



Track Materials Specification

Section 34 11 93

Revision 00
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Amendment Record

Amendment in Clause No.	Date of Amendment	Description of Changes
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Acronyms and Abbreviations

Table 1: Acronyms and Abbreviations

Abbreviation	Full Name
ESD	Engineering and Safety Division
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASTM	American Society for Testing and Materials
CSA	Canadian Standards Association
CWR	Continuous Welded Rail
FAT	Factory Acceptance Testing
MTO	Ministry of Transportation Ontario
MTS	Metrolinx Track Standards Heavy Rail
OPSD	Ontario Provincial Standard Drawings
OPSS	Ontario Provincial Standard Specifications
OTM	Other Track Material

Definitions

Table 2: Definitions

Term	Definition
Track Materials	All components of the track system other than rail, ballast, ties, Subballast and special trackwork. Examples include fasteners, joint bars, insulated joints, derails, bumping posts, and road-grade-crossing hardware.

1. General Requirements

1.1. Description of Specification

- 1.1.1. This Specification outlines the requirements for the supply, factory testing, delivery, handling, and storage of Other Track Material (OTM), including rail-fastening systems, compromise and transition rails, insulated joints, end-of-track devices, at-grade crossing components, track geometry tags, and derails used in ballasted track construction across the Metrolinx heavy-rail network. It also sets out the Contractor's obligations for material management and quality assurance in accordance with the referenced Metrolinx Track Standards and Standard Plans.

1.2. Reference Standards

- 1.2.1. This Specification includes references to the latest edition of other publications. These references are noted in the text where appropriate. All testing must be carried out according to the latest revision of the standard test methods referred to in this Specification. In the event of conflict, the most stringent must apply.
- a) Metrolinx Track Standards (Heavy Rail) RC-0506-02TRK;
 - b) Metrolinx Track Ballast Specification 32 11 25;
 - c) Metrolinx Rail Specification 34 11 13.23;
 - d) Metrolinx Concrete Tie Specification 34 11 33.1;
 - e) Metrolinx Timber Tie Specification 34 11 33.2;
 - f) Metrolinx Anti-Trespass Panels Specification 34 72 19;
 - g) GO Transit Grade Crossing Design Standard RC-0506-05RCM-01;
 - h) Metrolinx General Engineering Instructions; (Internal document) - To be requested from designated Project delivery team
 - i) Metrolinx Welding Manual, RC-0506-02TRK-01;
 - j) American Railway Engineering and Maintenance-of-Way Association (AREMA); Manual for Railway Engineering;
 - k) American Railway Engineering and Maintenance-of-Way Association (AREMA); Portfolio of Trackwork Plans;
 - l) ASTM A536, Specification for Ductile Iron Castings;
 - m) ASTM G101, Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels;
 - n) ASTM A242, Standard Specification for High-Strength Low-Alloy Structural Steel;

- o) ASTM A706, Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; and
- p) ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

1.3. Delivery, Storage and Handling of Materials

1.3.1. General

- a) All work must comply with the Metrolinx Track Standards (MTS) including Section 10.8, Distribution of Other Track Material (OTM) and must be performed in accordance with applicable manufacturing requirements. The Contractor must be responsible for the handling of all goods supplied and storage of materials in the appropriate storage locations.
- b) Ensure supplied materials are handled and stored in a manner to prevent damage to any of the materials in accordance with the manufacturer's instructions. Including securing all materials and protective coverings to avoid having them become loose due to the movement of passing trains or severe weather.
- c) Ensure that there is no loose material on site to protect from vandalism and theft when the Contractor is not present. Including, daily, physically removing and securing all construction materials away from public areas or placing all such material in secure bins. Scrap rail less than 4 ft (1,219 mm) in length must be removed from the railway Right of Way at the end of every shift and/or before leaving the site as per Metrolinx Track Standards (Heavy Rail) RC-0506-02TRK clause 4.2.2.
- d) Contractor must ensure that equipment used is of the proper type and capacity for the intended purpose and must conform to all Provincial Government Ontario Health and Safety (OH&S) standards.
- e) Provide manufacturer's written product or system warranty, including extended warranty, if applicable, for the period starting from Substantial Completion of the Project, covering materials and labour.

1.3.2. Submittals

- a) Shop Drawings and Product Data for each material listed in this specification must be submitted to Metrolinx for review and approval in accordance with the requirements of this Section. The submittal shall include, but not be limited to the following:
 - i) Quality Management Plans;
 - ii) Material Data Sheets;
 - iii) Inspection and Test reports;

- iv) Material and Compliance Certificates; and
 - v) Installation, Operations and Maintenance Manuals.
- b) Shop Drawings should indicate:
 - i) Materials or equipment being supplied. Including thicknesses and finishes;
 - ii) Details of construction, accurate dimensions. Include mounting and installation details;
 - iii) Capacity, operating characteristics and performance;
 - iv) Both catalogue and non-catalogue items;
 - v) Total weight and shipping sectioning;
 - vi) Bill of materials; and
 - vii) Connections, calculations, test results and loads.
- c) Product Data should indicate:
 - i) Mechanical properties, chemical composition, compliance with appropriate reference standards, characteristics, advantages and limitations;
 - ii) Product transportation, storage, handling and installation requirements;
 - iii) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists; and
 - iv) Product identification in accordance with Metrolinx requirements.

2. Products

2.1. General

- 2.1.1. Products listed in this specification may be substituted with approved equivalent products, subject to prior written approval from the Metrolinx Track Engineering department. Requests for approval must include sufficient technical documentation to demonstrate equivalency in performance, durability, and compliance with applicable standards.

2.2. Rail

- 2.2.1. New rail must conform to Metrolinx Rail Specification 34 11 13.23.

2.3. Ballast

- 2.3.1. New ballast must conform to Metrolinx Track Ballast Specification 32 11 25.

2.4. Concrete Ties

- 2.4.1. New concrete ties must conform to Metrolinx Concrete Tie Specification 34 11 33.1.

2.5. Concrete Tie Fasteners

- 2.5.1. Requirements for standard concrete tie fasteners and guard rail concrete tie fasteners are outlined in the Metrolinx Concrete Tie Specification 34 11 33.1.

2.6. Timber Ties

- 2.6.1. New timber ties must conform to Metrolinx Timber Tie Specification 34 11 33.2.
- 2.6.2. Length and arrangement of Transition Tie sets used between different types of track structures must conform to MTS Section 9.2.

2.7. Timber Tie Fasteners

- 2.7.1. Tie Plates:
- a) Steel tie plates must be manufactured in accordance with AREMA Chapter 5 Part 1 Specifications for high carbon steel tie plates;
 - b) Cast tie plate material shall be in accordance with AREMA 100-08 Portfolio of Trackwork Plans and as per ASTM A536, Specification for Ductile Iron Castings, Grade 65-45-12;
 - c) Tie plate dimensions, base width, markings and tolerances must conform to Standard Plan GTS-0501 (Sheets 1 - 5); and
 - d) Tie plates must be selected in accordance with Metrolinx Track Standards - Appendix S. Corresponding tie plate fastening patterns must be determined as per Appendix R of the Metrolinx Track Standards.
 - e) Tie plates that do not conform to requirements of Metrolinx Track Standards shall not be used.
 - f) Track panels through grade crossings shall be constructed with MSR (Mechanical Systems Remanufacturing) tie plates with elastic fastenings. Plates must be fully predrilled and lagged.
- 2.7.2. Anchors:
- a) All anchors must be "Improved Fair" anchors for 115RE and 136RE rail conforming to Standard Plan GTS-1313.

- b) Anchors shall not be reused unless permission is obtained in writing from the Director, Engineering–Track.

2.7.3. Screw Spikes:

- a) Screw Spikes must be manufactured in accordance with AREMA Chapter 5 Part 2 Specifications for High Strength Steel Screw Spikes; and
- b) Screw spikes dimensions, length and thread form must conform to Standard Plan GTS-1315.

2.7.4. Cut Spikes:

- a) Cut spikes must conform to AREMA Chapter 5 Part 2 Specifications for Track Cut Spikes; and
- b) Cut spike dimensions, length, markings and tolerances must conform to Standard Plan GTS-1325.
- c) Cut spikes shall not be reused.

2.8. Steel Ties

- 2.8.1. Steel ties must be manufactured in accordance with AREMA Chapter 30, Part 6 Specifications for Steel Ties.
- 2.8.2. Steel tie must pass AREMA Chapter 30 Section 2.7 Test 6 for Tie and Fastener System Wear/Deterioration Part 6 Specifications for Steel Ties.
- 2.8.3. Steel tie dimensions, weight, yield strength and tolerances must conform to Standard Plan GTS-2101 and GTS-2102.
- 2.8.4. Steel ties shall be manufactured from hot rolled ASTM A242/G101-01 High Strength Low-Alloy Weathering Steel with a minimum 345 MPa yield strength, or an approved equivalent, with a Corrosion Index of not less than 6.00, as determined in accordance with ASTM G101.
- 2.8.5. Steel tie systems must be suitable for use in both non-insulated and insulated (signalized) track applications, as determined by the project requirements. For signalized applications, electrical isolation between the rail and steel tie must be achieved through the fastening system, utilizing insulating tie pads and insulators on elastic fastening devices.

2.9. Steel Tie Fasteners

- 2.9.1. Fasteners and Hook-In Shoulders must be compatible with the steel tie system.
- 2.9.2. The following NARSTCO style components should be used on the NARSTCO steel tie system:
 - a) Rail seat pad - Narstco 3015 6 in (152 mm) for 136RE rail and Narstco 3025 5-½ in (140 mm) for 115RE rail;

- b) Insulator - Narstco heavy duty rail insulator HD-10 for 136RE and 115RE rail; and
- c) Rail Hook-In Shoulders for both 115RE and 136RE rails are outlined in the table below:

Table 3 - NARSTCO Steel Tie Hook-In Shoulders

Tie Type	Hook-In Shoulder Part No.	Tie Type	Hook-In Shoulder Part No.
N/A	N/A	M8 Non-insulated	4040
M10 Insulated	4010	M10 Non-insulated	4020
H10 Insulated	4010	H10 Non-insulated	4020
H12 Insulated	4030	H12 Non-insulated	4080

2.10. Elastic Clips

- 2.10.1. Rail clip qualification tests must follow the laboratory testing requirements outlined in AREMA Chapter 30, Section 2.6 at a minimum. The fastener system shall demonstrate acceptable performance across the full range of tolerances of all mating components, including rail and ties.
- 2.10.2. Clips are to be heat treated steel and to be galvanized where required per project's specification and Metrolinx Standard Track.
- 2.10.3. Elastic Rail clip - 25/32 in (19.8 mm) diameter, Pandrol e-2055 and Vossloh e-2055 as per Standard Plan GTS-1322 for use on wood and concrete ties.
- 2.10.4. Insulated joint clips - 25/32 in (19.8 mm) diameter, Pandrol flat-toe e-2063 as per Standard Plan GTS-1322, for use on all types of ties (concrete, timber and steel ties) at Insulated Joints.
- 2.10.5. Conventional splice joint clips - 7/8 in (22.2 mm) diameter, Pandrol PR-609 as per Standard Plan GTS-1322.
- 2.10.6. CWR bridge clips - 7/8 in (22.2 mm) diameter, Pandrol PR-633 as per Standard Plan GTS-1322; with toe plate as Zero Longitudinal Restraint System for CWR on open deck bridges.
- 2.10.7. As defined in GTS-1322 Pandrol Rail clips can be identified as shown in Figure 1

PANDROL "e" TYPE CLIPS				PANDROL "PR" TYPE CLIPS			
CLIP TYPE.	COLOUR CODING	STAMP CODE	WEIGHT (LBS.)	CLIP TYPE.	COLOUR CODING	STAMP CODE	WEIGHT (LBS.)
e 2055	AS MADE	TC	1.71	PR 609	YELLOW	GM	2.70
e 2063	GREEN	TH	1.63	PR 631A	AS MADE	GF	2.73

Figure 1 Pandrol Clip Stamping Details

2.11. Compromise Rails

- 2.11.1. Only Head-Hardened rail is approved for use for compromise rails.
- 2.11.2. Compromise Rails must be manufactured in accordance with AREMA 700B-12 Portfolio of Trackwork Plans.
- 2.11.3. Compromise rails must be minimum 25 ft (7.6 m) long and comply with Standard Plan GTS-1112.
- 2.11.4. Compromise rail dimensions, transitions length, markings and tolerances must conform to Standard Plan GTS-1112.
- 2.11.5. Universal compromise rails are not permitted for installation on Metrolinx-owned tracks.

2.12. Transition Rails

- 2.12.1. Transition Rails must be manufactured in accordance with AREMA 700C-18 Portfolio of Trackwork Plans.
- 2.12.2. Transition rails to be 310 Brinell Hardness (3 HB).
- 2.12.3. Transition rails dimension, transition length, marking and tolerances must conform to with Standard Plan GTS-1110, have blank (non-drilled) ends, and be a minimum 39 ft (11.9 m) long.
- 2.12.4. Wear values must be marked on the compromise rail and field verified by the Contractor before installation.

2.13. Compromise Transition Rail

- 2.13.1. Rails 136RE and 115RE sections must be Head-Hardened.
- 2.13.2. Compromise Transition Rail must be manufactured minimum 39 ft (11.9 m) in left-hand and right-hand.
- 2.13.3. Compromise Transition Rail dimensions from full height to deep head cut worn height must comply with GTS-1112, be fully supported on the correct tie pattern, and be fastened with approved hardware and must follow MTS Section 5.4.7.

2.14. Joint Bars

- 2.14.1. Joint bars must be manufactured in accordance with AREMA Chapter 4, Section 3.4 Specifications for Quenched Carbon-Steel Joint Bars, Micro-alloyed Joint Bars and Forged Compromise Joint Bars.
- 2.14.2. Conventional toeless type joints for 115RE and 136RE rail must comply with MTS Section 5.

- 2.14.3. Dimensions, length, cross-sectional properties and tolerances must conform to Standard Plan GTS-1202 and GTS-1203 for the appropriate rail sections.
- 2.14.4. Compromise Joint Bar
- a) Rail joint bars connecting rails of different weights for use on non-main track must follow Standard Plan GTS-1210, GTS-1211, GTS-1212, GTS-1213 as per MTS Section 5.4.1.
- 2.14.5. Joint bar bolts
- a) Bolts must be manufactured in accordance with AREMA Chapter 4 Part 3.5 Specification for Heat-Treated Carbon Steel Track Bolts and Carbon-Steel Nuts for chemical composition, mechanical requirements, tolerances, heading, and marking.
 - b) Bolts should be Heat-treated carbon-steel track bolts in diameters from 7/8 in (22.2 mm) to 1-1/8 in (28 mm) and must conform to Standard Plan GTS-1317, GTS-1318, GTS-1319 and GTS-1320.
 - c) Specifications for bolts and nuts smaller than 1 in (25.4 mm) diameter shall conform to AREMA mechanical requirements for Grade 5.
 - d) Bolts and nuts 1 in (25.4 mm) diameter and larger shall conform to AREMA mechanical requirements for Grade 8.
 - e) Bolts and nuts of all sizes shall conform to AREMA mechanical requirements for Grade 8.
 - f) Joint bar bolts shall not be reused.

2.15. Insulated Joints

- 2.15.1. Insulated Joints must be designed, fabricated, and tested in accordance with AREMA Chapter 4 Part 3.8 Specification for Bonded Insulated Rail Joints, and in conformance with MTS Section 5.3.
- 2.15.2. New insulated joints must be premium factory-made insulated joints with a minimum six-hole joint-bar assembly and must be to the proper design and dimensions for the rail on which it is to be installed.
- 2.15.3. Length of insulated joints must be minimum 20 ft (6.1 m) for tangent track and minimum 40 ft (12.2 m) on curved track.
- 2.15.4. Insulated joints must employ Kevlar-based insulation to provide superior elasticity and impact absorption, minimizing the risk of insulation failure compared to conventional fiberglass-reinforced bonded joints.
- 2.15.5. Continuous insulated joints must be tested by qualified signals Employees prior to installation. Non-continuous insulated joints must be tested by qualified Signals Employees after installation, prior to the track going back in service

2.16. End-of-Track Devices

- 2.16.1. Rigid-type bumping posts must be Western-Cullen-Hayes WGC-type units with guard rails and must conform to Standard Plan GTS-2214.
- 2.16.2. Alternative types of bumping posts, such as Sliding Friction End Stop must be approved by ESD - Track.

2.17. At-Grade Crossing Components

- 2.17.1. All at-grade crossings must comply with MTS Section 14 employing a full-depth crossing material/panel system. Crossing surface type must meet the requirements of MTS Appendix U as well as the following minimum requirements:
 - a) Flangeway dimensions that comply with MTS Section 14.3;
 - b) Provide a skid-resistant surface;
 - c) Provide positive end restraint to prevent longitudinal and lateral movement;
 - d) A 30-degree sloped end sections to act as deflectors;
 - e) Be compatible with skewed or curved at-grade crossings;
 - f) Rubber seal must be compatible with the type of crossing panel; and
 - g) Installation without modifying standard tie spacing through crossings, or other track materials.
- 2.17.2. Asphalt crossing components including but not limited to the asphalt surface, rubber rail seal, rail fastening systems, filter fabric placement, drainage, etc. must conform to MTS Section 14.2.
 - a) Asphalt material, type, and depth must be in accordance with the Contract Drawings and as per the local municipality codes and standards for bituminous asphalt layers.
 - b) Rubber rail seal must be installed and clamped on the running rails. The rubber rail seal on the gauge side forms a standard flangeway, and the rubber rail seal on the field side eliminates any gap between the running rails and the asphalt surface. Rubber rail seal must be designed to accommodate cast tie plates with elastic fasteners.
 - c) Filter fabric must be a nonwoven geotextile that resists ultraviolet degradation, rotting, biological deterioration, and naturally occurring alkalis and acids. It shall be installed beneath asphalt road crossings on ties, fully covering the ballast section before placement of the asphalt crossing.
- 2.17.3. Precast concrete crossings are not permitted to be installed.

2.17.4. Temporary/Construction Crossings

- a) Temporary/Construction at-grade crossing requirements such as location, material, installation and inspection must conform to MTS Section 14.6 and Standard Plan GTS-2301 (Sheets 1-6);
- b) Timber crossing planks must be spruce or eastern hemlock, minimum 20 ft (6.1 m) long, and of sufficient depth to match rail height and crossing width;
- c) Lag screws with washers must be 12 in × ½ in (305 mm × 12.7 mm) per plank; and
- d) Spruce flange-filler blocks must extend the full plank length and must match the rail section.

2.17.5. Anti-trespass mat requirements must conform to Metrolinx Anti-Trespass Panels 34 72 19 requirements.

2.18. Track Geometry Tags

2.18.1. All horizontal track geometry points such as Tangent-to-Spiral (TS), Spiral-to-Curve (SC), Curve-to-Spiral (CS), and Spiral-to-Tangent (ST) must be permanently marked in the field with Track geometry tags. The requirements such as tag size, material, tag information and installation method must conform to Standard Plan GTS-0726.

2.19. Derails

2.19.1. Type, location and installation of derails must be in accordance with MTS Section 10.3.

2.20. Signage

2.20.1. All required signage within the Metrolinx railway right of way must conform to Standard Plan GTS-720.

2.20.2. Grade Crossing Signage must be in accordance with GO Transit Grade Crossing Design Standard and Transport Canada Grade Crossing Standards.

3. Quality Assurance

3.1. General

3.1.1. The Contractor must implement and maintain a quality assurance program that ensures all track materials comply with the Metrolinx Track Standards.

3.2. Factory Acceptance Testing

- 3.2.1. Metrolinx reserves the right to participate in the Contractor's Factory Acceptance Testing (FAT) at its sole discretion. Participation in FAT does not relieve the Contractor of its responsibility to meet all applicable standards and specifications.

3.3. Management of Materials

- 3.3.1. The Contractor must manage both existing and new track materials, including secure storage, inventory tracking, documentation, issuance, and handling. Materials must be accessible to Metrolinx at all times.
- 3.3.2. The Contractor must maintain and make available an up-to-date inventory of materials upon request from Metrolinx.
- 3.3.3. The Contractor must provide the necessary management resources for all track materials.
- 3.3.4. The Contractor is responsible for conducting its own quality-assurance program to verify that railway track construction and materials meet Metrolinx Track Standards requirements.
- 3.3.5. The Contractor must ensure Metrolinx has access to all facilities required to verify that track materials are produced and furnished in accordance with Metrolinx Track Standards.
- 3.3.6. Track material that fails to meet Metrolinx Specifications, whether discovered during tests, inspections, or after acceptance, will be rejected and returned to the Contractor.
- 3.3.7. The Contractor is entitled to a joint inspection of defective components at Metrolinx premises. Defective components must be identified before construction, removed from use, and replaced with defect-free components at the Contractor's expense, including handling and transportation in both directions.

End of Section