

## Research on Measures for Heat Retention of Exposed Pipes in Cold Districts

Year of Research

2012

Construction of efficient sewage

**(Purpose)**

In this research, on-site experiments were conducted to confirm risks concerning the blockage of quick piping (exposed piping) , one of the technologies in the Sewerage Quick Project, due to freeze of wastewater in cold districts and to verify the necessity of measures for heat retention of exposed pipes facilities installed in Joubouji area in Ninohe City of Iwate Prefecture

**(Results)**

(1) Freezing experiment

It was supposed that freeze of wastewater takes place by the phenomenon that sediments dotted in pipeline due to low flow cause the stagnation of wastewater. In addition, the blockage in pipes was supposed to occur due to the phenomenon that melting of freeze by flow of wastewater is hard to take place because of quite low frequency of inflow of wastewater to the pipeline. In order to prove these suppositions, two (2) cases of experiments for confirming freezing process and the one for countermeasures against freezing were carried out by the use of actual on-site facilities. These experiments were mainly carried out in days with highest temperature below 0 degrees C, partly in days with lowest temperature below 0 degrees C. As shown in **Table-1**, freezing phenomena was observed in all cases of experiments.

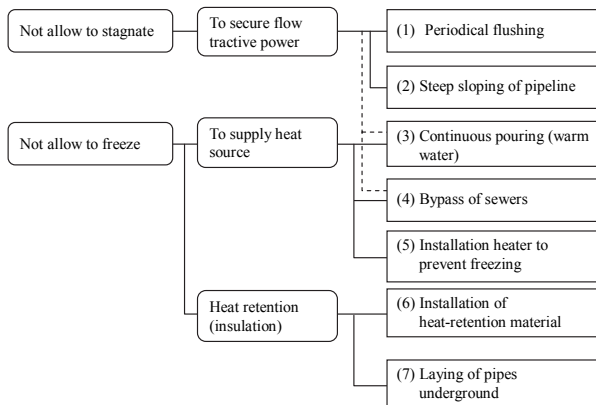
**Table-1 Methods and results of experiments**

Experiment cases	Methods of experiments	Results of experiments
Case No.1	By pouring water about every 2 hours except night time, it is checked 2 times a day whether there is freeze in pipes.	In the upstream of experimental section, pseudo-excreta stagnated and freeze was observed.
Case No.2	Based on the observation results in case No.1, pouring amount or frequency is modified and it is checked 2 times a day whether there is freeze in pipes.	In the upstream of experimental section, pseudo-excreta stagnated and freeze was observed.
Case No.3	In order to confirm effect of measures for heat retention of piping for the prevention of freezing, Case No.1 experiment with heat retention material on exposed pipes were carried out.	Freeze was observed.

【Source: Report of National Institute for Land and Infrastructure Management (NILIM)】

(2) Study on measures against freezing

Based on the results of on-site experiments, it was found out that there is a possibility of blockage in quick piping due to freeze of wastewater under the environment in which atmospheric temperature below 0 degrees C lasts for long time and low flow because of the commencement of facility operation. In order to avoid freezing, it is important “not to allow wastewater to stagnate” and “not to allow wastewater to freeze even if it stagnates.” From these considerations seven (7) countermeasures were worked out and listed as shown in **Figure-1**. Moreover, these seven countermeasures are studied comparatively in terms of quality, cost and time for delivery and (3) continuous water pouring method is considered to be the most economical.



**Figure-1 Classification of ultimate measures**

**(Conclusion)**

Based on the results of the freezing experiments and study on the countermeasures against freezing, continuous water pouring method which can decrease pouring water amount according to the number of houses connected to sewerage has been considered to be the most economical as countermeasure against freezing of quick piping which is used in cold districts and low flow because of commencement of its operation. However, it is necessary that the applicability of this countermeasure to actual facilities and its effectiveness will be confirmed.

※ Japan Institute of Wastewater Engineering and Technology  
Inquiries ; Shigeharu Inoue, Yasumasa Sakabe, Hiroshi Kawamura;1st Research Department [03-5228-6597]

Key words

Sewerage quick project, quick piping (exposed piping), cold districts