

## WAVISTRONG®

ASSEMBLY INSTRUCTIONS  
REKA SEALED LOCK JOINT (REKA SLJ)





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## 1 GENERAL

This document describes the method to assemble the REKA Sealed Lock Joint (REKASLJ).

To ensure that the performance of the installed joint complies with the requirements used for the design, it is essential that all personnel involved in the bonding procedure is familiar with and fully understands the techniques described in this document.

The instructions in this document are as complete as possible. However, it is not possible to describe all circumstances that might be encountered in the field. Therefore, our experienced supervisors can opt for an alternative method in order to achieve an optimum solution, using the latest techniques, methods and insights.

Besides, our supervisors may be consulted for clarification of statements made in this document and for advice about specific problems encountered in the field.

Definition of words used in these instructions:

- the word "shall" indicates a requirement;
- the word "should" indicates a recommendation.

### 1.1 Joint overview

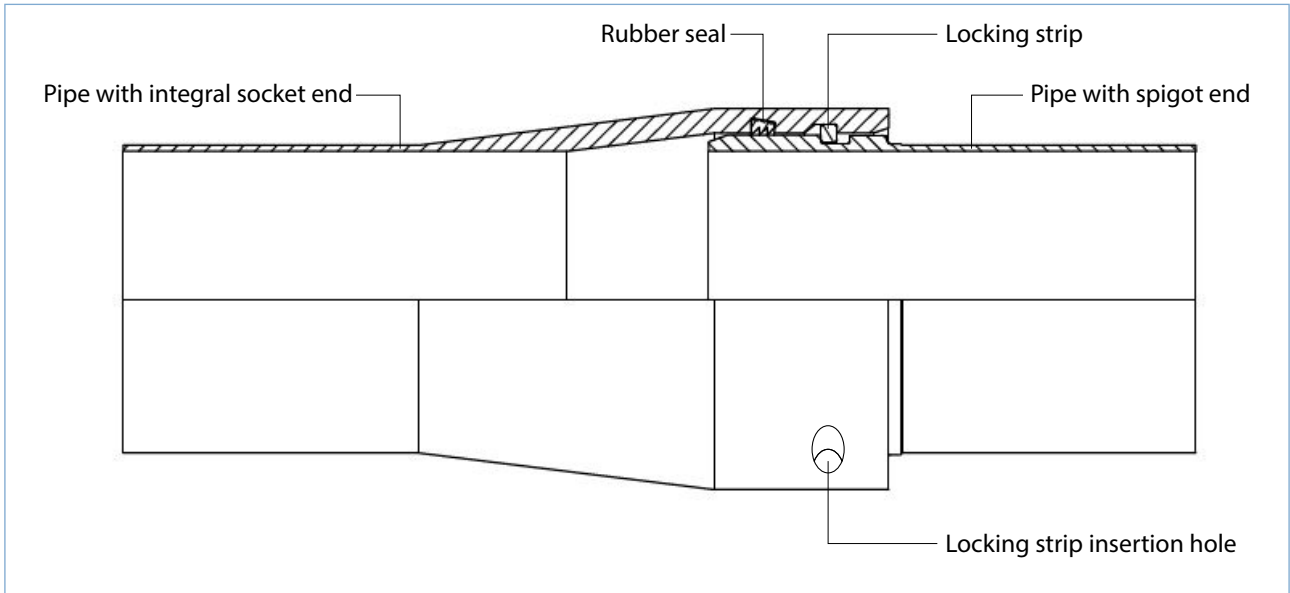
The REKASLJ is a mechanically locked joint, sealed by means of a rubber seal housing in the socket end (a so-called REKA seal). It comes in two types:

- Type A, using one locking strip; and
- Type B, using two locking strips.

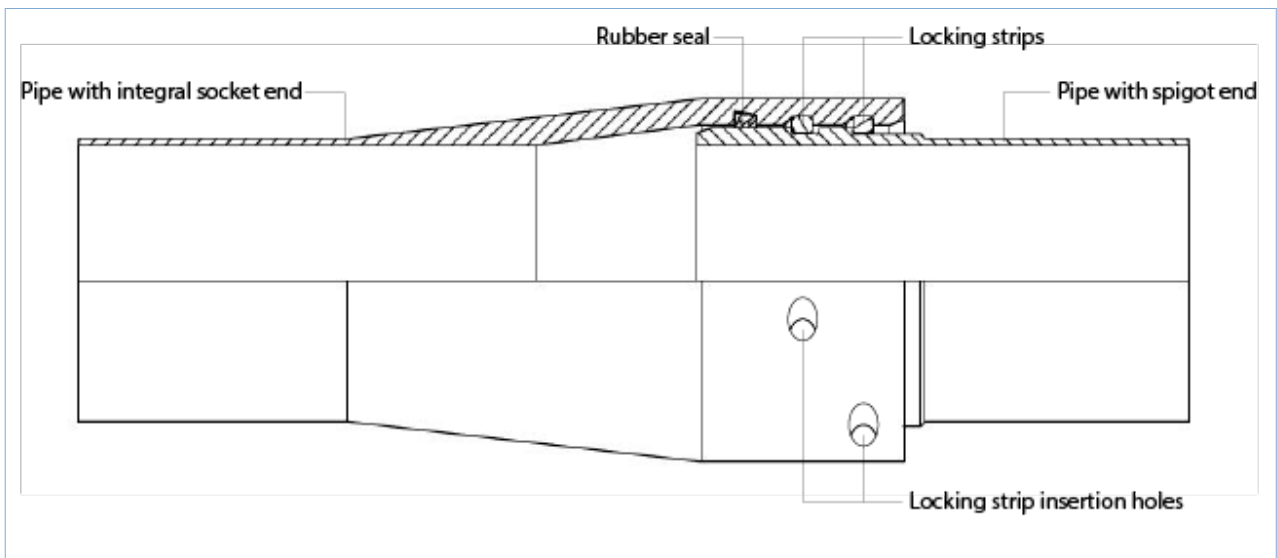


REKASLJ Type A

REKASLJ Type B



REKASLJ Type A overview



REKASLJ Type B overview



## 2 REFERENCES

These instructions are part of the overall Wavistrong pipe system. As such the following documents, and the references therein, apply.

- Wavistrong Installation Guide for GRE Pipe Systems.

## 3 HEALTH AND SAFETY

When working with GRE products, following safety precautions shall be taken:

- Wear suitable protective clothing at all times
- Use Personnel Protective Equipment (PPE), such as:
  - Long sleeves
  - Hard hat, if required by site conditions
  - Safety shoes
  - Glasses
  - Gloves, for mechanical and chemical protection
  - For health and safety data reference is made to the applicable instructions (see Section 2)

## 4 QUALITY

It is advised that the bonder possesses a valid Joints Qualification Certificate, issued by the pipe manufacturer or a Qualified Certifier.

## 5 INSPECTION

All pipes, fittings or components used in the pipeline system shall be inspected for damages, prior to the actual jointing activity. Pay special attention to anything that might damage the seal and might result in a leaking joint. Rejected items shall be separated and quarantined from undamaged materials to avoid unintentional use.

Make sure that storage of rubber seals, locking strips and lubricant complies with the storage requirements. Ensure all necessary tools and materials are available.

Take notice of the safety precautions stated in this document and those in the referenced instructions.

## 6 MATERIALS, TOOLS AND CONSUMABLES

The following materials, tools and consumables are needed during the installation.

### 6.1 Materials

- REKA rubber seal\*
- Locking strip, one or two depending on joint type\*
- Lubricant\*

\* to be supplied by Future Pipe Industries.

### 6.2 Tools

- Two rubber lined pipe clamps
- Chain tackles
  - For pipe ID  $\leq$  500 mm: pulling force capability of 750 kg
  - For pipe ID  $>$  500 mm: pulling force capability of 1500 kg
- Plastic or wooden hammer, or pneumatic hammer
- Digital level indicator
- String line of at least 30 meter length
- Water proof marker
- Measuring tape and/or folding rule
- Vernier calliper

### 6.3 Consumables

- Non fluffy clean rags
- Plastic sheets
- Mixing spatula
- Duct tape
- Clean water
- Safety equipment (see Section 3)

## 7 ASSEMBLY PROCEDURE

The REKASLJ requires a specific but straightforward way of assembling, split into the following five overarching steps.

1. Prepare the assembly.
2. Install the REKA seal.
3. Insert the spigot.
4. Insert the locking strip.
5. Stretch and align the joint.

Before starting the installation, the following shall be insured.

- For underground pipe lines, the trenching shall be ready and shall meet the system requirements on bedding and compaction, and shall be within the joint approved and project specified angular deflections.
- For above ground pipe systems, the supporting shall be performed as specified by the design engineer or as per the project-specific method statement, and shall be within the joint approved and project specified angular deflections.

### 7.1 Step 1: Prepare the assembly

- a) **Position the holes of locking strip such that they are easily accessible.**

This guarantees easy insertion of the locking strip for both the current and the next joint. At this position, place a mark at the crown of the spigot end indicating "this side top". From this point onwards, do not rotate the pipe during any stage of the assembly process and always maintain the mark at the top side.

- b) **Remove sand and dirt from the joint area.**

Obtain sufficient clearance from the soil during the assembly process.

- c) **Remove the end protection.**

Do this for both the socket and spigot ends to be assembled.

- d) **Inspect the inner surface of pipe for cleanliness.**

In case of deposit of mud, sand, etc., use an acceptable method to clean the inner surface (such as use of water, pressurised air, etc.) before installing it into the system.

- e) **Clean the spigot and socket ends.**

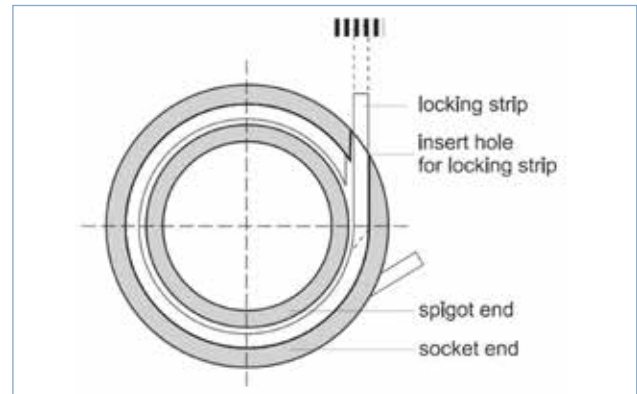
Do this thoroughly with a non-fluffy clean rag before jointing. In case of a greasy or dirty socket or spigot, use water. Do not use materials such as dusters or paintbrushes in order to avoid unwanted fibres from sticking to the surface of the seal.

- f) **Ensure a clean working environment.**

Do this to avoid contamination of joint during the insertion process. For trench assembly, place a plastic sheet underneath the socket and spigot ends.

- g) **Cover the insertion hole(s) of locking strips.**

Do this by means of a non-fluffy clean rag, duct tape, or similar in order to avoid pollution of dirt or mud into the joint during assembly.



Step 1a



Step 1b



Step 1f



Step 1g and Step 1h

## 7.2 Step 2: Install the REKA seal

### a) Clean the rubber seal and inspect it for damage.

Clean it with a non-fluffy clean rag or with water, and look for cracks, the presence of any foreign material, any indentation caused by the removal of contaminant, and permanent deformation.

### b) Ensure that correct seal is being used.

Use only the correct size of rubber ring by comparing its height, width, diameter and number of lips with the data provided in Annex C – Rubber seal dimensions.

### c) Insert the rubber seal into the groove.

Make sure the seal is facing the correct way, pointing towards the socket. Leave uniform loops extending out of the groove. There should be one loop for every 500 mm of ring circumference. Do not lubricate the rubber nor the groove at this stage. Wetting of the groove with clean water is allowed.

### d) Push all the loops simultaneously into the groove.

Manually apply uniform pressure on the loops and make sure that the compression in the ring is uniformly distributed all around the circumference. For larger diameters this can require multiple persons.

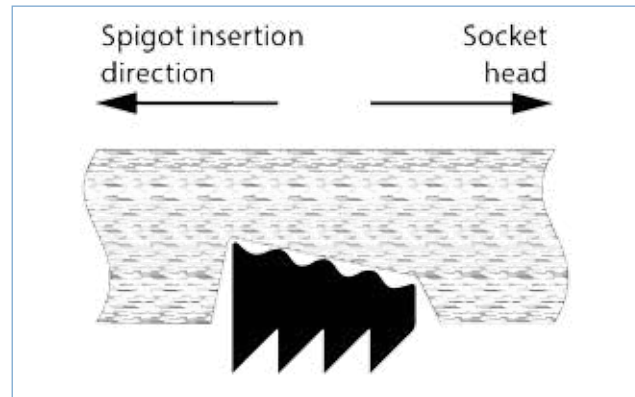
### e) Apply lubricant to the exposed surface of the inserted rubber seal.

When lubricating, do:

- Do use a non-fluffy clean rag.
- Do use the lubricant, provided by Future Pipe Industries.

When lubricating, do not:

- Do not use a paintbrush to avoid risk of contamination with unwanted bristles or hairs detaching from the paintbrush.
- Do not use other lubricants.
- Do not add water to the lubricant.



Step 2c



Step 2c



Step 2c and Step 2d



Step 2d

### 7.3 Step 3: Insert the spigot

**a) Lubricate the spigot and locking strip grooves.**

Do not try to assemble the joint without the use of any lubricant. Keep the lubricated surfaces free of potential contaminants such as sand and mud.

**b) Align the spigot and socket end.**

Ensure that the spigot end is positioned right in front of the socket end. Do not try to join two pipes at an angle, as this may damage the rubber seal.

**c) Manually insert the spigot into the socket end.**

Do so until the spigot hits the rubber seal.

**d) Cover the joint with a plastic sheet.**

This ensures the joint itself stays clean during the insertion process.

**e) Attach the clamps and chain tackles.**

Do this on both sides of the pipes to be connected. Diameters up to and including DN250 may be installed without the use of chain tackles, as using a wooden beam as a lever at the end of the pipe can apply the force necessary to insert the spigot. For larger diameters than DN250, fit rubber lined clamps or slings on both sides of the joint. When using clamps, the chains may only be attached to the bolts that hold the clamp together, not halfway each clamp, as this may result in the clamps squeezing and damaging the pipe. Use wooden blocks to keep the chains from damaging the pipe.

**f) Remove the joint cover and locking strip insertion hole covers.**

Looking through the locking strip insertion holes allows visual monitoring of the insertion progress.

**g) Insert the spigot slowly and gradually further into the socket.**

Do so until the required depth of entry is achieved while ensuring alignment throughout the insertion process. Inspect the penetration spigot as it moves deeper into the joint and continue insertion until it is possible to engage the locking strip(s).

In case of doubt if the spigot was difficult to insert, check with a thin feeler gauge, all throughout the circumference if possible, to confirm that the rubber seal is in the right position in the groove. If it proves difficult to insert the feeler gauge throughout the circumference due to slight misalignment of the joint, then the joint shall be straightened to enable such inspection. If complete circumferential check with feeler gauge is not possible, then dismantle the joint and restart the assembly process



Step 3c



Step 3d



Step 3e



Step 3f



Step 3g

#### 7.4 Step 4: Insert the locking strip

- a) **Ensure the correct locking strip is used.**  
Verify that the correct locking strip is used by comparing its dimensions with the data provided in Annex D – Locking strip dimensions.
- b) **Apply lubricant on the locking strip.**  
Make sure the tip of the locking strip is well lubricated.
- c) **Manually insert the locking strip in the hole.**  
Ensuring that the bevelled end rests against the inner surface of the socket.
- d) **Tap the locking strip home until it completely circumferences the joint.**  
Use a plastic or wooden mallet or a pneumatic hammer to drive the joint. The locking strip is fully inserted when its tip becomes visible through the insertion hole. By then, a part of the locking strip will still be sticking out. This is normal and allows removal of the locking strips if needed. Repeat this step for the second locking strip if applicable.
- e) **Remove all temporary supports, if any.**  
Once the locking strips are completely inserted, all temporary supports, where installed, shall be removed to avoid the risk of losing the stretching of the joint which will be executed in the next step. Replace any temporary supports with permanent bedding support.

Note that at low temperatures, the locking strip may become less flexible. In this case it is advisable to heat the locking strip up to around 20°C.



Step 4c



Step 4d



Step 4d

### 7.5 Step 5: Stretch and align the joint

**a) Draw the first marking line.**

Mark the insertion distance of the joint on the pipe at the socket head.

**b) Pull the newly installed joint outwards.**

Apply axial tension on each jointed pipe to fully engage the locking strip(s) against the stop collar. While applying this stretching force, ensure that the joint is fully straight in terms of axial alignment. Stretching can be done manually for small pipe diameters. For larger diameters, mechanical pulling is required. Approximate capacity of pulling equipment is 750 kg for diameters up to and including DN500, and 1500 kg for larger diameters. If stretching is not executed correctly, the pipeline may move and subsequently fail during the field hydrotest.

**c) Draw the second marking line.**

Mark the stretching distance on the pipe at the socket end. This will reveal the amount of stretch, and will provide a baseline for further joint checks, such as joint movement.

**d) Apply a permitted deflection angle if necessary.**

This may be done at this stage only, after assembly of the joint, for the purpose of aligning it with the support or trench layout.

Refer to Annex A – Permitted angular deflections and Annex B – Measuring angular deflection in the field for more information.

Do not apply the maximum permitted angle blindly. Always refer to the project specific method statement or consult with the system design engineer regarding the maximum permitted deflection angles.

**e) Secure the joint.**

After correct alignment is ensured, support the joint. For underground applications, apply the correct backfill material on both sides of the joint. Pay special attention to place the backfill material under the pipe haunches. Also, apply enough backfill to prevent trench flooding (see Section 2). For above ground applications, use the prescribed supports. This initial stage of supporting ensures that the pipe is secured as the installation continues towards the next joint.

Note that after a reasonable length of pipeline is installed, it is possible to fine-tune the pipeline's alignment further. If this fine-tuning is done, the securing process may need to be repeated



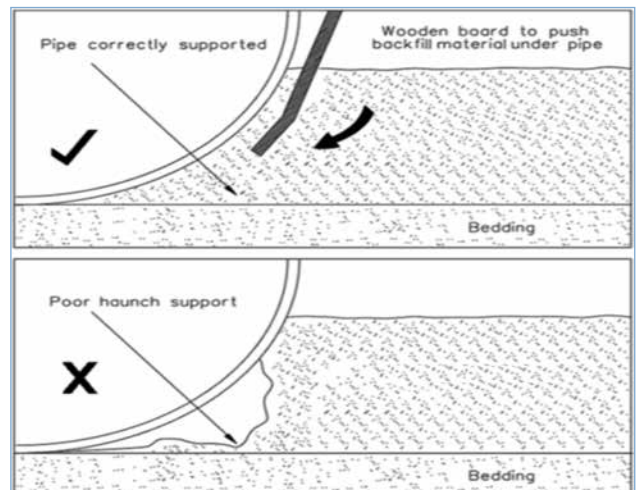
Step 5a



Step 5b



Step 5c



Step 5c

## 8 STORAGE GUIDELINES FOR RUBBER SEALS, LOCKING STRIPS AND LUBRICANT

The following guidelines shall be honoured when storing the rubber seals, the locking strips and lubricant.

- Rubber seals are delivered in closed bags or protective boxes from the factory. They must be stored in their original packing in a sheltered environment, inside a dry and shaded area where they are protected from direct heat sources, (sun)light, ionizing radiation and UV radiation, away from ozone generating electrical devices and exhaust gases, and in a clean condition until they are ready for use. Windows of storage rooms should be covered with a UV blocking coating.
- The maximum storage temperature for rubber seals shall be 38°C. Brief periods of higher temperatures due to temporary climate changes are allowed. The maximum relative humidity shall be 75%.
- Store rubber seals without tension (i.e., never hang rubber seals).
- Rubber seals shall be used on the so-called First In, First Out principle (FIFO), such that those most recently received seal is always used last.
- Locking strips shall be stored in a clean condition in a sheltered environment, inside a shaded area where they are protected from direct sunlight until they are ready for use.
- Lubricant shall be stored in its original container. Recommended storage temperature is from 0°C to 65°C.
- During storage, keep all consumables away from chemicals which tend to attack them.



## ANNEX A - PERMITTED ANGULAR DEFLECTIONS

Table 1 shows the maximum allowed angular deflections for the joint.

Do not apply these maximum permitted angle blindly. Always refer to the project specific method statement or consult with the system design engineer regarding the maximum permitted deflection angles.

Table 1

ID (mm)	Angular Deflection
80	1°30'
100	1°30'
125	1°30'
150	1°30'
200	1°30'
250	1°30'
300	1°30'
350	1°30'
400	1°30'
450	1°30'
500	1°30'
600	1°30'
700	1°
750	1°
800	1°
900	1°
1000	1°
1200	1°

## ANNEX B - MEASURING ANGULAR DEFLECTION IN THE FIELD

Angular deflections can be measured in the field using a string line.

Two ways of measuring can be performed, see Figure 1.

1. Measure on the outside of the joint.
2. Measure on the inside of the joint.

Measuring always must be done in the plane of the deflection and the measured distances may never exceed the values presented in Table 2. Furthermore, the surveyor must always check, record and approve the applied angular deflections prior to final securing.

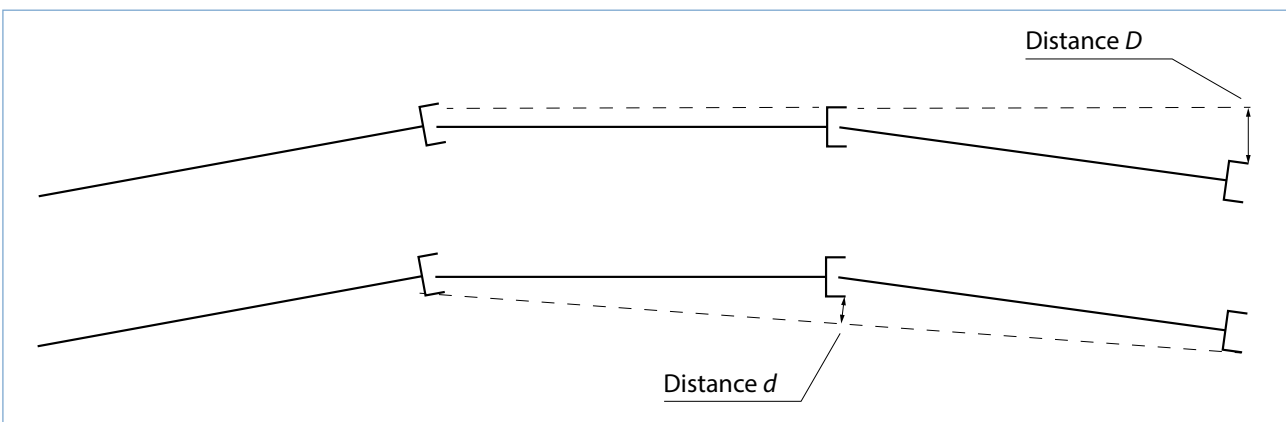


Figure 1

Table 2

Pipe length (m)	Angular deflection	Maximum Distance D (mm)	Maximum Distance d (mm)
10	1°	175	85
10	1°30'	260	130
12	1°	200	100
12	1°30'	300	150

## ANNEX C - RUBBER SEAL DIMENSIONS

The general shape of the rubber REKA seal is shown in Figure 2, its dimensions are grouped per diameter range and are presented in Table 3.

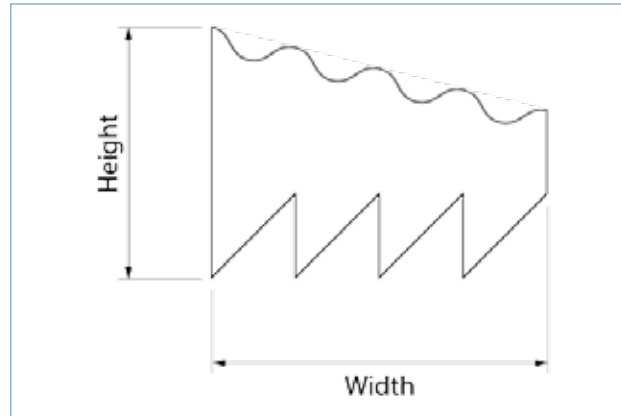


Figure 2

Table 3

DN (mm)	Number of lips	Height (mm)	Width (mm)	Seal OD Type A (mm)	Seal OD Type B (mm)
80	3	15	16	126	-
100	3	15	16	148	-
125	3	15	16	177	-
150	3	15	16	203	-
200	3	15	16	256	260
250	3	15	16	317	323
300	4	18	20	375	382
350	4	18	20	426	432
400	4	18	20	480	487
450	4	18	20	534	542
500	4	18	20	593	605
600	6	22	30	708	722
700	6	22	30	825	825
750	6	22	30	880	880
800	6	22	30	934	934
900	6	22	30	1034	-
1000	6	22	30	1142	-
1200	6	22	30	1361	-

## ANNEX D - LOCKING STRIP DIMENSIONS

Table 4 provides the locking strip dimensions.

Table 4

ID (mm)	PN (bar)		Quantity	Height (mm)	Width (mm)	Length (mm)
	Min	Max				
80	32	32	1	8	12	420
100	25	32	1	8	12	420
125	25	32	1	10	14	550
150	20	32	1	10	14	780
200	16	20	1	10	14	780
	25	32	2			
250	12.5	20	1	16	20	1330
	25	32	2			
300	12.5	20	1	16	20	1330
	25	32	2			
350	8	16	1	16	20	1330
	20	25	2			
400	8	16	1	16	20	1700
	20	25	2			
450	8	16	1	16	20	1700
	20	25	2			
500	8	12.5	1	20	24	2260
	16	25	2			
600	8	12.5	1	20	24	2260
	16	25	2			
700	8	12.5	1	23	40	2885
	16	20	2			
750	8	12.5	1	23	40	2885
	16	20	2			
800	8	12.5	1	23	40	2885
	16	20	2			
900	8	12.5	2	23	40	1765
1000	8	12.5	2	23	40	1765
1200	8	12.5	2	23	40	2260

## ANNEX E - INSTALLATION TIME

Table 5 shows typical installation times per diameter, based on the following presumptions.

- Uninterrupted work.
- Sufficient space and an open trench for underground applications, etc.
- The use of powered equipment, such as a crane, to move the pipe
- An installation crew of 3 persons (two in the trench, one outside).
- Competent installation personnel with optimal training (see Section 4).
- Moderately sunny, dry weather conditions.
- Piping to be installed is as part of a straight run with no fittings.
- Excluding the handling time of pipe (example: stringing of the pipe inside a trench).
- Including the time taken for clamping and assembly of the joint.

Table 5

ID (mm)	Time (min.)
80	5
100	5
125	5
150	5
200	10
250	15
300	15
350	15
400	15
450	20
500	20
600	20
700	20
750	25
800	25
900	25
1000	30
1200	30

## ANNEX F - JOINT DISASSEMBLY

If a joint requires disassembly, the following steps apply.

1. Push the pipe back to free up the locking strip.
2. Grip the locking strip with a pair of pliers or a plate clamp. Tap the pliers or use a crane to pull the plate clamp to remove the locking strip. If the locking strip jams, slightly rotate and/or align the pipe while pulling the strip.
3. Now the joint can be released by pulling the spigot out of the socket.

This procedure does not apply to joints that contain 2 locking strips engaged with a single groove, as in the case of very large diameters such as ID  $\geq$  900mm.



