

Pipe Laying Procedure

The appropriate installation procedure for GRP Pipe varies depending on the rigidity of the pipe, the depth of the trench, the width, the natural soil properties, the additional loads on the pipeline and the filling material. In order to support the pipe in a healthy way, the natural ground should be firmly wrapped around the pipe area filler. The following pipe installation procedures are provided to assist in the proper laying of the pipe.



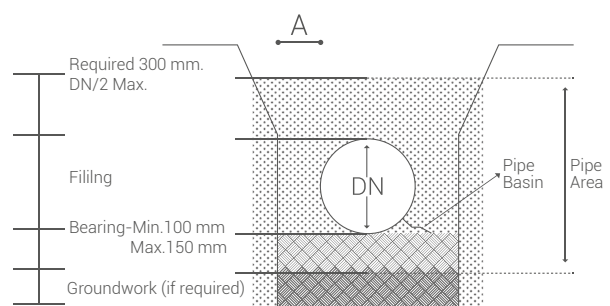


Standard Trench

It shows the typical trench section dimensions. The dimension "A" should always be wide enough to ensure that sufficient filling material can be placed and compacted in the pipe basin. Dimension "A" should also be wide enough to allow the clamping equipment to operate in a manner that does not damage the pipe. Typical "A" size, except for very small diameters, the minimum is 0.4 DN. For larger diameters, a smaller value for "A" may be appropriate, depending on the natural substrate, filler material and compression technique.

For example, in the 1st, 2nd and 3rd groups of natural soils, the trench can be kept narrower by using SC1 and SC2 fillers which do not require much compression.

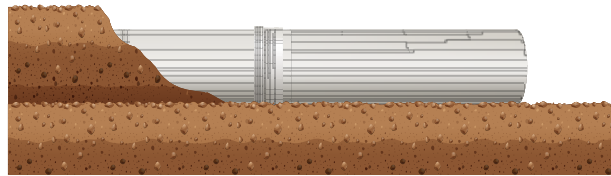
NOTE: If soft, loose, unstable or expanding natural ground is found on the bottom of the trench, it may be necessary to increase the thickness of the bearing pad to provide regular and unchanged support along the pipe.



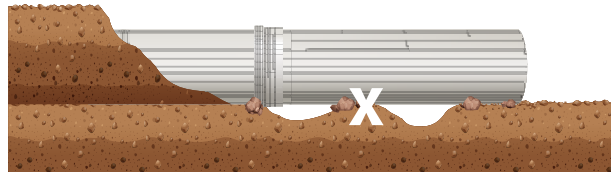
Pipe Trench Filling

The pipes may float due to heavy rainfall or may be exposed to thermal expansion, which may result from high temperature differences between day and night. In order to avoid such nonconformities, it is recommended that each pipe, which has been completed, be filled to the surface level.

If pieces of the pipe is assembled but the filling process will pass; first, the joints in the middle of each pipe should be filled to the top to prevent movement. Correct selection and tightening of the pipe area filler are crucial for controlling vertical deflection and for pipe performance.



Correct bearing support



Wrong bearing support

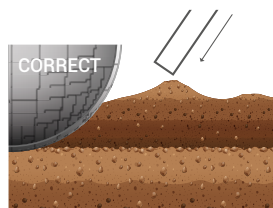
Filling Material Group	Definition of Filling Materials
SC1	Crushed stone containing less than 15% sand, maximum 25% amount of material
SC2	Less than 12% fine grain containing clean coarse materials
SC3	Clean coarse materials containing 12% or more fine grains Sandy or fine grains containing less than 70% fine grains
SC4	Fine-grained materials containing more than 70% fine-grained piecess



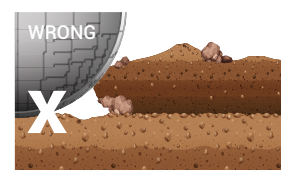
Pipe Trench Filling

It should be ensured that the filling material does not contain trash and foreign materials which may damage the pipe and cause the lateral support to decrease. Located in the basin region between the bottom of the pipe and the bearing. The filling and compression of the material must be carried out before the remaining filling material is placed. The amount of energy consumed in the compression method should be checked as well as the thickness of the compacted fill layer. The appropriate filling process is generally carried out in layers between 100 mm and 300 mm thickness depending on the filling material and the compression method.

Gravel or crushed stone is used as filling material, When these materials are relatively easy to compress. The thickness of the filler layer is 300 mm. Since thinner materials require more compression energy, the thickness of the filler layer should be limited. In order to support the pipe well, it should be ensured that each filling layer is well compacted.



Providing appropriate basin support.



Inappropriate basin support.

On-Pipe Compression

When it reaches the top of the pipe, it should not exceed 1.5% of the pipe diameter. This initial amount of ovalization will depend on the amount of energy required to achieve the desired relative degree of compression. High amounts of energy required for SC3 and SC4 fillers can cause this ovalization limit to be exceeded. In this case, can be considered the use of pipes or other filling materials of higher rigidity.

Filler Type	Hand Operated Impact Compactor	Hand Operated Vibratory Plate Compactor	Suggestions
Type SC1		Tip SC1	Two-time transition provides a good compression.
Type SC2		Tip SC2	2-4 transitions depending on desired density and height.
Type SC3	100 - 200 mm		The number of transition and layer height depends on the desired density. Optimal or close moisture content. Check compression.
Type SC4	100 - 150 mm		It may require high compression energy. Check that if the moisture content is ideal. Make sure that the compression is done correctly.

Permissible initial vertical deflection values	Vertical Deflection (of Diameter %)
Large Diameter (DN ≥ 300) Beginning	3
Small Diameter (DN ≥ 250) Beginning	2

TRAFFIC LOADS

Loads Type	Strength (Kn)	Strength (lbs)	Depth of Embedment (m)
AASHTO H20 (C)	72	16000	1
BS 153 HA (C)	90	20000	1,5
ATV LKW 12 (C)	40	9000	1
ATV SLW 30 (C)	50	11000	1
ATV SLW 60 (C)	100	22000	1,5
Cooper E80	Demiryolu		3

- Minimum pipe area filling floor module is taken as 6.9 Mpa

With the Type 1 mounting version, the pipe area up to 300 mm in height must be tightened. In areas that will be subject to traffic load, the trench filler is compacted to the natural ground to minimize road surface settlements. It provides the thickness of the soil cover on the pipe required for the operation of various compaction equipment on the pipe. Care should be taken not to apply high compression energy to the top of the pipe, which may cause deformity of the pipe circularity. At the same time, the material in this section should not be left loose and should be reached to the desired density.

WATER- HUMMBER IMPACT :

The impact of the water-hammer is a change in the flow rate of pipe systems caused by the sudden decrease or increase of the system pressure. These changes are caused by sudden opening and closing of the valves, sudden stopping of the pumps in the event of a power failure or sudden operation during commissioning. The water- hummer pressure in the GRP pipes and steel and ductile pipes are is 49.9% . The water-hammer impact pressure in GRP pipes is approximately 39.9% of the rated pressure. The water-hammer stroke is calculated by the following formula.

$$\Delta H = (W \cdot \Delta V) / g$$

ΔH : Change in pressure (m)

ΔV : Change in fluid velocity (m/sn)

w: Surge wave celerity (m/sn)

g: Gravitational acceleration (m/sn²)

Double Sided Elastomer Sealed Coupling Mounting

A - REKA COUPLING

The following steps (1-5) must be followed when fitting the Reka couplings.

Step 1 Foundation and Bearing

The bearing should be dug in such a way that at each point of the coupling, the head rests on the coupling to prevent it from hanging and to ensure continuous support of the pipe. After the jointing process is completed, the filling and bearing of the coupling area should be made properly.

Step 2 Cleaning the Coupling

The grooves of the double-sided couplings and the Epdm Reka seal to be placed in the couplings should be thoroughly cleaned until they are clear of dirt and oil.

Step 3 Installing the Seals

The elastomer seal is placed in the groove of the coupling such that the protrusions of the Epdm Reka seal are facing out of the groove. Do not apply lubricant into the groove or on the seal during gasket installation. However, the seal duct can be moistened with water for easy installation of the seals.

Step 4 Apply Lubricant to Elastomer Seal

Then apply a thin layer of lubricant to Epdm Reka Seal. The amount of lubricant that should be used in each coupling must be kept constant.

Step 5 Cleaning the Pipe Opening and Applying Lubricant

The pipe opening that will pass into the coupling must be cleaned from sand, dust, dirt and oil. Check the sealing surface of the pipe opening for any damage. Apply a thin layer of lubricant to the area of the pipe up to the Pieces marked with a black strip. Make sure that the coupling and the pipe opening remain clean after the lubricant has been applied. A plastic sheet of approximately 1 m² or a clean cloth to be placed under the jointing area has been found to be an effective way of ensuring that the pipe ends and seals remain clean.