



Gidrolica
Water drainage system manufacture

*Gidroloica surface flow system
installation and operation manual*

Technical manual

Gidroloica surface flow system installation and operation manual

For the maximal service life and most effective operation of surface flow systems it is recommended to follow the below mentioned installation and operation requirements.

All the surface flow elements should be selected in accordance with the load class and their water-transmitting capacity. Water drainage gutter installation diagram is indicated on Fig. B.

Gutters are laid down in a trench on a concrete basement. The installation should be commenced with gutter or sand catcher installation at the lower trace mark from which the drainage canal lay down line can be marked.

1 Shell bottom should be supported with the drainage layer – basement of puddled gravel and sand mix. Artificial basement is 10 cm thick.

2 The waterproofing material (such materials as glassine, "Asbestos felt" may be used as waterproofing material) should be laid down the built basement of break stone M 400 (GOST 8267-93). Then concrete mat of cement and concrete B 25 F200 W6 (GOST 26633-91) is made. Basement thickness depends on the load applied to the gutter during operation (Table 1).

Concrete should be laid before the level, 5 mm lower than the gutter bottom design mark.

Table 1. Dimensions of concrete shell depending on the loading class
(according to EN1433)

| Loading class | D400 | E600 |
|---------------------------------|------|------|
| Concrete shell width, C, mm | 150 | 200 |
| Concrete shell thickness, H, mm | 200 | 200 |
| Concrete mat class | B25 | B25 |

Note: when the concrete class changes the concrete shell dimensions change according to Table 2.

3 Upon completion of the concrete basement board plywood form panel or reusable formwork is installed.

The formwork should be strong, tight and stable under the influence of installation, transportation loads as well as loads when concrete laying. Plywood panel, sawn wood and other wooden materials should be saturated or covered with waterproof solutions. Formwork end faces of sawn wood should be protected from moisture with waterproof sealing and from mechanical damage – with plastic or metal shells. The formwork installed should not have any deviations from vertical and horizontal axes of basement established by gutter line.

4 Before concrete mix laying all the formwork cavities and internal surfaces should be cleaned of rubbish and foreign matters. 10 mm thick M 150 cement and sand solution levelling course is made on the completed concrete plate basement according to the gutter basement width (Fig. 1)

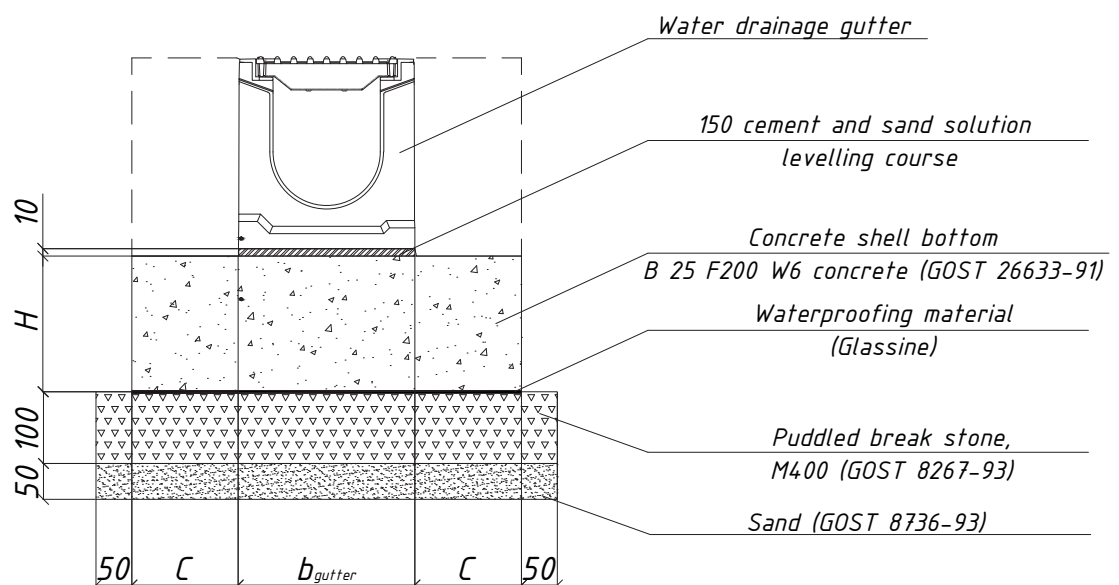


Fig. 1 Concrete water drainage gutter installation diagram

5. The gutters are matched according to the tongue-in-groove. After installing the gutter its direction should be checked according to the height marks from four sides according to the angle bar top.

6. After setting the sand catcher and the adjacent gutters into the design position the shell walls should be joint grouted. To avoid shear of canals the concrete should be laid around them in horizontal layers without technology gap along with the laying direction to one side in all the layers. Every next concrete mix layer should be laid up to the beginning of the concrete adhesion in the previously laid layer. For the higher loading zones the concrete is laid on the gutter on all the height.

To preserve the concrete qualities and to increase strength obtaining the newly laid concrete should be covered with the film till the concrete obtains the strength level at least 70%.

7. The formwork should be dismantled after the concrete achieves the stripping strength level.

8. If needed, gutter joints should be greased with sealing (GOST 25945).

9. To arrange the sealing joint at the border between the joint grouting and gutter shell at the concrete laying stage the flexible polystyrene foam formwork should be applied along both sides of the water drainage gutters to make joint cells.

After filling in the design strength joint grouting shell remove the temporary polystyrene foam seal. The seal should be dismantled in a mechanical way with the help of metal brush. Before sealing the joint should be cleaned with the brushing device, blown off and dried with hot air plants. Joint drying is the obligatory operation. Joint walls should be treated with priming, then the joint cell should be filled in with sealing (GOST 25945).

10. To seal the gutter and adjacent asphalt concrete joint BRIT-A bitumen polymer clamping film should be used. Sealing is performed under the influence of high-temperature asphalt concrete mix which leads to melting of the film and it will form a protective layer.

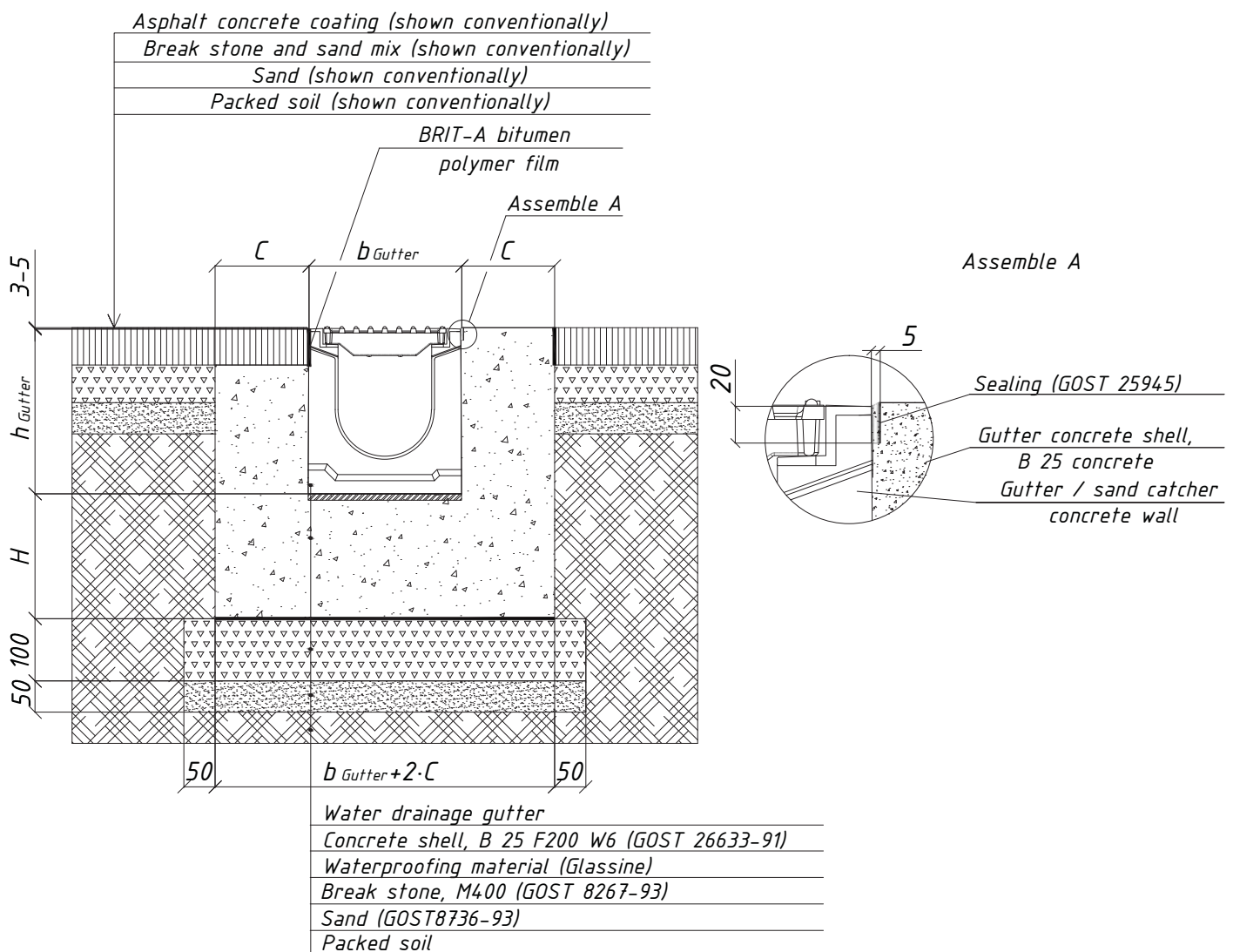


Fig. 2 Concrete water drainage gutter installation diagram

11 When joint grouting the shell on all the gutter height the expansion joint should be taken into account. Transverse expansion joint should be arranged in the cast-in-place gutter shell at the concrete laying stage by means of soft sealing laying (GOST 15588-86), $d=20$ mm. At the stage of joint arrangement a packing cord of foam rubber $d30$ mm (GOST 6467-79) should be installed over the sealing. After laying the cord the joint cell is filled in with the sealing (GOST 25945). The expansion joint is greased on the gutter bottom with the sealing over the packing cord. Transverse cord step is no more than 20 m.

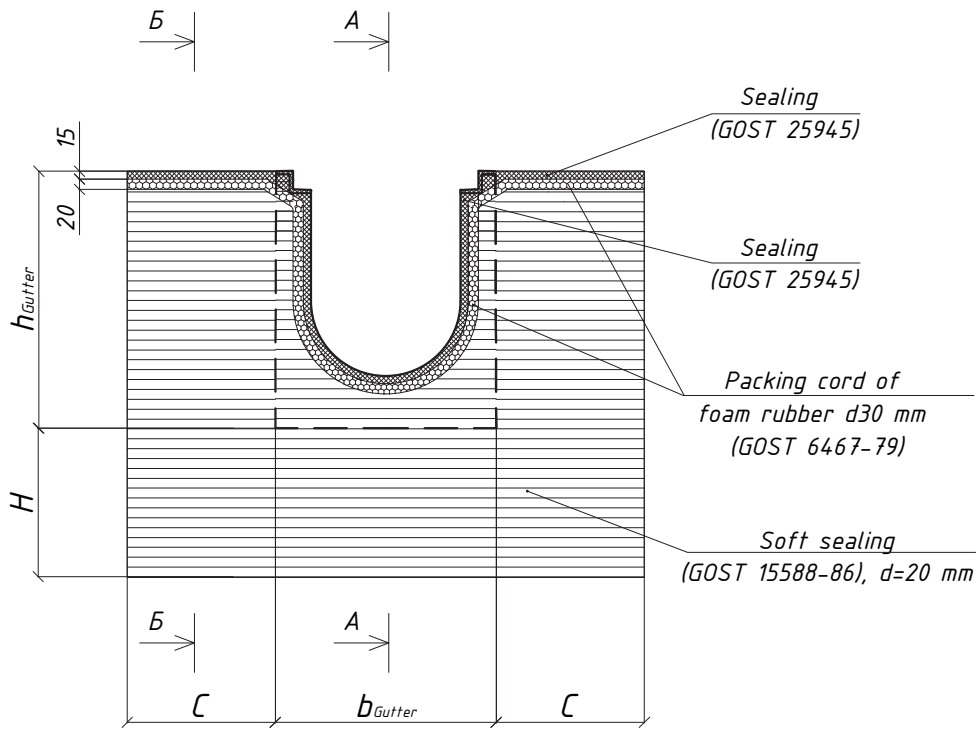
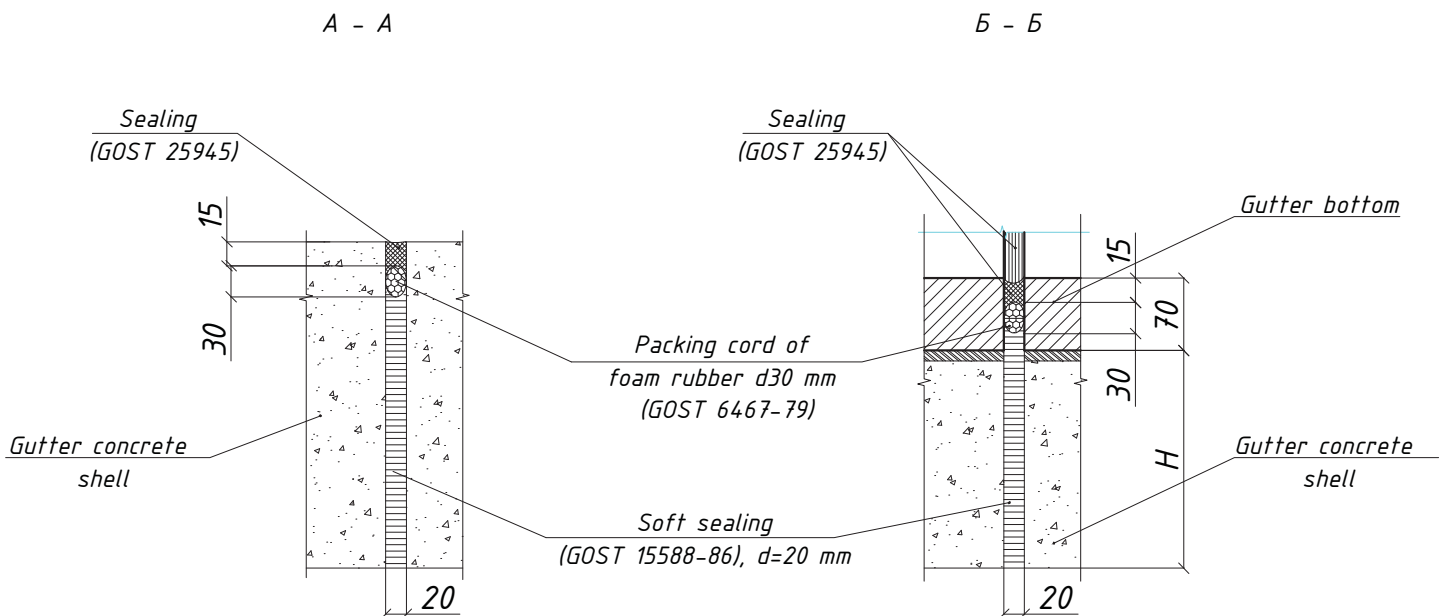


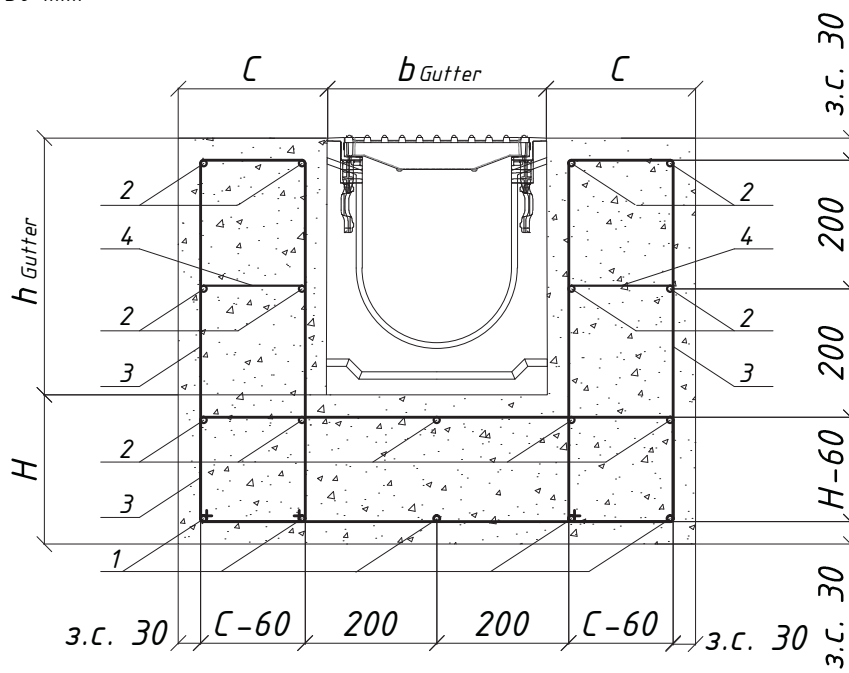
Fig. 3 Expansion joint arrangement diagram



12. After the installation the sewer grate level should be 3-5 mm less than the paving level. When asphalt paving the territory an asphalt paver may run over the canal line.

13. If needed to reinforce (*) the gutter concrete shell the reinforced bars are laid to the completed concrete mat surface. The working rebars are made of class A -II reinforcement bars (GOST 5781-82). Reinforced bars coupling in the crossing places is made with the help of a binding wire.

To provide the protective layer the lower row of reinforcement is laid to the fine grain concrete seals or plastic anchors located along the concrete mat surface. The working rebar protective layer in the shell bottom place and walls is at least 30 mm.



- | | |
|---|--|
| 1. Steel reinforcement 12-A-III (A400) GOST 5781-82 | 3. Steel reinforcement 8-A-III (A400) GOST 5781-82 |
| 2. Steel reinforcement 10-A-III (A400) GOST 5781-82 | 4. Steel reinforcement 6-A-I (A240) GOST 5781-82 |

*Reinforcing the cast-in-place shell is provided only in case of installation of gutters in the airports and in the zones with transverse overrun of transport and high load.

Fig. 5 Water drainage gutter concrete shell reinforcement diagram

14. If needed to match the gutters at arbitrary angle other than 90° it is necessary to saw the gutters and grates in the place of joint at the angle equal to half of the required angle.

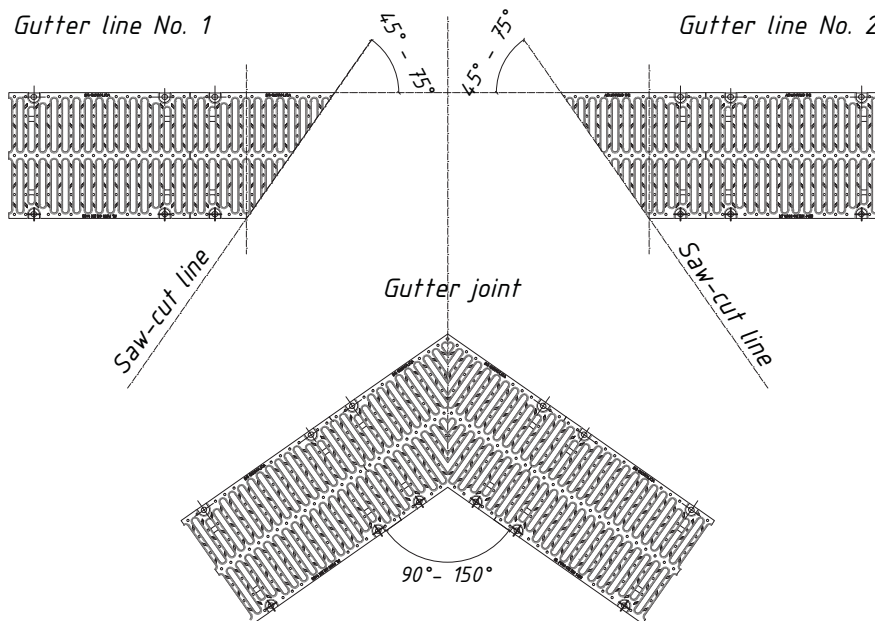
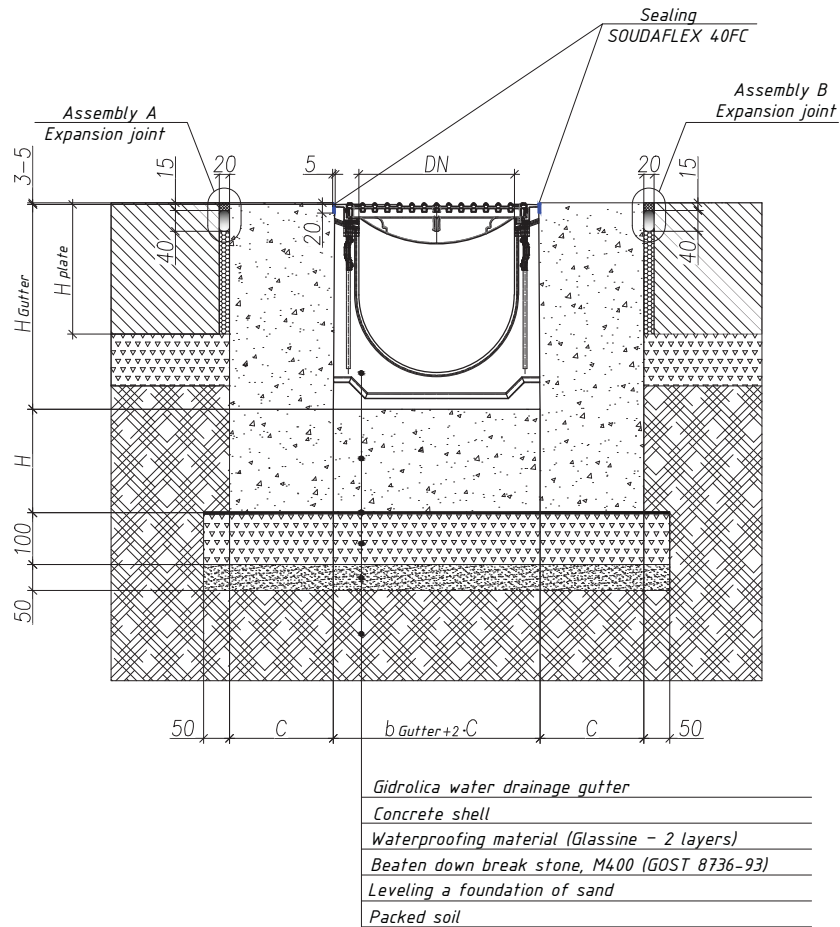


Fig. 6 Grate cut diagram

15. When installing the concrete water drainage gutters in the reinforced or precast reinforced concrete plate coatings the polystyrene foam longitudinal expansion joints should be taken into account. Herewith the joint should be at least 20 mm thick and lay down depth should be no less than the paving concrete platelay down depth.



Assembly A
Expansion joint arrangement

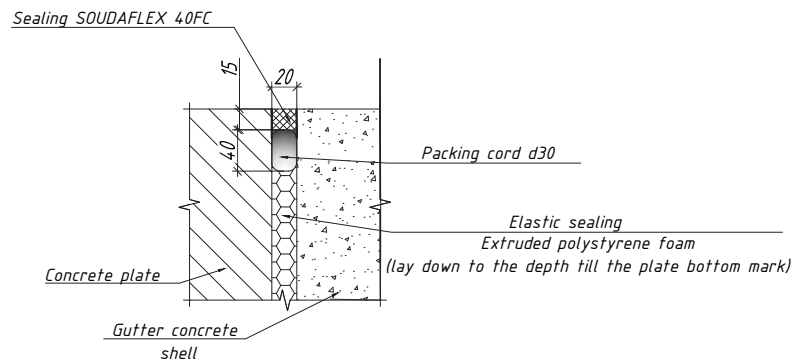


Fig. 7 Longitudinal expansion joint arrangement diagram

16. To provide the normal operation of all the linear water drainage system it is necessary to clean the sand catcher cage. Regularity depends on the operation conditions.

Table 2. Dimensions of concrete shell (cm) depending on concrete class

| Safety factor | Concrete pressure class | | | | | | |
|---------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | B10(M150) | B15(M200) | B20(M250) | B25(M300) | B30(M350) | B35(M400) | B40(M500) |
| | E600 loading class | | | | | | |
| 1,0 | 14 | 12 | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 |
| 1,5 | 25 | 16 | 12 | 10 | 10 | ≤10 | ≤10 |
| 2,0 | 32 | 25 | 20 | 16 | 14 | 12 | ≤10 |
| | D400 loading class | | | | | | |
| 1,0 | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 |
| 1,5 | 14 | 10 | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 |
| 2,0 | 22 | 14 | 12 | 10 | ≤10 | ≤10 | ≤10 |

Surface flow system maintenance and cleaning

For the maximal service life and most effective operation it is recommended to follow the below mentioned surface flow system operation rules.

- After first installation it is necessary to tighten all the bolting joints on the gutter with the help of a wrench. Within 4 weeks the first joint control should be performed. Further it is necessary to regularly control all the bolting joints on each grate and, if necessary, the bolts should be tightened. The checks should be performed at least once a year – for the areas with non-intensive traffic and once per half year – for the areas with intensive traffic.
- For the easier cleaning of gutters and sand catchers the replacement bolting of grates is provided, which allows to remove the grate fast and clean the stopped-up area.
- If necessary to remove the grate to clean the gutter the following assembly rules should be followed: at first square cage nuts are removed, then the grates are laid down. Bolts are drawn up tight when matching the grates and nuts holes due to which the reliable and stable bolting is ensured. When bolting the grate the corresponding torque should be taken into account (about 60 Nm for M10 and about 100 Nm for M12).
- For the areas with over-intensive loading level it is recommended to regularly control the degree of stop-up and, as needed, clean the gutters to preserve their transmitting capacity. Besides, it is necessary to remove acid, toxic chemicals, reagents (for example, deicing agents) and other highly chemical substance remains from the gutter to prevent gutter damage. A special point to note is the timely cleaning of sand catchers as their stop-up leads to decrease in the water transmitting capacity of all the surface flow system.

Ways of cleaning the surface flow system:

1. Mechanical way – involves dismantling the canal grates and removal of stop-ups mechanically (brush, shovel).
2. Hydro-dynamic way – is based on application of a special equipment including high-pressure apparatus and firefighting machines.
3. Thermal way – involves cleaning the canals in the winter and spring from ice. This process is performed by heating gutters with the help of burners or by transporting hot water through them.

If rust appears on the cast iron sewer grates it is necessary to clean them from rust and paint in black (Hammerite hammer black paint). To prevent rust it is recommended to clean and paint the grates at least once a year.