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## Steel Design Guide

# Industrial Buildings

## Roofs to Anchor Rods

**Second Edition**

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## 19. CRANE RUNWAY FABRICATION AND ERECTION TOLERANCES

Crane runway fabrication and erection tolerances should be addressed in the project specifications because standard tolerances used in steel frameworks for buildings are not tight enough for buildings with cranes. Also, some of the required tolerances are not addressed in standard specifications.

Tolerances for structural shapes and plates are given in the Standard Mill Practice section of the *Manual of Steel Construction* published by AISC. These tolerances cover the permissible variations in geometrical properties and are taken from ASTM Specifications, AISI Steel Product Manuals and Producer's Catalogs. In addition to these Standards, the following should be applied to crane runways.

- a. Sweep: not to exceed  $\frac{1}{4}$  in. in a 50-ft. beam length.
- b. Camber: not to vary from the camber given on the drawing by plus or minus  $\frac{1}{4}$  in. in a 50-ft. beam length.
- c. Squareness: within 18 in. of each girder end the flange shall be free of curvature and normal to the girder web.

Columns, base plates and foundations should adhere to the following tolerances.

- a. Column anchor bolts shall not deviate from their theoretical location by 0.4 times the difference between bolt diameter and hole diameter through which the bolt passes.
- b. Column base plates: Individual column base plates shall be within  $\pm \frac{1}{16}$  in. of theoretical elevation and be level within  $\pm 0.01$  in. across the plate length or width. Paired base plates serving as a base for double columns shall be at the same level and not vary in height from one to another by  $\frac{1}{16}$  in.

Crane runway girders and crane rails shall be fabricated and erected for the following tolerances.

- a. Crane rails shall be centered on the centerline of the runway girders. The maximum eccentricity of center of rail to centerline of girder shall be three-quarters of the girder web thickness.
- b. Crane rails and runway girders shall be installed to maintain the following tolerances.

- The horizontal distance between crane rails shall not exceed the theoretical dimension by  $\pm 1/4$  in. measured at 68 °F.
- The longitudinal horizontal misalignment from straight of rails shall not exceed  $\pm 1/4$  inch in 50 ft with a maximum of  $\pm 1/2$  in. total deviation in the length of the runway.
- The vertical longitudinal misalignment of crane rails from straight shall not exceed  $\pm 1/4$  in. in 50 ft measured at the column centerlines with a maximum of  $\pm 1/2$  in. total deviation in the length of the runway.

The foregoing tolerances are from the AISE *Technical Report No. 13*. The Table shown in Figure 19.1 is taken from MBMA's *Low Rise Building Systems Manual* and gives alternate tolerances.

Item		Tolerance	Maximum Rate of Change
Span	<p><math>L=L+A</math> (Max.)  <math>L=L-A</math> (Min.)  <math>L =</math> Theoretical Span</p>	$A = 3/8"$	$1/4" / 20'$
Straightness	<p><math>B</math>  <math>B</math>      Theoretical <math>\bar{C}</math></p>	$B = 3/8"$	$1/4" / 20'$
Elevation	<p>Top of beam for top running crane.      Bottom of beam for underhung crane.  <math>C</math>  <math>C</math>      Theoretical Height</p>	$C = 3/8"$	$1/4" / 20'$
Beam to Beam Top Running	<p><math>D</math>      Top Running</p>	$D = 3/8"$	$1/4" / 20'$
Beam to Beam Underhung	<p><math>E</math>      Underhung</p>	$E = 3/8"$	$1/4" / 20'$
Adjacent Beams	<p><math>F</math>  <math>F</math></p>	$F = 1/8"$	N/A

Fig. 19.1 Summary of Crane Runway Tolerances