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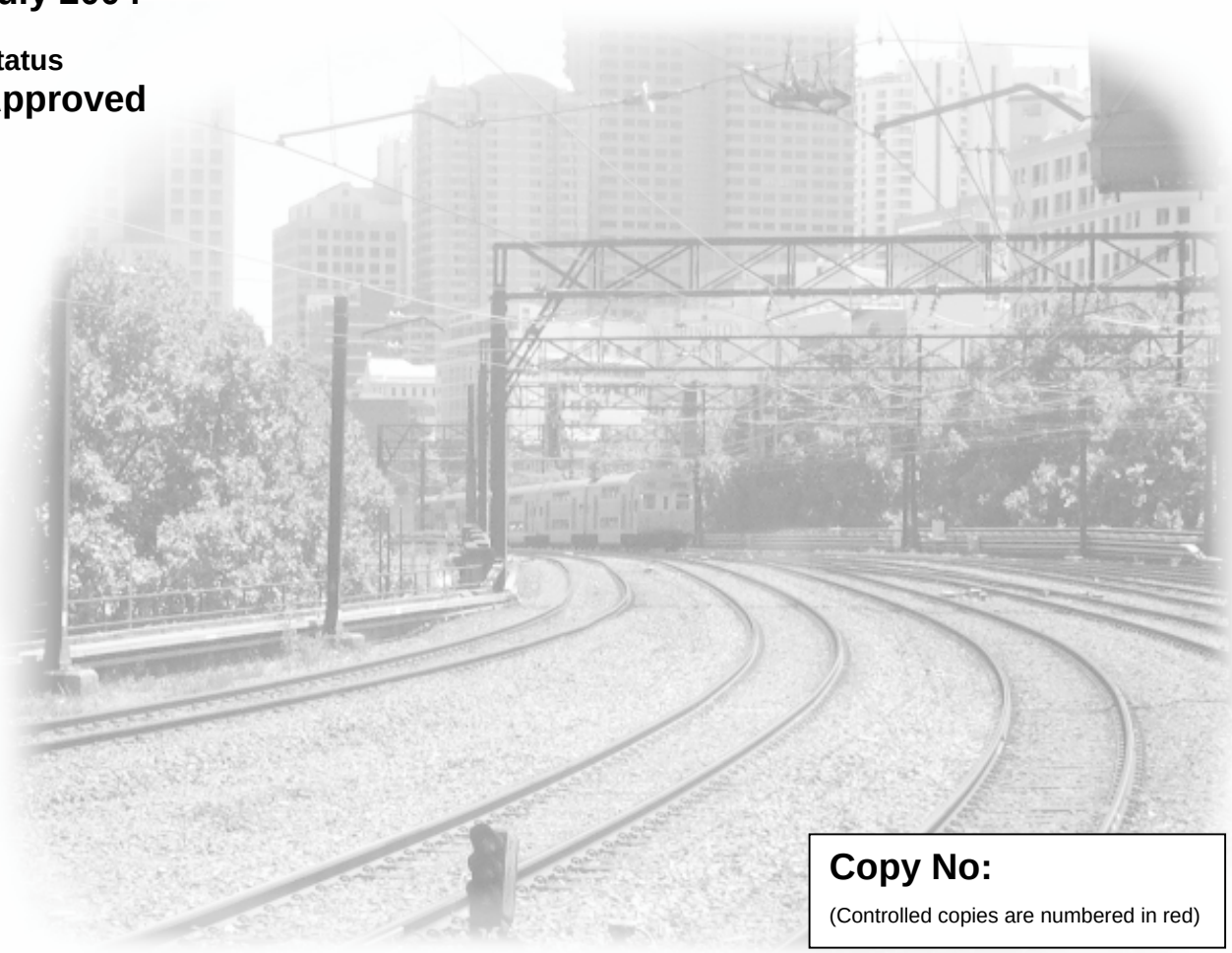

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About This Standard

This standard is based on the following TRS Standards:

TRS 1079 Spring requalification requirements.

TRS 1622 Spring groups load bearing for freight bogies.

TRS 1623 Spring Coil – Understanding identification markings

TRS 1729 Spring preventative maintenance inspection of springs for freight bogies.

Version History

Version 1.0

First issued January 2004

Draft 1 numbered RSS 0022
Draft 2 renumbered as RSS 0043

Version 1.1 July 2004

Section 1 Definition of primary and secondary suspension added.

Table 2 Spring groups not used on RIC vehicles deleted.

Table 3 Spring Numbers of springs not used on RIC vehicles deleted. Spring colours added.

Section 5.1.2 “secondary springs” was “bolster springs”

Section 5.4.1 “black unless otherwise stated.” amended to read “black or white as shown in table 3.”

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1 Scope

This standard covers the preventative maintenance inspection and requalification of coil springs.

Primary suspension springs act between the axlebox and the bogie frame and allow independent support and motion of the wheelset relative to the bogie frame. Generally, a primary spring group supports the vehicle wheel load.

Secondary suspension springs act between the bogie frame and the bolster or vehicle body and allows independent support and motion of the vehicle body relative to the bogie. Generally, a secondary spring group supports half the bogie load.

A coil spring is shown in Figure 1.

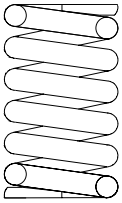
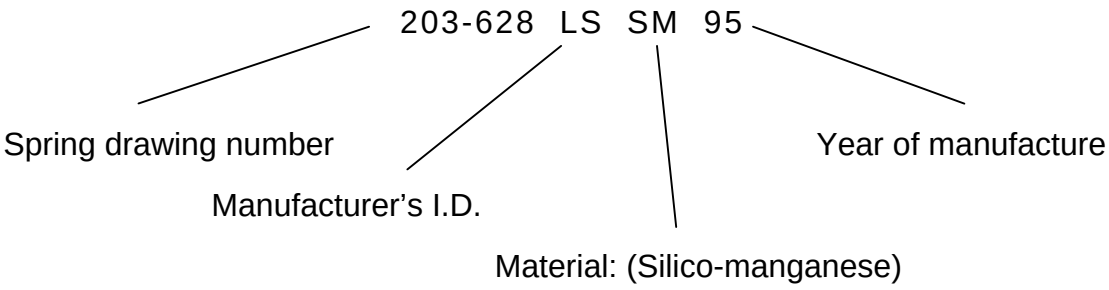


Figure 1

2 Identification of Springs

Each helical coil spring carries a code hot stamped on the side of the dead coil. This code comprises the spring engineering drawing number, the manufacturer's identification, the spring material and the year of manufacture. Spring codes may vary to the following example.

2.1 An Example Code:



2.2 Position of Identification Code

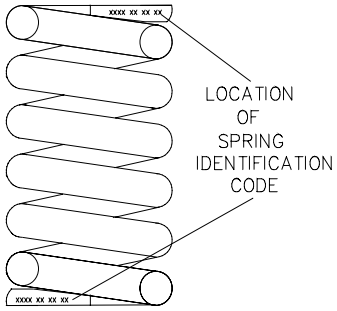


Figure 2

3 Inspection

3.1 Broken

Springs shall be checked to see if any are broken or missing. Any broken or missing springs shall be replaced.

3.2 Type

Springs shall be checked to see that they are of the correct type and number.

For correct type and number see the Spring Group Tables.

3.3 Seated

Springs shall be checked to see that they are correctly seated.

Springs shall sit with full contact on the top and bottom seat.

Dislodged or cocked springs shall be reseated with the vehicle unloaded, preferably with as little weight on the bogies as possible.

Care shall be taken to ensure that the springs are not damaged whilst reseating.

After reseating the springs shall be checked for surface damage.

3.4 Damage

Springs shall be inspected for surface damage. Prior to inspection all excessive dirt shall be removed from the springs by washing or wire brushing.

Coil pitch variation. The variation between any two adjacent coils shall not exceed 25% of the average free coil spacing.

Free of nicks grooves any sharp edges or abrupt depression.

Free of corrosion. Single pits shall be less than 1 mm in diameter or the major axis of any general pitted area shall be less than 20% of the coil bar diameter.

Free of cracks. No cracks or fissures are allowed.

Free of excessive wear. Any wear flat width must be less than 20% of the coil bar diameter.

Smooth edged depressions are allowed providing there are no sharp edges and that the reduction in bar cross section dimension is less than 5% of the coil bar diameter.

Lack of identification. All springs must show a drawing number, year of manufacture, manufacturers initials and material.

Excessive flattening of dead coils shall not exceed 25% of the forged bar width.

3.5 Free height

Any springs removed from a bogie or where there is any doubt the free height shall be measured to the limits shown in the Spring Group Tables.

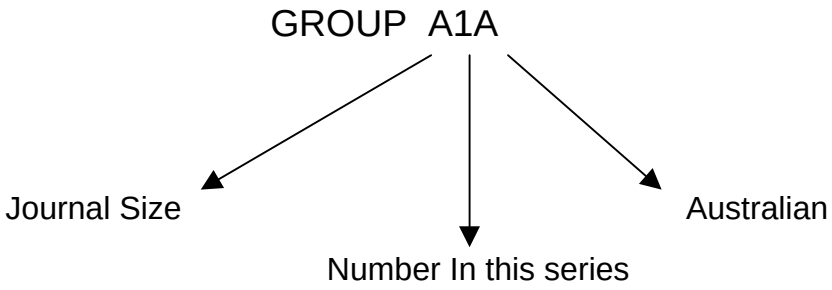
4 Spring Group Tables

The purpose of this section is to ensure that the correct spring group is installed into freight bogies upon assembly

4.1 How To Use the Following Tables

The following diagrams are representations of valid load bearing suspension spring groups for freight bogies. The “S” codes nominated in the spring group diagrams correlates with the springs listed in Table 3. The “|” denotes that a blocking bar is welded in place on the sideframe to prevent the use of this spring position.

The group code nominates the following information:-



BOGIE	SPRING GROUP	NOMINAL JOURNAL SIZE	BEARING TYPE	BOGIE CAPACITY AT RAIL
“A” Type	A1A or A2A	110 mm		26 tonnes
“B” Type	B1A	120 mm	10R or CPU	31 tonnes
“C” or “X” Type	C1A or C2A	130 mm	9R or DPU	38 tonnes
“W” or “Y” Type	C3A or C4A	130 mm	18R or DPU	38 tonnes
“D” Type	D1A or D2A	140 mm	15R or EPU	50 tonnes
“E” Type	E1A, D5, D5(Barber HD) or D7	160 mm	GPU	60 tonnes

Table 1 Application of spring groups to bogies

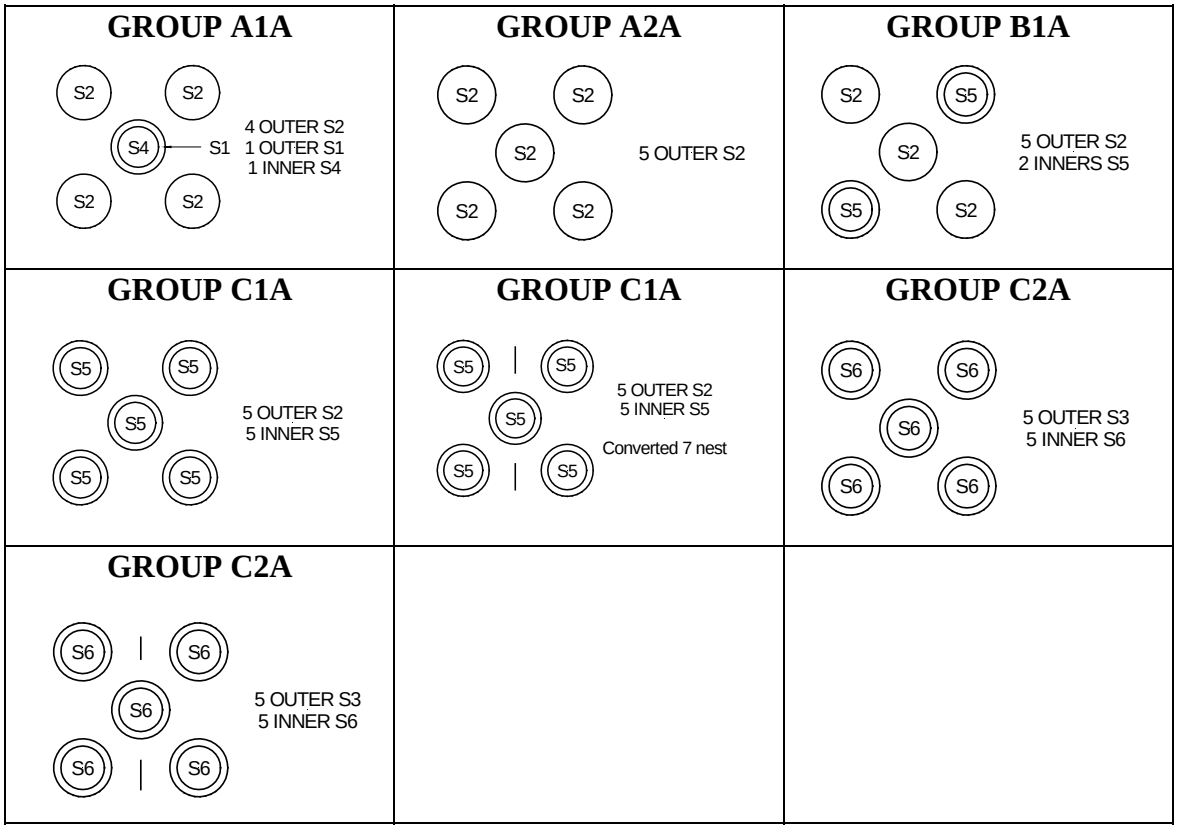


Table 2 Spring Groups

4.2 Spring details and allowable free heights

This specification details the free height limits for the requalification of freight load bearing springs.

Springs shall only fail the free height test if all points around the spring fail.

Spring Nº	Drawing Nº/ Item Nº	Minimum Free Height (mm)	Colour
S1	73962	214	Black
S2	203-628/2	240	Black
S3	203-627/3	256	White
S4	73961	214	White
S5	203-628/5	240	Black
S6	203-627/6	256	White

Table 3 Spring heights

5 Spring Requalification

5.1 Definition Of Classes

The various spring types have been categorised as follows:-

5.1.1 Class A

Class A springs are critical suspension springs where failure of any one spring in service will adversely affect the safe operation of the vehicle. (eg: affect vehicle dynamics or loading, eg: DCA & EBA primary springs, YM & WN primary & secondary springs and locomotive primary springs).

5.1.2 Class B

Class B springs are suspension springs where failure of any one spring in service will not adversely affect the safe operation of the vehicle. (eg: three piece bogie secondary springs).

5.1.3 Class C

Class C are those non critical, low duty springs in a bogie (eg: friction snubber and sidebearer springs), which would also not adversely affect the operation of the vehicle.

5.1.4 Class D

Class D springs are those critical suspension springs (similar to Class A) which carry a lateral load in addition to a vertical load such as flexi-coils. (eg: XPT PLA bogie secondary springs).

5.2 Pre-Qualification Cleaning

High pressure washing is an acceptable cleaning method for Class B & C spring groups, however, an abrasive cleaning method shall be required for Class A & D spring groups, (ie: shot peening).

5.3 Testing/Qualification

5.3.1 Free Height Test

All springs including load bearing, snubber and sidebearer springs shall be tested for excessive free height variations. The allowable variations of free heights are tabled in the relevant bogie overhaul manual.

The minimum spring free height shall be taken to be the greatest height of the spring measured around the spring."

All springs, with the exception of locomotive springs, failing to comply with the free height requirements shall be scrapped. Those locomotive springs that do fail the free height test but pass the load/deflection test in addition to complying all other requirements maybe re-used provided appropriate shims are added to calibrate the spring.

5.3.2 Visual Inspection Criteria

To qualify coils for re-use the springs must have a visual inspection after the cleaning process. This inspection shall comply with the following criteria:

Coil pitch variation. The maximum variation between any two adjacent active coils shall not exceed twenty five percent (25%) of the average free coil spacing.

Free of nicks, notches, grooves, any sharp edges or sharp edged and/or abrupt depression.

Free of corrosion. Single pits to be less than one millimetre (1mm) in diameter or any major axis of any general pitted area shall be less than twenty percent (20%) of the coil bar diameter.

Free of cracks. No cracks or fissures allowed.

Free of excessive wear. Any wear flat width must be less than twenty percent (20%) of the coil bar diameter.

Smooth edged depressions are allowed providing there are no sharp edges and that the reduction in bar cross-section is less than five percent (5%) of the coil bar diameter.

Lack of identification. To qualify, all springs must show a drawing number, year of manufacture, manufacturer's initials and material, although some allowances will be made for springs of small bar diameter such as snubber and sidebearer springs.

Excessive flattening of dead coils ends shall not exceed twenty five percent (25%) of the forged bar width.

Any spring failing to comply with these requirements shall be rejected.

5.3.3 Deflection Test

5.3.3.1 Class A

Shall not require load/deflection testing.

5.3.3.2 Class B and C

Shall not require deflection testing.

5.3.3.3 Class D

Shall require deflection testing. The lateral rate of flexi coil springs need not be tested.

5.3.3.4 Test procedure

The deflection test requires compressing the spring to the working load for the class of vehicle to which it is fitted. For working load test values refer to the relevant standard or drawing. If the working load is not detailed on the drawing this may be calculated from data for the vehicle, the nominal free height and the nominal spring rate.

The allowable variation is tabled on the relevant spring drawing or standard but should not exceed the tolerances shown in Table 4. If not shown on the drawing use the tolerances shown in Section Table 4.

The lateral rate of flexi-coil springs need not be tested.

Each spring of the assembly is to be individually tested and colour coded. Any spring failing to comply shall be rejected.

The spring nest should then be assembled and tested to ensure the nest complies with the working height requirements. The qualified spring nest shall be kept together, springs and shims where required to ensure the correct spring nest is installed. The spring nest shall be wired together and marked accordingly to identify the nest by painting as detailed in Section 4.4. Failure to do this may allow interchanging of components after calibration and lead to an unqualified spring nest being installed in a bogie.

5.4 Painting & Marking

5.4.1 General

All successfully qualified helical coil springs shall be coated with at least one coast of bituminous paint, covering the entire spring surface and shall be applied no later than eight hours (8hrs) after the completion of the inspection process.

The final paint coating colour shall be black or white as shown in Table 3.

5.4.2 Painting For Locomotive Coil Springs

After locomotive springs have been qualified and painted with a protective coating, they must be marked with a vertical slash of colour paint down the entire length of the spring to identify their working height range as shown in Table 4.

Colour Coding	Working/Free Height Range (in mm)
Brown	+5.0 to >1.5
Blue	+1.5 to -1.5
Green	<-1.5 to -5.0

Table 4

6 Reference Documents

6.1 RIC Drawings

73961	
73962	
203-505	Bolster Springs
203-627	Three Piece Bogies 93 mm Bolster Springs
203-628	Three Piece Bogies 77mm Bolster Springs