

In Partnership with



Methods of jointing

7.0 Introduction

This chapter deals with the four key methods of joining plastic pipes and the selection of a jointing method is dependent on the pipe material and its characteristics. Table 7.1 is a guide to the selection of the type of joint which can be used for the particular pipe material.

| Table 7.1 Thermoplastic jointing methods | | | |
|--|------------------------|-----|-----------|
| Method | Thermoplastic material | | |
| | PVCu | ABS | PP and PE |
| Solvent cement | ✓ | ✓ | ✗ |

Solvent cement is formulated to chemically solvate the surfaces of pipes and fittings, so that when they are pushed together the softened surfaces intermix and cure into a hard, strong and leak-free joint.

Materials welded this way must be alike, i.e. PVCu to PVCu and ABS to ABS. Not PVCu to ABS or vice versa.

| | | | |
|------------|---|---|---|
| Mechanical | ✓ | ✓ | ✓ |
|------------|---|---|---|

This method uses threads and flanges to connect the different parts of pipeline systems.

| | | | |
|--------|---|---|---|
| Fusion | ✗ | ✗ | ✓ |
|--------|---|---|---|

Fusion jointing involves heating the two components to be joined, so that the fusion/melt temperature on each surface is reached simultaneously. The two melted surfaces are then brought together at a pressure designed to produce a homogenous joint when cooled. The resulting joint will have an equivalent strength and pressure rating as the original pipe. Contact Polypipe for further details.

| | | | |
|-------------|---|---|---|
| Compression | ✓ | ✓ | ✓ |
|-------------|---|---|---|

Compression jointing consists of compressing a rubber ring between the inner wall of the fitting and the outer wall of the pipe to be jointed. Compression joints can be used to connect different types of pipe, both plastic and metal. As long as the correct fitting is selected, taking into account the outside diameters of the different types of pipe work, then a satisfactory joint can be made. **Note:** Compression joints are designed primarily for use on water pipelines. Contact Polypipe for further details.

✓ = Suitable ✗ = Not suitable

Table 7.2 PVCu and ABS solvent jointing procedure

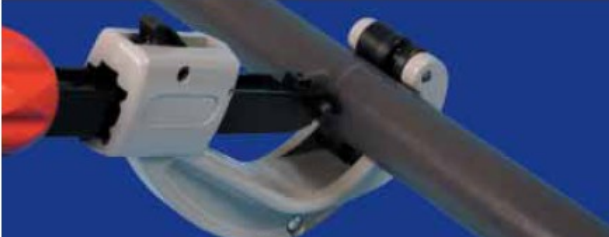



| Procedure | Equipment |
|---|---|
| <p>Important information:</p> <ul style="list-style-type: none"> • Always use Personal Protective Equipment - gloves and eye protection • Always carry out work in a well ventilated area • Always refer to Material Safety Data Sheets • Dispose of waste responsibly • Failure to follow the jointing procedure may invalidate any warranties given | |
| <p>1. Cut the pipe at right angles to its axis and to the required length. Deburr the cut end of the pipe with a sharp knife or scraper.</p> |  <p>Pipe cutter Saw Scraper or knife</p> |
| <p>2. Chamfer the leading edge of the pipe at approximately 15° to 30°. This will prevent the solvent cement being wiped from both the pipe and fitting when mated together and will also help to build up a ring of solvent around the chamfer, thus ensuring a proper seal.</p> |  <p>Chamfering tool Fine disc angle grinder, file or abrasive paper 80 - 100 grit</p> |
| <p>3. Mark the pipe back from the chamfered end to a length equal to the socket depth plus 5mm. This mark will act as a visual indicator to show that the pipe is fully inserted into the socket.</p> |  <p>Marker pen</p> |
| <p>4. Roughen the pipe surface (up to the indicator mark) and the inside of the socket with abrasive cloth or paper. Do not roughen the pipe and fitting to the extent that the clearance between them is noticeably increased.</p> |  <p>Abrasive paper/cloth 80 - 100 grit</p> |
| <p>5. Clean the inner surface of the socket and the surface of the pipe up to the mark using a lint free cloth or absorbent paper dampened with Effast solvent cleaner.</p> |  <p>Lint free cloth or absorbent paper Effast solvent cleaner</p> |

Table 7.2 PVCu and ABS solvent jointing procedure - continued

| Procedure | Equipment |
|---|---|
| 6. Select the correct solvent cement, PVCu to PVCu, ABS to ABS. (failure to use the recommended solvent cement may invalidate any warranties given) Apply the cement straight from the tin and ensure all relevant surfaces are covered. | Read the instructions on the tin. Avoid using excessive amounts of solvent cement. |
| | Effast PVCu cement Effast ABS cement Brush (half the diameter of the socket) |

Joints are normally made in temperatures between 5 - 25°C and in dry conditions, damp or wet conditions can adversely effect the solvent jointing procedure. The maximum time before the cement is too dry for jointing is approximately 3 minutes. In hot weather this time is reduced. The joint must be made whilst the cement is still wet. At temperatures below 5°C the curing time will be considerably increased.

| 7. Push fittings/pipe together without twisting and ensure that they are aligned and fully engaged (the indicator mark should be in line with the edge of the socket) then hold the assembly for a short time as specified. | Pipe Size | Holding Time (minutes) |
|---|--------------------------|------------------------|
| | 3/8" - 2" (16mm - 63mm) | 1/2 |
| | 2 1/2" - 4" (75 - 119mm) | 3/4 |
| | 5" - 8" (140 - 225mm) | 1 |
| | 10" - 12" (250 - 315mm) | 2 |

When the joint is made, an O-ring of cement is formed between the pipe chamfer and the internal socket wall. This ring helps to ensure seal integrity. A bead of cement will show around the external junction of the pipe and fitting, this should be wiped off leaving the outer part of the joint clean. Do not disturb for at least 10 - 15 minutes to ensure that the weld integrity is maintained. After this period, the assembly can be carefully handled, prepared for further jointing or left for the recommended curing time which is:

| | | |
|---|----------------|---|
| Up to 8" (225mm) ambient temperature constantly above 5°C | After 8 hours | The joint will have cured enough to withstand the working pressure. |
| | After 24 hours | The pipe system can be fully pressure tested. |

The number of operators:

For joints of up to 2 1/2" (75mm) 1 person is required, from 3" (90mm) up to 6" (160mm) 2 persons are needed, for 8" (225mm) and above 3 people are required. Pipe work should be ventilated during the joining and curing processes. Never seal a pipe system which has been newly jointed as the trapped vapours can cause damage. Positive ventilation with a small air blower is recommended to purge systems with multiple joints.

Table 7.3 Recommended joints per litre of Effast cement

| Pipe size | | Thermoplastic material | |
|-----------|-----------|------------------------|-----|
| inch | mm | PVCu | ABS |
| 3/8 - 1 | 16 - 32 | 300 | 400 |
| 1 1/4 - 2 | 40 - 63 | 120 | 175 |
| 2 1/2 - 3 | 75 - 90 | 50 | 70 |
| 4 | 110 | 30 | 45 |
| 5 | 140 | 20 | 30 |
| 6 | 160 | 15 | 25 |
| 8 | 200 - 225 | 8 | 15 |
| 10 | 250 - 280 | 3 | 4 |
| 12 | 315 | 3 | 4 |

7.1 Important points

- Heavy equipment should be supported independently from the pipeline. i.e. valves, strainers, etc.
- Pipe clips should be made to allow linear expansion of the pipeline and if lined the lining should be of a material compatible with the pipeline.
- Mastics, intumescent mastics, adhesive tapes and labels should not be used (as many degrade plastics), unless manufacturers provide documents of adhesive or mastic compatibility.
- Insulation must be considered very carefully, as a number of foam rubber insulation products and their adhesives may not be compatible with plastic pipes. Adhesives should only be used to bond the foam edges together and should never be used to bond the insulation to the pipeline. Refer to manufacturers for compatibility data. For example, compatible insulations are fibre wools (Rockwool), polystyrene, etc.
- Trace heating tapes: Don't use tapes covered with plasticized PVC as this can react with thermoplastic pipes. Tapes with sheaths made from woven wire, polyester or silicone rubber are acceptable.
- Oils: A number of synthetic oils are not suitable for use with plastic pipelines. Oils such as esters, organic phosphates and polyalkylene glycols should be avoided.
- Health and safety: Solvent cement and cleaning fluid give off vapours that are dangerous to health. During jointing the work place must be well ventilated.

7.2 Solvent jointing, "Do Nots"

- Make joints in rain or wet conditions.
- Use dirty brushes or cleaning rags.
- Use the same brushes with different solvent cements.
- Dilute or thin solvent cements with cleaner.
- Leave solvent cement tins open as the contents will evaporate and the cement performance will be reduced.
- Use near naked lights or smoke whilst jointing as solvents are highly flammable.
- Make joints in a confined space as solvents emit hazardous vapours.

7.3 Mechanical jointing procedure - threaded fittings - plastic to plastic

An extensive range of threaded fittings are available, mostly parallel threaded but some tapered. Thread compatibility is an essential aspect of jointing. For jointing such parts follow these steps: -

1. Select compatible thread i.e. Parallel to Parallel, never Parallel to taper or vice versa.
2. Use PTFE tape to seal the joint. If sealant pastes are used they must be compatible with the plastic components.
3. Hand tighten and if necessary tighten further to a maximum of ¼ turn using a strap wrench.

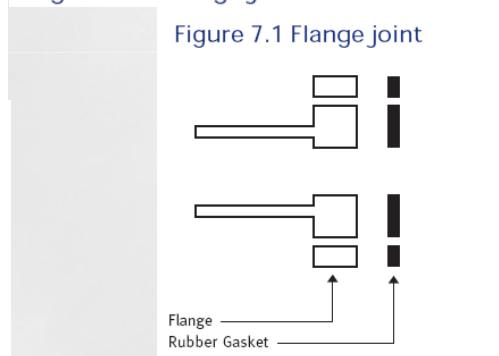
PVCu class 7 and ABS class T pipes, sizes ¾" up to 2" are manufactured with a thick wall to enable threads to be cut.

7.3.1 Flanges - plastic to plastic/metal

Flanges are suitable for joining metals or rubbers to plastics. Jointing such parts follow these steps: -

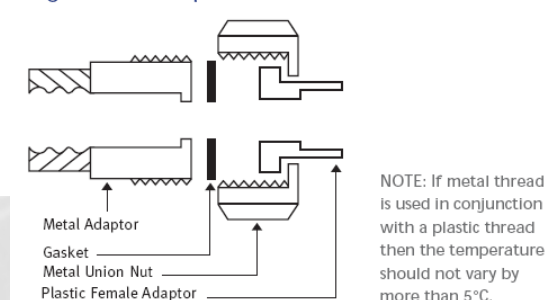
1. Ensure flanges are parallel, close to each other and allow a gap for the gasket.
2. Insert gasket, ensure that the bolt holes are aligned.
3. Use flat washers between bolt head, the nut and the flange.
4. Tighten bolts according to the sequence figure 7.3 and table 7.4.

Figure 7.1 Flange joint



7.3.2 Composite unions - metal to plastics union joint

Figure 7.2 Composite



| Table 7.4 Flange bolting torques (approximate) | | | | | | | | | | | | | | | | | |
|--|--------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pipe size | Inch | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 4 | - | 5 | 6 | - | 8 | 10 | 12 |
| | mm | 20 | 25 | 32 | 40 | 50 | 63 | 75 | 90 | 110 | 125 | 140 | 160 | 200 | 225 | 280 | 315 |
| Torque | NM | 8 | 9 | 10 | 18 | 24 | 32 | 36 | 40 | 44 | 48 | 50 | 62 | 74 | 76 | 76 | 76 |
| | Ft/Pdl | 6 | 7 | 8 | 13 | 18 | 23 | 26 | 29 | 32 | 35 | 37 | 46 | 54 | 56 | 56 | 56 |

Figure 7.3 - Flange bolt tightening sequence

