.80											3.29	3.57	0.96	2.10	0.34	1.36	0.15	0.97
3.00											3.73	3.83	1.09	2.24	0.39	1.46	0.17	1.04
3.20											4.39	4.08	1.22	2.39	0.43	1.55	0.19	1.11
3.40													1.30	2.54	0.48	1.65	0.21	1.18
3.60													1.44	2.69	0.53	1.75	0.24	1.24
3.80													1.59	2.84	0.59	1.84	0.26	1.31
4.00													1.74	2.99	0.65	1.94	0.29	1.38
4.20													1.99	3.14	0.67	2.04	0.31	1.45
4.40													2.17	3.29	0.73	2.13	0.34	1.52
4.60													2.35	3.44	0.79	2.23	0.37	1.59
4.80													2.53	3.59	0.85	2.33	0.40	1.66
5.00													2.73	3.74	0.96	2.43	0.41	1.73
5.20													2.93	3.89	1.03	2.52	0.44	1.80
5.40													3..13	4.04	1.11	2.62	0.47	1.87
5.60															1.18	2.72	0.50	1.94
5.80															1.26	2.81	0.53	2.01
6.00															1.34	2.91	0.59	2.07
6.20															1.42	3.01	0.63	2.14
6.40															1.50	3.10	0.67	2.21
6.60															1.59	3.20	0.70	2.28
6.80															1.68	3.30	0.74	2.35
7.00															1.77	3.40	0.78	2.42

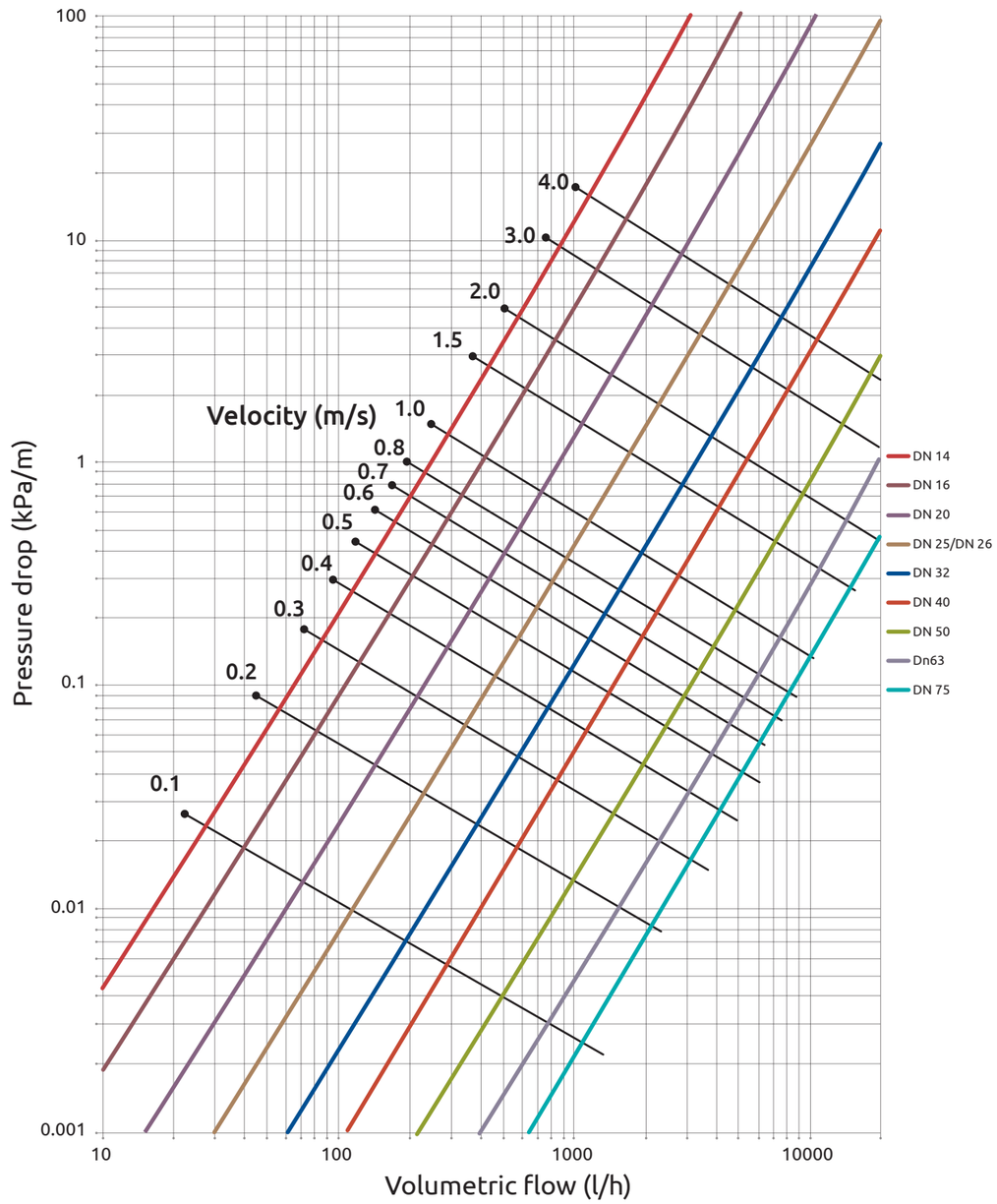
Pressure loss table of PEX/AL/PEX Pipe water temperature = 70° C

	14mm		16mm		20mm		25mm		32mm		40mm		50mm		63mm		75mm	
Q L/S	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s	i KPa/m	V m/s
0.02	0.12	0.26	0.05	0.18	0.01	0.10												
0.04	0.40	0.52	0.16	0.36	0.04	0.20	0.01	0.13										
0.06	0.81	0.79	0.33	0.54	0.09	0.31	0.03	0.19	0.01	0.11								
0.08	1.34	1.05	0.56	0.73	0.14	0.41	0.05	0.25	0.01	0.15	0.01	0.10						
0.10	1.99	1.31	0.82	0.91	0.21	0.51	0.07	0.32	0.02	0.19	0.01	0.13						
0.12	2.75	1.57	1.14	1.09	0.29	0.61	0.09	0.38	0.03	0.23	0.01	0.15						
0.14	3.61	1.84	1.49	1.27	0.38	0.71	0.12	0.45	0.04	0.26	0.01	0.18						
0.16	4.42	2.10	1.89	1.45	0.48	0.82	0.16	0.51	0.05	0.30	0.02	0.20	0.00	0.12				
0.18	5.47	2.36	2.25	1.63	0.59	0.92	0.19	0.57	0.06	0.34	0.02	0.23	0.01	0.13				
0.20	6.63	2.63	2.72	1.81	0.71	1.02	0.23	0.64	0.07	0.38	0.03	0.26	0.01	0.15				
0.30	13.83	3.94	5.67	2.72	1.42	1.53	0.46	0.95	0.14	0.57	0.05	0.38	0.01	0.22	0.01	0.15		
0.40			9.57	3.63	2.39	2.04	0.77	1.27	0.22	0.76	0.09	0.51	0.02	0.30	0.01	0.19	0.00	0.14
0.50					3.59	2.55	1.15	1.59	0.33	0.95	0.13	0.64	0.04	0.37	0.01	0.24	0.01	0.17
0.60					4.99	3.06	1.60	1.91	0.46	1.13	0.18	0.77	0.05	0.45	0.02	0.29	0.01	0.21
0.70					6.61	3.57	2.12	2.23	0.60	1.32	0.23	0.89	0.06	0.52	0.02	0.34	0.01	0.24
0.80					8.42	4.08	2.70	2.55	0.77	1.51	0.30	1.02	0.08	0.60	0.03	0.39	0.01	0.28
0.90							3.35	2.86	0.95	1.70	0.37	1.15	0.10	0.67	0.04	0.44	0.02	0.31
1.00							4.05	3.18	1.16	1.89	0.45	1.28	0.12	0.75	0.04	0.49	0.02	0.35
1.20							5.65	3.82	1.61	2.27	0.62	1.53	0.17	0.90	0.06	0.58	0.03	0.41
1.40									2.13	2.65	0.82	1.79	0.23	1.05	0.08	0.68	0.04	0.48
1.60									2.71	3.03	1.05	2.04	0.29	1.20	0.10	0.78	0.05	0.55
1.80									3.36	3.40	1.30	2.30	0.36	1.35	0.13	0.87	0.06	0.62
2.00									4.08	3.78	11.58	2.55	0.44	1.50	0.15	0.97	0.07	0.69
2.20											1.87	2.81	0.52	1.65	0.18	1.07	0.08	0.76
2.40											2.20	3.06	0.61	1.80	0.21	1.16	0.09	0.83
2.60											2.54	3.32	0.70	1.95	0.25	1.26	0.11	0.90
2.80											2.91	3.57	0.80	2.10	0.28	1.36	0.13	0.97
3.00											3.30	3.83	0.91	2.24	0.32	1.46	0.14	1.04
3.20											3.49	4.08	1.02	2.39	0.36	1.55	0.16	1.11
3.40													1.14	2.54	0.40	1.65	0.18	1.18
3.60													1.27	2.69	0.45	1.75	0.20	1.24
3.80													1.40	2.84	0.49	1.84	0.22	1.31
4.00													1.54	2.99	0.54	1.94	0.24	1.38
4.20													1.58	3.14	0.59	2.04	0.26	1.45
4.40													1.73	3.29	0.64	2.13	0.28	1.52
4.60													1.87	3.44	0.70	2.23	0.31	1.59
4.80													2.03	3.59	0.75	2.33	0.33	1.66
5.00													2.19	3.74	0.76	2.43	0.36	1.73
5.20													2.35	3.89	0.82	2.52	0.39	1.80
5.40													2.52	4.04	0.88	2.62	0.41	1.87
5.60															0.94	2.72	0.44	1.94
5.80															1.00	2.81	0.47	2.01
6.00															1.07	2.91	0.47	2.07
6.20															1.14	3.01	0.50	2.14
6.40															1.21	3.10	0.53	2.21
6.60															1.28	3.20	0.56	2.28
6.80															1.35	3.30	0.59	2.35
7.00															1.42	3.40	0.63	2.42

Pressure drop of the pipes 10°C (kPa/m)



Pressure drop of the pipes 70°C (kPa/m)



3.2 Pipe pressure loss for heating applications

Heating systems pressure loss - ΔT 20°C (70°C - 50°C - Correction factor @60°C 0.861)

		16mm - 0.11 l/m		20mm - 0.20 l/m		25mm - 0.31 l/m		32mm - 0.53 l/m		40mm - 0.80 l/m		50mm - 1.32 l/m		63mm - 2.04 l/m		75mm - 2.83 l/m	
W	kg/h	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m
400	17	0.05	6														
600	26	0.07	9														
800	34	0.09	14	0.05	5												
1000	43	0.11	18	0.06	7												
1200	52	0.14	26	0.08	9	0.05											
1400	60	0.16	34	0.09	13	0.06											
1800	78	0.20	51	0.11	15	0.07	4	0.05	3								
2000	86	0.22	60	0.12	19	0.08	7	0.05	6								
2500	107	0.28	93	0.15	26	0.10	11	0.06	7								
3000	129	0.33	127	0.18	35	0.12	13	0.07	7	0.05	1						
3500	150	0.38	169	0.21	45	0.14	18	0.08	8	0.06	1						
4000	172	0.44	211	0.24	54	0.16	23	0.10	9	0.06	2						
4500	194	0.49	271	0.27	71	0.18	26	0.11	10	0.07	3						
5000	215	0.55	322	0.30	80	0.20	30	0.12	11	0.08	3						
5500	237	0.60	389	0.33	93	0.22	35	0.13	13	0.09	4	0.05	1				
6000	258	0.66	456	0.36	110	0.24	42	0.14	14	0.09	6	0.06	2				
6500	280	0.71	533	0.39	128	0.26	44	0.15	16	0.10	8	0.06	3				
7000	301	0.77	608	0.42	153	0.27	51	0.16	18	0.11	9	0.07	3				
7500	323	0.82	693	0.45	171	0.29	60	0.17	20	0.12	10	0.07	4				
8000	344	0.87	777	0.48	195	0.31	69	0.19	23	0.12	10	0.08	4				
8500	366	0.93	870	0.51	211	0.33	77	0.20	25	0.13	12	0.08	5	0.05	1		
9000	387	0.98	963	0.54	237	0.35	83	0.21	26	0.14	15	0.09	5	0.06	1		
9500	409	1.04	1072	0.57	263	0.37	93	0.22	29	0.15	17	0.09	6	0.06	2		
10000	430	1.09	1174	0.60	288	0.39	102	0.23	33	0.15	19	0.1	6	0.06	3		
11000	474	1.20	1401	0.66	347	0.43	119	0.25	35	0.17	20	0.1	7	0.07	3		
12000	517	1.31	1647	0.72	406	0.47	136	0.28	43	0.18	22	0.11	8	0.08	4		
13000	560	1.42	1917	0.78	473	0.51	162	0.30	47	0.20	24	0.12	9	0.08	4		
14000	603	1.53	2195	0.84	541	0.55	186	0.32	51	0.21	28	0.13	11	0.09	5		
15000	646			0.90	617	0.58	212	0.34	60	0.23	29	0.14	13	0.09	5	0.07	1
16000	689			0.96	694	0.62	237	0.37	69	0.24	30	0.15	14	0.10	6	0.07	1
17000	732			1.02	777	0.66	262	0.39	76	0.26	32	0.16	16	0.10	6	0.08	2
18000	775			1.08	862	0.70	288	0.41	85	0.27	36	0.17	17	0.11	7	0.08	3
19000	818			1.14	954	0.74	322	0.43	93	0.29	40	0.18	18	0.12	7	0.09	3
20000	861			1.20	1047	0.78	355	0.46	102	0.30	43	0.19	19	0.12	8	0.09	4
21000	904			1.26	1150	0.82	390	0.48	111	0.32	49	0.2	19	0.13	9	0.09	4
22000	947			1.32	1253	0.85	423	0.50	119	0.33	54	0.2	19	0.13	9	0.10	5
23000	990			1.38	1352	0.89	457	0.52	127	0.35	58	0.21	21	0.14	10	0.10	5
24000	1033			1.44	1469	0.93	499	0.55	136	0.36	60	0.22	23	0.15	11	0.11	6
25000	1077			1.50	1580	0.97	533	0.57	153	0.38	66	0.23	25	0.15	12	0.11	6
26000	1120					1.01	575	0.59	161	0.39	70	0.24	25	0.16	13	0.11	7
27000	1163					1.05	617	0.61	170	0.41	75	0.25	26	0.16	13	0.12	7
28000	1206					1.09	659	0.64	186	0.42	78	0.26	27	0.17	14	0.12	7
29000	1249					1.12	701	0.66	195	0.44	82	0.27	28	0.18	15	0.13	8
30000	1292					1.16	752	0.68	211	0.45	89	0.28	31	0.18	16	0.13	8
32000	1378					1.24	845	0.73	237	0.48	99	0.29	32	0.19	17	0.14	9
34000	1464					1.32	946	0.77	262	0.51	108	0.31	34	0.20	18	0.15	9
36000	1550					1.39	1047	0.82	296	0.54	128	0.33	36	0.22	19	0.16	11
38000	1636					1.47	1158	0.86	322	0.57	138	0.35	39	0.23	21	0.17	13
40000	1722					1.55	1276	0.91	355	0.60	148	0.37	44	0.24	23	0.17	15

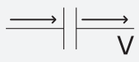
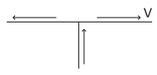
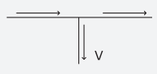
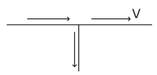
Heating systems pressure loss - ΔT 10°C (60°C / 50°C - Correction factor @50°C 0.890)

		16mm - 0.11 l/m		20mm - 0.20 l/m		25mm - 0.31 l/m		32mm - 0.53 l/m		40mm - 0.80 l/m		50mm - 1.32 l/m		63mm - 2.04 l/m		75mm - 2.83 l/m	
W	kg/h	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m	v - m/s	Pa/m
400	34	0.09	9	0.05	6												
600	52	0.14	27	0.08	9	0.05	4										
800	68	0.18	44	0.10	14	0.07	6	0.04	2								
1000	86	0.22	62	0.12	18	0.08	9	0.05	3								
1200	104	0.27	88	0.15	24	0.10	13	0.06	4								
1400	120	0.31	114	0.17	27	0.11	17	0.07	5	0.05	2						
1800	156	0.40	184	0.22	44	0.14	18	0.09	6	0.06	3						
2000	172	0.44	219	0.24	53	0.16	22	0.10	8	0.06	4						
2500	214	0.55	332	0.30	80	0.20	27	0.12	9	0.08	6	0.05	1				
3000	258	0.66	472	0.36	114	0.24	35	0.14	14	0.09	8	0.06	2				
3500	300	0.76	472	0.42	158	0.27	53	0.16	18	0.11	9	0.07	2				
4000	344	0.87	803	0.48	202	0.31	71	0.19	23	0.12	11	0.08	3				
4500	388	0.98	1004	0.54	245	0.35	88	0.21	27	0.14	13	0.09	4				
5000	430	1.09	1214	0.60	298	0.39	106	0.23	32	0.15	15	0.10	5				
5500	474	1.20	1449	0.66	358	0.43	122	0.25	35	0.17	17	0.10	6				
6000	516	1.31	1702	0.72	420	0.47	140	0.28	44	0.18	18	0.11	8				
6500	560	1.42	1982	0.78	489	0.51	166	0.30	49	0.20	20	0.12	9				
7000	602	1.53	2260	0.84	559	0.54	193	0.32	53	0.21	24	0.13	10	0.09	1		
7500	646			0.90	638	0.58	219	0.34	62	0.23	25	0.14	11	0.09	1		
8000	688			0.96	716	0.62	245	0.37	71	0.24	27	0.15	12	0.10	3		
8500	732			1.02	803	0.66	271	0.39	79	0.26	30	0.16	14	0.10	5		
9000	774			1.08	890	0.70	298	0.41	88	0.27	33	0.17	15	0.11	6		
9500	818			1.14	987	0.74	332	0.43	97	0.29	35	0.18	17	0.12	8	0.09	1
10000	860			1.20	1083	0.78	367	0.46	106	0.30	40	0.19	17	0.12	9	0.09	1
11000	948			1.32	1292	0.85	437	0.50	122	0.33	44	0.20	18	0.13	9	0.10	3
12000	1034			1.44	1519	0.93	516	0.55	140	0.36	53	0.22	21	0.15	10	0.11	4
13000	1120			1.56	1764	1.01	594	0.59	114	0.39	62	0.24	24	0.16	11	0.11	5
14000	1206					1.09	681	0.64	193	0.42	71	0.26	26	0.17	12	0.12	7
15000	1292					1.16	777	0.68	219	0.45	79	0.28	27	0.18	13	0.13	8
16000	1378					1.24	874	0.73	245	0.48	88	0.29	30	0.19	14	0.14	9
17000	1464					1.32	978	0.77	271	0.51	97	0.31	33	0.20	15	0.15	9
18000	1550					1.39	1083	0.82	306	0.54	114	0.33	35	0.22	17	0.16	9
19000	1636					1.47	1197	0.86	332	0.57	122	0.35	40	0.23	17	0.17	10
20000	1722					1.55	1319	0.91	367	0.60	131	0.37	44	0.24	18	0.17	10
21000	1808							0.95	402	0.63	149	0.39	48	0.25	19	0.18	11
22000	1894							1.00	437	0.66	158	0.40	50	0.26	20	0.19	11
23000	1980							1.04	471	0.69	175	0.42	53	0.27	22	0.20	12
24000	2066							1.09	516	0.72	184	0.44	57	0.29	24	0.21	13
25000	2154							1.13	559	0.75	202	0.46	62	0.30	25	0.22	14
26000	2240							1.18	594	0.78	219	0.48	66	0.31	27	0.22	15
27000	2326							1.22	638	0.81	236	0.49	71	0.32	29	0.23	16
28000	2412							1.27	681	0.84	254	0.51	79	0.33	31	0.24	17
29000	2498							1.31	734	0.87	262	0.53	83	0.35	33	0.25	17
30000	2584							1.36	777	0.90	280	0.55	88	0.36	34	0.26	18
32000	2756							1.45	874	0.96	324	0.58	97	0.38	35	0.28	20
34000	2928							1.54	978	1.02	358	0.62	106	0.40	40	0.29	22
36000	3100									1.08	393	0.66	122	0.43	44	0.31	24
38000	3272									1.14	437	0.69	131	0.45	49	0.33	25
40000	3444									1.20	481	0.73	149	0.47	53	0.34	27

3.3 Multilayer fittings technical information

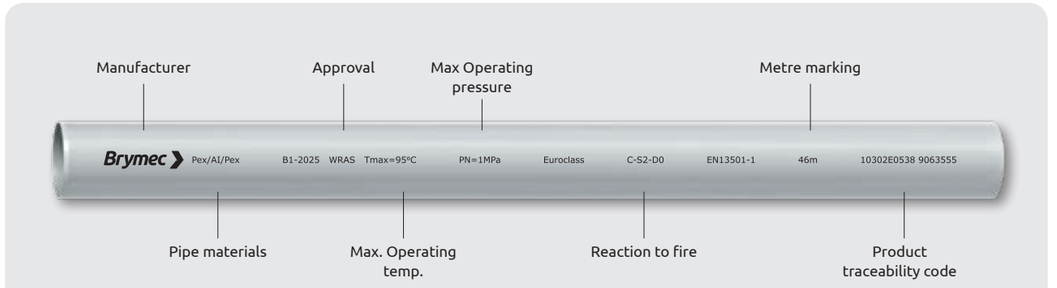
Brymec Multilayer Fittings Technical Information	
Body Material	CW617N (equivalent)
Plastic Press Jaw Guide Material	Polyethylene
Press Sleeve Material	Stainless Steel 1.4301 (304)
O-ring Material	2 x EPDM (Ethylene Propylene Diene Monomer rubber- UBA Elastomer) to BS EN 681-1 with engineered leak path
Approved Press Profile	CNAF compressed fibre washers
Approved Press Profiles	U-Profile
Thread Standard	BSP - R & Rp to BS EN10226:-1 2004
Manufacturing Standard	BS EN ISO 21003:2008-3

3.4 Fitting Zeta values and pressure loss

			Siemans STAR CCM+ , Density 997.6 kg/m³, Velocity 2m/s					
			OD					
			16mm	20mm	25mm	32mm	40mm	50mm
90° Elbow		Flow resistance - ζ (Zeta)	1.76	1.46	1.41	1.39	1.47	1.45
		Equivalent Length - eL (m)	0.82	1.01	1.31	1.83	2.51	3.39
45° Elbow		Flow resistance - ζ (Zeta)	1.00	0.72	0.62	0.53	0.59	0.48
		Equivalent Length - eL (m)	0.47	0.50	0.57	0.69	1.01	1.12
Straight Coupler		Flow resistance - ζ (Zeta)	0.68	0.42	0.27	0.20	0.31	0.20
		Equivalent Length - eL (m)	0.32	0.29	0.25	0.26	0.53	0.47
Branch Fed Tee		Flow resistance - ζ (Zeta)	1.83	1.55	1.55	1.48	1.55	1.54
		Equivalent Length - eL (m)	0.85	1.07	1.45	1.94	2.66	3.59
End Fed Tee		Flow resistance - ζ (Zeta)	1.82	1.49	1.43	1.42	1.48	1.46
		Equivalent Length - eL (m)	0.85	1.03	1.33	1.86	2.53	3.40
End Fed Tee		Flow resistance - ζ (Zeta)	0.80	0.54	0.38	0.28	0.42	0.31
		Equivalent Length - eL (m)	0.37	0.37	0.35	0.37	0.73	0.73

3.5 Multilayer pipe technical information

Brymec Multilayer Pipe Technical Information						
OD	16mm	20mm	25mm	32mm	40mm	50mm
Nominal wall thickness - mm	2.0	2.0	2.5	3.0	4.0	4.5
Internal Diameter - mm	12.0	16.0	20.0	26.0	32.0	41.0
Pipe weight - Kg	0.109	0.146	0.220	0.340	0.525	0.782
Water Volume - L/m	0.113	0.201	0.314	0.531	0.804	1.320
Pipe weight with water - Kg	0.222	0.347	0.534	0.871	1.329	2.102
Max. Operating Pressure	10 Bar to BS EN21003:2008					
Max. Operating Temperature	See table of operating conditions on page 11					
Thermal Expansion Coefficient	0.025 mm (m*K) BS EN 806					
Thermal Conductivity	0.45 W/(m*K)					
Internal Roughness	0.0007mm					
Pipe Constuction	PE-Xb / Aluminium / PE-Xb					
Reaction To Fire	C-S2-D0 to BS EN13501-1					
Pipe identification markings	Markings at 1m intervals with full production data according to BS EN21003:2008					
Oxygen Permeability	100% oxygen diffusion tight, exceeding the requirements of DIN 4726					
Hygiene	Pipes capped immediately after producton - to BS EN 806-5					
Approvals	WRAS - 2012108					
Pre-insulated Pipes	50m, pre-insulated coils with 13mm insulation λ 0.04 W/m*K, with a PE vapour barrier					
Insulation Reaction to Fire	BL-S1-D0 to BS EN13501-1 (test report includes insulation and LDPE vapour barrier as required by BS 5422:2023-6.2.2)					
Design Support	BIM - COBie Level 2					



Brymec Multilayer pipes are clearly labelled for easy identification purposes. codes are added to identify every part of the product's manufacturing, from batches of raw materials to the machines used, the time and date of manufacture and even down to the named person operating the production equipment. This feature is all part of the Brymec quality process and enables us to track every meter of pipe that we supply.

Reaction to fire

Brymec Multilayer pipe is certified as Class C-S2-D0 to the requirements of - *BS EN 13501-1:2018 Fire classification of construction products and building elements. Classification using data from reaction to fire tests.*

4. Installation

It is extremely important when installing the Brymec Multilayer system that each engineer is familiar with the correct handling, installation and safety procedures. We highly recommend that each engineer undertakes our free, certificated, on-site installation training. Please contact sales@brymec.com

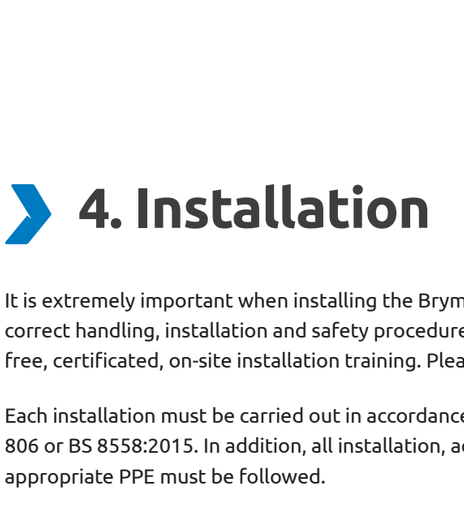
Each installation must be carried out in accordance with recognised national engineering standard such as BS EN 806 or BS 8558:2015. In addition, all installation, accident prevention and safety regulations, including the use of appropriate PPE must be followed.

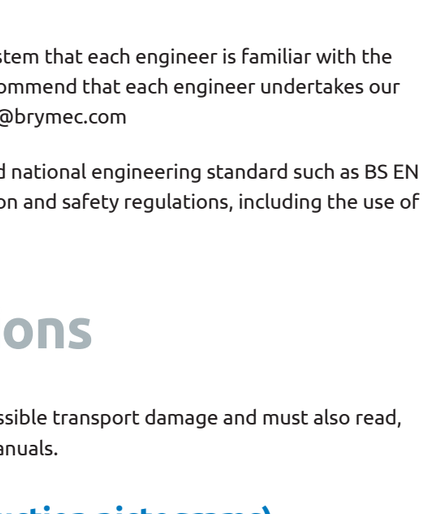
4.1 Installation instructions

Before installation, the installer must check all components for possible transport damage and must also read, understand and observe the relevant installation and operating manuals.

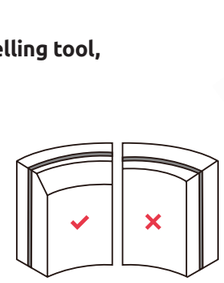
Fast, simple 4 step installation (new instruction pictograms)

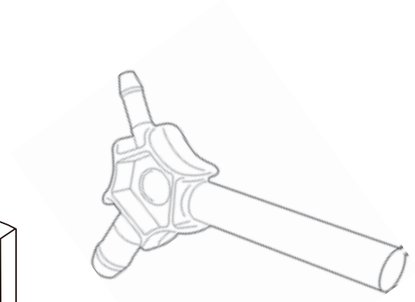
1. Cut the pipe, perpendicular to the axis, using an appropriate smooth bladed cutting tool



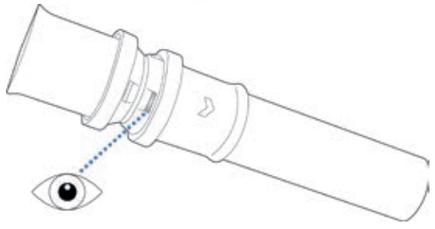


2. Using the appropriate Brymec bevelling tool, calibrate and bevel the pipe

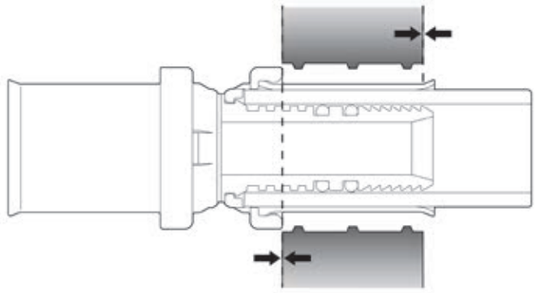


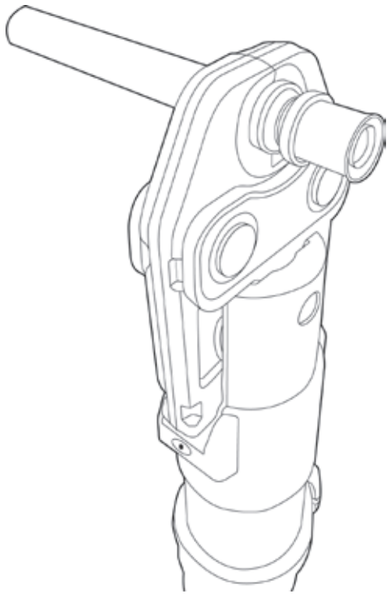


3. Apply the fitting to the end of the pipe until the pipe is clearly visible in the observation windows



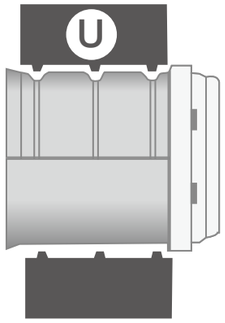
4. Locate the press jaw securely in between the plastic tool guide and the profile of the press collar (U profile)





4.2 Tool Compatibility

Key to the strength and security of the Brymec Multilayer Press-fit System, is the use of calibrated hydraulic press tooling to make the permanent, leak-free connections. These high-performance tools must be used in combination with the correct corresponding approved jaws.



To ensure that each and every connection is 100% watertight and secure, the correct U-profile jaws must be used.

HYDRAULIC PRESS TOOL		Press Jaw / Sling Dimension		
Manufacturer	**Model Number**	**Type 16 - 32mm**	**Type 40 - 50mm**	**Press Profile**
Rothenberger	Romax Compact	Yes	No	U
	Romax 3000 AC	Yes	No	U
	Romax 4000	Yes	Yes	U
Novapress	ACO 103	Yes	No	U
	ACO 201 / 202 / 203	Yes	Yes	U
	ACO 202XL / 203XL	Yes	Yes	U
	ECO 201 / 202 / 203	Yes	No	U
Milwaukee	M12 HPT	Yes	No	U
	M18 HPT	Yes	Yes	U
Rigid	RP241	Yes	No	U
	RP300B	Yes	No	U
	RP350	Yes	No	U
	RP351	Yes	No	U
	RP342XL	Yes	Yes	U
Rems	AKKU ACC 22V mini-press	Yes	No	U
	AKKU Press ACC	Yes	Yes	U
	Power Press ACC	Yes	Yes	U
	Power Press ACC XL	Yes	Yes	U
	AKKU ACC 22V (not Mini-press)	Yes	Yes	U
Hilti	Nuron NPR 19-32	Yes	No	U
	Nuron NPR 32-22	Yes	No	U
Klauke	MAP215	Yes	No	U
	MAP 219	Yes	No	U
	UAP 332	Yes	No	U
	UAP432	Yes	Yes	U
Uponor	Mini 32	Yes	No	U
	UP110	Yes	Yes	U

Each hydraulic press tool, press jaw, intermediate adapter or press sling should be able to demonstrate a calibration date certificate, which identifies the date the next calibration or inspection is due. Generally, these inspections should occur at least once every 12 months – unless stated otherwise by the relevant tool manufacturer.

Certificate to identify the next recommended date of inspection or calibration

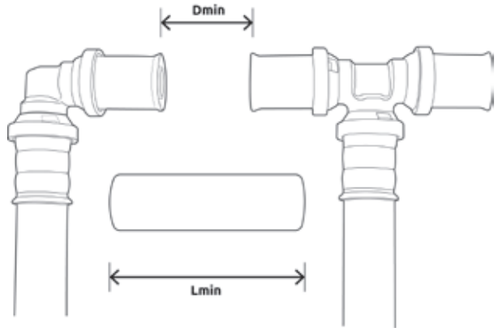
4.3 Planning the installation and pipe spacing

Before installing any pipework, it is important that the project specification is consulted to understand the necessary spacing of the services in order that the required thickness of insulation can be applied.

However, it is also important to plan the overall layout of the system to make sure that each connection has enough room in order that the press jaw can be correctly located on the fittings, and also so there is sufficient room between the connection being pressed and the adjacent services or the fabric of the building.

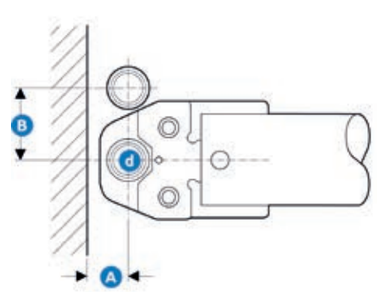
To ensure that every connection is completely safe, secure and watertight, there is a minimum safe distance that must be maintained between two adjacent pressed connections. This safe distance is maintained in order that the pressing process on either fitting will not affect the performance or security of the other.

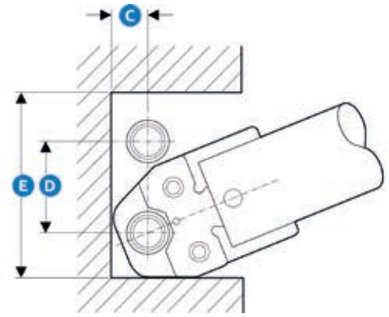
The table below gives the minimum length of pipe (Lmin) that can be cut to achieve the minimum distance that is acceptable between the two fittings (Dmin).



Pipe diameter	Min. between fittings (Dmin)	Min. length of pipe (Lmin)
OD	Dmin	Lmin
16mm	16mm	70mm
20mm	35mm	90mm
25mm	60mm	115mm
32mm	80mm	145mm
40mm	100mm	-
50mm	140mm	-

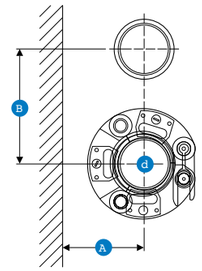
Space requirements when pressing with press jaws for mounting on a wall, in corners and in ducts

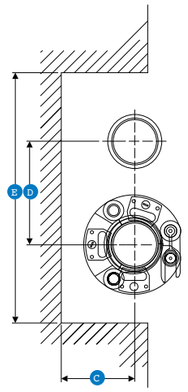




Pipe minimum fixing distances (16-32mm)					
Pipe size OD (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
16	20	45	30	88	148
20	22	48	32	90	154
25	28	71	49	105	203
32	28	75	50	110	210

Space requirements when pressing with a press collar or for mounting on a smooth wall, in corners and in ducts.





Pipe minimum fixing distances (40-50mm)					
Pipe size OD (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
40	55	90	55	90	210
50	60	100	60	100	230

4.4 Pipe supports, anchor points and fixing distances

Pipe supports and fixing points must be planned in order to provide structural security for the installed services. The type of bracket or support used must be correctly specified in order that it can be suitable to provide adequate support for the total weight of the pipe + weight of water + weight of insulation. Bracketry should be capable of catering for the intended applied forces for the application, including for the control of thermal expansion. Guidance can be sought from BS EN 806:part 4 - 4.7.2 and Annex B.

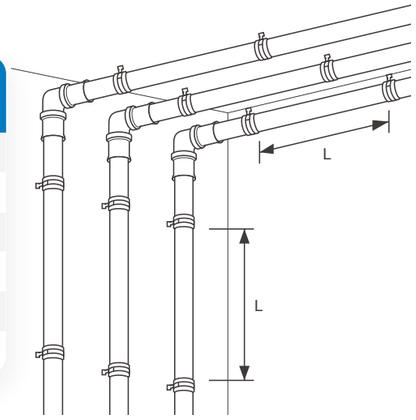
When choosing which brackets should be applied at each area of the system, firstly refer to the project's specification for clear guidance on the requirements for application of the insulation. Brackets can come in several forms depending if they will be required to be mounted over insulating blocks, over the insulation itself, or indeed if they are to be installed directly onto the pipe.

However, whatever the style of bracket, some common rules must always apply. Brackets must never provide a route for heat losses, must always prevent the transfer of noises from the pipes to the building structure and should never be a cause of unwanted corrosion. Where thermal movement and expansion will occur between two fixed points (anchor points), the support brackets must not restrict or inhibit the movement of the pipes towards the installed method of expansion relief.

Selecting the correct bracket arrangements for your needs is an important part of ensuring the overall quality of your installation. Brymec offers a wide range of pipe brackets and associated fixings that are intended for use with our Multilayer system. Please contact sales@brymec.com for advice.

Maximum support spacing of pipeline

Pipe Dimension OD (mm)	Horizontal Spacing (m)	Vertical Spacing (m)
16	1.20	1.55
20	1.20	1.70
25	1.30	1.95
32	1.60	2.10
40	1.70	2.20
50	2.00	2.60

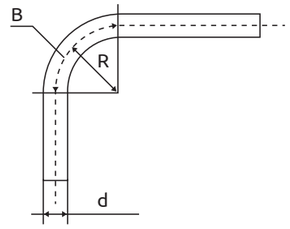


The above table shows the maximum fixing distance "L" between the individual pipe clamps for the different pipe dimensions (shorter fixing distances may need to be used in certain systems).

4.5 Minimum bending radii

Reducing the number of fittings used to install a system is part of the DNA of the Brymec Multilayer system. Fewer fittings mean the system is faster to install, cheaper to install, and the overall performance of the system is optimised.

For pipe sizes 16-25mm, bends are easy to form by hand or with the aid of a suitable bending spring or a suitable mechanical bending tool. To maintain the hygiene, metal internal springs should not be used for bending pipes intended for use in drinking water systems.



Multilayer minimum bending radii				
Pipe diameter OD	Min. radius without tools (by hand)	Min. radius with external bending spring	Min. radius with internal bending spring	Min. radius with bending tool
16	80mm	70mm	60mm	32mm
20	100mm	90mm	80mm	60mm
25	130mm	110mm	100mm	75mm

Bending by hand

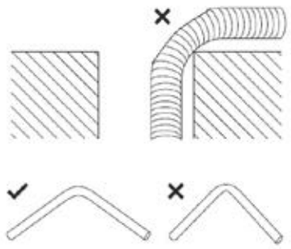
Bending using external spring

Bending using internal spring

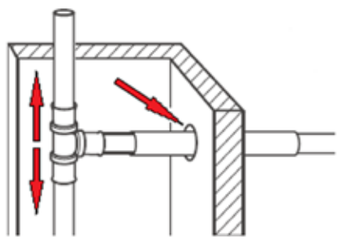
Bending using an appropriate bending tool

4.6 Pipes passing through structures

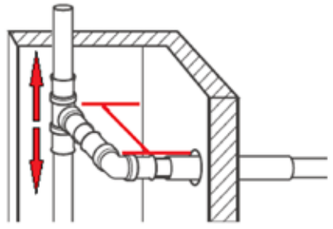
When passing through floors, walls and ceilings, pipes must never be bent using the structure of the building.



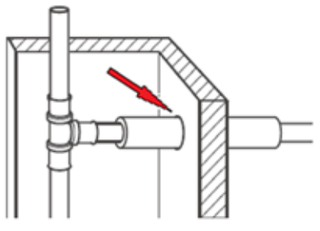
When passing pipes through a wall, floor or ceiling, unrestricted movement of the pipe must be permitted. Thermal expansion of pipe lengths must not cause pipe branches to force against apertures and outlets BS EN 806 4.7.5 states ‘pipes passing through walls and floors should be sleeved’.



Where possible, an in-direct pipe route will assist with reducing the opportunity for un-wanted forces to be applied to branches passing through a wall, floor or ceiling.



If the specified fire stopping methods permit, it is advisable to add a continuous insulation through any wall, floor or ceiling penetration. The addition of the insulation will allow greater movement of the pipe, whilst maintaining an unbroken insulation layer to prevent heat loss, or gain.



4.7 Laying pipes within a concrete floor

There are several reasons that pipes will need to be installed within a concrete or screed floor. Obviously, for the purposes of UFH, the whole principal of the system relies on the embedment of the pipe into a solid screed in order to provide heat. However, for many standard plumbing and heating systems, pipes may need to route through a screed or concrete floor as the only direct route to reach services, appliances and outlets.

Standard screeds and concretes will not have any detrimental affect on the Brymec Multilayer pipes, but some design considerations need to be considered when planning the installation.

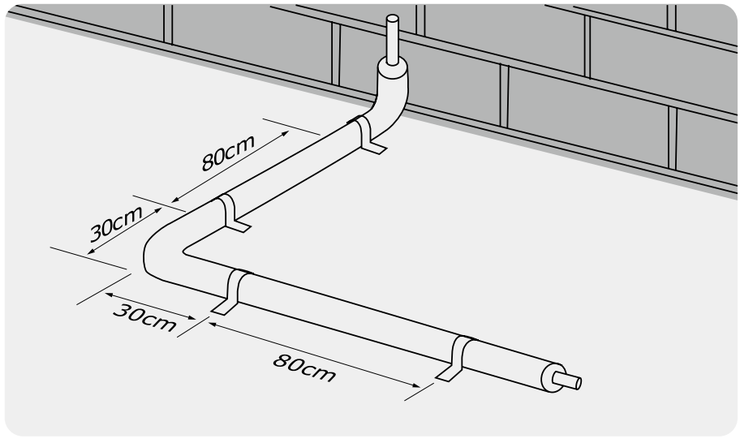
It is generally accepted that a standard screed material is suitable for the conveyance of heating pipes to a maximum temperature of 55°C. Pipes that may be carrying water temperatures above this point may risk cracking the screed material. To prevent this from happening, heating pipes within a screed that are not using the floor mass as a heating emitter should be laid within an insulation or protective conduit. The protective conduit will lower the thermal transfer into the screed and will help prevent overheating. To limit discomfort to residents, and to protect floor finishes from damage, BS EN1264-2 limits the maximum temperature of the floor surface to 29°C.

If screeds are applied to insulation layers (floating screed), BS8204 *“Screed bases and in situ floorings. Concrete bases and cementitious levelling screeds to receive floorings*” guidance must be followed regarding the minimum depth for the screed type to be considered as suitably ‘load-bearing’.

Screeds with floor heating in floating screeds should follow guidance from BS1264 parts 1 - 4.

Pipes intended for the purposes of carrying drinking water must be able to be withdrawn from the building structure should they become damaged or need replacing and *the Water Supply (Water Fittings) Regulations 1999* also states *‘7.—(1) No water fitting shall be embedded in any wall or solid floor’*. For this reason, drinking water pipes must be laid within a protective conduit, with no fittings in the line and bends and crossovers should be avoided if possible.

The mobility of pipelines due to thermal expansion must also be taken into account
See Thermal Expansion on page 24.



5. Pressure testing and commissioning

Pressure and leak testing drinking water systems

Important - Pressure testing should only be carried out by a trained, competent person.

Pressure tests are ancillary services under a work contract and are often part of the installer's contractual terms, even if not explicitly detailed within the written agreement. Before concealing drinking water pipes within walls, ceilings, floors and screeds, a leak test should be performed and er, a visual inspection of all pipe connections should be completed prior to the pipes being

It is a requirement of *The Water Supply (Water fittings) Regulations 1999* for any drinking water distribution system to undergo a pressure test in accordance with BS EN 806-4 or an equivalent national standard.

Before the pressure test, it must be ensured that all components of the installation are accessible and visible, in order to locate incorrectly installed fittings. If the pipe system is to remain unfilled after a pressure test (for example because regular water replacement cannot be guaranteed within seven days after the test procedure), a pressure test with compressed air or inert gases is recommended in order to maintain hygiene.

Whether pressure testing with inert gasses or water, there are several actions that must be undertaken in preparation for the test;

- Any connected equipment not intended to be a part of the test must be removed or completely isolated – special care must be taken to isolate any equipment that is not capable of the intended pressure being applied to the system.
- All pipes must be sealed using appropriate methods which are capable of the intended test pressure being applied.
- All AAV outlets must be closed (when testing with air or inert gasses).
- Select a manometer with an accuracy and scale suitable for the pressures to be measured.

Leak test with compressed air or inert gas

Following a leak test with water, even after the system is drained properly, residual water can remain in some sections of the pipe system. This residual water would be termed as being 'stagnant' after laying in the system for over 7 days. Stagnant water is the ideal breeding ground for bacteria. For this reason, leak testing with oil-free compressed air or inert gas (usually nitrogen or carbon dioxide) is recommended, especially in buildings with high hygiene requirements such as hospitals and retirement homes. Once tested, the system can remain empty until the first fill with potable water shortly before the commissioning of the installation.

A pressure test with compressed air or inert gases is carried out in two stages, the leak tightness test and the load test.

Leak test (to ZVSHK guidance note)

1. Before the leak test, all pipe connections must be visually inspected.
2. Ideally, attach the manometer and the pump to the lowest part of the system.
3. Fill the system to a test pressure of 150 mbar (150 hPa).
4. Allow the system 30 minutes for the ambient and system temperatures to balance.
5. Top-up the system until the required 150 mbar (150 hPa) is achieved.
6. For a system volume of up to 100 litres, the test time must be at least 120 minutes. For each additional 100 litres of system volume, a further 20 minutes should be added to the test duration.
7. No leakage must occur at the connectors during the test.

Load test

Following the leak test, the load test is carried out. Here the pressure is increased to max. 3 bar (for pipe size OD ≤ 63 mm) or max. 1 bar (for pipe size OD > 63 mm). For a system volume of up to 100 litres, the test time must be at least 10 minutes.

Stock No. 14070

Stock No. 14067

5. Pressure testing and commissioning

Leak test with water

According to BS EN 806 and the Water Supply (Water Fittings) Regulations 1999 12.—(1) The water system shall be capable of withstanding an internal water pressure not less than 1.5 times the maximum pressure to which the installation or relevant part is designed to be subjected in operation (“the test pressure”).

Summary of requirements of BS EN 806:

BS EN 806: Part 1 defines maximum design pressure (MDP) of a system as:-
‘the maximum hydrostatic pressure at which the potable water installation is designed to work’

BS EN 806: 2 - Design, clause 3.4.2 which covers strength of the system states:-
‘To ensure adequate strength, all components of the system shall be designed to meet the test pressure requirements of the local and national laws and regulations. The test pressure shall be at least 1.5 times the allowable maximum operating pressure (PMA).’

Therefore the maximum design pressure should be at least 1.5 times the maximum operating pressure.
MDP = 1.5 x maximum operating pressure
1½ x 5 bar =7.5 bar

BS EN 806 recommends a test pressure of:-
1.1 x maximum design pressure (MDP)

Where
MDP = 1½ x maximum operating pressure
1.1 x [1½ x 5 bar] = 8.25 bar

Hydraulic pressure testing of drinking water pipe work should only be undertaken a maximum of 7 days prior to the system being commissioned and put in to use. Water remaining in the system for longer than this period could stagnate and cause bacterial growth affecting the hygiene of the whole system.

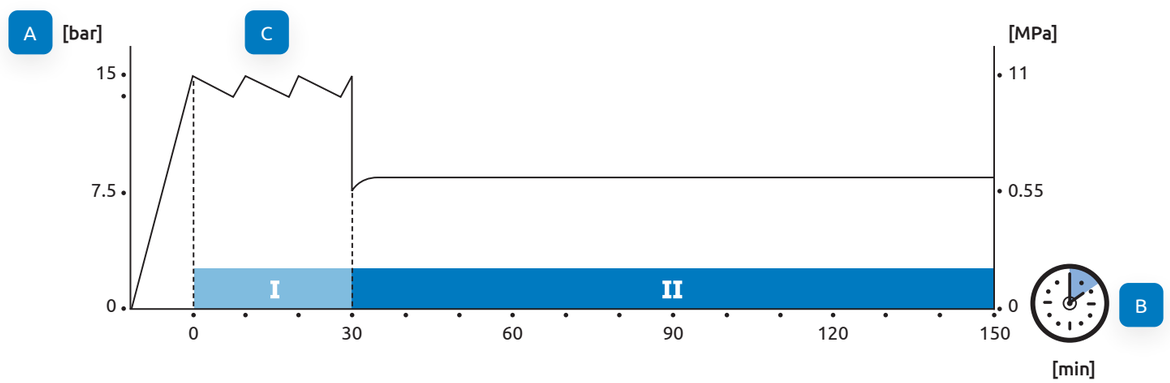
A pressure test with water is carried out in two stages, the tightness test and the load test.

- Any connected equipment not intended to be a part of the test must be removed or completely isolated – special care must be taken to isolate any equipment that is not capable of the intended pressure being applied to the system.
- All pipes must be sealed using appropriate methods which are capable of the intended test pressure being applied.
- To comply with the requirements of schedule 2 paragraph 15 (1) a backflow prevention device or arrangement rated to at least fluid category 2 must be installed
- All air must be vented from the system.
- Only pressure gauges which are accurate enough to determine a pressure change of 0.1 bar should be used.

Leak test (to BS EN 806 6.1.3.3)

1. Before the leak test, all pipe connections must be visually inspected.
2. Ideally, attach the pressure gauge and the pump to the lowest part of the system.
3. The system must be filled with filtered tap water (particle size ≤ 150 µm)
4. Allow the system time to balance ambient and system temperatures (ideally 12 hours).
5. Apply pressure to the system up to the maximum 1.5 x MOP (maximum 15 bar)
6. After 30 minutes test time, by draining water, reduce the pressure to 0.5 maximum test pressure.
7. The test time at this pressure is 120 minutes. No leakage should be detected during this test period.

Leak test with water



The leak test must be documented by the test engineer in a ‘pressure test report’ and this document should make a record of the equipment used, the duration of the test and the tightness of the system.

5. Pressure testing and commissioning

5.1 Flushing a drinking water system

Drinking water systems should be flushed with the local supply pressure in accordance with BS EN 806-4, Section 6.2.2, unless a different flushing procedure is contractually agreed or required.

The tap water used for flushing must be filtered (filter according to BS EN 13443-1).

Flushing must take place before the actual start-up of the system.

To ensure the system operates flawlessly, the flushing process must remove contaminants and residues that may have entered the system during installation. This process protects tap water quality, prevents corrosion damage and also prevents malfunctions of valves and equipment.

Flushing method with water

Tap water systems must be flushed to the local supply pressure using the water flushing procedure in accordance with BS EN 806-4, Section 6.2.2, unless another flushing procedure is contractually agreed or required.

The tap water used for flushing must be filtered (filter according to BS EN 13443-1).

Flushing with air and water

The procedure is based on a pulsating current of water and air and is described in more detail in the technical rules for drinking water distribution systems, BS EN 806-4 Section 6.2.3. Suitable flushing equipment must be used for this purpose. The flushing procedure should be used when a sufficient flushing effect cannot be expected when flushing with water alone.

Points to consider

- Sensitive fittings (such as solenoid valves, thermostatic fittings etc.) and apparatus (such as water heaters) should be isolated to prevent damage caused by contaminants and assembly residues.

Flushing by-passes should be operated in order to protect plant and equipment

- Aerators, regulators, flow-limiters, shower heads and hand showers must be removed from a system during flushing.
- For in-wall thermostatic fittings and other sensitive fittings which cannot be removed during flushing, the installation instructions of the manufacturer must be followed.
- Any built-in pressure reducers must be fully open and are only adjusted after flushing.
- Built-in fine strainers in front of fittings that cannot be removed or bridged must be cleaned after flushing.

Depending on the size of the system and the installed scheme, flushing may be carried out in sections.

Always maintain one flushing direction away from the main inlet valve, flushing each section line by line (from nearest to the most distant).

Starting from the riser, flushing is carried out floor by floor. Fully open the outlets (see table in the following flushing protocol for the minimum number) and the associated supply pipework for at least 5 minutes each, one after the other, starting at the outlet furthest from the riser.

After a flushing time of 5 minutes at the last opened outlet, the taps are now closed one after the other in reverse order.

5.2 Pressure and leak testing heating systems

The heating system installer should perform a leak test on the installation before closing in the pipes with walls, ceilings, floors or screeds. As a rule, tap water can be used for the leak test as long as the water quality meets the requirements as detailed by DWI.

- The heating system must be filled slowly and should be completely purged of any air.
- If there is a risk of freezing, suitable measures must be taken to prevent damage (e.g. use of antifreeze or temperature control of the building). Once frost protection is no longer required, any antifreeze must be removed by draining and flushing the system with at least three water changes.
- Once filled and pressurised, a period should be allowed to permit the temperature compensation between the ambient temperature and the temperature of the filling water. Once this balancing period has finished, If necessary, restore the test pressure.
- Only pressure gauges which are accurate enough to determine a pressure change of 0.1 bar should be used.
- The pipe system and water heating system must be tested at a pressure corresponding to the set pressure of the safety valve. Alternatively, 1.3 times the designed operating pressure can be used as the pressure for the test in accordance with BS EN 14336:2009
- The test pressure must be maintained for two hours and may not drop. No leaks must occur during that time.

The leak test must be documented by the test engineer in a ‘pressure test report’ and this document should make a record of the equipment used, the duration of the test and the tightness of the system.

5.3 Chemical treatment for heating systems

Although the Brymec Multilayer system is not susceptible to corrosion that would occur in a traditional metal piped heating system, there are obviously other pieces of equipment within a heating system that needs to be protected such as boilers, pumps, valves, radiators, fan-coil units and plate exchangers.

Whether the system is a small domestic installation, or a large complex system to supply a large apartment building, there are a number of treatments that should be used to ensure a long trouble-free life for the entire system. Products such as inhibitors, cleaning products and water balancing additives are amongst some of the common treatments.

Standard water treatments should have no detrimental effect on the materials of the Brymec Multilayer Press-fit system.

Brymec offer a range of suitable cleaning and treatment chemicals which can be used to maintain the Brymec Multilayer system. However, if third party treatments are to be used as part of a larger system treatment, we recommend getting written confirmation from the engineer undertaking the treatment for the suitability of the product to be used in combination with the materials of our Multilayer product.

6. Transport, storage and installation conditions

6.1 information

In order for the Brymec Multilayer system to provide years of trouble-free service, care must be taken when transporting, storing and installing all of the products. All components within the system should be stored in a clean, dry location and away from direct sunlight.

To maintain the hygienic quality of the items it is recommended that all components are stored off the floor on appropriate shelves and racking, and that they all remain in their packaging until each item is ready to be installed. During installation, open ends of pipes should be closed off by a suitable method in order that construction debris doesn't enter the system during construction.

6.2 Temperatures during installation

Brymec's Multilayer system should not be installed at temperatures below –10 °C or above +40 °C. The hydraulic press equipment have specified operating temperatures which should be detailed in the respective operating manual for the tool.

6.3 Storage and handling of pipes and fittings

All Brymec components for the multilayer system (pipes and fittings) must be protected from mechanical damage, dirt and direct sunlight (UV radiation) during transport, storage, and during installation. All items should remain in their original packaging until they are to be installed. As required by BS EN806, open pipes should be capped to protect hygiene and to prevent dirt from entering the system during installation. Damaged, bent or deformed pipes must not be used. Straight lengths/bars must be transported and stored in such a way that they cannot be accidentally bent.

7. Handover and documentation

7.1 O&M information

On completion of the construction project, design and construction teams are typically contracted to deliver a structured information handover package to support a client's asset operations and maintenance.

When they are handed the keys at the end of a construction project, what a facilities manager (FM) will be typically given is an information package, be it electronic or physical, filled with information and data. That information should contain explanations on building maintenance, equipment warranties, security operating instructions and asset lists among other things. This information may be in all kinds of formats, including paper and digital media like memory media such as memory sticks.

The plumbing system, including the heating system and the drinking water system, will be no different to the rest of the building and these detailed records should contain manufacturer details, system information, operating information, commissioning results and expected design performance.

- Construction with description of use and concept of the drinking water distribution system
- Construction with description of use and concept of the heating system
- Leak test and flushing results for all systems
- Commissioning processes and information
- Protocol for regulating the hot water system
- Test results for the cold and hot water installation
- Inspection and maintenance plan (BS EN 806, part 5)
- Manufacturer's documents, assembly and operating documents
- System design and floor plans of the building with schematic diagrams
- If applicable, information on water treatment systems
- Maintenance and hygiene plan

8. LCA's and EPD's

LCA's

As part of Brymec's commitment to the environment and our customers, we are driven to continually assess our products and business via reporting into LCA's.

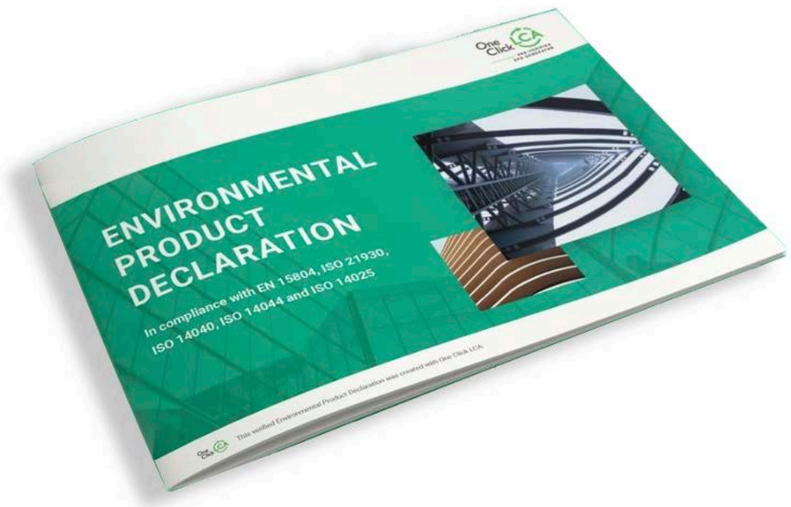
An LCA is a systematic analysis of environmental impact over the course of the entire life cycle of a product, material, process, or other measurable activity. LCA models the environmental implications of the many interacting systems that make up industrial production. When accurately performed, it can provide valuable data that decision-makers can use in support of sustainability initiatives.

Continued assessment of our whole business via the LCA process helps us to highlight specific areas of interest when it comes to quantifying key environmental impacts. Once these impacts are measured we can enact goal setting developments to further reduce our impact on climate change.

EPD's

As the construction industry moves towards the goal of net zero by 2050 it is becoming ever more important that manufacturers are able to present that environmental performance of our products to the industry. The best way this can be achieved is via an EPD.

An **Environmental Product Declaration (EPD)** is a standardized document that provides transparent and independently verified information on the environmental impact of a product . The information is measured and reported using the international standard ISO 14025 . The goal of an EPD is to inform and communicate with stakeholders about a product's environmental impact.



9. Brymec technical support

We recognise the importance of having top quality support from the manufacturer throughout every phase of the construction process.

At Brymec, our whole team are committed to providing easy access to design support and technical advice right the way from pre-construction to post-contract.

Key areas of support;

- **Specification**
  - Technical submittal documentation
  - Advice on products and applications
  - Tender documentation
  - Budgetary quotations
- **Construction**
  - Free, certificated installation training
  - Site visits
  - Observation reports
  - Product verification and testing
- **Post contract**
  - O&M manuals
  - Warranty and after-care support

Whatever your needs, we have a dedicated Technical Support Team which has sophisticated equipment and facilities to support you whenever you need.

Multi-Layer Press-Fit Pipe & Fittings

Pre-Insulated Coiled Pipe

STOCK NO	SIZE	DESCRIPTION
50983	16mm x 50m	WRAS multi-layer pipe with 13mm RED insulation
50984	16mm x 50m	WRAS multi-layer pipe with 13mm BLUE insulation
50987	20mm x 50m	WRAS multi-layer pipe with 13mm RED insulation
50988	20mm x 50m	WRAS multi-layer pipe with 13mm BLUE insulation
50985	25mm x 50m	WRAS multi-layer pipe with 13mm RED insulation
50986	25mm x 50m	WRAS multi-layer pipe with 13mm BLUE insulation
50991	32mm x 25m	WRAS multi-layer pipe with 13mm GREY insulation

Coiled Pipe

STOCK NO	SIZE	LENGTH
51000	16mm	100m
51002	20mm	100m
51001	25mm	50m
51004	32mm	50m

Straight Pipe

STOCK NO	SIZE	LENGTH
51006	16mm	5m
51007	20mm	5m
51008	25mm	5m
51009	32mm	5m

Multi-Layer Press-Fit Pipe & Fittings

Couplers

STOCK NO	SIZE
51019	16mm
51020	20mm
51018	25mm
51022	32mm

90° Elbows

STOCK NO	SIZE
51044	16mm
51045	20mm
51043	25mm
51047	32mm

Reducing Couplers

STOCK NO	SIZE
51028	20mm x 16mm
51040	25mm x 16mm
51038	25mm x 20mm
51031	32mm x 16mm
51032	32mm x 20mm
51039	32mm x 25mm

Multi-Layer Press-Fit Pipe & Fittings

Male Iron Couplers

STOCK NO	SIZE
51081	16mm x 1/2”
51083	20mm x 1/2”
51084	20mm x 3/4”
51082	25mm x 3/4”
51085	25mm x 1”
51088	32mm x 1”

Female Iron Couplers

STOCK NO	SIZE
51067	16mm x 1/2”
51069	20mm x 1/2”
51070	20mm x 3/4”
51095	25mm x 3/4”
51068	25mm x 1”
51073	32mm x 1”

Male Iron Elbows

STOCK NO	SIZE
51096	16mm x 1/2”
51098	20mm x 3/4”
51099	25mm x 1”

Female Iron Elbows

STOCK NO	SIZE
51108	16mm x 1/2”
51107	20mm x 1/2”
51109	20mm x 3/4”
51105	25mm x 3/4”
51106	25mm x 1”

Equal Tees

STOCK NO	SIZE
51058	16mm
51059	20mm
51042	20mm
51061	32mm

Multi-Layer Press-Fit Pipe & Fittings

Reducing Tees

STOCK NO	SIZE (END X END X CENTRE)
51121	20 x 20 x 16mm
51124	25 x 25 x 16mm
51125	25 x 25 x 20mm
51129	32 x 32 x 20mm
51130	32 x 32 x 25mm
51140	16 x16 x 20mm
51137	20 x 20 x 25mm
51142	20 x 16 x 16mm
51147	25 x 20 x 20mm

Female Iron Tees

STOCK NO	SIZE
51155	16mm x 1/2”
51156	20mm x 1/2”
51157	25mm x 3/4”

Backplate Elbows

STOCK NO	SIZE
51171	16mm x 1/2”
51173	20mm x 3/4”

Copper Adaptors

STOCK NO	SIZE
51174	16 x 15mm
51175	20 x 22mm

Chrome Radiator Pipe

STOCK NO	SIZE
51176	16mm Crimp Elbow to 15 x 50mm
51177	16mm Crimp Elbow to 15 x 300mm

Multi-Layer Manifolds

Manifolds Hot and cold water manifold which allows the distribution of water around a property. A distribution manifold allows the isolation of an individual appliance or outlet at one central location.

Brass Manifold with 3/4" Outlet

STOCK NO	SIZE
50955	3/4" 2 Port c/w zone iso. valves
50956	3/4" 3 Port c/w zone iso. valves
50957	3/4" 4 Port c/w zone iso. valves
50958	1" 2 Port c/w zone iso. valves
50959	1" 3 Port c/w zone iso. valves
50960	1" 4 Port c/w zone iso. valves
50965	3/4" Blanking plug
50966	1" Blanking plug

Aluminium Slide Rail & Brackets

STOCK NO	SIZE
50967	200mm Single rail
50968	400mm Double rail
50969	3/4" Brackets (Pair)
50970	1" Brackets (Pair)

3/4" Eurocone Outlet Adaptor

STOCK NO	SIZE
50961	15mm Copper pipe
50962	15mm Polybutylene PB
50963	16mm Multilayer MLCP
50964	20mm Multilayer MLCP

Multi-Layer Press-Fit Tools

Calibration and Bevelling Tool

STOCK NO	SIZE
51194	16mm
51195	20mm
51189	25mm
51196	26mm
51197	32mm

Multi- Calibration and Bevelling Tool

STOCK NO	SIZE
51191	16 / 20 / 25mm
51192	20 / 25 / 32mm

Internal Bending Spring

STOCK NO	SIZE
51190	16mm
TBC	20mm

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