



NMRA STANDARDS	
General - Overview	
Apr 20, 2021	S-1

1 General

The primary purposes of NMRA STANDARDS are to establish the broadest correlated set of limiting dimensions, electrical parameters, and communications parameters within which interchange may be assured.

5 1.1 Introduction and Intended Use (Informative)

1.2 References

This standard should be interpreted in the context of the following NMRA Standards, Technical Notes, and Technical Information.

1.2.1 Normative

- 10 • S-1.1 General – Proto Scales
- S-1.2 General – Standard Scales
- S-1.3 General – Scales with Deep Flanges
- S-3 Series Trackwork
- S-4 Series Wheels
- 15 • RP-1 Abbreviations used on Drawings

1.3 Terminology

Term	Definition
Track Gauge	The distance between railheads of two Stock (running) rails.
Track Check Gauge	The distance from the flange side of a Guard Rail to the flange side of the Frog it guards
Wheel Check Gauge	The distance from the back of the flange on one wheel to the tread-side of the flange of the other wheel on the axial.
Span	The distance between flange sides of the Guard and Wing Rails in the guarded Frog.
Back-to-Back	The distance between the Backs for the wheel flanges in a wheelset at railhead height.
Flangeway Width	The distance between flange sides of the Wing and Frog Rails.
Tire Width	The distance between the Back of the wheel flange at railhead and the outer edge of the wheel tread
Flange Clearance	The vertical distance from the railhead to the highest obstruction below it.
Flange Depth	The vertical distance from the root of the flange to its outer edge.
Switch Point Spread	The distance from the Gauge Line of the closed Point Rail to the outside of the open Point Rail.

2 Overview of Scales Track and Wheel Relationships

20 The primary purposes of **NMRA STANDARDS** are to establish the broadest correlated set of
limiting dimensions, electrical parameters, and communications parameters within which
interchange may be assured. This definition includes the intricacies involved in the Track-Wheel
relationship for each scale defined. It is not the specific purpose of the **NMRA STANDARDS** to
25 set production dimensions or tolerances but rather to set limits which manufacturers can use when
setting their tolerances. When used to determine manufacturing tolerances care must be taken to
ensure that the production dimensions are not at the extreme edge of the range specified. Specific
NMRA Tech Notes supplement the standards to provide additional guidance.

The scale names, proportions and track gauges are provided in S-1.1, S-1.2 and S-1.3. S-2 provides
standards for couplers. S-3 and S-4 provide the critical wheel and track dimensions to ensure
reliable operation

30 S1, S3, and S4 are subdivided into three classes: Proto Scales, Standard Scales, and Scales with
Deep Flanges. The purpose of this division is to provide standards for the three general classes
within scale model railroading.

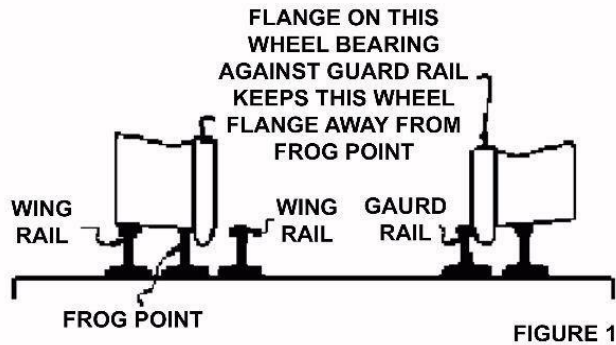
To ensure interchange and reliable performance, **NMRA STANDARDS** S-3 and S-4 are designed
so that Track and Wheels constructed within prescribed limits will meet the following related
35 conditions. These conditions closely parallel prototype practices. Many of the various dimensions
provided are strongly related to each other and care must be taken to meet each of the specifications
provided.

40 **2.1 TRACK GAUGE** (G in S-3) is the distance between railheads of two Stock (running) Rails
of a length of Track.

- a. Straight (tangent) track should be laid as close to the minimum limit of Track Gauge as
practical.
- 45 b. Curved track may increase Track Gauge as curve sharpness increases, with such increase
applied with care, lest the wheel is inadequately supported by the railhead and side sway of
equipment is exaggerated.
- c. Three-point track gages should be constructed so as to fulfill these requirements.
- d. For turnout construction, the track should be laid as close to the minimum gauge as possible
50 between the point of the frog and the running rails.

2.2 TRACK CHECK GAUGE (C in S-3) is the distance from the flange side of a Guard Rail
to the flange side of the Frog it guards. **WHEEL CHECK GAUGE** (K in S-4) is the distance
55 from the Back of the flange of one wheel to the tread-side of the flange of the other wheel of a
wheelset.

- a. Maximum Wheel Check Gauge should not exceed the minimum Track Check Gauge such
that Guard rails will protect the Frog. See Fig. 1.



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2.3. SPAN (S in S-3) is the distance between flange sides of the Guard and Wing Rails at the guarded Frog. **BACK-to-BACK** (B in S-4) is the distance between the Backs of the wheel flanges in a wheelset at railhead height.

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- a. Maximum Span should be less than the minimum Back-to-Back distance.

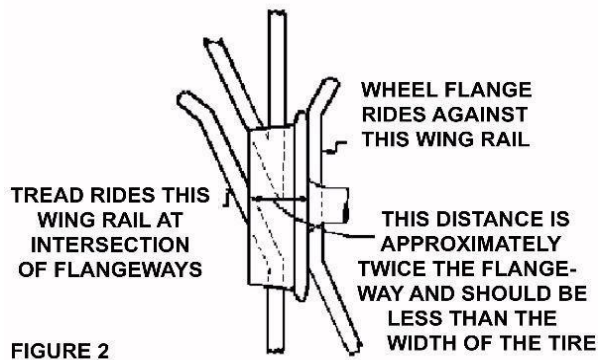
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2.4. FLANGEWAY WIDTH (F in S-3) is the distance between flange sides of the Wing and Frog Rails. **TIRE WIDTH** (N in S-4) is the distance between the Back of the wheel flange at railhead height and the outer edge of the wheel tread.

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- a. Maximum Flangeway Width at the point of the Frog should be less than half the minimum Tire Width to ensure the wheel tread riding the Wing Rail across the intersection of the flangeways until it is supported by the Frog Point Rail. See Fig 2.
- b. Guard Rail Flangeway Width is limited at its maximum only by Track Gauge and Check Gauge (G and C).
- c. Guard Rail Flangeway Width is limited at its minimum only by the Span and Check Gauge (C and S). Optimal operation is obtained by keeping the flangeway F close to its maximum.

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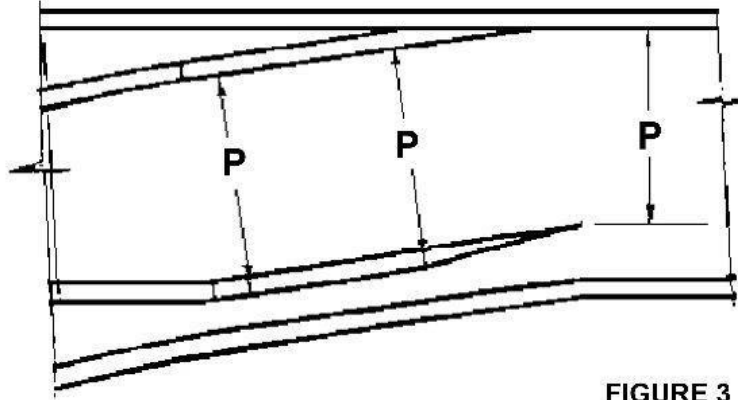
2.5 FLANGE CLEARANCE (H in S-3) is the vertical distance from the railhead to the highest obstruction below it. **FLANGE DEPTH** (D in S-4) is the vertical distance from the root of the flange to its outer edge. Minimum Flange Clearance should not be less than the maximum Flange Depth.

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2.6. SWITCH POINT SPREAD (P in S-3) is the distance from the Gage Line of the closed Point Rail to the outside of the open Point Rail. See Fig 3.

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- a. Maximum Spread (mechanical) should not exceed the sum of minimum Back-to-Back plus minimum Flange Width ($B_{min} + T_{min}$) to prevent interference. This is specified as P_{max}
- b. For best operation the Point rail and the Stock rail should always have the same polarity as this prevents electrical short circuits within the turnout. For turnouts where the Point and Stock rails may have opposite polarities the Maximum Spread (electrical) is $P_{max} - 0.005$ ".



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3 Document History

Date	Description
7/2004	Standard Approved by the Board of Directors
4/20/2021	Standard changed to current format. Editorial corrections made throughout

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