



AUSTRALIAN RAIL TRACK CORPORATION LTD

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About This Standard

This document details the technical requirements for signal lamps used for railway signalling applications on the New South Wales railway network.

A batch testing method for acceptance testing using random samples for signal lamps is included in this document.

A list of lamps used by Australian Rail Track Corporation for its New South Wales railway network is tabulated for easy reference. Lamp parameters such as wattage, lumen output, physical dimensions and expected life of signal lamps are also included.

Other forms of light sources may be offered instead of incandescent lamps for consideration as alternatives. These alternatives need to provide extended service availability and reliability to the rail system. Rail safety shall be the prime objective considering the railway signalling environmental factors.

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1. Introduction

This specification stipulates the technical requirements for Signal Lamps to be supplied to Australian Rail Track Corporation for signalling applications on the NSW railway network. The specification also describes the methods of acceptance testing of lamps for quality inspections.

Any matter that is not specified in this specification shall conform to AS 2325-1980 (Tungsten Filament Lamps for General Service) & AS 3117-1988 (Approval & Test Specification-Bayonet Lamp holders)

1.1. Signal Lamps used in the NSW rail network

Signal lamps used for railway applications are specified and included in the following table.

However alternative light sources that can perform better than incandescent lamps are acceptable for consideration. These alternate light sources shall satisfy the rail system safety objectives, considering environmental conditions associated with railway signalling applications.

The following performances considerations are important:

- a) Lamp life.
- b) Light output.
- c) Visibility at nominated view angles and at nominated distances.
- d) When used on vital signalling applications the reliability and possibility of false illumination of lamp indications shall be taken into consideration.
- e) Susceptibility to environmental conditions such as; temperature, humidity, vibration, etc.

Signal Lamps used in NSW Rail Network

Item No	Voltage Rating (V)	Wattage Rating (W)	APPLICATION	REMARKS
1	120V	10W	Train Destination Indicator	Ring filament
2	12V	36W	Signal Lighting	Dual ring 18+18W
3	240V	15W	Train Destination Indicators (Underground)	Ring filament
4	120V	15W	Train Destination Indicator, power supply indicators	Ring filament
5	120V	25W	Ditto	Ditto
6	130V	40W	Shunt Signals & Route indicators	RC, frosted glass A60
7	130V	60W	Ditto	RC, frosted glass A60
8	12V	2+2W	Marker lights, Tunnel signal lights	Standard Filament 2CP+2CP

9	10V	13+3.5W	Signal Lighting	Superseded
10	10V	5W	Level crossing barrier arm, tip lights	Superseded by 25W
11	10V	11 W	Level crossing barrier arm, tip lights	Superseded by 25W
12	10V	25W	Level crossing warning lights	
13	10V	18W	Signal lighting	re-based
14	10V	18+3.5W	Signal lighting	re-based
15	12V	24+24W	Signal lighting (multi-aspect colour light)	SL35-BS469, triple pole
16	12V	55W	Revolving Halogen lamp	Warning lights
17	2.5V	0.15A	Clearance Post Light	

2. Mechanical and Physical Requirements

2.1. Lamp Marking

Lamps shall be distinctly marked with the following information:

- Rated Voltage.
- Rated Wattage.
- Manufacturer's Name or trade mark.
- Batch Number to identify the production batch which should detail the month and year of manufacture.

2.2. Dimensions and Filament Arrangement

The dimensions and filament arrangement of the Signal Lamps shall be in accordance with Table-1 and related drawings No 1042-1 to 1042-12.

2.3. Bulbs

Bulbs shall be clear glass (unless otherwise stated as frosted), uniform and free of defects.

2.4. Insulation Resistance

The test voltage shall not be less than 250V and not be more than 500 Volts.

The insulation resistance between the contact plates and the shell of the lamp shall not be below 10 MOhm.

The Insulation resistance test should be carried out after the ageing period of the Lamp (i.e. One Hour after the Lamp has burnt at the rated voltage).

2.5. Solder

Soldering shall be done in such a way that the cap allows proper engagement with the lamp holder. Melting point of the solder shall not be less than 290C.

2.6. Packaging

Each lamp shall be individually packed in a protective Cardboard pack with the following information marked on it.

- Contract Item Number
- Manufacturers Name or the trade mark

3. Initial Readings and the Lamp Life

The values for "Initial readings" and "Lamp Life" shall be in accordance with the values given in Table 1. (The reading taken after burning the lamp at the rated voltage for one hour is considered as the "initial reading").

4. Acceptance Testing Procedure

Samples of Lamps for acceptance testing shall be selected as follows:

4.1. Samples for Testing

4.1.1 Batches of 1000 lamps and less

4.1.1.1. Batches consisting of 10 or less containers

Lamps shall be selected from every container.

4.1.1.2. Batches consisting of more than 10 containers

Lamps shall be selected from at least one half of the total number of containers in the batch, with a minimum of 10 containers.

4.1.2 Batches containing more than 1000 lamps

Lamps shall be selected, as far as possible, from one third of the total containers in the batch, with a minimum of 10 containers.

4.2. Inspection Test Quantity (I.T.Q.)

Inspection Test Quantity shall be selected as 5 percent of the batch with a minimum quantity of 35 and a maximum of 70 lamps.

4.3. Rating Test Quantity (R.T.Q.)

Samples for Rating test shall be selected from the lamps which have passed inspection test. Test quantity shall be 25 lamps.

4.4. Life Test Quantity (L.T.Q.)

A quantity of 12 lamps shall be selected at random from lamps which have passed the rating test.

4.5. Acceptance criteria

The maximum number of lamps failing to meet the requirements shall not exceed the values tabulated in the following tables.

4.5.1 Inspection Test Quantity (Mechanical & Physical Characteristics)

(For any one of clause 2.1 to 2.5 inclusive)

TEST QUANTITY	QUALIFYING LIMIT
35 – 54	3
55 – 70	4

4.5.2 Lamps from the Rating Test Quantity found to be inoperative at any time up to the end of the Ageing period

TEST QUANTITY	QUALIFYING LIMIT
25	2

4.5.3 Initial Readings (As per Table 1)

TEST QUANTITY	QUALIFYING LIMIT
25	5

4.5.4 Life Test Quantity

TEST QUANTITY	QUALIFYING LIMIT
12	2

4.5.5 Information to be furnished by the Supplier

The following information shall be furnished by the supplier for each batch of production to be supplied:

- Lamp type
- Rated Voltage
- Rated Wattage
- Base type
- Light Centre Length (for precision Lamps)
- Deviation of Light Centre Length for vital lamps
- Lamp output in Lumens
- Overall length
- Bulb Diameter

- Minimum supply quantity.

5. Photometric Measurements for Signal Lamps

5.1. Test Gear for Photometric Measurements

A suitable photometric integrator shall be used for photometric measurements.

5.2. Method of Testing

5.2.1 Test Rack

Lamps shall be burnt on the test rack with the rated voltage applied by a DC or AC source at 50 Hz frequency. Lamps on the test rack shall be separated by at least 150mm.

5.3. Test Conditions

5.3.1 Test Voltage

The test voltage at the time of photometric measurements shall be equal to the rated voltage $\pm 0.2\%$.

5.3.2 Environmental

For Life Test, the lamp holder or the test rack shall be free of vibration. Lamps shall not be operated in excessive ambient temperature nor there shall be undue heating of a lamp by adjacent lamps.

5.3.3 Life Test Quantities

- The test voltage for the lamps shall be 100 to 110 percent of the rated voltage.
- The lamps shall be switched off twice a day for at least 15 Minutes at each time.
- For life tests, samples of lamps from each batch shall be tested for a minimum of 1000 Hours.

6. TABLE 1 - Lamp Dimensions and Ratings – (Signal Lamps used in the NSW Rail Network)

Item No	Filament Ratings			Figure CAP	Initial Readings		Overall Arrangement	Drawing No	Dimensions		Light Centre Length	Maxm Axial error	Specified Life Hours	Operating position	
	MAIN	AUX	Wattage		Maximum	Minimum			Lumens	Length					Dia
	V	W													
1	120V	10W		E27	11W	40	Ring	1042-1	82±5	41±2		0.5	1000	Horizontal	
2	12V	18W	18W	E27	39W	400	Dual Ring	1042-2	100±5	50±2	67±1		1000	Cap Down	
3	120V	15W		B22d	16.5W	160	Ring	1042-3	58±5	28±2	40±0.5	0.5	1000	Horizontal	
4	120V	25W		B22d	27.5W	270	Ring	1042-3	58±5	28±2	40±0.5		1000	Cap Down	
5	130V	40W		B22	44W	425	RC	1042-4	100±5	55±2	70±0.5		1000	Cap Down	
6	130V	60W		B22	65W	600	RC	1042-4	100±5	55±2	70±0.5		1000	Cap Down	
7	12V	4.4W		E27	4.4W	24	Double metal C7A	1042-5	78±5	27±2	55±0.5		1000	Cap Down	
8	10V	13W	3.5W		18W	160	C2Vmajor / C12minor	1042-6	55±5	32±2	32±0.5		1000	Cap Down	
9	10V	5W		SC	5.5W	50	C2V	1042-7	57±5	32±2	32±0.5		1000	Cap Down	
10	10V	11W		SC	12W	110	CC-6	1042-7	55±5	32±2	32±0.5		1000	Cap Down	
11	10V	25W		SC	27.5W	250		1042-7	55±5	32±2	32±0.5		1000	Cap Down	
12	10V	18W		rebased 2PS	19.5W	225	CC-6 or C2Vmajor	1042-8	87±5	50±2	56±0.5		1500	Cap Down	
13	10V	18W	3.5W	rebased 2PS	23W	225	CC-6 or C2Vmajor	1042-8	87±5	50±2	56±0.5		1500	Cap Down	
14	12V	24W	24W	B22d 3-pin	26W	260	Vertical / Horizontal	1042-9	78±5	50±2	56±0.5		1000	Cap Down	
15	12V	55W		P14.5S	60W	260	Halogen	1042-10	62±5				1000	Cap Down	
16	2.5V	375mW (0.15A)		BA15S	400mW	550		1042-11	46±5	24±2			1000	Cap Down	