



Training #11

Infrastructure projects - Preparation of tender documentation for wastewater projects –
Selection Criteria / Technical Specification / Employers requirements



Technical specification / Employers requirements

- give instruction and guidance to tender to prepare quality offer;
- give guidance how to respond to all technical and administrative requirements during contract implementation
- **Technical Specification as given in tender dossier will become an annex to the resulting contract.**

Principle of drafting Technical specification

- technical specifications must allow equal access for tenderers;
- must not have the effect of creating unjustified obstacles to tendering;
- must be clear and non-discriminatory;
- proportionate to the objective and/or the budget for the project.;
- specify the minimum requirements whose non-compliance entails the rejection of the tender;

May not point to particular brands and types, and they may not limit competition by being too specific.

Contents of the TS / ER

- levels of required quality of materials, process, and equipment;
- environmental and climate performance;
- design for all users' requirements (accessibility for disabled people, environmental issues, etc.);
- levels of and procedures for conformity assessment, including environmental aspects;
- dimensions;
- terminology, symbols;
- testing and test methods, packaging, marking and labelling;
- production processes and methods.

Technical Specification – key principle

- **TS ≠ Main Design or any other Design**
- Main Design is not sufficient to represent all requirement needed for PRAG or FIDIC Contract to proper implement the works;
- TS should not overlap with other documents;
- TS should not indicate any brand;
- TS should avoid repetition;
- TS should be precise and unbiased;
- TS shall link to norms, standards, laws and regulation.

Technical Specification – key principle

The terms of reference or technical specifications are drafted by the Contracting Authority (Beneficiary in the case of IPA projects);

Any TS shall be based on prepared Main Design;

Given the technical complexity of many contracts, preparing the tender dossier - particularly the technical specifications - may require the assistance of one or more external technical specialist(s);

Technical Spec. vs. Employers requirements

TS

- description something already done
- technical characteristics, functions, qualities of already prepared design
- very detailed which allow construction based on it

ER

- description something that need to be done
- oriented on functions, performance, qualities, and constraints – the “what” to guide the design
- can be detailed, very specific or very simple

TS / ER and Conditions of Contract

TS / ER Supplement Conditions of Contract with additional information required to conduct the work

1.13 Compliance with the law - the Employer shall have obtained (or shall obtain) the planning, zoning or similar permission for the Permanent Works, and any other permissions described in the **Specification**

2.21 Right to access the site - The Employer shall do so in the time and manner stated in the **Specification**.

4.1 Contractors general obligation - Contractor's Documents shall be in accordance with the **Specification**

4.18 Protection of the Environment - The Contractor shall ensure that emissions, surface discharges ...shall not exceed the values indicated in the **Specification**.

Contents of TS

General Requirements

- Description of the works
- Definitions
- Interferences with other Contracts
- Work Programme and Method Statement
- Health, Safety and Environmental Plan
- Quality Control Plan
- Technical documentation
- Working Drawings and Calculations
- As-Built Drawings

Contents of TS

General Requirements – Information about the Site

- Access to site
- Right-of-Way
- Facilities for Engineer's Personnel
- Contractor's Offices, Stores and Services
- Water Supply
- Sewage and Waste Disposal
- Electrical power supply
- Signboards

Contents of TS

General Requirements – Quality Control, Sampling and Testing

- Responsibilities and Procedures
- Sampling and Testing
- Certification
- Employer Inspection
- Inspection and Acceptance
- Materials/Plant Certificates
- Construction Completion Reports
- Daily Log Book

Contents of TS

General Requirements – Progress of the works

- Updating, Monitoring and Reporting Progress
- Detailed Programme
- Record / Progress Photographs
- Progress Reports

Contents of TS

General Requirements – Materials and Workmanship

- Equipment and materials
- Packing and shipping
- Quantities
- Toxic Materials
- Reference Standards and Codes
- Alternative designs, materials and constructional procedures
- Approval of Equivalent Materials

Contents of TS

Technical Requirements

- Setting out the works
- Protection of existing services
- Demolition works
- Earthworks
- Masonry works
- Concrete and steel works
- Mechanical works
- Electrical works
- Instrumentation requirements – PLC and SCADA system

Employer's Requirements

Design – Basic characteristics

- The **indicative** WWTP design presented in the Volume 5 contains the Tender drawings based on Preliminary design.
- Technical solutions, equipment components as well as the facilities' arrangement and/or shape, with the target to improve the treatment results, reduce the investment and/or operation costs, or to facilitate and improve the operation and make it more reliable for the wastewater treatment process have to be based on the activated sludge process, in combination with anaerobic sludge stabilization, all in accordance with the Employer's Requirements
- The tender design shall show that there shall be sufficient process streams and doubling of units, equipment and control functions to ensure flexibility of operation and such that the Plant is capable of satisfactory operation with any critical process unit out of service.

Employer's Requirements

Design – Basic characteristics

- Ease of operation in order to allow the WWTP to minimize personnel requirements;
- High flexibility of the treatment process in order to easily allow plant operation to be very well adjusted according to the actual wastewater load of the WWTP;
- High degree of reliability using mechanical and electrical equipment with proven reliability record in similar works;
- Sufficiently high degree of redundancy by means of installed spare capacity and/or spare units of equipment;
- Reduction of the volume of sludge and other residues in order to minimize disposal expenditures;
- Minimization of capital costs;
- Minimization of operation and maintenance costs

Employer's Requirements

Design life criteria

Description/Subject	Design Life [Years]
Concrete & Water Retaining Structures	50
Buildings & Roads	50
Pipes & Sewers	50
Steel & Metal Constructions	25
Machine Units, Machines, Fittings	15
Electrical Cables & Accessories	25
Electrical Equipment	10
Process Control & SCADA Equipment	10

Employer's requirements

- Must clearly and precisely indicate what and how shall be done;
- What is minimum criteria and condition to be followed;
- Important is to distinguish '**Shall**' 'Will' 'Must' from 'may' or 'may be required';
- To be in line with the norm, standards and national regulations in particular construction regulation;
- Minimise the role of the Engineer in interpretation of what and how shall be done;
- May include previously prepared design, but usually only for consideration;

Common mistakes

- To specific or to detailed;
- Not harmonise with other part of TD usually with the Contract GCC and PCC;
- Evaluation approach not aligned with the concept of drafting ER;
- not clear what are the minimum criteria, and what is proposed or anticipated criteria;
- not clear what is description and what is requirements;
- Allowing only specific regulation (such as ATV or DWA);
- No clear information about the access to the existing infrastructure;
- No clear demarcation with other contract (where is the point where the connection to the WWTP shall be made on Sewage mains);

Common mistake:

Unclear requirement, using wording „can“ instead of „shall“ or „must“

Technical data for the biological unit

parameter	unit	value
maximum load	PE	6.000
minimal number of basins	/	3
minimum total volume of the units	m ³	15.00
minimum sludge age	d	20
maximal sludge concentration	kg d.s/m ³	5,2

When doing the static calculation of the Design take into the consideration, **that the unit can be empty** (buoyancy).

Common mistakes

ER not aligned with the Evaluation approach

Tenderers must give detail related to their design proposals based Volume 3 of the Tender Dossier, with drawings and calculations where applicable;

Technical offers will be rejected as non-responsive and excluded from further consideration during the Tender process for the following reasons:

- Non-compliance with the requirements of Volume 3
- Insufficient information and/or calculations to verify compliance.

What will be treated as non compliance?

Table 13: Basic design criteria for Aeration Tanks (OX)

Parameter	Value & Unit	
Total design peak flow, selected for OX design	181	m ³ /h
Number of OX tanks	2	pcs.
Effluent COD	392	kg/d
Effluent BOD ₅	78	kg/d
Effluent TSS	110	kg/d
	12 °C	
	4,1 – 5,3 d	
	3 – 4 kg/m ³	
	Fine bubble	
	Disk/membrane	
	4,1 m	
required	2 mg/l	
%/max. N loads	DWA A131 E	
option For carbon removal	1.07 -1.2 kg O ₂ /kg BOD ₅	
	3 mmol/l	
	393 – 393.50 m.a.s.l	
eration)	0.6	
brane diffuser's efficiency	≥ 18 g O ₂ /m ³ _N / m	
per OX, min.	1	
	8 –10 W/m ³	
ty (for carrousel or other circulating geometries)	0.3 m/s	
1 the OX tank necessary for mixing (for circulating	Submersible flow boosters (propulsors/flow boosters)	
the OX tank necessary for mixing (for non-circulating	Submersible mixers	

Common mistakes

Not clear what are minimum, proposed or anticipated criteria

parameter	unit	value
flow	m ³ /h	100
slot	mm	6
number of septic sludge receiving units	/	1
number of basins	/	2
volume of each basin	m ³	60
flow of each pump	m ³ /h	30
number of pumps in each basin	/	2
number of mixers in each basin	/	1
number of containers	/	1

Common mistakes

not clear what is description and what is requirements

The tank of the biological unit will be divided into three compartments. Each compartment will be provided with an inner wall for flow redirection. Distribution channel is positioned at longitudinal side of the tank. By this configuration the flow can be directed either from one compartment to the next and also each compartment can be by-passed by closing inlet and outlet hand/manual penstocks.

Cascaded aeration tank using step-feed denitrification will allow for a stable process that include nutrient removal and will help to reduce control efforts. There will be no need for any kind of recirculation, and, usually, the denitrification process takes place without correction of the flow proportions optimized at start-up of the plant.

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All documents, information, materials and pictures from this EU PPF training are available for download in the download section of our site www.ppf.rs

Questions and assistance

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Thank you for your attention!