

Patented Track Rail 200 Series

Review all general instructions prior to starting installation. Note that there is no single, most appropriate method or procedure for all installations, and these instructions cannot cover all variables at each work site, the differences in equipment available for handling the rail, or the experience of the installation crew. See other installation instructions for switches, suspension, electrical conductor bar, or interlocks.

DANGER

Lifting Operations

Installation of products such as TC/American Crane's patented track rail requires performance of overhead lifting operations. Proper lifting procedures involve training, skills and experience beyond the scope of this document. Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following safety practices appropriate for the lifting operation being employed.

DANGER

Overhead Mechanical Assembly

Persons performing installation and assembly of overhead equipment must use caution while lifting, assembling and adjusting components. These operations are frequently conducted from manlifts or platforms that require specific knowledge, training and operation skills beyond the scope of this document.

Access to the floor below the work area must be restricted to reduce the potential of personnel injury due to falling objects.

Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following appropriate safety practices.

DANGER

Electrical Equipment Installation, Service and Maintenance

Persons performing installation, service or maintenance activities on, near, or with equipment that is electrically powered are exposed to electrical hazards that could result in serious injury or death if proper precautions are not followed. Before performing such work, disconnect the electrical power source for the system at the disconnect device and lock it out, following appropriate Lockout/Tagout (LOTO) procedures, to prevent electric power from being applied while work is being performed.

All persons must use safe work practices appropriate to the electrical system, and follow all workplace procedures and policies. This requires specific knowledge, equipment and training beyond the scope of this document. Workplace supervisors are responsible to assure that all persons under their supervision are properly trained, properly equipped, and are following appropriate safety practices.

Index

<u>Item</u>	<u>Page</u>
A. General Safety Alerts	1
B. Patented Track Rail – Model Numbers and Descriptions	3
C. General Installation Instructions	
D. Responsibilities	4
E. Overhead Rail Handling and Installation	4
F. Before Beginning Installation	4
G. General Runway and Monorail Installation Practices	5
H. Rail Suspension Systems	6
I. Installing 200 Series Rail in a Crane or Monorail System	7
J. Initial Start-Up	8
K. Maintenance of Rail Systems	8
L. 200 Series Rail Wear and Replacement Criteria.....	9
M. Terminology Notes	9
N. 200 Series Rail	
O. 2R3-5T Rail and Girder Rail.....	10
P. 200 Series Rail Specifications	11
Q. Paint.....	11
R. Lap Joint Splices	12
S. Splice Bolts and Nuts	13
T. Alignment Lugs.....	13
U. Hangers	
V. 2R3-5T Rail	
W. 2H-407, 2H-407C	14
X. 2H-470	14
Y. Hanger Locations	14
Z. Girder Rail	14
AA. 2R3-5T and Girder Rail End Preparation Combinations	15,16
BB. Rail Options	
CC. End Stops.....	17
DD. Top Flange Holes.....	17
EE. Rail Notch or Step Cut	17
FF. Rail Web Holes	17
GG. Conductor Bar	18
HH. Spur Support Brackets.....	18
II. Curves.....	18
JJ. Rail Manufacturing Standards	18
KK. Runway and Monorail Alignment Tolerances.....	19
LL. Inspection Schedule	20

Patented Track Rail

TC/American Crane offers several models and sizes of our rail. Selection of the appropriate model depends upon the layout of the crane or monorail, the load to be carried, distance between support centers, deflection criteria, and other factors. See the Rail Section of the TC/American Crane Systems Catalog for information about the rail, and the Engineering Section for methods and procedures to select the appropriate rail.

Rail Model Numbers:

(general information for all current rail)

- The first number(s) of the Model Number identifies the tee section used on this rail series:
 - 2 = 200 Series Rail
 - 3 = 325 Series Rail
 - 4 = 400 Series Rail
 - 45 = 450 Series Rail
- The second character(s):
 - R = Rail (200 Series, 2R3-5T; 400 Series and 450 Series)
 - GR = Girder Rail (200 Series)
 - RL = 325 "L" Series Rail
 - RH = 325 "H" Series Rail
- The next intermediate numbers identify rail by its nominal overall depth, i.e.:
 - 3 = 3" (200 Series, 23R3-5T)
 - 8 = 8" rail
 - 14 = 14" rail
 - 22 = 22" rail
 - Etc.
- The last number (after the "-") is the nominal weight of the rail per foot:
 - 5 = 5 pounds per foot
 - 18 = 18 pounds per foot
 - 26 = 26 pounds per foot
 - 41 = 41 pounds per foot
 - 74 = 74 pounds per foot
 - 129 = 129 pounds per foot
 - Etc.
- A last character (not always present) has the following meaning:
 - T = Tee Section only (200 Series, 2R3-5T)
 - F = 200 Series Rail or Girder Rail Filler

NOTE: See the appropriate section(s) of these instructions for assembly, installation and maintenance details specific to your Rail model.

NOTE: For a specific parts breakdown of the Rail provided with an order, see the drawings provided with that shipment and the Rail Section of TC/American Crane Systems Catalog.

General Installation Instructions

Reference ANSI MH27.1, Specifications for Patented Track Underhung Cranes and Monorail Systems, and additional referenced Specifications and Standards.

Responsibilities:

- TC/American Crane, in association with our dealers, will design, manufacture and sell the highest quality equipment possible to meet the product handling needs of the customer. However, TC/A has no direct control over transportation, receipt, handling, installation and operation of our crane and monorail products.
- The selling dealer and the installation crew must properly receive, handle, install and test the equipment before turning it over to the owner, user and operating personnel.
- The selling dealer must train the owner, user and operating personnel in operation, conformance to safe operating practices, inspections and maintenance.
- The owner, user and operating personnel must perform, or cause to be performed, required training, proper operation, inspections, maintenance and repairs. Records of actions are to be maintained.

Overhead Rail Handling and Installation

- Runways, monorails and all associated components must be erected in a manner that assures the safety of all personnel involved.
- Runways, monorails and all associated components must be erected in a manner that maintains the condition of the equipment as it was manufactured and delivered to the site.
- Runways, monorails and all associated components must be erected by an experienced and qualified installer, with proper equipment for lifting and rigging as appropriate for the application.
- Practices and recommendations contained within these instructions are minimums and are not intended to exclude other considerations. Not all items are applicable to all installations.

Before beginning the installation:

- When shipment is received, remove all shipping materials and visually inspect all parts for damage. Repair and/or replace if necessary.
- Check packing lists against materials received and identify all parts.
- Gather all TC/American Crane drawings, plus any vendor equipment drawings, and keep in a secure location for reference during installation and start-up, and to give to end user for future reference.
- Store all equipment in a clean, secure area prior to final assembly and installation.

General Runway and Monorail Installation Practices:

- No holes shall be made in the building structure without permission from the owner.
- All supporting structures to which the track is suspended shall be installed in accordance with the specifications of the American Institute of Steel Construction, current edition.
- Where supporting steel or equipment is erected by welding operations, such work shall be installed in accordance with the standards of the American Welding Society, or equivalent technical publication.
- It is the responsibility of the installer and customer to verify that the building structure is capable of supporting the loads imposed by a crane or monorail system, and to modify the structure as required if necessary. Consider the building structure deflection caused by the calculated maximum hanger loads and verify that total deflection (building plus monorail, runway and crane) is within acceptable limits. For buildings with limited structural capacity, it may be necessary to supply a “self-supported” system (support structure independent of the building).
- To avoid creating stress points for possible failure, hanger rods should never be welded or have welding connections applied to them.
- If field threading of hanger rods is necessary, take care to prevent undercutting or sharp roots of threads.
- Check all hanger fittings provided and compare to hanger locations and elevations shown on print (see Crane and Suspension drawings). Be sure these fittings will give the dimensions required for the proper elevation before track is hung.
- Bracing of rail systems, if required, is the responsibility of the installer and is determined largely by field conditions to accomplish the following:
 - ✓ Monorail tracks must be side braced to prevent swinging, if rod suspended. Normally, this is done at each splice joint.
 - ✓ Monorail tracks with motor driven carriers must also be end braced to prevent racking caused by stopping and starting of carriers.
 - ✓ Switches should be rigidly connected directly to superstructure.
 - ✓ If switches are supported by hanger rods, the switches must be rigidly braced.
 - ✓ Curves must be rigidly braced.
 - ✓ Crane runway systems normally require one runway to be side braced when runways are hung from rods. Both runways must be end braced.
 - ✓ It is best to brace system after leveling and installing conductor bars. If bracing is done before conductor bar is installed, be sure 1" clearance is maintained from any portion of conductor path.
- 200 Series rails use a unique overlapping, bolted splice joint for both the 2R3-5T rail and the girder rail. On girder rail, the top flange angles are cut 1/8" short of the end of the 2R3-5T rail tee section, to assure that the tee section can be butted tightly together. For adjustments, the 2R3-5T tee section is provided with slots for the splice bolts, and the angles of girder rail have oversized holes. After rails are installed, leveled, aligned and all splice hardware tightened, check the tread-to-tread alignment at splices. Minor treadline misalignments are to be ground flush and level to allow smooth trolley travel. The maximum gap between adjacent rail ends should not exceed 1/16", except at switches or other free ends when 3/16" is permitted (1/8" preferred).
- Setting the final proper elevation of all tracks is the responsibility of the installer. Elevation of rail treadline throughout any system is to be held $\pm 1/8"$, with elevation readings taken at each track hanger, switch, etc. See *Runway and Monorail Alignment Tolerances* section in this document.

Rail Suspension Systems:

- Be familiar with all hanger types used for suspension for the crane or monorail system – see the TC/American Crane Systems Catalog, drawings provided with the order, or the Operation and Maintenance Manual provided with the job.
- Each hanger is designed to handle the listed maximum capacity and is utilized in the system to the designated maximum hanger load.
- Be certain that each hanger is used at its designated point. Some systems use more than one type of hanger.
- There are two types of suspension methods: rigid and flexible. Most 200 Series systems will be rigidly suspended.
 - Rigid suspension systems include direct bolt, direct bolt to brackets, direct bolt to stools, beam flange clamps, rigid rods with a combination of hangers and clamps, or a combination of all of the above.
 - Flexible suspension systems are a hanger rod system using rods, clamps and hangers with special spherical washer and seat fittings that allow the installer some latitude in locating hangers and clamps relative to the runway rail and the support steel. As compared to “rigid suspension” components, these flexible suspension components may be directly bolted or clamped to overhead support steel or the runway top flange without shimming for “out-of-level” conditions, within some limitations. Flexible Suspension components are not intended to provide a “free-swinging” system.
 - See the TC/American Crane Systems Catalog, Engineering Section, for more a more complete definition and description of suspension systems.
- High-strength rods are used on all rigid and flexible hanger rod suspension systems. Do not, under any circumstances, weld or apply heat to any load carrying rod.
- All load carrying fasteners are minimum Grade 5 or A325. Any fasteners of a lesser grade will change the hanger or clamp capacity.
- Use a flat washer on hardware if the diameter of the hole is greater than 1/16" above the fastener diameter, or has a slotted hole.

Note: the hardware to fasten 2R3-5T tee sections together is exception to the “slotted hole” requirement. This hardware uses “heavy” head bolts and nuts. No washer is required in this application.
- Each fastener must have a lock washer under its nut, except where a lock washer is not provided and a torque value is stated.
- Shimming at hanger points may be necessary to assure the rail is installed level. Unless ordered from TC/American Crane, shims are the responsibility of the installer.
- After final leveling, check any flexible hanger rod suspension points to assure spherical washers are seated properly. Tighten the set screw on each lock nut, then insert the spring pins.
 - Be certain that all hanger rods are plumb.
 - Recheck fasteners to be certain all are secured, and washers are properly placed.

Installing 200 Series Rail in a Crane or Monorail System:

- Check mark numbers on each track length, if applicable (see system layout drawings), identify with location on print.
- Check all suspension fittings provided and compare to hanger locations and elevations shown on layout drawings. Before the track is hung, verify these fittings will provide the dimensions required for the proper elevation.
- Lay out system location from print, establishing each hanger location on supporting steel. This can be done by a chalk layout on floor and plumbing up; a line stretched under steel above; or using a transit marking each location. Be sure layout measurements are from proper building reference.
- When installing a monorail system with a switch or curves, start installation at a switch and curve located in the system and install rails sequentially from the switch or curves to the ends of the monorail. For a single run of rail without switches or curves, start at one end and work sequentially toward the other end.
- Refer to *Runway and Monorail Alignment Tolerances* in these instructions for tolerances for monorail straightness and elevation.
- When installing crane systems, start the rail installation with the line of runway that has the electrification. If a spur track or crossover is part of the system, start at that point. Then level, align and brace this rail. Align the rail both parallel and perpendicular to the web. Always level the rail from the riding tread, never from the top flange. The riding tread elevation should be held within $\pm 1/8"$. Refer to *Runway and Monorail Alignment Tolerances* in these instructions. This rail becomes the benchmark and reference point to install the balance of the crane runway system.
- For multiple crane runways, the procedure is the same except that all crane runway spans are measured to the first crane runway installed as a benchmark. Span tolerances should not exceed $\pm 1/8"$. Refer to *Crane Runway Alignment Tolerances*.
- Before rail sections are raised into position, electrification, track hangers, etc. should be assembled onto track. Bolts should be snug, capable of slight movement for final adjustment.
- Make splices between rail sections as each track is hung. Splice bolts can be started but left loose. A hanger must be centered over each rail splice. If top of adjoining rails are not flush at splices when treads are aligned, shims must be used under the low side of lower hanger fittings to bring it up to level.
- Final adjustments of entire track system:
 - ✓ Start at most advantageous location and adjust one section to elevation and alignment. Proceed from this section to bring each connecting rail into corresponding line and elevation.
 - ✓ Monorail tread alignment at splice points is most important, both horizontally and vertically. Splices will hold this alignment if properly installed. Where track hangers span the track joint at top flange, it is the responsibility of the installers to place shims under one side of hanger if there is a difference in track girder depths. Shims provided by installer.
 - ✓ After entire system has been leveled, tighten all connection bolts. Make sure each is secured with lock washer.
 - ✓ When all hangers are properly installed, the track splices can be tightened for final tread alignment. Tighten splice bolts securely (flatten the lock washers). Center punch around threads to prevent loosening.
 - ✓ The monorail treadline may require a minimum amount of grinding (feathering) at the splice points, to provide a smooth transition from one piece to another.

Initial Start-Up:

- After installation of the crane or monorail system is completed, operate the crane or hoist throughout the full extent of the runway or monorail.
- Observe how the hoist trolley tracks the monorail. Trolley must remain centered on the riding tread and not scrub hard against the tee section edge during transition through a curve or switch.
- Observe how the crane trolleys track the runway. The runway gauge must match the crane span at all hanger points, and the trolleys must remain centered on the riding tread. Trolleys with flanged wheels may “float” slightly from side to side, but must not scrub hard against the tee section edge as the crane travels the length of the runway. Trolleys with side rollers should follow the runway tee section without excessive pressure against the side rollers at any point. Runway rails manufactured and installed to tolerances will maintain proper gauge between hanger points within the designed operation of the crane.
- Verify that trolley wheels transition tee splice joints smoothly. See rail splice assembly note about grinding tread.
- Verify that crane or hoist trolleys will pass by all rail splices without catching.
- Verify that trolleys do not catch on interlock components.
- Verify that suspension hardware or components do not interfere with crane and hoist components.
- Verify that electrical conductor bars are properly installed, that electrical collectors properly track their respective conductors, and that collectors travel smoothly throughout the entire run.
- Verify that trolleys, loadbars or bumpers properly engage to end stops.
- Make any corrections necessary before continued operation.
- Refer to job specific Operation Manual for any additional start-up requirements.
- Conduct load test as required.
- Turn over system to owner or user. Conduct operator training as required.

Maintenance of Rail Systems:

- Every rail system must be checked periodically to assure that all installation tolerances are maintained as described in the preceding items. Adjust as required.
- Each system should be carefully inspected about 30 days after original installation. Vibration may loosen components that could not be secured because of paint, burrs, high spots, etc. All systems should be checked a minimum of once per year for loosening or wear. Tighten, adjust or repair as required.
- New buildings or new construction may settle or shift and cause monorail or crane runway systems to become out of tolerance. Adjust back to within tolerances as required.
- TC/American equipment is designed to give maximum service. However, like any other piece of machinery, it must be given regular and careful inspection and maintenance.
- The suspension fittings and component parts have been designed to withstand the stress of normal operations. No equipment will last forever. Make certain all nuts are kept tight and that hangers are periodically inspected. In the event any of these show wear, nicks or distortion, determine the cause of the wear, correct the cause and replace the worn components immediately.
- This system has been designed for certain load limits. Operating personnel should be advised that these load limits are not to be exceeded. In the event that any unusual shock is introduced into the system, investigate to determine if any damage has been done. Repair as required.
- A system that has excessive rail movement may be introducing stresses which have not been anticipated, thus creating a potentially dangerous situation. The system should be examined and care should be taken to see that this situation is immediately corrected.

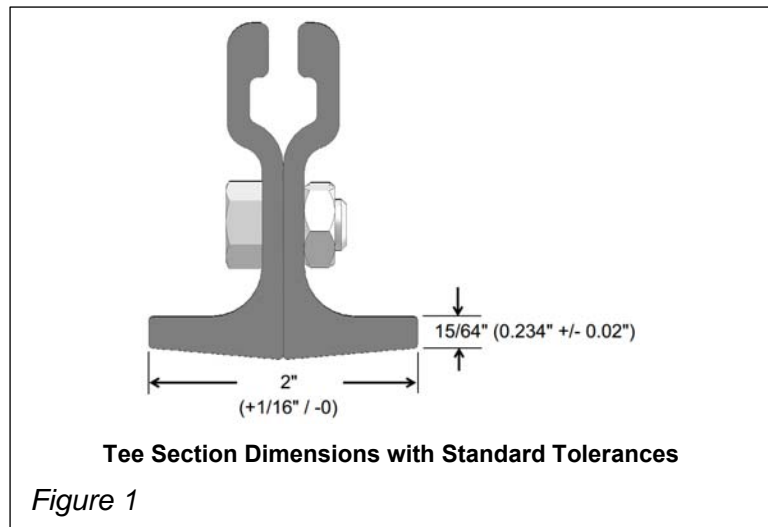
200 Series Rail Wear and Replacement Criteria

TC/American Crane patented track rail will provide many, many years of service before replacement must be considered. Use the following information to determine when replacement is eventually recommended:

- For 200 Series rail, the rail will have full rated capacity until 1/32" of the riding tread is worn down.
- Flange width must be maintained to assure proper wheel width contact. Recommended maximum rail width wear is 1/8" for 200 Series rail.
- Wheel loads approaching the maximum allowable for the rail section (1000 pounds per wheel for 200 Series rail) justify replacement of worn track at the above noted allowances.

Figure 1: tee section profile with standard dimensions and tolerances.

Note: Because the tee section halves are mill rolled shapes, they are subject to manufacturing tolerances. To accurately monitor rail wear, sample measurements must be taken at installation and again at periods of time during the life of the system to record actual wear. Measure and record the values at several representative locations throughout the system, taking all subsequent measurements at the same locations. All measurements must be taken by similar measuring devices and in a consistent manner. Also, make note of any changes to loads.



Note: If the tee section surfaces are worn flat and parallel, the trolley wheels are likely to be in good condition. However, if the tread surfaces are worn to a tapered condition, then the wheels are also likely worn tapered. Such wheels would very quickly ruin new replacement track. Under this condition, trolley wheels should also be replaced. If the tapered wear extends below any portion of the raised portion of the riding tread, the rail should be considered for replacement.

Terminology Notes

The following instructions use these unique terms:

- “Treadline” – the flat riding surface of the rail tee section on which the trolley wheels roll. All elevation measurements for patented track systems are made to the treadline.
- “Span” – when used to define a crane, refers to the horizontal distance from one runway rail to another, or also to the distance between end trucks on a crane. May also refer to the distance from one support on a piece of rail to a support at the other end of that rail.
- “Gauge” – the center-to-center distance between the two crane girders of a double girder crane. May also be used to refer to the center-to-center distance between the two rows of rail of a runway system.
- “Support Centers” – the distance from one support on a piece of rail to a support at intermediate points or a support at the far end of that rail.

200 Series Rail

TC/American Crane 200 Series Patented Track Girder Rails are composite beams with an ASTM A36 top flange angles and web, and a load carrying twin-section tee rolled from high carbon-manganese alloy steel.

200 Series tee sections are 2" wide with a flat riding tread.

Figure 1: (Page 9) tee section dimensions and tolerances.

Figure 2: typical general configuration of TC/American Crane 200 Series Patented Track Girder Rail. Girder rail is manufactured in lengths as required for each order. Note the composite beam construction.

Rail may be ordered with "square" ends as shown in Figure 2, with overlapping splice ends, or various other preparations for interlocks, switches, etc. (see Page 15 and Figures 13 through 17 on Page 16).

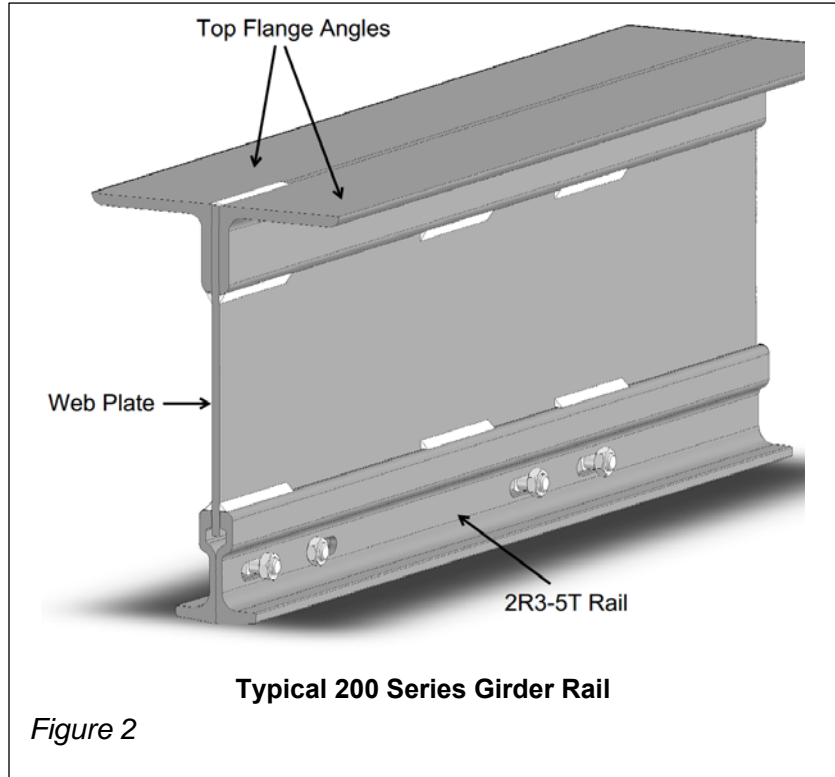
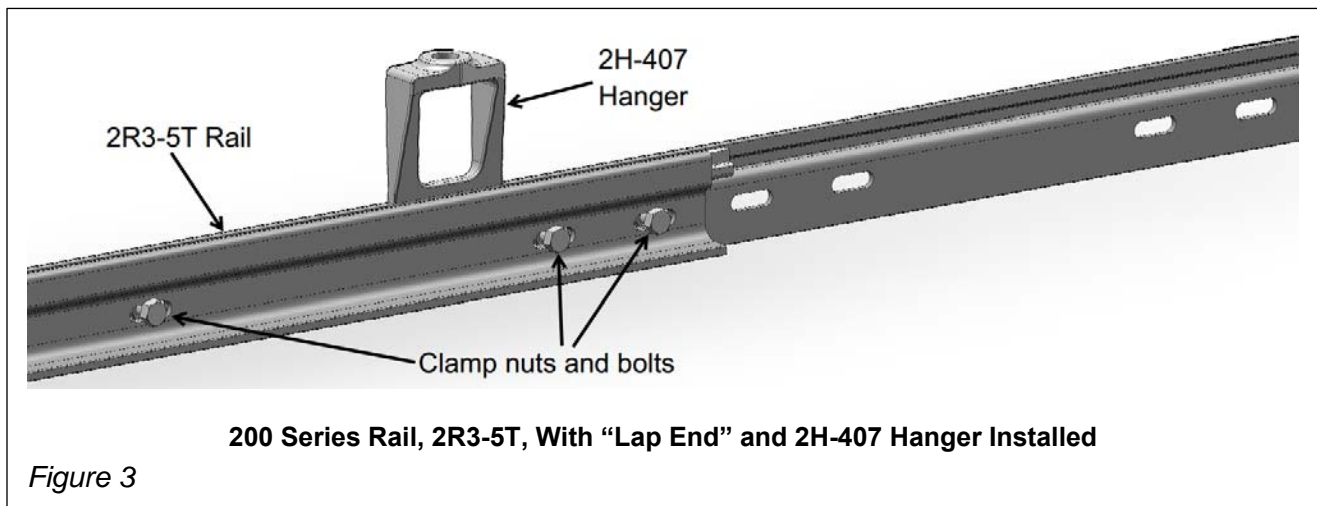


Figure 3: 2R3-5T rail, for light duty monorails. Shown is a piece of rail assembled with a 2H-407 hanger. Hangers can be easily repositioned to align with support points. See Page 15 for end preparation combinations.

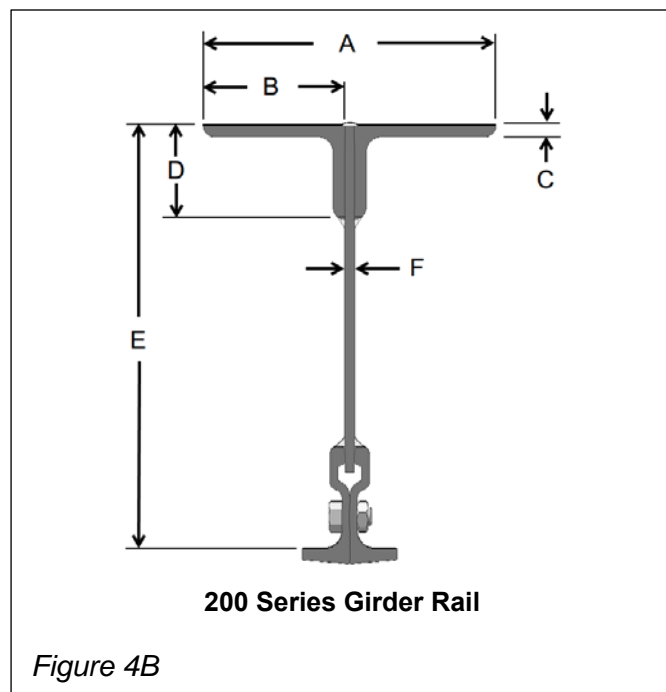
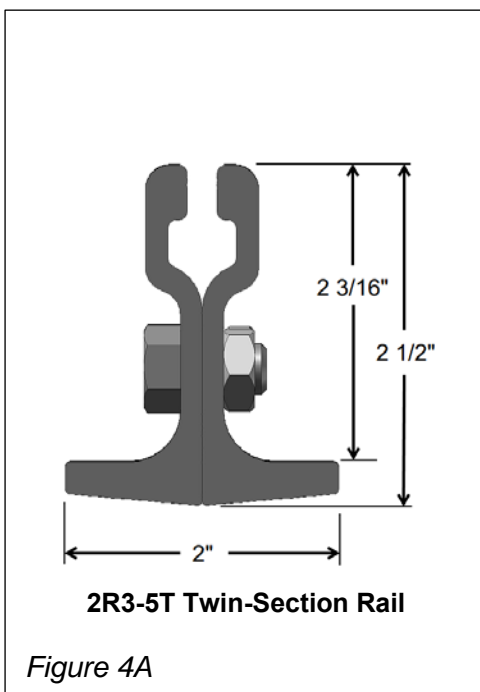
Figures 4, 4A and 4B: (Page 11) standard rail dimensions and weights. See the TC/American Crane Systems Catalog for additional specifications and load carrying capabilities.



200 Series Rail Specifications

Model	Weight (#/ft)	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F
2R3-5T	4.9	--	--	--	--	--	--
2GR7-15	15.7	5 3/16"	2 1/2"	1/4"	2"	7"	3/16"
2GR7-17	16.6	6 3/16"	3"	1/4"	2"	7"	3/16"
2GR9-18	17.9	6 3/16"	3"	1/4"	2"	9"	3/16"
2GR9-22	21.9	7 3/16"	3 1/2"	5/16"	2 1/2"	9"	3/16"
2GR11-16	17.4	4 3/16"	2"	1/4"	2"	11"	3/16"
2GR11-23	23.2	7 3/16"	3 1/2"	5/16"	2 1/2"	11"	3/16"
2GR11-26	25.4	8 3/16"	4"	5/16"	3"	11"	3/16"
2GR13-27	27.0	8 3/16"	4"	5/16"	3"	13 1/2"	3/16"
2GR13-29	29.0	10 3/16"	5"	5/16"	3"	13 1/2"	3/16"

Figure 4



Paint

200 Series rail is painted with standard TC/American Crane gray-green enamel for monorail. Other types of paint, colors and surface preparations are optional.

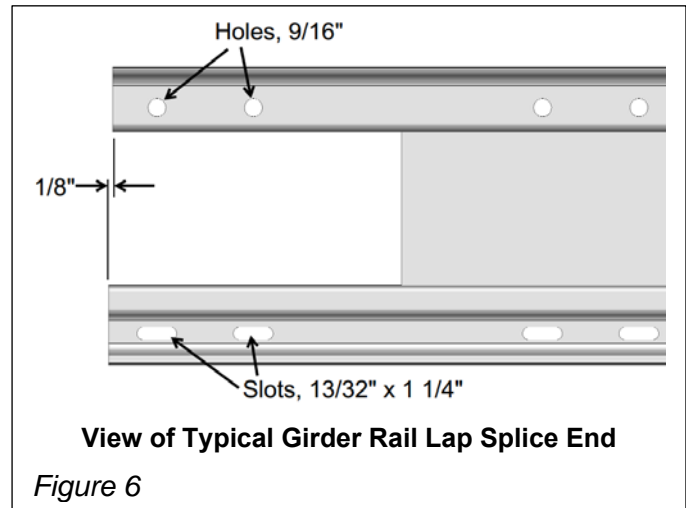
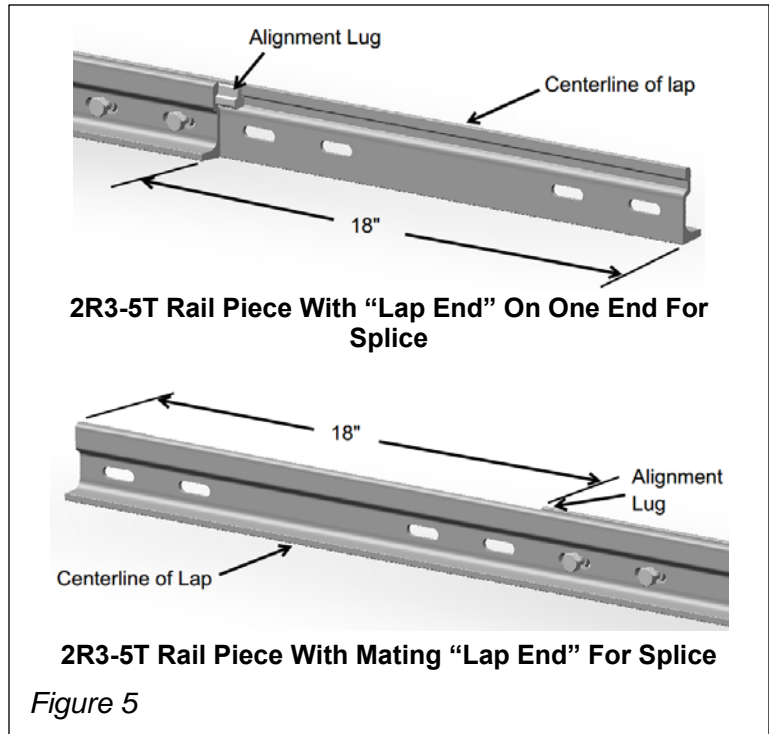
Lap Joint Rail Splices

Figure 5: typical 200 Series 2R3-5T rail pieces with “lap ends.” Lap sections of adjoining rails are bolted together at installation. Alignment lugs assure alignment of rail halves at joint.

Note: splice bolts are the same as the “clamp bolts” that hold the twin-section halves together.

Figure 6: Lap end preparation on typical Girder Rail. Note hole and slot sizes. Also see Figure 13 for another view of the lap end.

Note: after rail is aligned and leveled, and all hardware is tight, check tread-to-tread alignment at splices. Grind (“feather”) any minor treadline misalignment or irregularities until flush and level to allow smooth trolley travel.



Splice Bolts and Nuts

Hardware for bolted lap splices is shipped loose with each order. Quantity depends upon number of rail pieces and the end preparations (lap, square, etc.), plus some extras in case some are lost, dropped or missing.

Note: splice bolts are same as the “clamp bolts” that hold the twin-section halves together.

Rail Model	Nut and Bolt Ass’y Part #	Description
• 2R3-5T Rail Tee Splice, and Girder Rail Tee Splice	10-1996-00	3/8”-16 x 5/8” Bolt, Grd. 5, Heavy Hex Head 3/8”-16 Nut, Heavy Hex Jam
Note: the 2R3-5T splice bolt is special and not available from other sources.		
• Girder Rail, Top Flange Splice Angles	10-1997-00	3/8”-16 x 1 1/4” Bolt, Grd. 8 3/8”-16 Nut, Heavy Hex

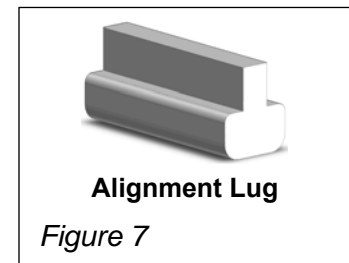
Splice Bolt Hardware Quantity Provided, for 2R3-5T Rail and Girder Rail:

For all rail pieces Type 1, 4, 6 and 8, including rail fillers and curves (see Page 15 for rail type numbers).

<u>Rail piece quantity:</u>	<u>Multiply by:</u>	<u>Plus extra:</u>
1 thru 10	4	4
12 thru 20	4	8
21 and up	4	12

Alignment Lug

Figure 7: Alignment lugs are used with 2R3-5T rails with lap joints, for alignment of the twin-section tee assembly at the splice. Alignment lugs are factory installed as shown in Figure 7, but extras are also shipped loose in case some are lost, dropped or missing.



Alignment Lug Quantity Provided, for 2R3-5T Rail (not required for Girder Rail):

Factory installed at each lap end of 2R3-5T rail pieces Type 1, 4, 6 and 8, including rail fillers and curves (see Page 14 for rail type numbers).

<u>Rail piece quantity:</u>	<u>Plus extra:</u>
1 thru 5	2
6 thru 10	3
11 thru 20	5
21 thru 30	7
31 and up	8

Note: 2R3-5T rail is hung by 2H-407, 2H-407C or 2H-470 hangers. The base of each of these hangers has a shoulder which is clamped into the head of 2R3-5T rail as shown in Figures 15 and 16. The hanger base has the same profile as an alignment lug and serves the same purpose as an alignment lug to keep intermediate portions of 2R3-5T rail lengths aligned. Hangers located at the tee section joint of a lap splice replace the alignment lug at that location.

Hangers

2R3-5T Rail

Figure 7 and 8: 2R3-5T rail uses 2H-407 hangers and 5/8" hanger rods for support. Hangers are ductile steel castings. Curves use 2H-407C hangers which have the base formed to a 3 foot radius. Rods and clamps or other attachment to overhead steel are ordered separately.

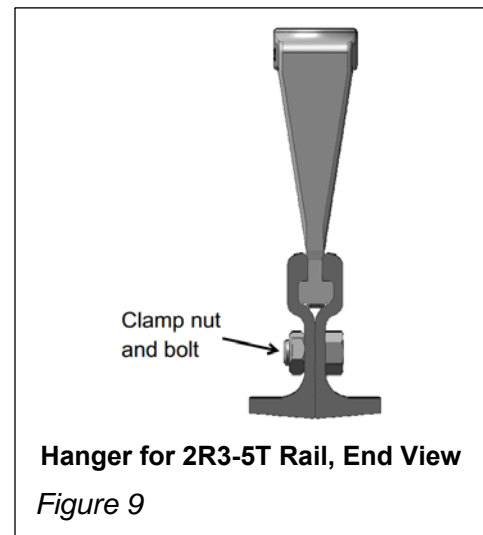
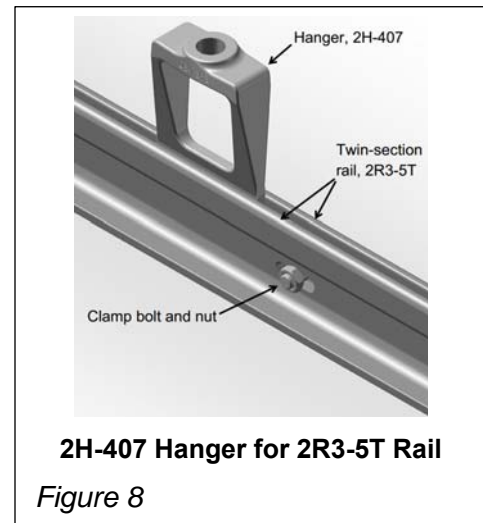
Figure 9: 2H-470 Rigid Hanger. Ductile steel casting clamps into 2R3-5T rail sections, same as 2H-407 hanger, but has a top flange with two 9/16" holes, countersunk for 1/2" bolts with 80° head angle. Bolts to overhead support are by others, with length as required.



Hanger Locations: see TC/American Crane catalog, Rail Section, for hanger spacing; depends upon load and trolley wheelbase. To install or reposition hangers, loosen bolts that clamp 2R3-5T rail together, install or slide hangers as required, then retighten to 20 ft-lbs.

2R3-5T rail is best supported at the centerline of lap joints, plus intermediate locations as required.

However, due to the overlapping splice design, hangers may be placed up to 12" off-center of the lap joint centerline.



Girder Rail

Girder Rail may be direct bolted to support steel through the top flange angles, or rod supported with a combination of hangers, rods and clamps.

Girder Rail is best supported at the centerline of lap joints, plus intermediate locations as required. However, due to the overlapping splice design, hangers may be placed up to 12" off-center of the lap joint centerline.

See the TC/American Crane catalog, Suspension Section, for details of components. Also see the separate document, *Suspension Installation Instructions*.

2R3-5T and Girder Rail End Preparation Combinations

The figures below show the various combinations of rail end preps on a piece of rail, and how the length of a piece of rail is measured. See additional information on Page 15.

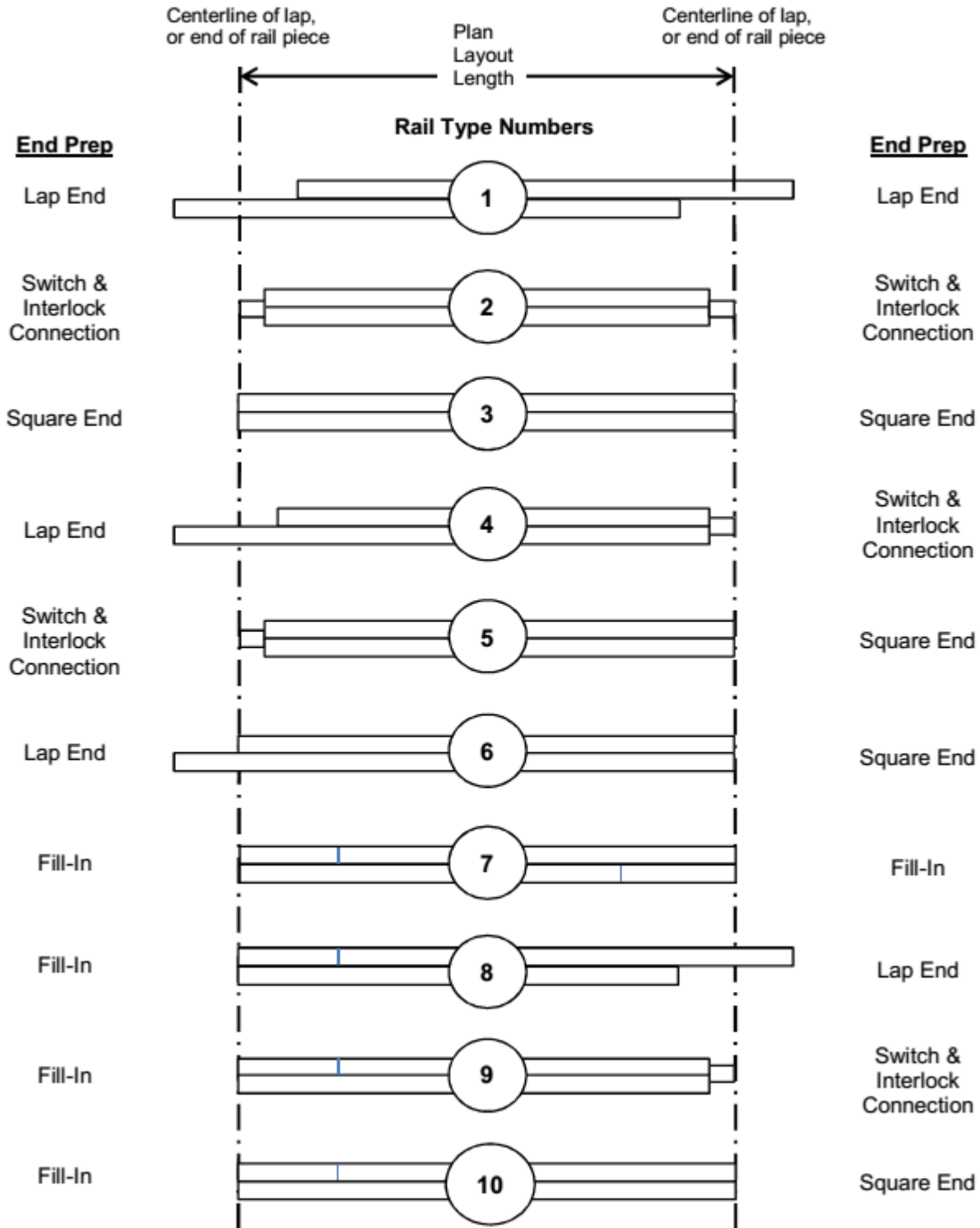
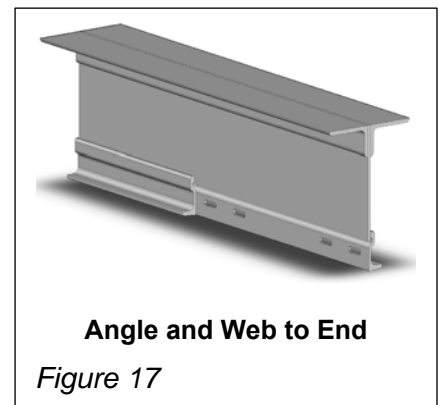
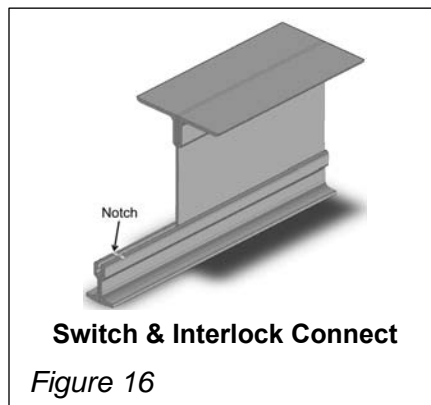
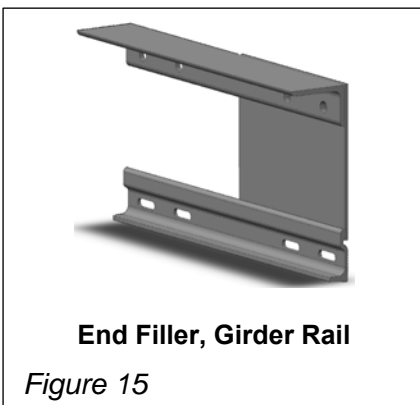
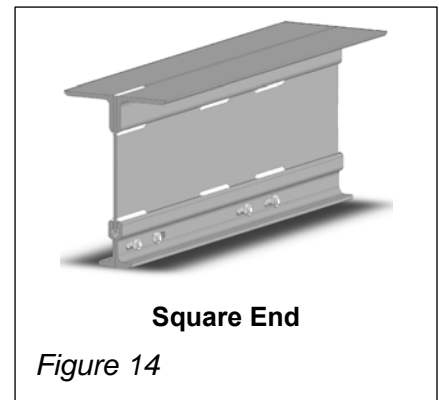
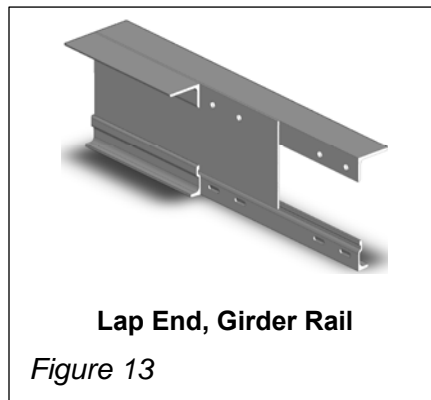


Figure 11

- Figures 12 and 13:** Lap Ends Used to join two lengths of 2R3-5T rail or Girder Rail together; Bolted connections. Ends of twin rail section (and the top flange angles of girder rail) are offset (staggered) for a high strength splice joint. Splice plate assemblies are not required. The alternating splice joint lines on the tee section provide a smoother treadline for the trolleys than a common butt joint.
- Figure 14:** Square Ends Used at ends of crane runways or monorails, where no future extension of the rail is expected.
- Figure 15:** End Filler End filler for Girder Rail shown. Used to convert a Lap End to a Square End. Provides for easy future extension of rail system (remove the end filler and replace with rails with a lap end). End filler for 2R3-5T rail not shown, consists only of an 18" length of a 2R3-5T section half.
- Figure 16:** Switch & Interlock Connection Used to connect 2R3-5T or Girder Rail to a switch. See *Installation Instructions 200 Series for Tongue Switches* and for *Glide Switches* for detail on this connection. Also to mounting 200 Series interlocks to either 2R3-5T or Girder Rail. Preparation for Girder Rail shown.
- Figure 17:** Angle and Web to End Similar to a Lap End, but with the top flange angle and web plate extended to the full end of the rail. Extends the fabricated length of a piece of Girder Rail as required to meet a hanger point and still also provide a Lap End for splicing to a piece 2R3-5T rail (either curve or straight rail section) with a Lap End.

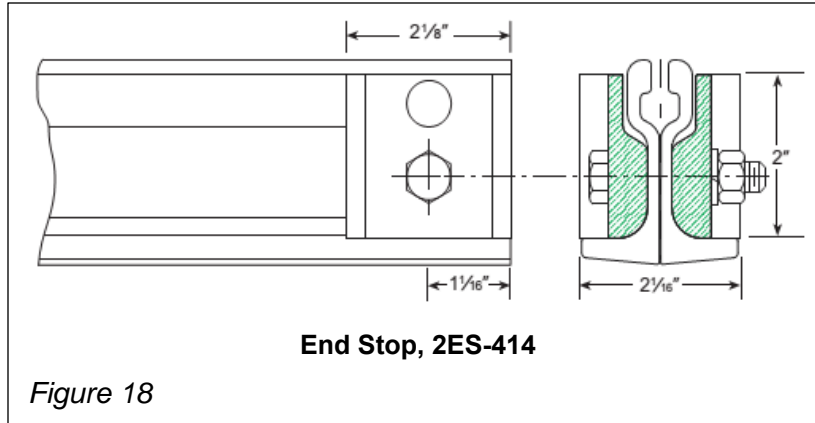


NOTE: the length of 200 Series Rail is measured to the centerline of a Lap End, or to the end of the rail for pieces with a Square End, Switch and Interlock Connection, or rail with Fillers. See the illustration on Page 14 for a guide. Rail ordered with Angle and Web to End is measured to centerline of Lap, plus 9".

Rail Options

End Stops

Fig.	Model #	Part #	Notes
18	2ES-414	10-1609-00	Wheel type stop; for hand pushed systems only
19	2ES-416	10-1613-00	Load bar stop; for motor driven systems. Reversible (may be contacted from either side)



Top Flange Holes

Top flange holes or slots may be factory punched or drilled, or may be field drilled as needed. Top flange hole or slot size and location must be coordinated with the hole pattern of suspension hangers or support steel. Slots allow for rail position adjustment.

See the Rail Section and Suspension Section of the TC/American Crane Systems Catalog for more information about hole and slot sizes available or require

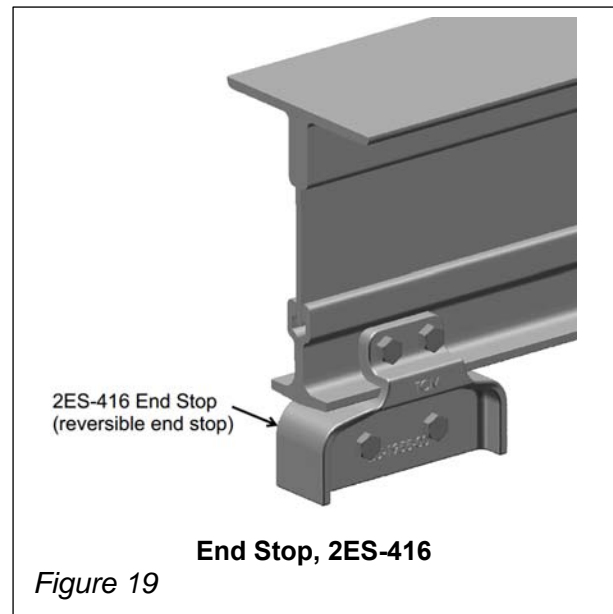
Rail Notch or Step Cut

Rails may be “notched” or “step cut” at hanger points to match one rail height to another, or to elevate the rail between hanger points to gain treadline elevation. See the Rail Section of the TC/American Crane Systems Catalog for standard notch dimensions.

Similar step cuts may be provided on bridge beams where end trucks are mounted.

Rail Web Holes

Holes may be drilled or punched in the rail web to attach mounting brackets for side contact or bottom contact conductor bars, or for various other attachments to the rail web. Locations of holes are referenced from the rail treadline. See rail drawings provided with the shipment. Verify clearances of attachments to trolleys, carriers and end trucks.



Conductor Bar

Railway or monorail may be provided with either side contact or bottom contact electrical conductor bars. Choice of styles depends upon the rail model and the application. For additional details on installation of conductor bar on rail, see *Shielded Channel-Bar Electrical Conductor Bar Installation Instructions*, or *Shielded Figure-8 Electrical Conductor Bar Installation Instructions*.

Spur Rail Support Brackets

Spur support brackets are used in conjunction with an interlocking crane and a connecting monorail.

The end of the spur rail is supported by the bracket, which in turn is attached to and supported by the runway rail. This method of support assures that the end of the spur rail will not move relative to the end of the crane bridge, due to runway deflection caused by the loaded crane. This assures crane bridge to spur rail alignment for interlocking.

For additional details on spur supports and interlock installations, see *Interlocks – 200 Series, Installation Instructions*.

Curves

Standard and special curves are available from the factory to meet almost any monorail requirement. Curves may also be field bent with a portable hydraulic press and fittings, then cut to length as required. End preparations on curves may be any of the combinations shown in Figure 11. For connection of 200 Series rail to switches, see *Installation Instructions 200 Series for Tongue Switches* and for *Glide Switches*.

Figures 20 and 21: Monorail curves are formed from 2R3-5T rail and are joined to other pieces of 2R3-5T rail, or to Girder Rail with a standard lap joint. See the description of an Angle and Web to End girder rail end preparation on Page 15.

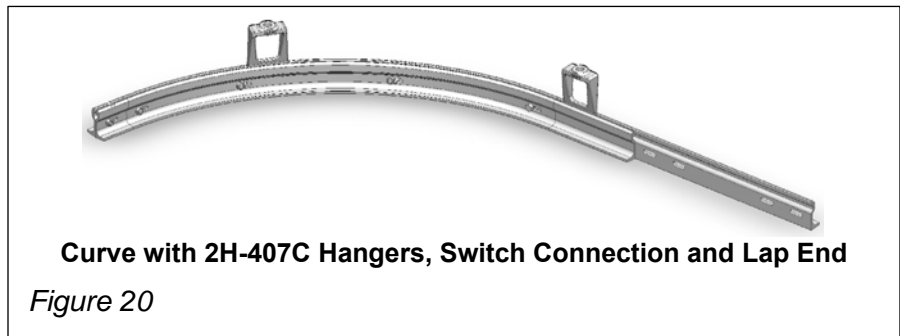
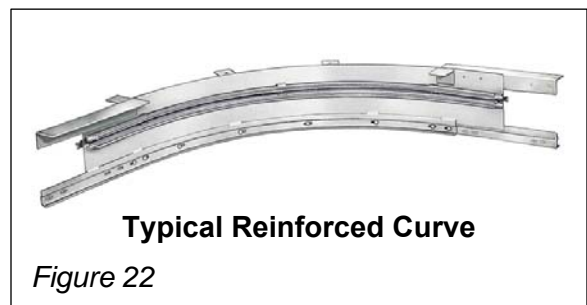
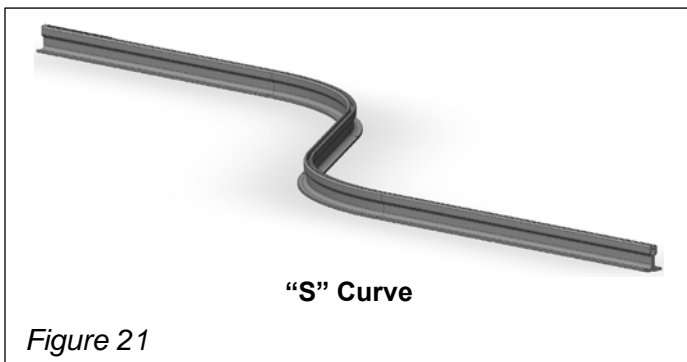


Figure 22: Reinforced Curves have a 2R3-5T curved rail tee section with the addition of a web plate similar to that of Girder Rail. Short lengths of angle are welded to the web to allow the curve to be supported from overhead steel, with either direct bolt connection or clamps.



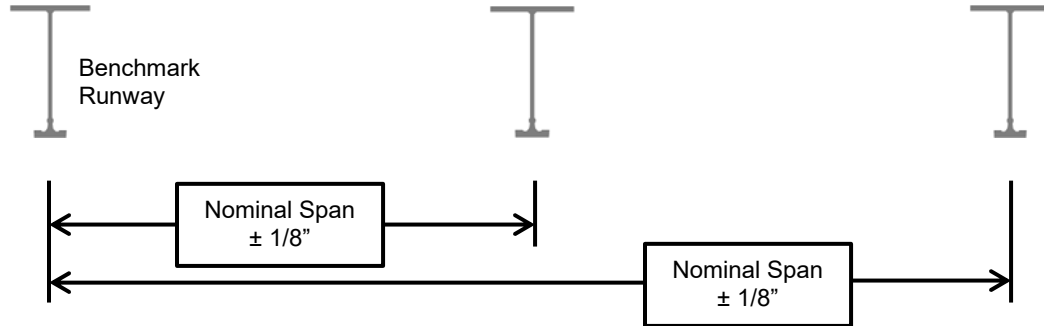
Rail Manufacturing Standards

See the Engineering Section of the TC/American Crane Systems Catalog.

Runway and Monorail Alignment Tolerances

Note: for these recommendations, first establish a benchmark point and make all measurements relative to that point. Elevation measurements to be made to treadline; span measurements taken at tee section.

Span:

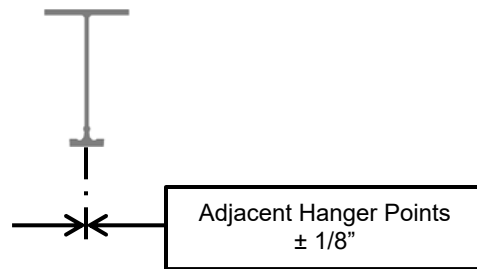


Above tolerance sketch is for two runways, and also for three or more runways. Dimensions measured at hanger points.

Two runways: Benchmark to second run; Nominal span $\pm 1/8$ "

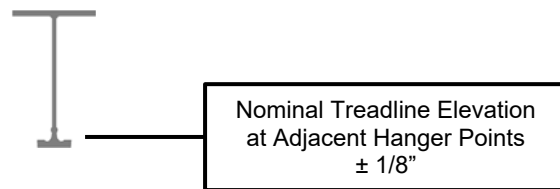
Three or more runways: Benchmark to first interior run; Nominal span $\pm 1/8$ "
 Benchmark to third or additional runs; Nominal span $\pm 1/8$ "

Straightness:

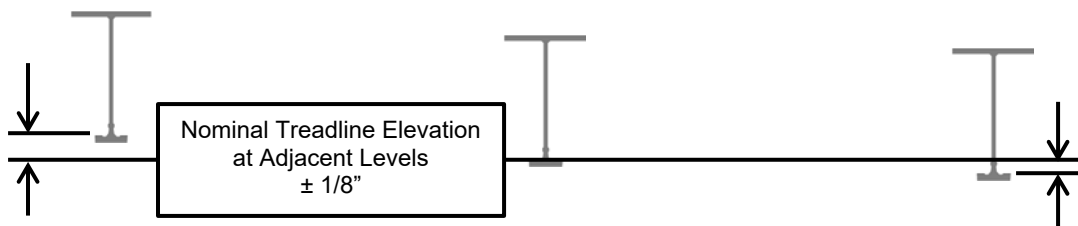


Above tolerance is for straightness of a single line of a runway, or a monorail line, measured at adjacent in-line hanger points. Also applies to overall length of runway or monorail (tolerances do not accumulate over the length of the run). Does not apply to curved monorails.

Elevation:



Above tolerance is for treadline elevation of a single line of a runway, or a monorail line, measured at adjacent in-line hanger points. Also applies to overall length of runway or monorail (tolerances do not accumulate over the length of the run). Does not apply to systems designed to operate on an incline.



Above tolerance is for treadline elevation of adjacent lines of runway, measured at adjacent hanger points.

Inspection Schedule

The following is a recommended minimum inspection schedule for runways and monorails, standard service duty systems. Maintain records of inspections.

Initial Inspection: by installation crew, upon completion of installation. Recommended to be accomplished with observation by owner's representative (maintenance supervisor, etc.).

Check all hardware, complete and tight.

30 Days After Install: by owners maintenance crew, or by contract with installation crew or a service crew.

Check all hardware on rail, splices, end stops, hangers, etc., complete and tight. Replace, adjust or tighten as required.

Each 3 Months: by owners maintenance crew, or by contract with installation crew or a service crew.

Check all hardware on rail, splices, end stops, hangers, etc., complete and tight. Replace, adjust or tighten as required.

Each 6 Months: by owners maintenance crew, or by contract with installation crew or a service crew.

In addition to 3 month check, also check rail for wear.

For rail wear, visually inspect entire system to note any wear (treadline, sides of tee section, rubbing on splice plates or bolts, etc.

Establish a record sheet and take measurements of tee section (see Figure 1 for baseline dimensions) at several locations. Make future measurements at the same locations.

Number and location of measurements will vary with the type of system, and where the majority of crane or carrier movements will be made (i.e., at the center of a monorail or runway as opposed to the far ends). Record measurements on curves as well as straight sections.