Technical Note - TN 061: 2015

Issued date: 06 October 2015
Effective date: 06 October 2015
Subject: Withdrawal of ESC 240 Ballast and SPC 241 Ballast

This technical note is issued by the Asset Standards Authority as a notification to remove from use the following RailCorp documents:

- ESC 240 Ballast, Version 2.4
- SPC 241 Ballast, Version 2.3

ASA standard T HR TR 00192 ST Ballast, Version 1.0 supersedes these documents.

Authorisation:

<table>
<thead>
<tr>
<th>Technical content prepared by</th>
<th>Checked and approved by</th>
<th>Interdisciplinary coordination checked by</th>
<th>Authorised for release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Melissa Melrose</td>
<td>David Cooper</td>
<td>John Paff</td>
</tr>
<tr>
<td>Position</td>
<td>Senior Engineer Track Structure</td>
<td>A/Lead Track Engineer</td>
<td>A/Chief Engineer Rail</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Director Network Standards and Services</td>
</tr>
</tbody>
</table>
Engineering Specification
Track

SPC 241

BALLAST

Version 2.3
Issued April 2013

Owner: Chief Engineer, Track
Approved by: Andrew Wilson
Technical Specialist
Wheel/Rail

Authorised by: Malcolm Kerr
Chief Engineer
Track

Disclaimer
This document was prepared for use on the RailCorp Network only.
RailCorp makes no warranties, express or implied, that compliance with the contents of this document shall be
sufficient to ensure safe systems or work or operation. It is the document user’s sole responsibility to ensure that the
copy of the document it is viewing is the current version of the document as in use by RailCorp.
RailCorp accepts no liability whatsoever in relation to the use of this document by any party, and RailCorp excludes
any liability which arises in any manner by the use of this document.

Copyright
The information in this document is protected by Copyright and no part of this document may be reproduced, altered,
stored or transmitted by any person without the prior consent of RailCorp.
Document control

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Summary of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>October, 2006</td>
<td>First issue as a RailCorp document. Includes content from TS 3402</td>
</tr>
<tr>
<td>2.0</td>
<td>October, 2007</td>
<td>Inclusion of requirements of Wet Attrition test and Crushed particles omitted from Version 1.0</td>
</tr>
<tr>
<td>2.1</td>
<td>December, 2009</td>
<td>All Sections - Change of format for front page, change of history and table of contents, Format change to all pages. Section 3.9 changed to &quot;Ballast Electrical Resistivity&quot; with changed limits and method of test.</td>
</tr>
<tr>
<td>2.2</td>
<td>June, 2012</td>
<td>Reformatted to new template</td>
</tr>
<tr>
<td>2.3</td>
<td>April, 2013</td>
<td>Changes detailed in Summary table below</td>
</tr>
</tbody>
</table>

Summary of changes from previous version

<table>
<thead>
<tr>
<th>Summary of change</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Changes</td>
<td>Document Control</td>
</tr>
<tr>
<td>Change to limits for ballast electrical resistivity</td>
<td>4.9</td>
</tr>
<tr>
<td>New Section – sampling and testing</td>
<td>5</td>
</tr>
<tr>
<td>Sections renumbered</td>
<td>6 to 8</td>
</tr>
</tbody>
</table>
Contents

1 Scope and Application .................................................................................................................................. 4
2 References .................................................................................................................................................. 4
  2.1 Australian and International Standards ................................................................................................. 4
  2.2 RailCorp Documents ............................................................................................................................... 4
  2.3 Other References .................................................................................................................................. 4
3 Definitions .................................................................................................................................................. 4
4 Requirements ............................................................................................................................................... 4
  4.1 Bulk density ............................................................................................................................................ 4
  4.2 Flakiness Index ....................................................................................................................................... 4
  4.3 Aggregate Crushing Value ....................................................................................................................... 5
  4.4 Wet Attrition Value ................................................................................................................................. 5
  4.5 Weak Particles ....................................................................................................................................... 5
  4.6 Crushed Particles of Coarse Aggregate .................................................................................................. 5
  4.7 Material finer than 75μm ......................................................................................................................... 5
  4.8 Particle Size Distribution ....................................................................................................................... 5
  4.9 Ballast Electrical Resistivity ................................................................................................................. 6
  4.10 Delivery ................................................................................................................................................ 6
5 Sampling and testing .................................................................................................................................... 6
6 Alternative Materials .................................................................................................................................... 7
7 Additional tests ............................................................................................................................................. 7
8 Documentation Required ............................................................................................................................. 7
1 Scope and Application

This Specification sets out requirements for the purchase of railway ballast.

It is applicable for ballast material used in RailCorp to meet the requirements of RailCorp standard ESC 240 – Ballast.

2 References

2.1 Australian and International Standards

AS 2758.7 – Aggregates and rock for engineering purposes Part 7: Railway ballast
AS 1141 – Methods for Sampling and Testing Aggregates
AS 1289.4.4.1 – Methods of testing soils for engineering purposes - Soil chemical tests - Determination of the electrical resistivity of a soil - Method for sands and granular materials

2.2 RailCorp Documents

ESC 240 - Ballast

2.3 Other References

Nil

3 Definitions

For the purpose of this document, the definitions in AS 2758.7 and those in Table 1 below apply:

<table>
<thead>
<tr>
<th>Track Classification</th>
<th>Aggregate requirements shall be determined on the basis of the following classification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class H</td>
<td>Track carrying more than 6MGT per year</td>
</tr>
<tr>
<td>Class N</td>
<td>Track carrying between 1MGT and 6MGT per year</td>
</tr>
<tr>
<td>Class L</td>
<td>Track carrying less than 1MGT per year</td>
</tr>
</tbody>
</table>

Table 1 - Definitions

4 Requirements

The supply of railway ballast shall be in accordance with AS 2758.7 unless otherwise specified in this document.

The following specific requirements shall apply:

4.1 Bulk density

When determined in accordance with AS 1141.4 the compacted bulk density of ballast material shall not be less than 1,400 kg/m³.

4.2 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%.
4.3 Aggregate Crushing Value
In addition to the limits specified in AS 2758.7, the aggregate crushing value of the ballast material for Class H track when determined in accordance with AS 1141.21, for the fraction of material passing the 53.0 mm test sieve and retained on 37.5 mm test sieve shall have a result no greater than 30%.

4.4 Wet Attrition Value
The wet attrition value of the ballast material for each track classification, 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 as follows:

- Class H: 6% maximum
- Class N: 8% maximum
- Class L: 12% maximum

Material having a wet attrition value in excess of the requirements for a specific class of track may be accepted provided the corresponding aggregate crushing value does not exceed the requirement for the specified class of track.

4.5 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%.

4.6 Crushed Particles of Coarse Aggregate
When determined in accordance with AS1141.18, 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%.

4.7 Material finer than 75µm
The percentage of materials finer than 75µm, when tested according to the procedure set out in AS 1141.12, shall not be greater than 1%.

4.8 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 2.

<table>
<thead>
<tr>
<th>Sieve size (mm)</th>
<th>Ballast Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>% passing by mass</td>
<td></td>
</tr>
<tr>
<td>60 (graded ballast)</td>
<td>50 graded aggregate</td>
</tr>
<tr>
<td>63.0</td>
<td>100</td>
</tr>
<tr>
<td>53.0</td>
<td>85 – 100</td>
</tr>
<tr>
<td>37.5</td>
<td>50 – 70</td>
</tr>
<tr>
<td>26.5</td>
<td>20 – 35</td>
</tr>
<tr>
<td>19.0</td>
<td>10 – 20</td>
</tr>
<tr>
<td>13.2</td>
<td>2 – 10</td>
</tr>
</tbody>
</table>
Table 2 - Ballast Grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>Ballast</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.50</td>
<td>0 – 5</td>
</tr>
<tr>
<td>4.75</td>
<td>0 – 2</td>
</tr>
<tr>
<td>2.36</td>
<td>5 – 10</td>
</tr>
</tbody>
</table>

4.9 Ballast Electrical Resistivity

To meet electrical resistance requirements necessary for the satisfactory operation of signalling track circuits, ballast shall demonstrate an electrical resistivity of greater than 60 ohm.m when tested in accordance with AS 1289.4.4.1.

4.10 Delivery

Graded ballast material 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 that may foul or damage the ballast.

Discharge from plant, loading of trucks, delivery and building and maintaining stockpiles shall be carried out in a manner which effectively avoids segregation and contamination with other materials.

Any Ballast delivered directly from quarry stockpiles shall have been accepted according to the requirements of this specification prior to delivery to railway wagons.

5 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 Australian standards.

Sample testing shall be undertaken from the point of delivery and/or at the source of the ballast supply as follows:

For product approval from new suppliers or material sources

Sample testing shall be undertaken for all tests specified in Section 4. Samples shall be taken from the point of delivery and/or at the source of the ballast supply.

During normal production

Sample testing shall be undertaken from the point of delivery and/or at the source of the ballast supply as follows:

- Every 5000t (or 1 week whichever is greater), carry out the following tests:
  - Flakiness Index, Clause 4.2
  - Weak Particles, Clause 4.5
  - Crushed Particles of Coarse Aggregate, Clause 4.6, if derived from river gravel
  - Material Finer than 75um, Clause 4.7
  - Particle Size Distribution, Clause 4.8
- Every 50,000 tonne (or 3 months whichever is greater), or if there is a change in the material quarried, carry out the following tests:
  - Bulk Density, Clause 4.1
  - Aggregate Crushing Value, Clause 4.3
  - Wet Attrition Value, Clause 4.4
  - Ballast Electrical Resistivity, Clause 4.9
6 Alternative Materials

In addition to meeting the requirements of Section 4 of this specification, material from new sources of supply shall be subject to petrographic and petrological analysis in accordance with the requirements of AS 1141.30 to evaluate for deleterious materials.

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.

7 Additional tests

Additional tests for other properties may be specified. These tests may include chemical reactions, electrolytic reactions, electrical conduction and others.

8 Documentation Required

Documentation required for each of the required specifications listed in this document and in AS 2758.7 shall be provided in accordance with the relevant Standard.