



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline  
Engineering Specification

Category  
Track & Civil

# General Appendix to ARTC Track & Civil Code of Practice

## Specification Clauses

### Ballast

### ETG-04-01

#### Applicability

ARTC Network wide	
New South Wales	
Western Jurisdiction	✓
Victoria	✓

#### Primary Source

(ARTC A1 Specification Ballast - Inspection & Assessment and Work on Asset/TCS-20)

#### Document Status Record

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#### List of Amendments

Issue	Date	Clause	Description
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## **4.7. Ballast**

### **4.7.1 Supply**

All ballast supplied should conform with ARTC Specification ETA-04-01 Ballast.

### **4.7.2 Ballast and By Product from ARTC Controlled Quarry**

#### **4.7.2.1. By Products from ARTC Controlled Quarry**

All waste materials, scalps, fine and screenings produced as by products from ballast production shall remain at the quarry but may be used by the contractor for the purpose of sheeting the quarry floor, stockpile and access roads. Any use of these materials outside of the quarry shall be subject to the agreement and approval of ARTC.

The Contractor shall stockpile these materials in a manner and locations approved by ARTC that will not restrict future development of the quarry.

#### **4.7.2.2. Quarry Stocktake**

This clause specifies requirements for the measurement of the quantity of ballast in quarry stockpiles.

##### **(a) Timing of measurements**

The quantity of ballast at individual quarries is to be measured as soon as possible after the commencement of the contract and before the removal of any ballast from the stockpile, or as otherwise directed by ARTC.

Thereafter it shall be measured at annual intervals or as otherwise specified by ARTC, with a final measurement being taken as close as practical to the end of the contract and after the final removal of ballast from the site by the Contractor.

##### **(b) Measurement Method**

The Contractor shall specify the method of calculating the volume of ballast and provide to ARTC the original survey measurements, the method of calculation and the calculated result. Such measurements are to be taken using appropriate, calibrated survey equipment.

Volumes expressed in cubic metres are to be provided for each individual pile of ballast on each site, together with a plan indicating their location.

##### **(c) Qualifications of Survey Staff**

Staff undertaking measurements shall be qualified for membership of the Institution of Surveyors, Australia as satisfying the requirements for Corporate or Associate Membership or alternatively, possess the experience and qualifications which would be acceptable for Membership to the Institution of Engineering and Mining Surveyors, Australia.

##### **(d) Data Required:**

Units in Stockpile for each Ballast Material/Grading

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Units in Stockpile for each other Material Type

### **4.7.3 Construction and Maintenance**

#### **4.7.3.1. Ballast Consolidation**

Following work where the ballast profile has been disturbed for any purpose and the stability of the track may be affected a speed restriction should be imposed at a level dependent on the degree of disturbance. The consolidation period will depend on the risk of the affected track becoming unstable and will depend on:

- Track curvature
- Type of fastening system
- Type of sleeper
- Track stiffness
- Rail temperature at time of work.

The following table 4.8 shall be used as a guide.

If dynamic track stabilisers are used, the duration of temporary speed restrictions may be reduced.

**Table 4.8 TEMPORARY SPEED RESTRICTIONS FOLLOWING BALLAST DISTURBANCE**

Type of Work	Sleeper Type	Max. Rail Temp. Reached or Predicted for Duration of Works [Includes Period to Run Trains to Consolidate Ballast]	Minimum Duration and Maximum Speed Associated with TSR Placed to Consolidate Track After Work is Completed	Notes
Spot and on face activities involving sleeper renewal and/or tamping, lift not exceeding 30mm	Timber	40° C and over	20 freight trains at 40km/h. If track OK then 10 freight trains at 60km/h. If track OK then 10 freight trains at 80km/h, if OK then allowable track speed.	Work not normally carried out when rail temperature exceeds 50° C
	Timber	Below 40° C	10 freight trains at 70km/h, if OK then allowable track speed	
	Concrete	40° C and over	5 freight trains at 70km/h. If track OK then allowable track speed.	Work not normally carried out when rail temperature exceeds 50° C
	Concrete	Below 40° C	No consolidation period	
Ballast shoulder cleaning	Either	Any	If ballast shoulder is restored, 20 freight trains at 40km/h. If track OK then 10 freight trains at 60km/h. If track OK then 10 freight trains at 80km/h, if OK then allowable track speed.	Work not normally carried out when rail temperature exceeds 50° C
Spot and on face undercutting without surfacing	Either	Any	2 freight trains at 25km/h. If track OK then 40 km/h until track surfaced.	

#### 4.7.3.2. Ballast Distribution

The Contractor shall be responsible for all transport and distribution from point of supply to installation in track.

Only ballast that meets the requirements of Clause 4.7.1 shall be placed into the track.

The Contractor shall have procedures for distributing ballast into track and recording amounts of ballast distributed including:

- Distribution equipment to be used (including hopper cars and where applicable rubber tyred road vehicles)
- Method of recording amounts of ballast distributed in cubic meters on a kilometer by kilometer basis
- Distribution Process including operation and unloading of ballast trains, and the distribution in track once unloaded.

The distribution process shall include provisions for:

- Distributing ballast quantities at locations derived from the Contractors plans in accordance with visual inspection prior to running ballast, or as otherwise directed by ARTC.
- Minimum wastage
- Avoidance of ballast contamination and unnecessary handling of ballast which may degrade the ballast in any manner
- Repair of any damage caused by the process.

When operating and unloading rail vehicles, the Contractor shall be responsible for all aspects of operational safety, and for keeping the track(s) and surrounds in a safe operating condition during the period of site occupancy.

#### **4.7.3.3. Ballast Profile Regulation**

The requirements specified in the relevant table 4.3, 4.4, or 4.5 shall be met by the Contractor for:

- Any work task or activity where the Contractor's work procedures require disturbance of the ballast in any way;
- Rectification of ballast deficiencies, unless otherwise specified by ARTC.

The Contractor shall have procedures for ballast profile regulation of track and post regulation inspections including:

- Regulation equipment to be used
- Inspection of completed work
- Regulation Process

The regulation process shall include provisions for:

- Minimum wastage
- Avoidance of ballast contamination and unnecessary handling of ballast which may degrade the ballast in any manner
- Profile, depth and movement of excess ballast in accordance with the relevant table 4.3, 4.4, or 4.5.
- Clearing all ballast from the area around sleeper fastenings to the sleeper surface level and for approx 100mm either side of the rails
- Repair of any damage caused by the process (e.g. replacement of clips knocked out).

Note that for steel sleepers track, the minimum ballast profile shall conform as specified in Clause 4.1.2 and Figure 4.1A.

#### **4.7.3.4. Removal of Ballast from Track**

When removing ballast from track, or where directed by ARTC, including:

- Removal of all contaminated ballast material over the full ballast profile
- Removal of all contaminated ballast material from the ballast shoulder
- Removal of excess ballast for redistribution
- Removal of ballast for lowering track levels,

the Contractor shall meet as a minimum the requirements of this clause.

Prior to carrying out any ballast removal the Contractor shall have documented procedures for the removal of existing ballast from track including:

- Ballast removal equipment to be used
- Removal process
- The reuse of removed ballast.

Where removing ballast these procedures shall include provisions for:

- The quarantining of contaminated ballast until screened in accordance with Clauses 4.7.4.2, or disposal in accordance with environmental regulations.
- Removal of the full ballast section or ballast shoulder to formation level or a minimum of 200mm. The depth of ballast removal for ballast screening shall be 300mm below the base of the sleeper or as specified by ARTC.
- Where removing ballast:
  - A cut surface of uniform grade shall be achieved, containing no depressions that may trap or direct water under the track.
  - No materials shall be left above the level of the base of the cut, for example part of the existing ballast shoulders at the ballast toe.
  - Cutting in and out of the track of the ballast removal machinery shall be achieved whilst maintaining a uniform depth of cut longitudinally along the track (e.g. where it is necessary to achieve any additional cutter clearance at cut-in and cut-out locations this should be carried out by releasing adjacent sleeper fastenings, not by cutting deeper)
- Removal of ballast for screening on a face:
  - Within 3m of the point of switch and the last common bearer in turnouts and in points and crossing layouts.
  - Within 3 m of fixed structures such as transom deck bridges
  - Within 3 m of the edge of the sealed surface of bitumen sealed level crossings (on both sides).
  - Through the whole crossing in a continuous manner at unsealed crossings and crossings fitted with reusable road surface units.
- Removal and replacement of all track fittings where necessary.

- Overhauling the formation in accordance with ARTC Appendix ETC-08-02 Railway Earthworks, in particular where removing defects in the ballast and formation.
- Ballast reinstatement in accordance with the requirements of Clause 4.1.2 or as directed by ARTC.

The contractor procedures shall include provision for “Cribbing” and “Panelling Out” where this is the preferred method of removal. These procedures shall incorporate all appropriate requirements of this clause.

Ballast removal shall not cause damage to the track structure and provide for minimal rail cutting and re-welding.

#### **4.7.3.5. Disposal of Ballast**

When ballast is removed for reuse or retention (particularly in the shoulders) the method of removal shall not introduce any contaminants into the ballast. If contaminated the ballast should be quarantined and screened prior to use.

Any removed material shall be placed clear of the track in a position where fines cannot be washed out and return to the track, contaminate adjacent property or cause any obstruction to train and maintenance operations.

Cleaning and disposal of waste shall be carried out off site or at approved ARTC sites under conditions agreed by ARTC (and address issues such as environment protection, waste disposal and dust.)

The contractor may be permitted to collect and clean removed material for reuse in track, subject to agreement with ARTC.

#### **4.7.3.6. Ballast Profile and Depth Following Rectification**

##### **(a) Profile**

The ballast profile following rectification shall be assessed in accordance with the requirements of Clause 4.4.2 and Tables 4.3 to 4.7.

Where ballast deficiencies on sections of track are greater than 10m in length, the rectification of the ballast profile shall be carried out on a face over the length of the deficient track section.

##### **(b) Depth**

The ballast depth following rectification shall be equal to or greater than that in the undisturbed corresponding ARTC track adjacent to the worksite, unless otherwise specified by ARTC.

#### **4.7.3.7. Maximum Profile to Run Trains**

Other than ballast trains whilst distributing the ballast, prior to the running of any train all ballast shall be removed from above the level of the top of rail.

Unrestricted operation of traffic shall not be permitted unless the ballast level is 50mm below the top of rail, except at take-offs and occupation crossings.

The Contractor shall ensure the distributed ballast does not foul or inhibit the function or operation of any part of the infrastructure or associated equipment (eg. points operation, blockage of drains and waterways).

The operation of ballast trains during ballast distribution shall be carried out in accordance with the procedures specified by the Contractor (refer Clause 4.7.3.2)

#### **4.7.3.8. Ballast Interference**

Where the ballast profile, or presence of ballast, is such that it may interfere with the operation of infrastructure (e.g. signals or switch operation) or rollingstock (e.g. interference with clearances or flangeway blockage) actions should be taken to maintain safe operations.

### **4.7.4 Ballast Screening**

#### **4.7.4.1. On Site Screening**

The Contractor shall have procedures for the screening of existing ballast in track including:

- Screening equipment to be used
- Control of the ballast placed back in track and waste materials
- Screening Process.

Where the Contractor chooses to screen ballast the procedure shall include provisions for those factors described in accordance with Clause 4.7.4.2.

#### **4.7.4.2. Mechanised Screening**

Mechanised screening of ballast includes the mechanised removal of either the full ballast section or the ballast shoulders, ballast screening and replacement of cleaned ballast in one operation.

The Contractor shall have procedures for the mechanised screening of existing ballast in track including:

- Mechanised screening equipment to be used
- Control of the ballast placed back in track and waste material
- Mechanised screening process

These procedures shall include provisions for the return of ballast stone to track so that:

- Stone passes the 65mm sieve and is retained on the 19mm sieve
- It contains less than 5% by weight; material that passes the 13.2mm sieve.
- The disposal of all other material to the side of the track well clear of the formation.



Such waste material should not contain more than 10% of track of ballast stone passing the 53mm sieve and retained on the 19mm sieve.

Waste material disposed of shall:

- Not be deposited within cuttings or on formation above the level of the cleaned track bed.
- Not be deposited on the reserve in built up areas without the prior approval of ARTC
- Be deposited clear of all signals, signs, services, roadways, drains, platforms, turnouts, shunt paths, or other locations which may disrupt operations or cause deterioration of the infrastructure at any time in the future
- Be positioned such that it does not adversely affect drainage by forming pockets or blockages to runoff.

Waste classified as contaminated material shall be disposed of by the Contractor offsite in licensed landfills.

**Samples of both material returned to track and wasted shall be collected and tested as required by ARTC.**

Sampling and testing shall be in accordance with Australian Standards AS2758.7 and AS1141 series, with results available within 24hrs of sampling.

Where test results are outside the specification for material returned to track or wasted the Contractor shall take corrective action to ensure this specification is met prior to continuing cleaning.