

Design guidelines

Technical Specification - Ballast

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1. Scope

This Technical Specification describes the minimum requirements of the ballast aggregate (EN 13450) to be supplied to the Client.

2. Requirements

Ballast shall be produced in accordance with EN 13450. The Assessment and Verification of Constancy of Performance (AVCP) level of the production shall be 2+.

The type of ballast shall be **natural railway ballast**.

Petrographic description according to EN 932-3 of the ballast shall be declared.

Ballast aggregate shall not be conductive and shall not contain harmful and friable minerals or components according to requirements set in local legislation of the country where ballast is imported.

The ballast shall fulfill the requirements stated in Table 1 of this Technical Specification.

Property	Reference	Category (requirement)
Grading	EN 13450, Clause 6.3	Category F (31,5 to 63 mm)
Fines content	EN 13450, Clause 6.5	Category A (0,5%) *
Shape index	EN 13450, Clause 6.6.2	Sl ₂₀
Particle length	EN 13450, Clause 6.7	Category D (12%)
Resistance to fragmentation	EN 13450, Clause 7.2	LA _{RB} 16
Resistance to wear	EN 13450, Clause 7.3	MDE _{RB} 11
Resistance to freezing and thawing (assessed based on water absorption)	EN 13450, Clause 7.4.3	WA _{cm} 0,5
Sonnenbrand	EN 13450, Clause 7.5	No signs of Sonnenbrand are allowed
*For the evaluation of degradation of the ballast during transportation, fines content at the Delivery place shall be < 1,0 %.		

TABLE 1. MINIMUM BALLAST REQUIREMENTS ACCORDING TO EN 13450

3. Stockpiling, Loading and Handling

Ballast supply shall be organized by the Supplier to locations indicated by the Client.

Ballast shall be delivered to the Client in a state fulfilling the requirements described in Table 1. Any deliveries which doesn't meet the requirements described in Table 1 shall be rejected and replaced at the expense of the Supplier.

Any necessary reprocessing of the material to meet the requirements shall be done by the Supplier's expense. The Supplier shall organize sampling and testing after reprocessing at the Supplier's expense.

The material will be weighed at the point of delivery.

4. Documentation

Ballast Supplier shall submit Factory Production Control (FPC) certificate and Declaration of Performance (DoP) of the material to the Client AS. DoP shall be signed by the ballast Producer. The declared properties shall conform with the minimum requirements described in Table 1 of this Technical Specification. In addition, the declared values shall be confirmed with test report(s) issued by accredited laboratory (accredited in accordance with ISO/IEC 17025) and testing shall be done with accredited testing methodology (accredited in accordance with ISO/IEC 17025 and applicable testing methodology).

Each supplied batch of material shall be accompanied with Delivery Ticket which shall contain following information:

- a) Designation – In accordance with Clause 10.1 of EN 13450
 - i. Source
 - ii. Petrographic type
 - iii. Railway ballast size
- b) Identification number (ID) of the batch and its' volume
- c) Date of dispatch
- d) Declaration of Performance and CE marking
- e) Test report, that confirms produced railway ballast conformity to Declaration of Performance (DoP);

All submitted documents shall be translated in English language and Official National language of the country where ballast is imported. Allowed file formats are *.XLSX, *.DOCX, *.PDF.

5. Testing and acceptance

All tests done by the Producer shall be documented and the Client shall always have access to these test results and test reports.

The Client AS reserves the right to conduct additional sampling and testing to verify the properties of the supplied material. Additional sampling and testing can be done at any times and locations.

Before acceptance of delivered railway ballast, the Client shall subject delivered railway ballast to:

- i. organoleptic inspection;
- ii. quantity measurements;
- iii. sampling and testing;
- iv. any other activities that the Client may consider as necessary to accept delivered railway ballast;

Sample shall be divided into three separate samples – samples A, B and C. Sampling and reduction shall be done in accordance with EN 932-1, EN 932-2 and EN 13450. Sample size depends on the testing scope and shall be sufficient for intended testing. Sample A is handed over to the Supplier and shall be tested if needed. Sample B and C are handed over to the Client and shall be tested if needed. Sample C shall be tested in independent laboratory in case of dispute between sample A and sample B test results and in that case test results of sample C shall be used to evaluate the quality of the material.

All laboratory tests shall be executed in laboratory accredited in accordance with EN ISO/IEC 17025 and all test methods shall be accredited.

In case when multiple samples of one delivered batch are tested and if one sample test results don't meet to set requirements, then delivered batch in full amount is the subject for non-conformance.

6. Manufacturing Quality plan

The Supplier shall submit the Manufacturing Quality plan to the Client for approval.

Manufacturing Quality plan shall include but not limited to at least following information:

- i. Description of raw materials sourcing;
- ii. Description of ballast production process;
- iii. Quality Assurance / Quality control plan (including procedure of Routine Tests);
- iv. Nonconformance management;
- v. Reporting;
- vi. Other related information required by the Client;

In case of changes in Manufacturing Quality plan, The Supplier shall inform the Client about such changes before continuing of ballast production as well as to submit amended Manufacturing Quality plan to the Client for approval;

7. Factory Acceptance Test

Factory Acceptance Test is a process that evaluates designed and produced railway ballast compliance to the set requirements;

The Supplier shall produce sample of railway ballast and provide samples testing to demonstrate compliance to set requirements, applicable laws, and standards;

To evaluate the compliance of documents submitted by the Supplier, the Client reserve the rights to participate in sample production and Factory Acceptance Test to inspect quarry and production site, to take samples for Factory Acceptance Test as well as to execute additional testing. The Supplier shall inform the Client about scheduled sample production and Factory Acceptance Test execution time;