Ken Mortimer Revised by R Guilmette

1 General

The NMRA Recommended Practices, Car Weight, will provide guidance in the weighing of cars, see TN-20.1 for more details and methodology.

1.1 Introduction and Intended Use (Informative)

What is an optimum weight? Excluding defects, the simple answer is a weight that provides a car with adequate ride and handling quality that will keep them from derailing and or overturning. What determines the optimum weight is the number of cars on your train. With short trains you may be able to operate underweight cars from right out the box. As more cars are added or operating on larger model railroads, having a uniform weighing system can reduce derailments. This optimum weight will work on most model railroads but there are conditions where more weight may be required.

This document is intended to be used on cars manufactured from light material like plastic.

1.2 References

This standard should be interpreted in the context of the following NMRA Standards (S), Recommended Practice (RP), and Technical Note (TN).

1.2.1 Normative

- S-1.1 General – Proto and Fine Scales
- S-1.2 General – Standard Scale
- S-1.3 General – Scales with Deep Flange
- S-3.1 Trackwork – Proto and Fine Scale
- S-3.2 Trackwork – Scale Track, Standard Scale
- S-3.3 Trackwork – Deep Flange for Guarded Track
- S-4.1 Wheels – Proto and Fine Scales
- S-4.2 Wheels – Scale Wheels
- S-4.3 Wheels – Wheels with Deep Flanges

1.2.2 Informative

- RP-2 Standard Gauge
- RP-10 Trackage General
- RP-11 Curvature and Rolling Stock
- RP-12 Turnouts General
- RP-15.1 Rail
- RP-24.1 Journals
- RP-24.2 Wheelsets
- RP-24.3 Axles
- RP-25 Wheel Contour
- TN-20.1 Car Weight

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1.3 Terminology

Term	Definition
Additional Weight	Additional weight added, due to the lateral force increase, due to car length.
String line effect	Cars are pulled off the rails due to lateral forces in sharp curves.

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2 Optimum Weight

Testing has shown that having cars at an optimum weight will improve the car's performance, reducing derailments and overturned cars from stringline effects: When cars are weighted consistently in proportion to car length (end sill to end sill) they tend to derail less when the track and wheels meet the specifications of S-3 & S-4 series.

2.1 Optimum Weight Table

To find the optimum weight of a given car, enter the Table below in the desired scale and find the "Initial Weight", then find the "Additional Weight" and multiply this by the number of actual inches in the length of the car body. Add this weight to the "Initial Weight" for the total Optimum Weight of the car. All car weights have a tolerance of +20% / -15%.

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Table 2.1 Optimum Weight

SCALE	INITIAL WEIGHT ounces – (grams) "grams = ounce x 28.3495"	+	ADDITIONAL WEIGHT per inch of car body length ounce/inch – (grams/mm) "grams/mm = ounce/inch x 1.116"
O	5 – (141.75)	+	1 – (1.12)
On3	1-1/2 – (42.52)	+	3/4 – (0.84)
S	2 – (56.70)	+	1/2 – (0.56)
Sn3	1 – (28.35)	+	1/2 – (0.56)
HO	1 – (28.35)	+	1/2 – (0.56)
HOn3	3/4 – (21.26)	+	3/8 – (0.42)
TT	3/4 – (21.26)	+	3/8 – (0.42)
N	1/2 – (14.17)	+	0.15 – (0.17)

2.2 Adding Weight

If supplementary weight is required to bring the weight to optimum, they should also be kept as low as possible. When adding weight to a car, it should be equally distributed on center line of the car and equally distributed over the wheels.

3 Conclusion

There are too many variables in equipment, individual layouts and club layouts to say one weight standard will work for everyone. This is a starting point; you may have to adjust to your specific requirements. Adding weight may fix some problems, but it may cause others. Improving cars rolling resistance without adding additional weight is a good option, assuming the car's rolling resistance was high. The prototype doesn't have a weight standard, adjust your operating procedures, like the prototype. This includes knowing your track conditions and your cars, which are heavy or light, not coupling a short car to a long car. How you operate your trains and how trains are made up, this includes the location of your locomotive's. To get a better perspective of how the variables affect our equipment, see TN-20.1.

For optimum performance check, clean and lubricate axles and journals on a regular schedule.

4 Document History

Date	Description
Aug 1961	Initial release Ken Mortimer and committee.
Aug 1978	Revised added recommendations for HOn3 Ken Mortimert and committee.
Jan 1990	Revised
21-Nov-2026	Revised, migrated to new template, added metric measurements, created TN-20.1 clarifying the methodology and experimental procedures to derive the optimum weight. Richard Guilmette

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