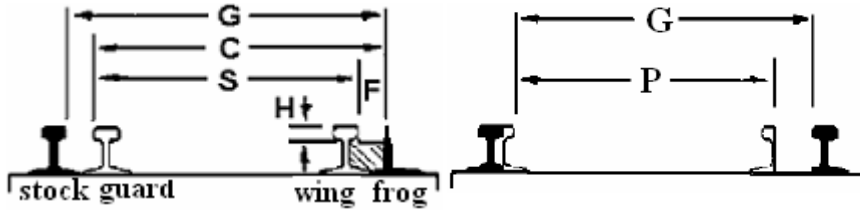


NMRA STANDARDS (IMPERIAL)
S-3.2 STANDARDS, TRACK, STANDARD SCALE



NMRA STANDARD	
Imperial Standards	
Scale Track For Guarded Work	
February 20, 2010	S-3.2

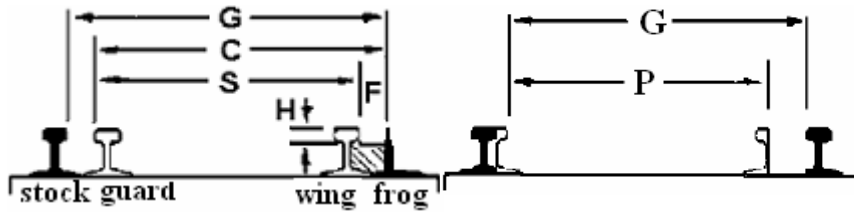
The Span, S, is derived by knowing $S = C - F$.
C is the primary controlling dimension.

Scale	Scale Ratio	Standard S3.2 Guarded using Target and Asymmetric Imperial (inch) Tolerance																
		G			C			S			F			P			H	Wheel
		Gage at Frog			Check Gage			Span			Flangeway			Points				
		Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	MIN	CODE
1"	1:12	4.752	0.060	0.002	4.586	0.011	0.004	4.366	0.004	0.002	0.218	0.002	0.065	4.561	0.004	0.004	0.140	1/2"
3/4"	1:16	3.502	0.038	0.002	3.353	0.014	0.004	3.172	0.004	0.002	0.179	0.002	0.046	3.325	0.004	0.004	0.094	13/32"
F	1:20.3	2.783	0.014	0.002	2.683	0.013	0.004	2.583	0.013	0.004	0.096	0.004	0.006	2.656	0.004	0.004	0.084	284
Fn3	1:20.3	1.772	0.010	0.006	1.652	0.010	0.004	1.550	0.005	0.015	0.115	0.002	0.023	1.628	0.004	0.004	0.066	250
LS	Varied	Large Scale Standards on Separate Page																
O	1:48	1.252	0.012	0.002	1.181	0.013	0.002	1.102	0.002	0.002	0.077	0.002	0.021	1.156	0.002	0.004	0.045	145
On3	1:48	0.752	0.012	0.002	0.707	0.010	0.002	0.654	0.002	0.002	0.051	0.002	0.018	0.685	0.002	0.004	0.026	116
On30	1:48	0.651	0.010	0.002	0.607	0.007	0.002	0.557	0.002	0.002	0.048	0.002	0.013	0.588	0.002	0.004	0.025	110
On2	1:48	0.502	0.009	0.002	0.457	0.007	0.002	0.407	0.002	0.002	0.048	0.002	0.012	0.438	0.002	0.004	0.025	110
S	1:64	0.885	0.010	0.002	0.841	0.007	0.002	0.791	0.002	0.002	0.048	0.002	0.013	0.822	0.002	0.004	0.025	110
Sn3	1:64	0.565	0.010	0.002	0.521	0.007	0.002	0.471	0.002	0.002	0.048	0.002	0.013	0.502	0.002	0.004	0.025	110
Sn2	1:64	0.415	0.008	0.002	0.379	0.004	0.002	0.339	0.002	0.002	0.038	0.002	0.008	0.363	0.002	0.004	0.023	88
OO	1:76.2	0.752	0.009	0.002	0.707	0.007	0.002	0.657	0.002	0.002	0.048	0.002	0.012	0.688	0.002	0.004	0.025	110
HO	1:87.1	0.651	0.010	0.002	0.607	0.007	0.002	0.557	0.002	0.002	0.048	0.002	0.013	0.588	0.002	0.004	0.025	110
HOn3	1:87.1	0.415	0.008	0.002	0.379	0.004	0.002	0.339	0.002	0.002	0.038	0.002	0.008	0.363	0.002	0.004	0.023	88
HOn2	1:87.1	0.278	0.007	0.002	0.248	0.004	0.002	0.215	0.002	0.002	0.031	0.002	0.007	0.234	0.002	0.002	0.020	72
TT	1:120	0.473	0.006	0.002	0.439	0.003	0.002	0.403	0.002	0.002	0.034	0.002	0.005	0.426	0.002	0.002	0.023	79
TTn42	1:120	0.355	0.004	0.002	0.325	0.001	0.002	0.295	0.001	0.002	0.028	0.002	0.001	0.314	0.002	0.002	0.020	72
TTn3	1:120	0.302	0.004	0.002	0.272	0.002	0.002	0.242	0.002	0.002	0.028	0.002	0.002	0.260	0.002	0.002	0.020	72
N	1:160	0.355	0.004	0.002	0.325	0.001	0.002	0.295	0.001	0.002	0.028	0.002	0.001	0.314	0.002	0.002	0.020	72
Nn3	1:160	0.258	0.003	0.002	0.232	0.003	0.002	0.207	0.002	0.002	0.023	0.002	0.002	0.219	0.002	0.002	0.016	54
Nn2	1:160	0.179	0.002	0.002	0.152	0.006	0.002	0.127	0.002	0.002	0.023	0.002	0.004	0.136	0.002	0.002	0.016	54
Z	1:220	0.259	0.008	0.002	0.238	0.004	0.002	0.213	0.002	0.002	0.023	0.002	0.008	0.224	0.002	0.002	0.016	54

Track NOTES:

- When wheels are used with deeper flanges - see **STANDARD S3.3**.
- The F limit applies only to the wing rail, and the C limit applies only to the guard rail. Both apply to the same rail only in special work such as a crossing.
- For a full discussion of minimum radius, minimum turnout and radius equivalents of degrees of curvature, etc., see **S-8** and **RP-11**.
- Guard and wing rails shall be flared to a minimum dimension across the flared flangeway end of 1.5 x Fmax. Flare angle shall not exceed 10 degrees, and the Flare must disappear before reaching the working area of its rail.
- These track dimensions are more restrictive with Gmax for guarded trackwork, for general track - see STANDARD S3.1.**
- Metric measurements are found on page 2.**
- Please see S4.2 and RP-25 Wheel Contour for the appropriate wheel profile.
- O-scale frog flangeway (F) is recommended with a target for code 145 wheels at 0.071".

NMRA STANDARDS (METRIC)
S-3.2 STANDARDS, TRACK, STANDARD SCALE



NMRA STANDARD	
Metric Standards	
Scale Track For Guarded Work	
February 20, 2010	S-3.2

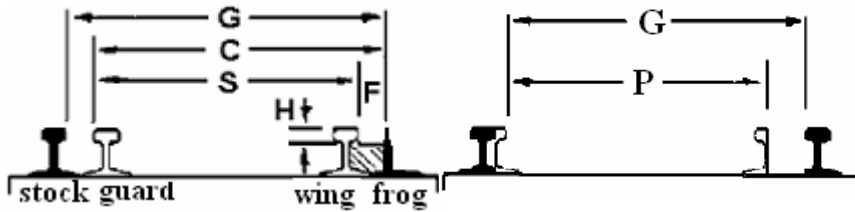
The Span, S, is derived by knowing $S = C - F$.
C is the primary controlling dimension.

Scale	Scale Ratio	Standard S3.2 Guarded using Target and Asymmetric <i>METRIC (mm)</i> Tolerance																
		G			C			S			F			P			H	Wheel
		Gage at Frog			Check Gage			Span			Flangeway			Points				
		Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	MIN	CODE
1"	1:12	120.70	1.52	0.05	116.48	0.28	0.10	110.90	0.10	0.05	5.54	0.05	1.65	115.85	0.10	0.10	3.56	1/2"
3/4"	1:16	88.95	0.97	0.05	85.17	0.36	0.10	80.57	0.10	0.05	4.55	0.05	1.17	84.46	0.10	0.10	2.39	13/32"
F	1:20.3	70.69	0.36	0.05	68.15	0.33	0.10	65.61	0.33	0.10	2.44	0.10	0.15	67.46	0.10	0.10	2.13	284
Fn3	1:20.3	45.00	0.25	0.15	42.00	0.25	0.10	39.37	0.13	0.38	2.92	0.05	0.58	41.35	0.10	0.10	1.68	250
LS	Varied	Large Scale Standards on Separate Page																
O	1:48	31.80	0.30	0.05	30.00	0.33	0.05	27.99	0.05	0.05	1.96	0.05	0.53	29.36	0.05	0.10	1.14	145
On3	1:48	19.10	0.30	0.05	17.96	0.25	0.05	16.61	0.05	0.05	1.30	0.05	0.46	17.40	0.05	0.10	0.66	116
On30	1:48	16.54	0.25	0.05	15.42	0.18	0.05	14.15	0.05	0.05	1.22	0.05	0.33	14.94	0.05	0.10	0.64	110
On2	1:48	12.75	0.23	0.05	11.61	0.18	0.05	10.34	0.05	0.05	1.22	0.05	0.30	11.13	0.05	0.10	0.64	110
S	1:64	22.48	0.25	0.05	21.36	0.18	0.05	20.09	0.05	0.05	1.22	0.05	0.33	20.88	0.05	0.10	0.64	110
Sn3	1:64	14.35	0.25	0.05	13.23	0.18	0.05	11.96	0.05	0.05	1.22	0.05	0.33	12.75	0.05	0.10	0.64	110
Sn2	1:64	10.54	0.20	0.05	9.63	0.10	0.05	8.61	0.05	0.05	0.97	0.05	0.20	9.22	0.05	0.10	0.58	88
OO	1:76.2	19.10	0.23	0.05	17.96	0.18	0.05	16.69	0.05	0.05	1.22	0.05	0.30	17.48	0.05	0.10	0.64	110
HO	1:87.1	16.54	0.25	0.05	15.42	0.18	0.05	14.15	0.05	0.05	1.22	0.05	0.33	14.94	0.05	0.10	0.64	110
HOn3	1:87.1	10.54	0.20	0.05	9.63	0.10	0.05	8.61	0.05	0.05	0.97	0.05	0.20	9.22	0.05	0.10	0.58	88
HOn2	1:87.1	7.06	0.18	0.05	6.30	0.10	0.05	5.46	0.05	0.05	0.79	0.05	0.18	5.94	0.05	0.05	0.51	72
TT	1:120	12.01	0.15	0.05	11.15	0.08	0.05	10.24	0.05	0.05	0.86	0.05	0.13	10.82	0.05	0.05	0.58	79
TTn42	1:120	9.02	0.10	0.05	8.26	0.03	0.05	7.49	0.03	0.05	0.71	0.05	0.03	7.98	0.05	0.05	0.51	72
TTn3	1:120	7.67	0.10	0.05	6.91	0.05	0.05	6.15	0.05	0.05	0.71	0.05	0.05	6.60	0.05	0.05	0.51	72
N	1:160	9.02	0.10	0.05	8.26	0.03	0.05	7.49	0.03	0.05	0.71	0.05	0.03	7.98	0.05	0.05	0.51	72
Nn3	1:160	6.55	0.08	0.05	5.89	0.08	0.05	5.26	0.05	0.05	0.58	0.05	0.05	5.56	0.05	0.05	0.41	54
Nn2	1:160	4.55	0.05	0.05	3.86	0.15	0.05	3.23	0.05	0.05	0.58	0.05	0.10	3.45	0.05	0.05	0.41	54
Z	1:220	6.58	0.20	0.05	6.05	0.10	0.05	5.41	0.05	0.05	0.58	0.05	0.20	5.69	0.05	0.05	0.41	54

Track NOTES:

1. When wheels are used with deeper flanges - see **STANDARD S3.3**.
2. The F limit applies only to the wing rail, and the C limit applies only to the guard rail. Both apply to the same rail only in special work such as a crossing.
3. For a full discussion of minimum radius, minimum turnout and radius equivalents of degrees of curvature, etc., see **S-8** and **RP-11**.
4. Guard and wing rails shall be flared to a minimum dimension across the flared flangeway end of 1.5 x Fmax. Flare angle shall not exceed 10 degrees, and the Flare must disappear before reaching the working area of its rail.
5. **These track dimensions are more restrictive with Gmax for guarded trackwork, for general track - see STANDARD S3.1.**
6. O-scale frog flangeway (F) is recommended with a target for code 145 wheels at 1,8mm.
7. **Imperial measurements are found on page 1.**

NMRA STANDARDS (IMPERIAL)
S-3.2 STANDARDS, TRACK, STANDARD SCALE



NMRA STANDARD	
Imperial and Metric Standards Large Scale Guarded Track	
February 20, 2010	S-3.2

The Span, S, is derived by knowing $S = C - F$.
C is the primary controlling dimension.

TRACK (S3.2 Large Scale Standard Scale):

Scale	Scale Ratio	Standard S3.2 Guarded using Target and Asymmetric Imperial (inch) Tolerance															
		G			C			S			F			P			H
		Gage at Frog			Check Gage			Span			Flangeway			Points			
		Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	
LS	Varied	1.772	0.010	0.006	1.652	0.010	0.004	1.550	0.005	0.015	0.115	0.002	0.023	1.629	0.003	0.005	0.118

Scale	Scale Ratio	Standard S3.2 Guarded using Target and Asymmetric <i>METRIC (mm)</i> Tolerance															
		G			C			S			F			P			H
		Gage at Frog			Check Gage			Span			Flangeway			Points			
		Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	Target	Plus	Minus	
LS	Varied	45.01	0.25	0.15	41.96	0.25	0.10	39.37	0.13	0.38	2.92	0.05	0.58	41.38	0.08	0.13	3.00

Track NOTES:

- 1) The term "LS" for "Large Scales" standards covers all common commercial scales running on LS 45mm gauge track (1:32, 1:29, 1:24, 1:22.5, and 1:20.3) without regard as to whether the trains are standard or narrow gauge.
- 2) Due to the inherent nature of large scale trains, the wheel and track standards for "Standard" (Sx.2) and "Deep Flange" (Sx.3) are identical except in terms of flange width and depth, thus the track H depth also is changed.
- 3) With regard to 1:20.3 (also designated "F" scale), trains built to that scale running on LS 45mm gauge track are also classified Fn3. Standards for Fn3 track and wheels are identical to those for LS, with exception given to more specific targets given for tread width and flange depth. Track standards for Fn3 are to be identical to those used for LS 45mm gauge.