



Bundesministerium  
für Verkehr

## ZTV-W

Additional Technical Terms of Contract – Hydraulic Engineering

for

**Earthworks**

**Performance range 205**

June 2025 edition

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# 205



**Bundesanstalt für Wasserbau**  
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**Bundesministerium  
für Verkehr, Bau  
und Stadtentwicklung**

**ZTV-W**

## **Additional Technical Terms of Contract – Hydraulic Engineering**

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## **Preliminary remark**

The numbers in brackets after the section headings refer to the 'General Technical Terms of Contract for Building Works (ATV) – Earthworks – DIN 18300'.

Products from other European Union Member States or from Türkiye, as well as goods originating from an EFTA member state that is a party to the Agreement on the European Economic Area, that do not conform to these Additional Technical Terms of Contract, shall be deemed compliant, including the tests, inspections and certifications conducted in the country of manufacture, if the required level of protection (in terms of health, safety and fitness for purpose) is achieved in a similarly permanent manner.

## **1 Scope (re: point 1)**

(1) The Additional Technical Terms of Contract – Hydraulic Engineering (ZTV-W) for Earthworks (performance range 205), cited as 'ZTV-W LB 205', apply to navigable waterway engineering, river engineering, agricultural hydraulics engineering and coastal protection, but not to earthworks in road construction (in this regard, see ZTVE-StB and the Guidelines for Rural Road Construction) or to dredging (in this regard, see ZTV-W LB 206 for dredging). The ZTV-W LB 205 apply additionally to the ATV – Earthworks – DIN 18300.

## **2 Materials, components (re: point 2)**

(2) The environmental compatibility of the substances intended for installation must be demonstrated by a certificate issued by a recognised testing body as part of the suitability test. If the substance is a mineral substitute building material or several mineral substitute building materials, the test must be carried out in accordance with the Substitute Building Materials Regulation (EBV). In the substance is soil material or dredged material that is intended for use and/or recovery in a soil-like application, its suitability must be demonstrated in accordance with the Alternative Building Materials Regulation or the Federal Soil Protection and Contaminated Sites Regulation (BBodSchV).

## **3 Execution (re: point 3)**

### **3.1 Discovery of contaminated sites and archaeological monuments (re: point 3.1.6)**

(3) If contaminated sites (e.g. contaminated soil) or archaeological monuments are encountered during the execution of earthworks, urgent measures must be taken immediately and the contracting authority must be informed thereof.

### **3.2 Water run-off**

(4) All measures must be taken in such a way that soils (both in situ and on waste rock) do not become adversely damp and do not soften or erode. The higher the water content in soils, the higher the risk of irreversible harmful compaction caused by extra load. This can be prevented by not passing over the surface, producing a sufficient surface incline, ensuring a closed surface, draining where possible, or by immediately providing a sufficiently thick cover. If the necessary interim measures are omitted or carried out improperly, or if the final drainage measures are not taken in good time, recultivation measures or material replacement shall be at the expense of the contractor. Bodies of water must be protected against the entry of eroded material.

### **3.3 Installation of various soils (re: point 3.4)**

(5) In the manufacture of dams, dykes or structural backfills, inhomogeneities in the earthwork materials, in terms of grain composition and installation density within a zone (e.g. in the supporting body, sealing body or drainage body) shall be excluded in the areas through which water flows in one or more design situations.

For the soils to be installed, the suffosion stability and the ability to counter contact erosion as regards the adjacent soils must be demonstrated for the respective design situation.

### **3.4 Installation layers (re: point 3.4)**

(6) The soil must be installed in compactable layers over the entire filling width, and must be compacted uniformly.

(7) Areas hardened by construction-site operations must be roughened in such a way that the fill layers are connected. Inhomogeneities must be eliminated.

(8) When installing cohesive soil, the installation layers must sufficiently interlock.

(9) The slope area must be compacted according to the following rules:

- Depending on the height on both sides, the dam or dyke must be filled at least 1 m beyond the target profile and compacted over the entire width. The soil installed beyond the target profile must be removed.
- The slope must be compacted directly in the fall line of its target profile using a suitable compaction device and working method.

### **3.5 Installation of weather-sensitive soils and rocks (re: point 3.4)**

(10) The planned use of variable solid rock (e.g. shale) requires coordination with the contracting party.

(11) When installing weather-sensitive soils, the fill surfaces must be laid with a sufficient transverse gradient.

(12) Each layer must be compacted immediately after filling.

(13) Whenever daily work is complete or rainfall is expected, the compacted fill surface must also be smoothed. Immediately before applying the next fill layer, the surface must be roughened.

### **3.6 Construction procedure**

(14) Proof of the suitability of the proposed construction equipment and construction procedure must be provided before the installation work begins, e.g. by means of a test compaction. If the construction equipment or construction procedure envisaged by the contracting party is unsuitable to meet the requirements or results adverse effects on the environment, either the construction method must be changed or other equipment must be used.

### 3.7 Compaction requirements (re: point 3.4)

(15) For dams and dykes, the degree of compaction for coarse-grained soils must be:

- for groups GE, SE, GW, SW and GI, SI at least  $D_{pr} = 1.0$ .

The degree of compaction for mixed and fine-grained soils must be:

- for groups GU, GT, SU, ST, OH and OK at least  $D_{pr} = 1.0$ ;
- for groups GU\*, GT\*, SU\*, ST\*, U, T, OU and OT at least  $D_{pr} = 0.97$ .

For soil groups GU\*, GT\*, SU\*, ST\*, U, T, OU and OT, an air-space ratio of no more than 12% is permitted.

(16) Subsoil areas under seals and structures must be constructed smooth without grooves, bulges or recesses.

(17) Subsoil in foundation areas must be compacted up to 0.5 m below the foundation level, in accordance with Section (15). This also applies to subsoil under seals in the cut section during installation in dry conditions.

### 3.8 Slope smoothing of earthworks (re: point 3.5)

(18) Slopes must be adapted by extending their transitions into the terrain. This must already be taken into account during the earthworks and not carried out with topsoil alone.

### 3.9 Backfilling and covering of structural installations (re: point 3.4)

(19) Structural installations must be backfilled uniformly on all sides in the areas specified in the terms of reference; the relative difference in height must not exceed 0.5 m without static proof. The soil must be installed and compacted in layers no more than 30 cm thick.

(20) The soil must be compacted in such a way that the degree of compaction for all types of soil is at least  $D_{pr} = 1.0$ . For mixed and fine-grained soil types, an air-space ratio of no more than 8% is permitted.

### 3.10 Filling of pipe trenches (point 3.6)

(21) Pipe trenches must be filled with materials whose permeability is not greater than that of the adjacent soils. If this is not the case, appropriate measures must be taken to prevent the pipe trench from forming into a longitudinal drain after filling for inflowing surface water and groundwater. The subgrade must be cavity-free, in order to, among other things, prevent water leakage.

(22) Pipe trenches must be filled and compacted in accordance with Section 3.9. Where necessary, the compacting device and the thickness of the installation layers must be reduced in order to protect the pipes. Compaction may be carried out in the vicinity of the pipe and in an area no more than 1 m above the pipe exclusively using light compacting equipment. In an area no more than 3 m above the pipe, compaction may also be carried out using medium-strength compacting equipment. In areas more than 3 m above the pipe, heavy compacting equipment may be used.

## **3.11 Quality assurance**

### **3.11.1 General**

(23) The tests are divided into the categories of suitability tests, self-monitoring tests and control tests.

(24) The tests consist of sampling, sealing the sampling site, packing the sample for dispatch, transporting the sample from the sampling site to the testing site in accordance with the terms of reference, and carrying out the tests. The sampling sites must be documented in terms of their location and height, and handed over to the contracting party.

(25) Work interruptions caused by the collection of samples, including equipment failures and waiting times, shall not be specially compensated for.

### **3.11.2 Suitability tests**

(26) Suitability tests are tests to prove the suitability of the soils for the intended use.

(27) The contracting party must demonstrate the suitability of the proposed soils, whereby a valid test certificate, issued by an approved inspection body, must be provided prior to installation.

(28) Suitability tests must be carried out in good time, and their results must be submitted to the contracting party in such a way as to enable verification by the contracting party before the work begins.

(29) If the nature and characteristics of the soils or the conditions for loosening, installation and compacting change, this must be notified in advance to the contracting party, and the suitability must be demonstrated again upon request.

(30) The following must be determined as part of the suitability tests, depending on the soil type:

- particle size distribution, water content, yield point, rolling-out limit, Proctor density and optimal water content, organic constituents, and proof of environmental compatibility in accordance with Section (2).

(31) On the basis of the grain range determined, the geometric suffusion stability of the soil and the ability to counter contact suffusion and erosion as regards the adjacent soils must be demonstrated.

### **3.11.3 Self-monitoring tests**

(32) Self-monitoring tests are tests carried out by the contractor to determine whether the quality characteristics of the building materials and the performance upon completed installation meet the contractual requirements.

(33) The sampling site and the time and place of sampling or testing must be agreed with the contracting party. The contracting authority reserves the right to participate in the sampling and testing. Sampling must be carried out in accordance with LAGA PN 98 (the sampler's certificate must not have been issued more than five years ago). The analysis must be carried out in a suitable/accredited laboratory.

(34) The results of the self-monitoring tests must be submitted to the contracting party. If deviations from the contractual requirements are established, their causes must be remedied immediately.



(35) The following minimum sampling scope must be complied with in the individual test areas:

Test area	Number per	Distance*	or area/quantity*
Dam/dyke filling	1	≤ 200 m	≤ 2 500 m <sup>2</sup>
Substrate	1	≤ 200 m	≤ 5000 m <sup>2</sup>
Backfilling of building	3	-	≤ 500 m <sup>2</sup>
Covering of building works	3	within the first metre of the cover layer	-
Pipe trenches	1	≤ 50 m	-

\* The relevant condition is the higher number of sampling sites.

(36) The grain distribution and the degree of compaction must be determined for each sampling site in the lower half of the location tested.

(37) Any alternative methods for testing for compaction must be agreed with the contracting party.

(38) When determining the dry density  $\rho_d$  in the context of self-monitoring tests, the following test tolerances are permitted:

- If the testing of a layer or a test zone is based on fewer than five individual values, all the individual values must be equal to or greater than the required minimum value.
- If the testing of a layer or a test zone is based on five or more individual values, one of the five or more individual values of at the measuring points closest to each other may fall below the required minimum value. However, this deviation must not be greater than 3.0%.

(39) If greater tolerances are justified on a case-by-case basis, e.g. in the case of highly uneven soils, these must be proven by means of test compaction and agreed with the contracting party.

### 3.11.4 Control tests

(40) Control tests are tests carried out by the contracting party to determine whether the quality characteristics of the building materials and the performance upon completed installation meet the contractual requirements. Their results are used for acceptance and invoicing.

The sampling and testing at the construction site is carried out by the contracting party in the presence of the contractor; it may also take place in the absence of the contractor if the contractor does not appear at the notified time.

(41) If it can be assumed that the result of a control test is not representative of the entire area concerned, the contractor may request that additional control tests be carried out. The sampling and/or testing sites shall be determined jointly by the contracting party and the contractor. From this moment on, acceptance and invoicing are based on the results of the initial and any additional control tests.

(42) The costs of the control tests shall be borne by the contracting party. The costs of any additional inspection tests requested by the contractor in accordance with Section (41) shall be borne by the contractor. Additional costs for the repetition of control checks due to non-compliance with the required parameters may be invoiced by the contracting party to the contractor.

## **4 Ancillary services, special services (re: point 4)**

### **4.1 Ancillary services**

(43) Ancillary services are, in particular, services in accordance with Sections 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11.1, 3.11.2 und 3.11.3.

### **4.2 Special services**

(44) Special services are, in particular, measures in accordance with Section 3.1(3) and Section 3.11.4.

**Annex List of cited standards, terms of delivery and of contract, guidelines and recommendations**

DIN 18331	VOB (German Construction Contract Procedures), Part C: General Technical Terms of Contract for Building Works (ATV) – Earthworks
ZTVE-StB	Additional Technical Terms of Contract for Earthworks in Road Construction
EBV	Substitute Building Materials Regulation
BBodSchV	Federal Soil Protection and Contaminated Sites Regulation
DIN 19639	Soil protection during planning and execution of construction projects
DIN 19731	Soil quality – Utilisation of soil material and dredged material
RLW	Guidelines for Rural Road Construction
LAGA PN 98	Guidance for procedures in physical, chemical and biological investigations related to the recycling/disposal of waste
ZTV-W LB 206	Additional Technical Terms of Contract – Hydraulic Engineering (ZTV-W) for Dredging (performance range 206)