

Ballast Specification

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AS 2758.7, ARTC A1 Specification for Ballast, RIC Standard TS 3402/ARTC Standard TPS 04 Specification for Supply of Aggregate for Ballast

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Table of Contents

Table of Contents	2
1 Introduction	3
2 Reason and Nature of Change	3
3 Definitions	3
4 Sampling and Testing	3
5 Ballast Production	3
6 Ballast Specifications	4
6.1 Rejection of Proposed Ballast Material	4
6.2 Bulk Density.....	4
6.3 Particle Density.....	4
6.4 Dimensional Requirements.....	4
6.4.1 Particle Size Distribution	4
6.5 Particle Shape	4
6.6 Flakiness Index.....	5
6.7 Crushed Particles of Coarse Aggregate.....	5
6.8 Durability.....	5
6.8.1 Aggregate Crushing Value	5
6.8.2 Wet Attrition Value.....	5
6.9 Los Angeles Values	6
6.10 Weak Particles.....	6
6.11 Electrical Resistance	6
7 Alternative Materials	6
8 Ballast, Delivery, Stockpiling, Loading and Handling	7
8.1 Delivery	7
8.2 Stockpiling	7
8.3 Loading.....	7

1 Introduction

This standard specifies the material specification, stockpiling and handling of ballast.

2 Reason and Nature of Change

Revision of documents to meet requirements of ARTC and Australian Standards.

3 Definitions

Ballast	Ballast is a free draining coarse aggregate or metallurgical slag used to support railway tracks.
Nominal Size	The designation of an aggregate which gives an indication of the largest size particle present.

4 Sampling and Testing

Unless otherwise specified below sampling and testing shall be carried out in accordance with the requirements of AS 2758.7 and the AS 1141 series of Standards.

The ARTC Officer or nominated delegate arranging supply of ballast shall obtain certification from suppliers for all new ballast supplied from:

- Quarries not previously used for the supply of Railway Ballast to this specification.
- Existing quarries used for the supply of Railway Ballast to this specification where the material being quarried changes.

An independent party who shall be an approved member of the National Association of Testing Authorities (NATA) shall carry out the sampling and testing. Certification shall include documentation that the ballast has been sampled and tested in accordance with, and meets the requirements of this specification. The test report from the sampling and testing authority shall be submitted to ARTC, even where this specification is not met.

The sample testing shall be obtained from the point of delivery or at the source of the supply for the first 300 tonnes of ballast delivered and for every 5000 tonnes of ballast subsequently delivered into track.

ARTC may require additional sampling and testing where ARTC suspects that the material is not to specification.

5 Ballast Production

ARTC shall be provided access to inspect ballast production facilities at any unscheduled time during normal working hours for the purpose of:

- Observing sampling and testing procedures.
- Review plant and ballast production facilities.
- Carry out any additional sampling and testing.

The ARTC Officer or nominated delegate shall ensure that contracts with Sub-contractors provide for these inspections.

6 Ballast Specifications

6.1 Rejection of Proposed Ballast Material

Igneous or other rock, displaying minerals considered to be harmful to the overall performance of the ballast may be rejected following petrographic analysis or durability testing, even though the rock complies with other sections of the specification.

6.2 Bulk Density

When determined in accordance with AS 1141.4 the compacted bulk density of ballast material shall not be less than 1200 kg/m³.

6.3 Particle Density

When determined in accordance with AS 1141.6 the particle density of ballast material shall not be less than 2500 kg/m³.

6.4 Dimensional Requirements

6.4.1 Particle Size Distribution

The particle size distribution (grading) of ballast aggregates, when determined in accordance with AS 1141.11 and AS 1141.12, shall conform to the requirements set out in Table 1.

Sieve Size (mm)	Nominal Size (mm)
	60
	% passing by mass
63.0	100
53.0	85-100
37.5	20-65
26.5	0-20
19.0	0-5
13.2	0-2
9.50	-
4.75	0-1
1.18	-
0.075	0-1

Table 1 – Railway Ballast Standard Grade – Grading Requirements

6.5 Particle Shape

When tested as described in AS1141.14 the proportion of misshapen particles in the fraction of the ballast material retained on the 9.50 mm test sieve shall not exceed 30% using a ratio of 2:1.

6.6 Flakiness Index

When determined in accordance with AS 1141.15 the proportion of flaky particles in the ballast material retained on the 6.70 mm test sieve shall not exceed 30%.

6.7 Crushed Particles of Coarse Aggregate

When determined in accordance with AS 1141.18, ballast that is derived from river gravel shall consist of at least 75% by mass of crushed particles. The proportion of uncrushed particles shall not exceed 5%.

6.8 Durability

6.8.1 Aggregate Crushing Value

The aggregate crushing value of the ballast material when determined in accordance with AS1141.21, for the fraction of material passing the 26.5 mm test sieve and retained on 19.0 mm test sieve shall be:

- 25% maximum

Note: The aggregate crushing value of the ballast material when determined in accordance with AS1141.21, for the fraction of material passing the 53.0mm test sieve and retained on 37.5mm test sieve shall have a result no greater than 30%.

6.8.2 Wet Attrition Value

The wet attrition value of the ballast material when determined in accordance with AS1141.27, for the fraction of material passing the 53.0 mm test sieve and retained on 37.5 mm test sieve shall be:

- 6% maximum

Note: Material having a wet attrition value in excess of the requirements may be accepted provided the corresponding aggregate crushing values does not exceed the requirement and is endorsed by ARTC's GM Infrastructure & Asset Management or nominated representative.

6.9 Los Angeles Values

The Los Angeles Values of the ballast, as determined in accordance with AS1141.23 shall be:

- 25% maximum

6.10 Weak Particles

The percentage of weak particles, when tested according to the procedure set out in AS 1141.32, shall not be greater than 5%.

6.11 Electrical Resistance

Note: Electrical Resistance test only needs to be done where the ballast is sourced from metallurgical slag.

To meet electrical resistance requirements necessary for the satisfactory operation of signalling track circuits, ballast should demonstrate, in track, a minimum resistance of 1.5 ohms per km.

Test methods, either in situ or off site, must be approved by the ARTC GM Technical Standards.

7 Alternative Materials

Material from new sources of supply shall be subject to petrographic analysis for approval.

Petrologic classification of ballast material shall be carried out in accordance with AS 2758.7-Appendix B.

8 Ballast, Delivery, Stockpiling, Loading and Handling

8.1 Delivery

Prepared ballast shall be handled at the producing plant in such a manner that it is kept clean and free from segregation. Vehicles used for transportation shall be clean and free from rubbish and substances which may foul or damage the ballast.

8.2 Stockpiling

The ARTC Officer or nominated delegate shall arrange for the management of ballast. ARTC supplied ballast shall be maintained separately from any Contractors ballast. This shall include physical separation as well as separation of stockpile usage record keeping.

When ballast is removed from stockpile for distribution into track, it shall conform to the same specification requirements defined in Section 6.

Ballast distributed into track, which does not meet the specified quality requirements shall be removed and replaced.

Ballast shall be stored stockpiled and handled in conditions which prevent material contamination, segregation and degradation. The movement of machinery over the stockpiled ballast shall be limited to minimize any degradation.

8.3 Loading

The ARTC Officer or nominated delegate shall ensure that there is a procedure for loading ballast and recording amounts loaded including:

- Loading equipment to be used.
- Method of measuring loaded amounts of ballast.
- Loading Process.

The loading process shall include provisions for:

- Minimising wastage of ballast.
- Avoiding unnecessary handling which may degrade the ballast in any manner by:
 - Repeated mechanical handling.
 - Unnecessary dropping of material.
 - Contamination from the base of stockpiles or other sources.

Ballast loading records shall be maintained based on one of the following methods:

- Measured weights (using certified loading scales) of the loaded hoppers or of the ballast passing through the device used to load the ballast directly into the hoppers.
- Average weight agreements for each type of ballast hopper in the loaded condition.

Ballast shall only be transported in accredited ballast hoppers, in trains operated by an accredited Operator.

Ballast shall be loaded in a safe and environmentally acceptable manner particularly with regard to dust nuisance and noise levels.