

Research on the joint for SSPC with smooth inside

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(Purpose)

During shield construction in recent years, when cost reduction, environmental loading reduction and improvement of the construction surroundings, etc. are more further required, the improvements has been attempted by the development of RC segment with the aspects of secondary lining omission , having smooth inside and high-speed type joint(the one-pass joint), etc..

In this study, by adopting the joint that the tightening is possible for the conventional style SSPC segment (the concrete filled steel segment) using M22(8.8) with bolt box, and without defect of bolt box in SSPC, the examinations of the segment evaluation, design and construction for practical application are carried out through the demonstration construction, and make the technology pamphlet.

(Content)

The joint for SSPC with smooth inside is used for connection of segments or connection of rings in order to omit secondary lining for shield lining, high-speed construct in sharp curved line and opening division. It is one system consisted of the pin member and intercuspatation member, can be fastened by inserting pin member in the intercuspatation member. And, it is made that the pin side is equipped with the gear style tightening mechanism to be a standard, in order the more tightening is possible when the aperture occurred after the fastening.

In this study, that (1)examination of research method on design, (2) evaluation of performance of joint, (3)examination of workability, (4) application examination, (5) general evaluation, (6) report preparation were carried out while demonstration experiments were carried out.

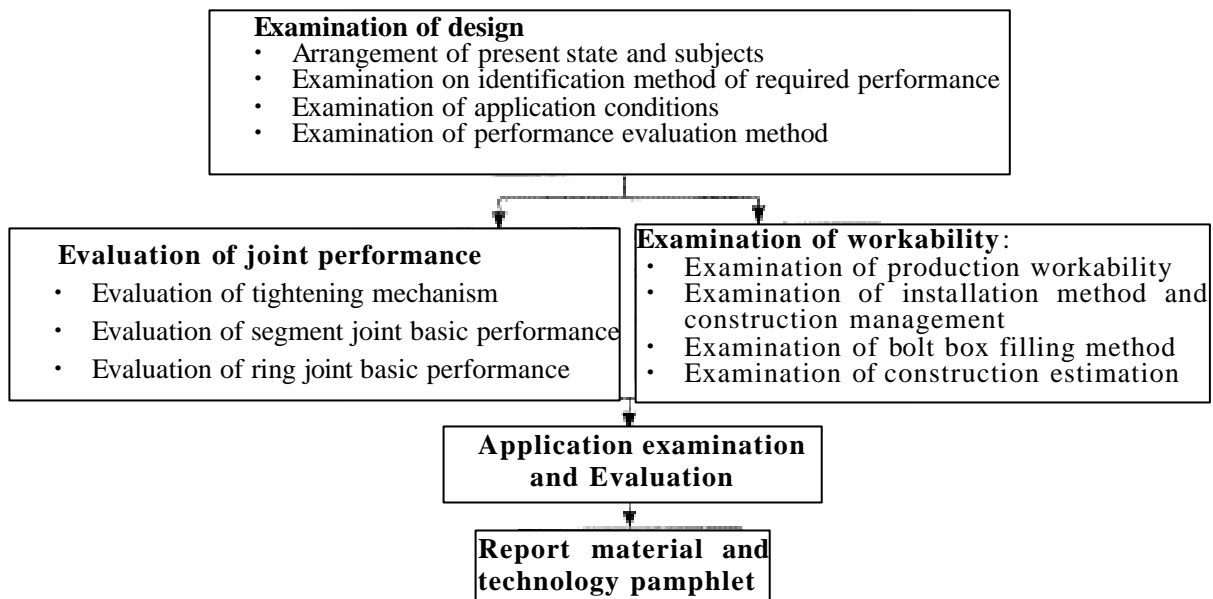


Fig. Study flow char

(Result)

In order to confirm the quality performance, item test using the test-piece, demonstration experiment using real segment and demonstration construction were carried out.

1) Items test

- Bending test of joint

When was fastened to 100% of tolerance, flexural capacity of the gear style joint was 70% bigger than the conventional Bolt style. When high-rigid joint plat of the gear style joint was fastened to 80% of yield

stress, the flexural capacity was 12% bigger than the fastening of 100% tolerance.

- Shear test of Joint between rings

For gear style joint, the failure is bolt shear failure as well as conventional bolt style, but both shear capacity and shear stiffness constant surpassed the conventional style.

2) Demonstration experiment.

- Tension experiment of joint between rings

Both tension capacity and tension spring constants of the gear style test-piece surpassed the conventional bolt style.

- Bending experiment of joint between segments

The gear style test-piece surpassed the conventional bolt style in design on the necessary rotation spring constant. The flexural capacity was equivalent between gear style test-piece and conventional bolt style.

- Experiment of Constructive verification

It was possible that the aperture width was corrected even in the condition of the width between segments being 2mm by the tightening.

3) demonstration construction

The demonstration construction was carried out in site where used SSPC in the sharp curved line division in order to carry out constructive examination of this joint. In the site measurement, it was set in one spot of identical curves of radius 30m, and the aperture amounts was compared in inside smooth SSPC and conventional style SSPC.

As result, it were confirmed that aperture width and irregularity were equivalent to convention style SSPC, but the inside smoothness of the segment is good. And, the assembly time was also as same as conventional style SSPC .

Collaborators : Japan institute of Wastewater Engineering Technology

ISHIKAWAJIMA CONSTRUCTION MATERIALS Corp.,...

Researchers : Takahashi Ryuuiti, Kirihara Takashi, Matuda Hiroshimare, Watanabe Kenzi

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