

NARSTCO STEEL TIE AND TURNOUT SPECIFICATIONS

SECTION 1 – GENERAL

1.1 SUMMARY

- A. The contractor shall furnish and place NARSTCO steel ties and NARSTCO steel turnout sets at locations shown on the drawings.

1.2 REFERENCES

- A. Manual for Railway Engineering - American Railway Engineering and Maintenance-of-way Association (AREMA).
- B. NARSTCO Assembly Instructions for Steel Tie Track and Steel Tie Turnouts (Revised October 2016).

SECTION 2 - PRODUCT

2.1 STEEL TIES

- A. Steel Cross-ties and Steel Turnout Sets shall be NARSTCO manufactured products

NARSTCO	NARSTCO
300 Ward Road	1501 Edgefield Way
Midlothian, TX 76065	Cedar Hill, TX 75104
Phone: 972-775-5560	Phone: 972-775-5560

- B. Manufacturer must have a minimum 10 years of experience installed on North American railroads.
- C. Steel ties must have approval for use by at least three North American Class I railroads for 10 years.
- D. Steel ties shall be new domestic hot rolled ASTM A242/G101-01 High Strength Low-Alloy Weathering Steel with a minimum 345 MPa yield strength.
- E. Steel ties shall pass AREMA Manual Chapter 30 Section 2.7 Test 6: Wear/Abrasion. Test procedure number 3 shall be performed to a minimum of 3,000,000 cycles.
- F. Steel ties shall conform to the nominal outside dimensions shown in NARSTCO drawings.
- G. Section profile design shall match the following:
 - H12 – 12mm top plate thickness, Height 120mm, Width 300mm with a plastic section moduli
 $Z_{top} = 175 \cdot 10^3 \text{mm}^3$, $Z_{Bottom} = 88.4 \cdot 10^3 \text{mm}^3$
 - H10 - 10mm top plate thickness, Height 118mm, Width 300mm with a plastic section moduli
 $Z_{top} = 153 \cdot 10^3 \text{mm}^3$, $Z_{Bottom} = 79.7 \cdot 10^3 \text{mm}^3$
 - M10 - 10mm top plate thickness, Height 100mm, Width 260mm with a plastic section moduli
 $Z_{top} = 115.2 \cdot 10^3 \text{mm}^3$, $Z_{Bottom} = 51.8 \cdot 10^3 \text{mm}^3$
 - M8 - 8mm top plate thickness, Height 98mm, Width 260mm with a plastic section moduli
 $Z_{top} = 97.4 \cdot 10^3 \text{mm}^3$, $Z_{Bottom} = 45.7 \cdot 10^3 \text{mm}^3$
- H. Steel ties shall have inspection holes along with 36mm holes for the NARSTCO type hook-in shoulders suitable for rail section provided.
- I. Steel ties requiring spaded ends shall have a minimum 66 degree angle at the spade.
- J. Fasteners and Hook-In Shoulders (HIS) must be NARSTCO style, compatible with the NARSTCO steel tie system, and supplied by NARSTCO.
- K. Turnouts must have NARSTCO channel tie type headblock ties or approved NARSTCO alternative design.
- L. Turnouts shall have NARSTCO type steel markings on ties to identify tie number and distance from point of switch.

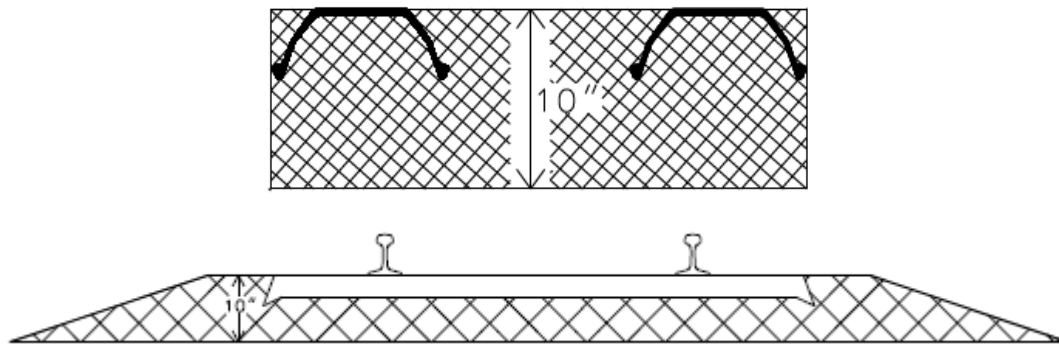
2.2 BALLAST

- A. The following ballast gradations, listed in Table 1-2-2 of the AREMA Manual ballast specifications, are recommended for Steel Ties:
 - Yard tracks and turnouts – AREMA Gradation No. 4A or 4
 - Main tracks and turnouts – AREMA Gradation No. 3 or 4A
- B. Whenever possible, the largest gradation AREMA spec ballast should be used.

SECTION 3 – INSTALLATION

3.1 PLACEMENT AND SURFACING

- A. Steel cross-ties shall be placed perpendicular to centerline of track spaced at the required distances specified in the NARSTCO Assembly Manual, Section 2.
- B. NARSTCO recommends a minimum of 10 inches of ballast to be placed under the tie as seen in the figures below. Note: Class 1 and other users may specify project specific minimum ballast sections.



- C. Steel turnout ties shall be placed based on the procedure specified in the NARSTCO Assembly Manual, Section 3, along with corresponding NARSTCO turnout drawing.
- D. Surfacing should be done as specified for steel ties in the NARSTCO Assembly Manual, Section 6
Note: A tamping machine equipped with traversing vibratory work heads and sixteen tamping tools must be used for surfacing Steel Tie track and turnouts. The depth of insertion of the tamping tools must be adjusted for surfacing of steel ties (as specified in the NARSTCO Assembly Manual, Sections 6.7 and 6.8). The tamping sequence, including center tamping of the ties, as specified in the NARSTCO Assembly Manual, Section 6.9, must be followed.

SECTION 4 – RECOMMENDATIONS

4.1 STEEL TIE APPLICATION GUIDELINES

Tie	MGTM	Speed MPH	Application
M8	<3MGTM Class 1	Freight 10mph Passenger 15	Light branch line, flat storage yard tracks, industrial yards and concrete encasement
M10	3 - 10 MGTM Class 2	Freight 25mph Passenger 30	Mainline, yard tracks, sidings, passing tracks, interspersed with wood ties, industrial tracks and concrete encasement
H10	10 - 25 MGTM Class 3	Freight 40mph Passenger 60mph	Mainline, yard leads, turnout tie sets, grade crossings and tunnels
H12	>25 MGTM Class 4 & 5	Freight 80mph Passenger 90mph	Mainline, tunnels, ballast deck bridges and premium turnouts

4.2 RECOMMENDED TIE SPACING & GAUGE ON CURVES

Degree of Curvature	Gauge	Tie Spacing
Tangent and curves under 4 degrees	4 feet 8-1/2 inches	24"
4 - 12 degree curves	4 feet 8-1/2 inches	22"
13 - 16 degree curves	4 feet 8-3/4 inches	20"
17 - 20 degree curves	4 feet 9 inches	20"
20 degree and over	4 feet 9-1/4 inches	20"