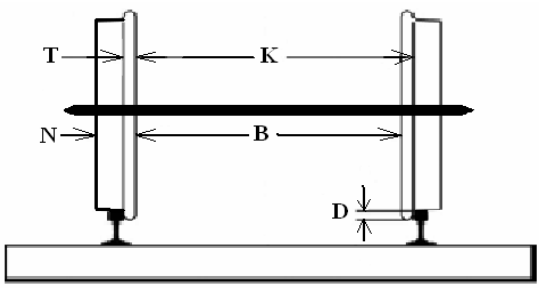
NMRA STANDARDS (IMPERIAL)
S-4.2 STANDARDS, WHEELS, STANDARD SCALE



NMRA STANDARD	
Imperial Standards Scale Wheels	
July 2009	**S-4.2**

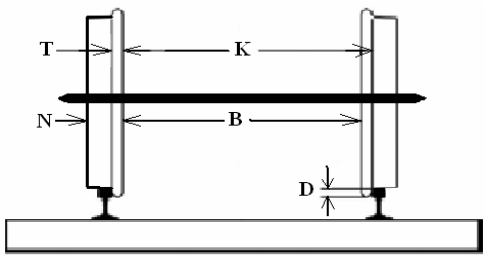
Back-to-Back, B, is derived by knowing B = K-T. K is the primary controlling dimension.

Scale	Scale Ratio	Standard S4.2 Wheels using Target and Asymmetric **Imperial (inch)** Tolerance									
		K			B			N	D	T	
		Target	Plus	Minus	Target	Plus	Minus	(Nom.)	Max	Nom	Tol
1"	1:12	4.579	0.002	0.016	4.454	0.002	0.016	0.505	0.156	0.125	+/- .002
3/4"	1:16	3.347	0.002	0.034	3.253	0.002	0.034	0.410	0.125	0.094	+/- .002
F	1:20.32	2.679	0.002	0.004	2.601	0.002	0.004	0.282	0.079	0.078	+/- .002
Fn3	1:20.32	1.658	0.002	0.013	1.580	0.002	0.013	0.256	0.079	0.078	+/- .002
LS	Varied	1.634	0.002	0.002	1.576	0.002	0.002	0.234	0.079	0.058	+/- .002
LSn3	Varied	1.056	0.002	0.008	1.008	0.002	0.008	0.175	0.047	0.048	+/- .002
O	1:48	1.177	0.002	0.006	1.138	0.002	0.006	0.145	0.036	0.039	+/- .002
On3	1:48	0.703	0.002	0.006	0.672	0.002	0.006	0.116	0.030	0.031	+/- .002
On30	1:48	0.603	0.002	0.007	0.573	0.002	0.007	0.110	0.028	0.030	+/- .002
On2	1:48	0.453	0.002	0.007	0.423	0.002	0.007	0.110	0.028	0.030	+/- .002
S	1:64	0.837	0.002	0.007	0.807	0.002	0.007	0.110	0.030	0.030	+/- .002
Sn3	1:64	0.517	0.002	0.007	0.487	0.002	0.007	0.110	0.030	0.030	+/- .002
Sn2	1:64	0.375	0.002	0.005	0.350	0.002	0.005	0.088	0.023	0.025	+/- .002
OO	1:76.2	0.703	0.002	0.007	0.673	0.002	0.007	0.110	0.028	0.030	+/- .002
HO	1:87.1	0.603	0.002	0.007	0.573	0.002	0.007	0.110	0.028	0.030	+/- .002
HOn3	1:87.1	0.375	0.002	0.005	0.350	0.002	0.005	0.088	0.023	0.025	+/- .002
HOn2	1:87.1	0.244	0.002	0.004	0.224	0.002	0.004	0.072	0.022	0.020	+/- .002
TT	1:120	0.435	0.002	0.008	0.415	0.002	0.008	0.079	0.026	0.020	+/- .002
TTn42	1:120	0.321	0.002	0.004	0.301	0.002	0.004	0.072	0.022	0.020	+/- .002
TTn3	1:120	0.268	0.002	0.004	0.248	0.002	0.004	0.072	0.022	0.020	+/- .002
N	1:160	0.321	0.002	0.004	0.301	0.002	0.004	0.072	0.022	0.020	+/- .002
Nn3	1:160	0.222	0.002	0.002	0.208	0.002	0.002	0.054	0.020	0.014	+/- .002
Nn2	1:160	0.145	0.002	0.002	0.131	0.002	0.002	0.054	0.020	0.014	+/- .002
Z	1:220	0.228	0.002	0.007	0.214	0.002	0.007	0.054	0.020	0.014	+/- .002

NOTES:

1. Fn3 was designed to work on LS (Large Scale) scale track so the same track and wheel geometry was used. This results in a minimum tire width that is much narrower than the prototype. Models designed to work in dual gauge track with F scale need to use the F scale tire width of .282" in order for the wheels to properly navigate the frogs in the turnouts.
2. Note: HO standard wheels will work on HO fine track (with adjusted K) but HO fine wheels are not standards on HO standard track.
3. See **RP-25** for recommended Wheel Contour. With Deeper Flanges - see **STANDARD S4.3**.
4. Wheels shall have a scale reduction in tread diameter from the prototype.
5. **Metric specifications are found on page 2.**
6. To avoid difficulty with long wheelbase locomotives in curves sharper than 20 degrees, and where guard rails are used on both sides as in special trackwork, the following are suggested: See **RP-8**
   - Allow lateral movement in driver axles of 1 percent of the rigid wheelbase length.
   - Remove flanges from center drivers.

NMRA STANDARDS (METRIC)
S-4.2 STANDARDS, WHEELS, STANDARD SCALE



NMRA STANDARD	
Metric Standards Scale Wheels	
July 2009	**S-4.2**

Back-to-Back, B, is derived by knowing B = K-T. K is the primary controlling dimension.

Scale	Scale Ratio	Standard S4.2 Wheels using Target and Asymmetric **Metric (mm)** Tolerance									
		K			B			N	D	T	
		Target	Plus	Minus	Target	Plus	Minus	(Nom.)	Max	Nom	Tol
1"	1:12	116.31	0.05	0.41	113.13	0.05	0.41	12.83	3.96	3.18	+/- 0.05
3/4"	1:16	85.01	0.05	0.86	82.63	0.05	0.86	10.41	3.18	2.39	+/- 0.05
F	1:20.32	68.05	0.05	0.10	66.07	0.05	0.10	7.16	2.01	1.98	+/- 0.05
Fn3	1:20.32	42.11	0.05	0.33	40.13	0.05	0.33	6.50	2.01	1.98	+/- 0.05
LS	Varied	41.50	0.05	0.05	40.03	0.05	0.05	5.94	2.01	1.47	+/- 0.05
LSn3	Varied	26.82	0.05	0.20	25.60	0.05	0.20	4.45	1.19	1.22	+/- 0.05
O	1:48	29.90	0.05	0.15	28.91	0.05	0.15	3.68	0.91	0.99	+/- 0.05
On3	1:48	17.86	0.05	0.15	17.07	0.05	0.15	2.95	0.76	0.79	+/- 0.05
On30	1:48	15.32	0.05	0.18	14.55	0.05	0.18	2.79	0.71	0.76	+/- 0.05
On2	1:48	11.51	0.05	0.18	10.74	0.05	0.18	2.79	0.71	0.76	+/- 0.05
S	1:64	21.26	0.05	0.18	20.50	0.05	0.18	2.79	0.76	0.76	+/- 0.05
Sn3	1:64	13.13	0.05	0.18	12.37	0.05	0.18	2.79	0.76	0.76	+/- 0.05
Sn2	1:64	9.53	0.05	0.13	8.89	0.05	0.13	2.24	0.58	0.64	+/- 0.05
OO	1:76.2	17.86	0.05	0.18	17.09	0.05	0.18	2.79	0.71	0.76	+/- 0.05
HO	1:87.1	15.32	0.05	0.18	14.55	0.05	0.18	2.79	0.71	0.76	+/- 0.05
HOn3	1:87.1	9.53	0.05	0.13	8.89	0.05	0.13	2.24	0.58	0.64	+/- 0.05
HOn2	1:87.1	6.20	0.05	0.10	5.69	0.05	0.10	1.83	0.56	0.51	+/- 0.05
TT	1:120	11.05	0.05	0.20	10.54	0.05	0.20	2.01	0.66	0.51	+/- 0.05
TTn42	1:120	8.15	0.05	0.10	7.65	0.05	0.10	1.83	0.56	0.51	+/- 0.05
TTn3	1:120	6.81	0.05	0.10	6.30	0.05	0.10	1.83	0.56	0.51	+/- 0.05
N	1:160	8.15	0.05	0.10	7.65	0.05	0.10	1.83	0.56	0.51	+/- 0.05
Nn3	1:160	5.64	0.05	0.05	5.28	0.05	0.05	1.37	0.51	0.36	+/- 0.05
Nn2	1:160	3.68	0.05	0.05	3.33	0.05	0.05	1.37	0.51	0.36	+/- 0.05
Z	1:220	5.79	0.05	0.18	5.44	0.05	0.18	1.37	0.51	0.36	+/- 0.05

NOTES:

1. Fn3 was designed to work on LS (Large Scale) scale track so the same track and wheel geometry was used. This results in a minimum tire width that is much narrower than the prototype. Models designed to work in dual gauge track with F scale need to use the F scale tire width of 7.16mm in order for the wheels to properly navigate the frogs in the turnouts.
2. Note: HO standard wheels will work on HO fine track (with adjusted K) but HO fine wheels are not standards on HO standard track.
3. See **RP-25** for recommended Wheel Contour. With Deeper Flanges - see **STANDARD S4.3**.
4. Wheels shall have a scale reduction in tread diameter from the prototype.
5. **Imperial specifications are found on page 1.**
6. To avoid difficulty with long wheelbase locomotives in curves sharper than 20 degrees, and where guard rails are used on both sides as in special trackwork, the following are suggested: See **RP-8**
   - Allow lateral movement in driver axles of 1 percent of the rigid wheelbase length.
   - Remove flanges from center drivers.