5. Joint solutions and installation

There are various coupling systems available for Amiblu pipes. Based on your project's requirements, Amiblu will select the best coupling for your scenario.

5.1. Amiblu coupling systems

Amiblu GRP couplings are double bell couplings with various types of gaskets. The gasket should always be cleaned and visually inspected before installation.

Before pressurizing, unburied pipelines or partially covered sections must be properly secured to ensure stability and prevent movement.

5.1.1. SEWER COUPLING / FSC OR ASC (FIG. 22)

This sealing system consists of 2 separate rubber gaskets and is used for gravity applications (PN 1). The gasket is fixed in the FSC coupling for diameters up to DN 1200, and the ASC coupling goes up to DN 960. The gasket position should be checked using a feeler gauge or other appropriate method after assembly.

The coupling is designed for a maximum draw of 24 mm.

5.1.2. PRESSURE COUPLING / FPC, REKA (FIG. 23)

This sealing system consists of 2 separate rubber gaskets and is used as a pressure coupling system for pipes up to 12 m in length. The gasket position should be checked using a feeler gauge or other appropriate method after assembly.

The coupling is qualified for a maximum draw of 36 mm.

5.1.3. PRESSURE COUPLING ANGULAR /FPC-A (FIG. 24)

This sealing system consists of 2 separate rubber gaskets. The FPCA coupling is used for larger angular deflections than that shown in Table 6. With this system, angular deflections of up to 3° can be achieved with pipes between 3-12 m in length for all diameters up to PN 16. For DN 600 and larger, 1.5° are required on each side to achieve a total of 3° deflection.

For pipes greater than DN 1200, angular cut pipe spigots are required for joints. If the joint is used in straight alignment, the pipe should not be angular cut. Alignment marks on the pipes should be considered during installation.

The joints should be checked using a feeler gauge or other appropriate method after assembly. The FPCA range is designed for DN 600 to DN 2500. For DN 2600 and larger, the FPC coupling can be used with angular cut pipes.

The coupling is qualified for a maximum draw of 36 mm.

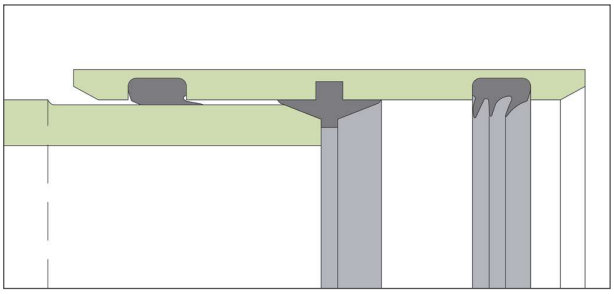

Fig. 22: FSC / ASC coupling

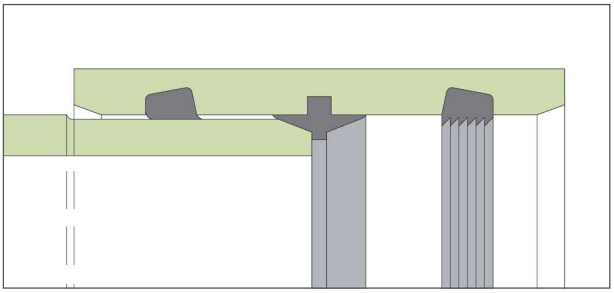

Fig. 23: FPC coupling

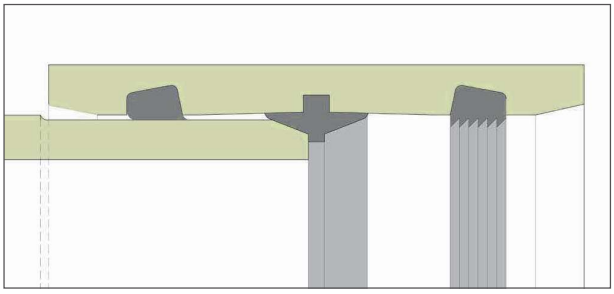

Fig. 24: FPCA coupling

5.1.4. FILAMENT WOUND COUPLING / FWC (FIG. 25)

This sealing system is a full-face rubber profile with 2 sealing lips per spigot. The FWC is a pressure coupling intended for use with pipes up to 6 m in length (also for gravity pipes). The FWC coupling can accommodate an angular deflection as indicated in Annex B. For additional angular deflections, angular cut pipe spigots are required. The allowed deflection is 3° for diameters up to DN 1400, and 2.5° for anything above.

This coupling is qualified for a maximum draw of 18 mm.

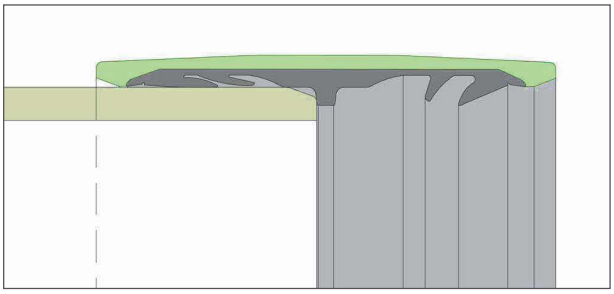

Fig. 25: FWC coupling

5.1.5. LOCKED JOINT COUPLING / FBC (FIG. 26)

This sealing system consists of 2 separate rubber gaskets and 2 locking rods that transfer axial thrust from one pipe section to another. The FBC coupling is a restrained pressure coupling system and can be used for pipes up to 12 m in length. Restrained pipes are locked with a mechanical locker rod. The joint system is available up to a maximum thrust for PN 16 (DN 800) and PN 6 (DN 2000). For fittings with FBC couplings, the laying length and the position of the couplings should be designed in the project.

The FBC coupling is not designed for a draw or angular deflection and should also not be used where bending moments are present.

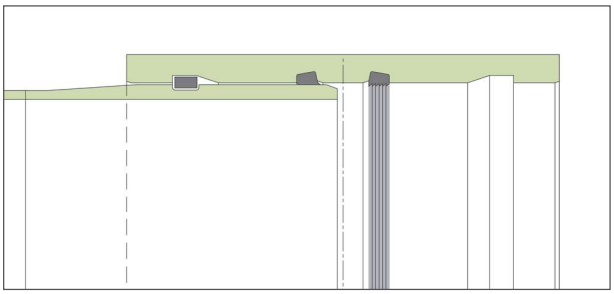

Fig. 26: FBC coupling

5.1.6. FLUSH JOINTS (FIG. 27)

Amiblu has several flush joints available made of stainless steel or GRP with various types of sealing systems. These are mainly used for trenchless applications. Contact Amiblu for further information on this type of connection.

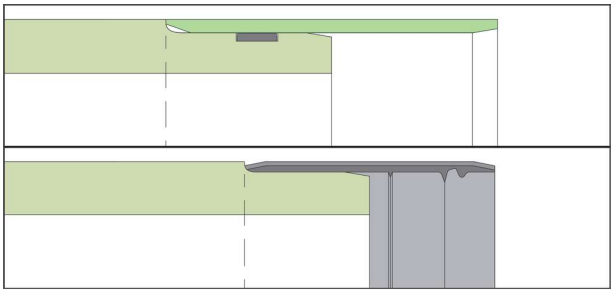

Fig. 27: Flush joints

5.2. Joining of pipes

Amiblu pipes are typically supplied to the construction site with one coupling pre-mounted. Before joining pipes, check that all components such as fitted couplings and gaskets are correctly in place.

5.2.1. MOUNTING STEPS FOR STANDARD JOINTS

5.2.1.1. Pipe placement

Follow Chapter 4.5 for pipe placement.

5.2.1.2. Cleaning the sealing elements

Immediately before joining the pipes, remove any dirt from the surfaces to be joined and in particular the sealing elements in the area of the grooves.

5.2.1.3. Gasket installation (for FPC, FPCA, FBC and ASC)

If the gasket needs to be installed on-site, the following procedure applies: Insert the gasket into the groove leaving loops (typically 2 to 4) of rubber extending out of the groove (see Fig. 28). Do not use any lubricant in the groove or on the gasket at this stage of assembly. Water may be used to moisten the gasket and groove to ease positioning and insertion of the gasket. With uniform pressure, push each loop of the rubber gasket into the gasket groove. When installed, pull carefully in the radial direction around the circumference to distribute compression of the gasket. Check also that both sides of the gasket protrude equally above the top of the groove around the whole circumference. Tapping with a rubber mallet will be helpful to accomplish the above.

5.2.1.4. Applying the lubricant

Next, apply lubricant to the spigot and gasket to minimize the force required for mounting. After lubricating, take care to keep the coupling, gasket and spigots clean. It has been found that placing a cloth or plastic sheet, approximately 1 m^2, under the jointing area will keep the spigot ends and gasket clean. Lubricants suitable for low temperatures are available on request.

Caution: It is very important to use only the correct lubricant. Amiblu provides sufficient lubricant with each delivery of couplings. If for some reason you run out, contact the local Amiblu supplier for additional supply or advice on alternative lubricants. Never use a petroleum-based lubricant. There are various types of lubricants available, see Table 7, for various conditions (warm, cold, wet, etc.).

Table 6 shows the approximate amount of typical lubricant for each gasket/spigot. Different types of lubricants may require greater amounts. Using more lubricant may make installation much easier.

5.2.1.5. Joining the pipes

Align the pipe and the coupling properly before joining. The following steps apply to joining pipes using clamps or slings and come-along jacks. Other techniques may also be used providing the general objectives outlined here are met. In particular, insertion of the pipe spigot ends should be limited to the position mark (home-line), and no damage to the pipe and coupling is permitted. If there is damage to any components, contact Amiblu immidiately. Join the pipes by suitable measures until the coupling is aligned with the home-line or until the spigot touches the center register. For exceptions, see Chapter 4.8. Squeezing of the center register or forcing it underneath the spigot is not permitted.

The pipes can be connected by come-along jacks (see Fig. 29), levers, or an excavator bucket. During installation, it is necessary to protect the pipes from being damaged. Use devices that allow full control of the forces for pipe joining to prevent pipe damage. For even force distribution on the contact area of the pipe or coupling, use appropriate tools. Do not apply point forces therefore, use wooden elements such as battens or beams. If metal equipment must be used, place rubber or wooden sheets between the metal and GRP.

5.2.1.6. Mounting of loose couplings

If the coupling is not pre-mounted, it should be mounted on one of the pipes in a clean, dry place before the two pipes are joined.

This is accomplished by placing a clamp or a sling around the pipe 1 to 2 m from the spigot on to which the coupling will be mounted. Ensure the pipe spigot is resting at least 100 mm above the ground surface to keep away from dirt. Push the coupling onto the pipe spigot end manually and place a 100 x 50 mm timber across the coupling.

Use three come-along jacks distributed around the circumference. Pull the coupling into position, i.e., until the coupling is aligned with the home-line or until the spigot touches the center register (see Fig. 30).

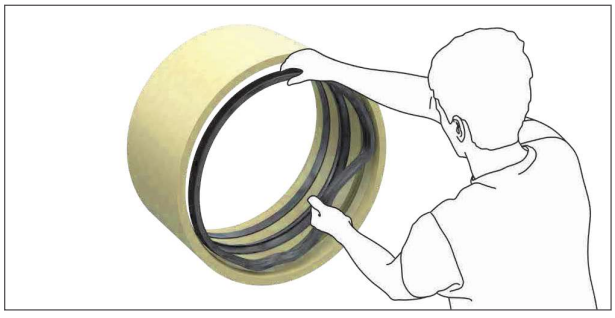

Fig. 28: Installation of the loose gasket

DN [mm]	Lubricant [kg]
100 - 350	0.1
400 - 600	0.2
700 - 900	0.3
1000 - 1200	0.4
1300 - 1500	0.5
1600 - 1800	0.6
1900 - 2100	0.7
2200 - 2400	0.8 - 1.6
2500 - 2700	0.9 - 1.8
2800 - 3000	1.0 - 2.0
3100 - 3300	1.1 - 2.2
3400 - 3500	1.2 - 2.4
3600 - 4000	1.3 - 2.6

Table 6: Approximate amount of lubricant for each gasket/spigot

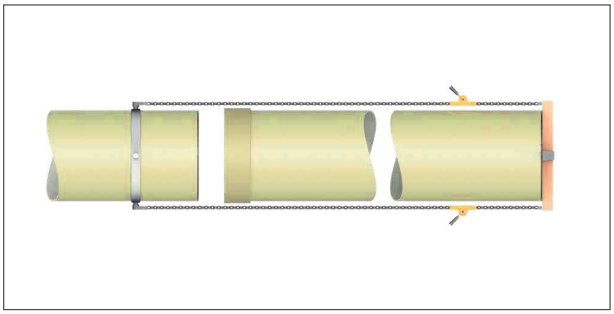

Fig. 29: Pipe assembly with come-along jacks

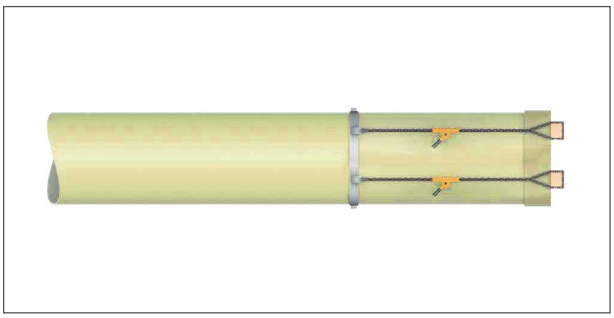

Fig. 30: Mounting of loose coupling to pipes

Name	Temperature range	Application	Diameter Range (DN)	Application Range
Standard	-5°C to +50°C	Standard lubricant	100 - 2000	Small and medium diameters
Standard Potable Water*	-5°C to +50°C	Standard, **Potable water approval**	100 - 4000	Small and medium diameters, **packed with DVGW Approval for potable water**
Potable Water High Performance*	-20°C to +50°C	Large diameter, Pressure Pipes (small DN) up to DN 800, Key-Lock with **potable water approval**	2000 - 4000	High load lubricant for large diameter pipes, locking rod and small diameter pressure pipes **with potable water approval, reduced mounting force**
High Performance	-10°C to +50°C	Large diameter, Pressure Pipes (small DN) up to DN 800, **bad weather conditions, rain, wet surface**	2000 - 4000	High load lubricant for large diameter pipes, locking rod and small diameter pressure pipe, **useful for wet conditions, rain etc., reduced mounting force**
Cold Temperature	-15°C to +50°C	Winter conditions	100 - 2000	Winter lubricant, recommended for small and medium diameters
Extreme Condition	-20°C to +50°C	Extreme conditions, **under water installation, water flow**	100 - 4000	Special lubrication for complicated conditions, not water soluble, vegetable based
* closed packing in potable water quality: Hygienic application required to comply with potable water requirements acc. DVGW, KIWA etc.				

Table 7: Types of lubricant for various conditions

5.2.1.7. Assembly of locked joints (FBC)

The locked joint system is intended for straight installation of pipes and fittings (no planned deflection in joints). The pipe spigot for locked joints has a matching groove (see Fig. 31).

The coupling is installed following the procedure as described above until the coupling matches the home-line, as there is no center register. The pipe is then pulled in position until the groove in the pipe is visible through the opening in the coupling. Generally, an excavator installation is not recommended.

After the coupling is in its final position and before inserting the locking rods, a feeler gauge may be used to ensure the gasket lips are properly oriented. The locking rod is then pushed into position with a hammer or suitable equipment. For large diameter pipes, more than one length of locking rod is needed. The locking rods shall be inserted until they are all around the groove and become visible through the insertion hole.

The pipeline must be backfilled before pressure testing. Note that the FBC coupling is not intended to be fully pressurized without backfill support. During pressurization, there will be movement, which is normal, until the joints are fully loaded.

For cooling water systems and other cases where the service temperature is considerably higher than the installation temperature, see Chapter 4.8.

5.2.1.8. Pipe misalignment

The maximum allowable misalignment of adjacent pipe ends is 5 mm (see Fig. 32). It is recommended to monitor misalignment in particular near thrust blocks, valve chambers, and similar critical structures, as well as at closure or repair locations.

5.2.1.9. Angular deflection (Fig. 33)

There is an allowable angular deflection in service at each coupling (FWC and FPC), as specified in the product standards, and presented in Table 8 and Annex B. These values take into account the combined vertical and horizontal deflection.

This can be utilized to accommodate gradual changes in line direction. The pipes should be joined in straight alignment and thereafter deflected angularly as required. The maximum offset and corresponding radius of curvature are shown in Table 9 and Annex B. For installations requiring larger angles, see Chapter 5.1.

5.2.1.10. Miscellaneous

For FSC, ASC, FPC, and FPCA couplings, a fully exposed central register may be removed or cut out to prevent it from coming loose or falling out.

The pipes can also be mounted with a crowbar up to DN 300, or by an excavator bucket. The spigot ends/coupling are to be protected from any damage or displacement. Do not apply any point loads, and instead use a suitable means for distributing the loads (e.g. wooden beam). If damage does occur, contact Amiblu immediately.

Figure 34 shows the pipe assembly using slings with protection of the spigot end.

Refer to Diagram 1 for the factory measured joining forces. Note that the forces may vary due to on-site conditions. Field experience has shown that a margin of 1.5 times the values shown in Diagram 1 covers most cases.

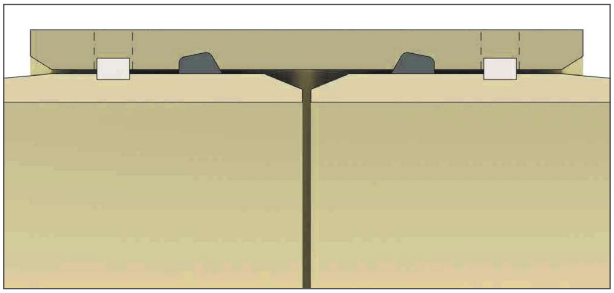

Fig. 31: Flowtite locked joint

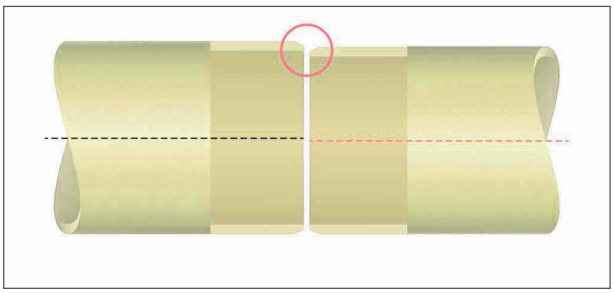

Fig. 32: Pipe misalignment