



EFFC Task Group Water-resistance of geotechnical walls

PROPOSAL

GUIDELINES FOR ACHIEVING QUALITY JOINTS IN GEOTECHNICAL RETAINING WALLS

Proposal for task group formation and the preparation of the document

1. BACKGROUND

Geotechnical retaining walls in most cases not only have to block the surrounding soil, but also have to resist groundwater. Since these walls are made from ground level, they have to be formed or installed as elements / panels. In this way wall are formed by e.g. sheet-piles, bored piles or diaphragm panels. Adjacent panels have always a joint in between them, throughout their entire width and depth. Joints can be formed interlocks in case of sheet-piles or cold joints with or without waterstops in case of cast-in-situ elements.

In case of interlocking elements like sheet-piles, the water resistance can be improved by filling the interlocks. But even then complete water tightness cannot be achieved. In case of diaphragm walls, due to their construction process, the existence of joints and the permeability and shrinkage of concrete, cannot be completely watertight structures, especially at joints and other connections.

In some standards, like the EN1538, it is stated that the (diaphragm) wall cannot be expected to be completely watertight, since leakage can occur at joints, at recesses or through the wall material. Damp patches and droplets of water on the surface of the wall cannot be avoided under normal circumstances.

Though this might sound like an obvious statement, the expectations regarding the waterproofness of geotechnical retaining walls are very high, and normal droplets of water through the joints or humid areas on the wall surface usually result in (legal) disputes affecting the foundation contractor.

So expectations about the leakage and seepage through a retaining wall need more clarification and general understanding to all parties and certainly to the end-user of a building project.

2. PURPOSE AND SCOPE

Due to the above-mentioned reasons, a guideline prepared by the EFFC in reference to retaining walls diaphragm wall joints would be helpful to create more understanding about the 'normal' water-resistance of different types of walls in dependence of the chosen materials, wall thickness, number of joints, water head difference, soil properties, etc. But also measurements in design or corrective should be mentioned to show possibilities for improvement as well as the effectiveness of such measurements.

The guidelines should be a clear document (a guideline, not a standard, not competing with any EN execution standard), focused on water-resistance, and might include:

- a) Definition of joints and clear explanation of why joints are inevitable in geotechnical wall constructions.
- b) Types of joints: short description of available methods. But the misunderstanding that some types of joints are completely watertight should be avoided. Even so, due to the working conditions, a relative large deviation in the quality of the individual joints should be expected.
- c) Execution: activities affecting the quality of the joints (informative regarding some operations and controls):
 - Verticality of the installation: tolerances, verticality control, etc.
 - Quality and control of support fluids.
 - Configuration of cages: position, dimensions, space between bars, etc.
 - Concrete specifications.
 - Concreting operation.
 - Quality control of joints after concreting
 - Quality control for complete interlocking of sheet-pile joints
 - Effect of the soil properties

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- d) **Definition of water-resistance of a specific wall and its joints: expected properties and performance.**
- e) Monitoring joints: Availability and reliability of methods and systems, e.g. sonic logging
- f) Structural design issues, like connection with bottom and top slabs or hybrid wall constructions
- g) Repair of joints: brief explanation of usual techniques.
- h) Conclusions.

3. **PROJECT PHASES**

This proposal is based on performing the project in 2 phases (\approx 18-months project + editorial phase):

- **Phase 1: task group formation and information gathering (6 months).**
 - Task group formation (6 to 8 persons) and chairman nomination (2 months).
 - Information gathering: standards used and best practice on each country (3 months).
 - Preparation of a document which summarizes the information received (1 month).
- ✓ Logistics: correspondence, online meetings and a face-to-face meeting (1).
- **Phase 2: preparation of the guidelines (12 months).**
 - Discussion on the document prepared on phase 1. Key points_____ Meeting 1
 - Discussion on key points: waterproofness, for instance_____ Meeting 2
 - Common position on key points.
 - Preparation of the first draft.
 - Discussion on the first draft_____ Meeting 3
 - Draft to enquiry.
 - Analysis of comments_____ Meeting 4
 - Preparation _____ of _____ the _____ final _____ document.
- ✓ Logistics: correspondence, online meetings and face-to-face meetings (4).

4. **FINANCIAL ASPECTS**

A research phase is not foreseen at the moment. Review of the document or specific input by external experts (technical, legal) should be considered if this will lead to a wide acceptance of this document.

In general a contribution regarding the travel expenses and costs for the venues might be considered by the EFFC, since quite some effort is asked from the volunteering participants.

Total EFFC contribution: $\text{€}10,000 + 5 \cdot 8 \cdot \text{€}250 = \text{€}20,000$

October 10th,

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