

Cooperative research on the technology of polyethylene pipe for sewerage laid in steep gradient

Period

1998.3 to 1996.9

65P ~ 70P

(Purpose)

The sewerage maintains the water environment, and contributes to the improvement of comfortable living environment as a basic and multi-roles facility for making community.

In plan and design of the sewerage, it is necessary to set the improving area for sewage works from the wide-area viewpoint and select the appropriate improvement technique, and it is vital to aim to make facilities adhered to the region as well as emphasize each region.

When the sewerage is laid in mountain ranges and steep slope, it is possible to attempt shortening of the pipe line extension, reduction of construction period and construction expenses, etc. by developing new technology for pipe and energy dissipater and using in practice.

Material and shape and dimension which mainly satisfy the conditions by showing next are required for pipe laying in steep gradient.

1. That the sewage has the free water surface, and flows in stabilized flow condition.
2. That for high speed flowing sewage, the tubing should be difficult to abrade.
3. That there is no hindrance in the joint of the tubing so that there is no invasion of the tree root from the outside.
4. That the manpower construction in the steep plane is possible.

The high density polyethylene pipe was focused on from these conditions. Still, it is specified by JIS for the polyethylene pipe as pipe (JIS K 6762, inner diameter 13 ~ 50 mm) for the water supply and the pipe (JIS K 6764, inner diameter 20 ~ 200 mm) for the gas. It can be said that the joints of the polyethylene pipe is the fusion structure and the reliability (strength, air tightness) of the joints is higher than the piping material of the collar joints. And, the polyethylene pipe of which the earthquake resistance is evaluated high in Great Hanshin Earthquake, etc., is the piping material which is adopted by gas pipe and water service pipe has increased at present rapidly.

Then, it was made to be a purpose of preparing design data, which centered to matter of design in using polyethylene pipe on the sewerage laid in steep slope such as the mountain range in respect of the matter which it must be thought.

(Result)

In 1996, the development objectives of polyethylene pipe for the sewerage was set, and on these examination items, the experiment was carried out, the furthers shown the following were examined in 1997.

1. Examination of the material property of polyethylene pipe for the sewerage.

It was confirmed that on the abrasion resistance of polyethylene pipe, by carrying out 2 experiments of drum style and the sand particle transportation, the development objective was achieved.

2. Examination of the shell characteristics of the polyethylene pipe for the sewerage

On 2 types of thick-walled pipe (SDR13.6) and thin-walled pipe (SDR21) classified by loading conditions, the tests of the pipe (Fatigue test, internal pressure creep test between ripeness) and Characteristics of joint (the flat negative pressure test) were carried out, and that the development objective had been achieved was confirmed.

3. That the points considered in the design of the polyethylene pipe for the sewerage laid in steep gradient was arranged by adding the investigation from the knowledge obtained from various test items, and it was arranged as design data.

4. Contents of design data

Chapter 1 General remarks

The following are described: Purpose and application range, application standards, laying plan, tube

diameter.

Chapters 2 Pipe line facilities

Foundation attached facilities are described with specification of pipe, selection of pipe, overburden of pipe.

Chapters 3 Construction technique

Material transportation and pipe facilities method are described.

Chapters 4 Maintenance

Inspection and repairing methods are described.

Still, as performance of pipe, the testing requirement, result and study on tubing and shell were attached as reference materials.

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Key Words

Steep slope, sewerage polyethylene pipe, material property, shell characteristic, flow characteristic, buried work characteristic