

# Glossary of Track Terms

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## **Preface**

This document is a first issue as TS 00172.

The glossary contains expansions of initialisms and acronyms and definitions of terms as they apply to track discipline standards and other technical documents.

This document is the primary source of track related terms and definitions.

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# 1 Scope

This glossary is a compilation of common railway track discipline terms, definitions and their meanings according to historical usage by track engineers in NSW railways. It directs the user to preferred terminology for single common usage across the TfNSW heavy rail network to ensure consistency and reduce misunderstanding. Meanings may not correspond to usage of similar terms in other rail systems. It is primarily for use in track discipline standards and related technical documents for TfNSW but is not exhaustive.

# 2 Application

This document has been prepared for use by TfNSW technical subject matter experts involved in the drafting of track related standards and other relevant documents.

It is also intended to be used by track Technically Assured Organisations (TAOs) working on or for the TfNSW heavy rail network with track discipline standards requirements or responding to other track documents such as specifications.

# 3 Referenced documents

There are no documents cited in the text.

# 4 Terms, definitions and abbreviations

Section 5 contains a glossary of terms, definitions and abbreviations.

# 5 Glossary of terms

The terms, definitions and abbreviations in Table 1 are the most commonly used in track related standards.

**Table 1 – Glossary**

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>administrative controls</b>	controls that use systems of work to eliminate or reduce risks to health or safety
<b>alignment</b>	the horizontal and vertical position of a track measured in relation to the track control marks Note: The measurement of alignment is from these survey marks to the running face of the adjacent rail and the top of the low rail, providing a reference for track position with respect to design.
<b>alignment index</b>	ratio of curve radius (m) to length of the curve (m) which is used in the calculation of track stability

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>aluminothermic weld</b>	welding process used to join rails together Note: An aluminothermic reaction takes place within a crucible and the resultant metal flows into a mould enclosing the rail ends that are to be joined.
<b>aluminothermic welding</b>	field welding by any process using an aluminothermic type reaction
<b>aluminothermic welding gap</b>	gap required between the rail ends to be welded together by aluminothermic welding
<b>anchor point</b>	section of track in which the rails are anchored to sleepers or bearers to prevent any longitudinal rail movement Note: The securely anchored track section provides a stable platform for managing rail stress adjustment.
<b>AoA</b>	angle of attack; alignment of the wheel set relative to the rail measured in milliradians Note: Excessive AoA can contribute to wheel squeal and rail wear on curves.
<b>approved track components</b>	products type approved for use on track infrastructure
<b>ARTC</b>	Australian Rail Track Corporation; rail infrastructure manager that manages the following heavy rail networks: <ul style="list-style-type: none"> <li>• NSW interstate network</li> <li>• Hunter Valley coal network</li> <li>• national interstate freight network</li> </ul>
<b>asymmetric switch</b>	switch typically installed in tangential turnouts Note: Asymmetric switches are a shallow depth, thicker webbed, asymmetrical rail, machined from a full rail at the heel to a tapered point which fits closely against a machined undercut stockrail. This allows the switch tip to move partially under the stockrail head. The switch sits on baseplates fitted with elevated switch slide plates.
<b>back canting</b>	rails are normally inclined 1:20 towards the track centreline Note: Back canting is where rails are tilted towards the field side of this normal position (typically due to timber sleeper wear).
<b>ballast</b>	free draining coarse aggregate used to support the railway track structure above the subgrade
<b>ballast cleaning</b>	process for removing fines from in-track ballast by removing the ballast from the track between the bottom of the sleeper and the subgrade, sieving it and returning graded ballast to the track in a continuous operation Note: Ballast cleaning often includes addition of new ballast.
<b>ballast depth</b>	distance from the subgrade to the base of the sleeper below the lowest rail seat
<b>ballast log</b>	timber, concrete, steel or composite material member sitting on top of the underbridge abutment to retain track ballast
<b>ballast mat</b>	mat manufactured from rubber or composite material which is placed between the capping layer and the ballast to modify track stiffness

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>ballast shoulder</b>	ballast placed outside the end of sleepers level with the top of the sleeper
<b>ballast shoulder height</b>	height of the shoulder ballast measured at the end of the sleeper Note: Normally, ballast shoulder height is profiled level with the top of the sleeper ends.
<b>ballast shoulder width</b>	width of the shoulder ballast as measured from the sleeper end to the edge of the shoulder
<b>base operating limits</b>	limits of deteriorated track conditions outside which operating restrictions will apply
<b>bearer</b>	type of sleeper used under turnouts and special trackwork Note: Bearers are generally larger in dimension than standard sleepers to provide support for both tracks as well as the increased loading experienced under such track structures.
<b>beater packing</b>	process for tightly packing ballast under sleepers using manual methods (includes hand tools and small motor driven machinery)
<b>bend</b>	the point of intersection of two straights
<b>biscuit</b>	insulating pad based on the foot of the rail to which a resilient fastener is attached
<b>block</b>	iron casting used mainly with checkrails and crossings to support rail components at a fixed distance apart Note: Raised lettering and numbers on the block identify its application. Also known as a chock.
<b>bonded insulated joint</b>	see GIJ which is the preferred term
<b>box anchoring</b>	application of four rail anchors to a sleeper, that is, two to each rail with one on each side of the sleeper Note: This is a pattern of rail anchoring used on timber sleeper track to manage rail creep.
<b>boxing up</b>	process for establishing correct ballast profile by laying ballast in sleeper cribs and on shoulders, normally using a ballast regulator
<b>buckle</b>	see misalignment which is the preferred term
<b>cant-rail</b>	inclination of the rail relative to the design superelevation plane, expressed as a ratio (nominally 1 in 20) with an inclination towards the track centreline being positive
<b>cant-track</b>	see superelevation which is the preferred term
<b>capping layer</b>	a layer of compacted material (normally road base) that provides a sealing layer to the earthworks
<b>cascaded rail</b>	rail that has been previously used in track Note: Also known as second-hand or serviceable rail.
<b>cast in shoulder</b>	component (steel insert) in concrete sleepers and bearers that prevents lateral movement of the rail foot and provides anchorage for the resilient fastening system

Term or abbreviation	Definition or term in full
<b>cast in synthetic (nylon) insert</b>	component in concrete bearers that allows a screwspike to be inserted to provide lateral restraint for turnout switch plates Note: Preferred term is dowel.
<b>catchpoint</b>	single switch assembly and a throw off rail Note: The catchpoint switch is normally set in the open position, thus breaking the continuity of the siding track causing unauthorised train movements to derail at a point clear of the main line. A guard rail is also used in lieu of a throw off rail for some types of catchpoints (containment catchpoint).
<b>CCB</b>	Configuration Control Board; predecessor of the Transport Network Assurance Committee (TNAC) and the Reliability, Operability, Availability, Maintainability and Safety Committee (ROAMS); group that assessed any proposed configuration changes into the network.
<b>centre binding</b>	where there is greater bearing pressure below the centre of the sleeper compared to the ends of the sleeper Note: Steel sleepers can become deformed and timber and concrete sleepers can break when centre bound. Occurs when sleepers are not fully supported by ballast.
<b>chair plates</b>	flat plate with a pressed up section that is attached with a bolt through the web of either the stockrail, in the case of a switch assembly, or the checkrail carrier, in the case of a checkrail assembly Note: The types of chairs are identified by a mark on the end of the plate.
<b>checkrail</b>	rail placed inside the running rail which comes into contact with the back of the wheel flange and is used in turnouts and special trackwork to provide steering of the wheelset such that the crossing nose is not contacted by the opposite wheel. Note: There is a difference between a wingrail and a checkrail – a wingrail bears load from wheels; a checkrail checks wheels against lateral movement. Wingrails in K crossings perform both functions (they bear and check).
<b>checkrail effectiveness</b>	distance from the guard face of the checkrail to the gauge face of the nose of the crossing, measured square to the running rail at the nose of the crossing
<b>checkrail unit</b>	unit consisting of a length of rail (called the checkrail) with a flared bevel machined on each end, hardened on the checking face, bolted through chocks to a closure rail (called the carrier) to provide flangeway clearance Note: The centre of the checkrail is usually opposite the theoretical point of the crossing.
<b>chock</b>	iron casting used mainly with checkrails and crossings to support rail components at a fixed distance apart Note: Raised lettering and numbers on the chock identify its application. Also known as a block.
<b>circular curve</b>	component of horizontal or vertical track alignment, defined by end points and radius

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>clearance</b>	margin between the kinematic envelope of rolling stock and a structure or between rolling stock on adjacent tracks
<b>clearance point</b>	point on converging or diverging tracks where the track centres or separation between the tracks allows clear passage for passing trains and beyond which vehicles do not stand
<b>closure</b>	short length of rail used to replace defective rail in plain track or as part of the assembly of special trackwork Note: the minimum length of a closure in plain track is 2.2 m, while for special trackwork it is 1.2 m
<b>closure rails</b>	rails making up a turnout apart from those in the points, crossings and checkrail units
<b>CoF</b>	coefficient of friction; a dimensionless number which for rail represents the friction between the steel wheel and steel rail Note: the normal range for CoF ( $\mu$ ) at the wheel rail interface is 0.3 (wet) – 0.5 (dry).
<b>combined rail wear</b>	rail wear that includes both curve (side wear) and tangent (top wear)
<b>compound crossing</b>	crossing V point manufactured from a single cast nose welded to head hardened rails to complete the V which replaces the housed point rails in a fabricated crossing Note: A compound crossing may be manufactured from manganese steel, chrome vanadium alloys or other materials.
<b>compound manganese crossing</b>	compound crossing V point that is manufactured from a cast manganese nose that is flashbutt welded to head hardened rails to complete the V Note: A compound manganese crossing replaces the housed point rails in a fabricated crossing.
<b>compound transition</b>	horizontal alignment component that joins two circular curves of different radii
<b>compression</b>	force generated when rail temperature increases and the rail expands which places the rail into compression Note: Applicable to CWR.
<b>conventional switch</b>	switches typically installed in conventional turnouts which are machined from a full depth rail at the heel to a tapered point which fits closely against an unmachined stockrail Note: Switch rails are machined and vertically set to override the stockrail foot. Conventional switches hinge at the heel.
<b>conventional turnout</b>	a turnout consisting of a heeled or flexible straight switch on the turnout road, followed by a curved section sometimes up to and through the crossing Note: The bearers for a conventional (or secant) turnout are set perpendicular to the through road. Conventional turnouts are being phased out of use.
<b>corridor transit space strategy</b>	operating parameters for a specified line, incorporating business and infrastructure service requirements, including any future requirements

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>cracking or spalling of the rail head</b>	surface damage in the form of visual cracks or breakout of small shallow sections of the rail surface typically 3 mm to 6 mm in depth
<b>creep pegs</b>	a pair of posts or other reference markers used to provide a reference for installed creep marks on the adjacent track or tracks
<b>creep mark</b>	reference marker (commonly punch mark on the head of the rail) recording the position of a rail at the time of stress adjustment Note: A creep mark allows for the measurement of subsequent longitudinal rail movement.
<b>crib ballast</b>	track ballast located between adjacent sleepers
<b>CRN</b>	Country Regional Network; heavy rail network across regional NSW comprising of operational passenger and freight lines and non-operational lines excluding interstate lines and the Hunter Valley coal network operated by Australian Rail Track Corporation (ARTC)
<b>crossing assembly</b>	component of a track system where lines branch out or intersect Note: Crossing assemblies assist in the passage of train wheels where two track rails intersect. Crossing assemblies may be fixed or switchable. In diamond crossings there are K and V crossings and in turnouts V crossings.
<b>crossfall</b>	grade on the formation or subgrade square to the track alignment to allow for drainage of the track structure
<b>cross level</b>	difference in level between the two rails in a track
<b>crossover</b>	means by which trains pass from one track to an adjacent parallel track Note: A crossover is constructed from two turnouts (one on each track facing opposite directions) and connecting plain trackwork
<b>cutting</b>	excavation of the natural ground to a determined cross section and longitudinal profile to accommodate the railway and any associated infrastructure
<b>CWR</b>	continuous welded rail; track where the rail is joined by welding (and other non-moveable joints such as glued insulated joints) in continuous lengths between fixed points or in lengths greater than 220 m and where adjustment controls are in place
<b>defect</b>	variation from maintenance or operating standards which exceeds the nominated limit Note: Also known as an exceedent.
<b>derailer</b>	rail traffic derailling device that, when operating to protect the main running line, causes wheels to climb the siding rail and derail clear of the protected line
<b>detailed walking</b>	thorough examination of a track length, by walking, of the components of the track structure and the right of way, to ensure that the components are satisfactory and contribute to a safe railway
<b>diamond crossing</b>	component of a track system where lines intersect Note: Diamond crossings comprise V and K crossings
<b>dogspike</b>	round spike that is driven into a pre-drilled hole in a timber sleeper to hold the rail foot and prevent against vertical and lateral movement

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>double glued insulated joint</b>	pair of glued insulated joints installed adjacent to each other on a running rail
<b>down rail</b>	rail on the left on a single track when facing away from Sydney
<b>drainage</b>	<p>the surface flow of water away from the track structure and cess including the following:</p> <ul style="list-style-type: none"> <li>• top and side drains along the railway reserve to direct water away from the rail track formation to recognised water courses</li> <li>• pipes installed expressly to collect water from between or beside tracks and direct it away to a recognised side drain or watercourse</li> <li>• waterways constructed under the track, whether by pipes, culverts or similar.</li> </ul>
<b>e clip</b>	<p>spring steel component attached to the foot of the rail having an appropriate stiffness that when installed maintains track gauge, creep resistance and twisting resistance</p> <p>Note: Clips are installed in pairs, one each side of the rail on a sleeper.</p>
<b>effective sleeper</b>	<p>in relation to timber sleepers, when the sleeper and fastenings combine to effectively support the rails vertically and provides lateral restraint</p> <p>Note: Restraint allows no lateral movement of the fastenings relative to the sleeper. The sleeper provides gauge restraint and is in one piece that will not separate along its length or transversely.</p>
<b>elastic fastenings</b>	see resilient fastenings which is the preferred term
<b>embankment</b>	stabilised fill formation, above the natural ground, to a determined cross section and longitudinal profile to accommodate the railway and any associated infrastructure
<b>exceedent</b>	see defect which is the preferred term
<b>expansion switch</b>	<p>assembly comprising two rails appropriately matched and fastened at the longitudinal interface to provide virtual continuity of the running rail and gauge faces while allowing controlled longitudinal slip</p> <p>Note: Expansion switches provide a level of control for rail stresses when tracks are attached to substructures (such as viaducts and steel underbridges) which are also subject to temperature related expansion and contraction.</p>
<b>fabricated crossing</b>	<p>crossing comprised of a V and two wing rails fabricated from sections of rail, set, machined and fitted together with blocks</p> <p>Note: The hand of the crossing is determined by the location of the point rail and may be right or left. The point rail is always the rail carrying the maximum tonnages, or higher speed. A right hand crossing has the point rail in the rail that connects to the right hand switch.</p>
<b>face work</b>	where sleepers are replaced systematically one after another (on a face)

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>field assembled insulated joint</b>	rail joint consisting of bored rail ends, insulated end post, high strength purpose designed insulated fishplates and insulated connecting bolts designed for assembly in the field Note: This joint provides electrical insulation between the connected rail ends with or without the use of insulating resin.
<b>field welding</b>	welding of rails together in the track by any process
<b>fishbolts</b>	bolts shaped to fit through fishplates to provide a mechanical rail joint
<b>fishplates</b>	mechanical joint components shaped to fit against the head, web and foot of a rail and by means of fish bolts, to provide structural support and a continuous running rail section
<b>fishscaling</b>	flow of steel at the gauge corner of the rail that resembles a series of fish scales which is a type of rail wear
<b>fixed crossings</b>	crossings that have a wheel flange gap in both rails Note: Wheel transfer at fixed crossings depends on matching wheel and rail profiles. Fixed crossings are used in conjunction with checkrails to provide lateral guidance in the crossing area.
<b>fixed point</b>	point or location in the track where the rail is fixed and cannot move longitudinally relative to the sleepers and ballast which includes locations such as turnouts and level crossings
<b>flame cut rail</b>	cutting of rail using a gas cutting process
<b>flangeway</b>	space adjacent to the gauge face of a running rail to allow for the passage of wheel flanges
<b>flangeway clearance</b>	distance between the gauge face of a running rail and the guard face of a checkrail or the guard face of a wing rail
<b>flangeway depth</b>	height of the running surface of the rail above the top of the blocks at checkrails and in V and K crossings
<b>flare</b>	tapered widening of rail at the ends of flangeways to gradually engage wheel flanges and position them to pass through flangeways Note: Also known as a bevel.
<b>flashbutt weld</b>	fusion welding of rail ends by electric arc heating and contact under high pressure which consumes a quantity of rail during the process
<b>flexible switch</b>	heel less switch machined from longer rails and fixed towards the end of the switch with blocks to the adjacent stockrail. The switch movement is provided by the flexibility of the longer switch rail
<b>formation</b>	base earthworks on which the track structure (subgrade, capping layer, ballast, sleepers and rails) is laid
<b>foul ballast</b>	ballast which has been contaminated by degraded ballast fines, failed formation material and possibly deposited material which restricts free drainage
<b>four foot</b>	area between the two rails of a track
<b>free welding</b>	welding without correcting rail adjustment
<b>French rail</b>	rail branded Longwy or Micheville installed in the nineteen fifties and exhibiting severe internal defects

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>front of train examination</b>	nonspecific examination which assists in the assessment of track by enabling the reaction of trains to the track structure to be observed (preferably at maximum allowable speed)
<b>frozen mechanical joint</b>	mechanical rail joint that is not free to open and close with changes in rail temperature
<b>fully cast crossing</b>	one-piece solid cast steel crossing with the four legs joined to standard rail sections through a welding process or by mechanical joints
<b>gauge</b>	square distance between the inside running (or gauge) faces of the two rails of a track measured at a point 16 mm below the top of the rail head
<b>gauge corner</b>	top corner of the rail between the gauge face and the top of the rail
<b>gauge corner fatigue</b>	damage to the gauge corner of the rail in the form of longitudinal cracks and irregularly spaced dark spots which may also take the form of fishscaling or lamination
<b>gauge face</b>	zone of the rail head facing the inside of the track below the gauge corner. In tighter curves the gauge face may be worn due to contact with the wheel flange
<b>gauge face angle</b>	angle of the gauge face to the vertical
<b>GIJ</b>	glued insulated joint; a pre-assembled rail joint consisting of rail sections connected by high strength, purpose designed fishplates and connecting bolts reinforced by a high-strength, insulating bonding material.  Note: A GIJ provides electrical insulation between the connected rail ends via the insulating resin.
<b>grade rail</b>	rail that defines the vertical position of the track  Note: On curves, the low rail is the grade rail. On tangent track normally the down rail is the grade rail.
<b>graded rail level</b>	design rail level of the track
<b>guard rails</b>	additional rails placed, normally inside but sometimes outside of the running rails, to restrain the lateral movement of a derailed wheelset  Note: Guard rails are used to protect structures such as bridges and in other higher risk situations to prevent significant damage to a derailed train.
<b>heel</b>	end of a conventional switch at which the switch pivots
<b>heel block</b>	single or multiple blocks, depending on switch type, that rigidly fix the switch rail to the adjacent stockrail in the correct geometric configuration
<b>heeled switch</b>	switch that pivots about a gapped joint between the switch rail and adjoining closure rail  Note: The heeled switch is bolted to the stockrail and closure rail using a heel block and fishplate designed to allow this movement.
<b>HH rail</b>	head hardened rail; standard carbon (as rolled) rail which has a specialised hardening process or treatment applied to the top and side surfaces of the rail head

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>high rail</b>	rail on the outside of a circular or transition curve generally with superelevation applied to it
<b>horizontal alignment</b>	designed horizontal location of track as measured relative to track control marks
<b>housed switch</b>	heavy duty switch and joggled stockrail equipped with a housing Note: The housing is a specially machined component with a hardened checking face fitting above the switch to act as a checkrail for the opposite switch and joggle. Where both switches are required to be heavy duty a housing is required on one of the switches.
<b>in-bearer</b>	hollow steel bearer designed to accommodate all the rodding associated with turnout switches which would normally be located between conventional bearers Note: In-bearers are used replace the A and B bearers of a turnout.
<b>insulated plate joint</b>	assembled joint consisting of bored rail ends, joined with purpose designed joint plates that are electrically insulated at all external surfaces and connected to the rail by high tensile bolts or swage fastenings Note: The preferred term is GIJ.
<b>interlocking</b>	interaction of equipment controlling switches and signals to prevent conflicting rail traffic movements and to ensure that routes are set correctly
<b>IRJ</b>	insulated rail joint; rail joint designed to prevent the flow of signalling circuit currents across the rail ends Note: In general, prevention of flow of signalling circuit currents across the rail ends is achieved by using insulating materials to separate the steel components of the mechanical joints. See also GIJ.
<b>JBS</b>	jointed bearer system; use of an elastic coupling to enable the division of a long concrete turnout bearer into two sections Note: The minimum bearer length used by this system is 3.1 m.
<b>junction rail</b>	rail with differing rail profiles at each end (for example 47 kg/m and 53 kg/m rail) in order to match with rails of dissimilar section
<b>JWR</b>	jointed welded rail; rails which are, individually, longer than 27.4 m and less than or equal to 220 m
<b>K crossing</b>	principal special component of a diamond crossing which is the intersecting component between two rails Note: This intersection creates an unchecked area in the centre of the diamond.
<b>kilometrage</b>	track distance from Sydney measured in kilometres Note: The origin for all kilometrages is measured from the buffer stop at No. 1 platform in Sydney Terminal
<b>kinematic envelope</b>	two dimensional cross-sectional representation of the swept path of a rail vehicle
<b>kinematic outline</b>	two dimensional cross-sectional representation of the swept path of all the vehicles authorised at a particular location

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>lading</b>	clearance outline of cargo carried on or in rail vehicles, including any fastening systems
<b>lamination</b>	formation of thin layers of metallurgically altered steel near the rail surface that typically interfere with ultrasonic signals used for rail examination
<b>leg</b>	a length of rail, normally 110 m
<b>line</b>	smoothness of the horizontal location of the track Note: Note the comparison of the definition of line with alignment. Track can have good line (that is, be straight or have a smooth curve) but have poor alignment (offset from design position). Conversely track can have good alignment (on design position at the survey marks) but poor line (not smooth line in between the marks)
<b>lockspike</b>	spring fastening spikes used to secure sleeper plates to timber sleepers Note: Lockspikes are driven through holes in the sleeper plate into the timber sleeper. As the spike penetrates the timber, the points of the spike separate and anchor the spike into the sleeper.
<b>loose rail</b>	rails which are 24.7 m or less in length
<b>LOTO</b>	lockout tagout; safety procedure used in industry to ensure that dangerous machines are properly shut off and not started up again prior to the completion of maintenance or servicing work
<b>low rail</b>	inside rail of a circular or transition curve
<b>LWR</b>	long welded rail; rails which are individually longer than 27.4 m and less than or equal to 220 m
<b>LX</b>	level crossing; structure provided at track grade to enable vehicular or pedestrian traffic to cross rail lines
<b>main lines</b>	lines normally used for running rail traffic through and between locations Note: Main running lines also include crossing loops, refuge loops and sidings.
<b>MPM</b>	major periodic maintenance: major track maintenance activities which are generally performed on a cycle greater than 12 months, for example, formation reconditioning, rerailing, ballast cleaning, resurfacing, rail grinding
<b>manual point lever</b>	apparatus consisting of a manually actuated lever and connecting rodding to operate points in turnouts and catchpoints or to operate a derail device Note: Manual point levers do not include ground frame or signal box levers that are generally connected to an interlocked signalling system.
<b>manual resleepering</b>	replacement of sleepers using hand tools and equipment and small on or off track plant

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>mechanical insulated joint</b>	conventional rail joint assembly incorporating insulating channels, ferrules and end posts where the components and insulation material are fitted to a modified mechanical joint and designed to electrically insulate the joined rails  Note: Mechanical insulated joint can be disassembled to their component parts and may include standard mechanical insulated joints or insulated plate joints.
<b>mechanical joint</b>	field assembled rail joint formed by mechanical means (as opposed to welding) comprised of fishplates, fishbolts and washers which provide a sliding joint that is designed within limits to allow the rail to expand and contract with temperature
<b>mechanised resleepering</b>	replacement of sleepers using dedicated teams and large production plant
<b>MGT</b>	million gross tonnes
<b>misalignment</b>	sudden horizontal displacement of track (includes rails and sleepers)  Note: A misalignment occurs when the compression generated in the rails exceeds the ability of the structure to hold itself in place and the track is displaced laterally. A misalignment has occurred when there is visible evidence that the sleepers have moved laterally in the ballast.
<b>monoblock sleeper</b>	prestressed concrete sleeper cast in a single piece
<b>MRA</b>	Metropolitan Rail Area; area bounded by Newcastle (in the north), Richmond (in the northwest), Bowenfels (in the west), Macarthur (in the southwest) and Bomaderry (in the south), and all connection lines and sidings within these areas, but excluding private sidings (Source: Order under Section 99D(2) of <i>Transport Administration Act 1988</i> (NSW), as gazetted on page 3132 of NSW Government Gazette of 28/6/2013.)
<b>MSDS</b>	material safety data sheet; a document that provides comprehensive information about the potential hazards of a product including its properties, safe handling procedures and emergency response measures
<b>neutral temperature</b>	temperature at which a rail will be neither in compression nor in tension  Note: Also called the stress free temperature (SFT). For example, in the MRA rail is to be adjusted so that this will occur at 35°C
<b>nominal size</b>	designation of an aggregate which gives an indication of the largest size particle present  Note; An example is ballast aggregates.
<b>non-critical area (rail)</b>	all areas that are not critical such as other flangeway areas, the base of the casting, outside walls, webs, flanges and ribs
<b>non-elastic fastenings</b>	fastenings that allow no vertical movement of rail, for example, dogspikes are non-elastic fastenings
<b>non-standard welded track</b>	track that does not conform to the definition of standard welded track and for which rail adjustment cannot be assessed with confidence
<b>OHW</b>	overhead wiring

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>OHWS</b>	overhead wiring structure Note: Also known as a stanchion.
<b>open ballasted track</b>	track comprising of rails, fastenings, sleepers and ballast, but not including special trackwork Note: Open ballasted track does not include track comprising of slab or embedded systems, or track on transom top bridges. Preferred term is plain track.
<b>operating limit</b>	limit or condition which triggers a mandatory response. The response depends on the asset and its condition and may include reviewing whether operational restrictions are required
<b>operating restriction</b>	restriction on the operation of rolling stock (such as speed, axle load, type of rolling stock, time of operation) to provide an appropriate level of risk in response to a specific infrastructure condition
<b>overbridge</b>	bridge carrying pedestrians, road vehicles or livestock over the track
<b>permanent rail joint</b>	non-welded rail joints intended for long term use which includes fishplated joints, bonded insulated joints and expansion switches
<b>plain track</b>	section of ballasted track not containing any special trackwork
<b>pod</b>	space under a steel sleeper designed to be packed with ballast
<b>points and crossings</b>	combination of rail and track components that provide for one track to join or cross another whilst maintaining continuous support and direction to the rolling stock wheels Note: The points are the location where one track separates into two tracks (or vice-versa) and generally includes moving rail components called switches or switch blades. The crossing allows rolling stock wheels to cross over a rail. Combinations of points and crossings may be used to construct various track structures including slips, diamond crossings, turnouts and catchpoints. The preferred term is turnouts and special trackwork
<b>points assembly</b>	location where one track separates into two tracks (or vice-versa) consisting of the complete assemblies including switches, stockrails, heel blocks, anti creep devices (if required), baseplates, switch slide plates, switch stops and fasteners Note: Preferred term is turnout with the points assembly being part of the turnout.
<b>prestressed concrete bearer</b>	concrete bearer where the deformed reinforcing bars (tendons) are stressed before casting the concrete
<b>prestressed concrete sleeper</b>	concrete sleeper where the deformed reinforcing bars (tendons) are stressed before casting the concrete
<b>PRS</b>	partial resleepering; replacement of sleepers in a pattern or randomly to maintain a general sleeper condition in a track section Note: Normally PRS is applicable to timber sleepers track sections.
<b>rail</b>	rolled steel section installed in the track and fastened to gauge for the purpose of carrying railway traffic Note: Also known as plain or Vignole rail.

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>rail adjustment</b>	procedure used to ensure welded track is in a stress free state at the defined neutral rail temperature of 35°C
<b>rail anchoring</b>	use of fair type anchors with timber sleepers and resilient rail fastenings to restrain (anchor) the rails from moving longitudinally through the sleepers
<b>rail anchors</b>	devices (fair type anchors) attached to the rail, adjacent to the edge of the sleepers to prevent longitudinal movement of the rail relative to the sleepers
<b>rail brace</b>	component used in points assemblies to fasten the stockrail in position where fastenings on the gauge side of the rail cannot be used. Note: The rail brace is bolted through the web of the stockrail. It contacts the underside of the head and the top of the foot of the stockrail and is used for stockrail support to maintain the gauge. Applicable only to conventional turnouts.
<b>rail brace plates</b>	plates that attach the rail brace to the bearer Note: The plates are distinguishable by a number at the end. Applicable only to conventional turnouts.
<b>rail bunching</b>	rail creep towards a fixed point, resulting in increased compressive stress
<b>rail corrugations</b>	cyclic wave defects that form on the surface of the rail Note: There are the following two types of rail corrugation: <ul style="list-style-type: none"> <li>• short pitched about 30 mm to 90 mm wavelength with a characteristic regular sequence of bright peaks with darker hollows on the running surface</li> <li>• long wavelength around 300 mm pitch with depressions in the running surface.</li> </ul>
<b>rail creep</b>	longitudinal movement of rail through the fastening system Note: For CWR track rail creep is generally measured as the net movement of rail in mm into and out of a defined section.
<b>rail defects</b>	rail discontinuities (for example, rolling contact fatigue, cracks, studs and squats) greater than the minimum size and for which there is a defined repair response
<b>rail end batter</b>	permanent plastic deformation of a rail end at a joint resulting from wheel impacts
<b>rail gap dial calculator</b>	round slide rule type calculator using rail temperature and rail length to give appropriate rail gap for a neutral temperature of 35°C before installation of an aluminothermic weld Note: For use with CWR work only
<b>rail gap</b>	space between rail ends in jointed track
<b>rail head</b>	region of the rail above the top of rail web
<b>rail level</b>	level of the top of the rail Note: The graded rail level is the down rail on straight track and the low rail on curved track.

Term or abbreviation	Definition or term in full
<b>rail lubricator</b>	device attached to a running rail designed to apply a controlled volume of lubricant to passing wheel flanges which transport and deposit the lubricant onto the high rail of curves to reduce friction and the wear of wheels and rails
<b>rail pads</b>	pads made of high density polyethylene or rubber that fit into the sleeper plate (or between the lugs of a concrete sleeper) and act as an interface between the sleeper plate (or sleeper) and the rail
<b>rail side wear</b>	rail wear that normally occurs at the gauge face on the high leg of curved track and has only a minimal amount of top wear Note: Side wear can be measured either by determining the width of the rail 16 mm below the running surface or the loss of head area as a percentage of the original head area.
<b>rail temperature</b>	temperature recorded on the web of the rail on its shaded side
<b>rail temperature error</b>	an expression of rail adjustment in degrees Celsius indicating the extent of rail adjustment deviation in relation to the standard neutral temperature of 35°C which is calculated by subtracting the theoretical measured temperature from the actual measured temperature
<b>rail top wear</b>	rail wear that normally occurs on the top running surface of the rail in tangent track or the low legs of curves Note: Rail top wear usually has a minimal side wear component.
<b>rail wear</b>	abrasion of rail due to contact between rail and rolling stock wheels Note: Rail wear occurs as top (tangent) wear or side (curve) wear.
<b>RCF</b>	rolling contact fatigue; deep seated cracking that occurs on the rail head due to high contact stresses between wheel and rail
<b>resilient baseplate</b>	device for securing rails to sleepers, transoms, bearers or track slabs Note: The fasteners are required to moderate noise and vibration. The baseplates typically consist of a resilient material bonded to a lower frame and rail base. Typically known as Alt 1 or Cologne eggs.
<b>resilient fastenings</b>	combination of elastic steel clips, insulators and pads attached to sleepers or bearers and designed to engage the foot of the rail with a degree of elasticity between the sleeper and rail with the aim of avoiding the loosening of the fastening due to vibration Note: These clips fasten rails to the sleepers or bearers providing lateral support. Standard resilient fastenings also generate toe load against the foot of the rail providing resistance to longitudinal movement. For special applications where longitudinal rail anchoring is not desirable, resilient fastenings may be designed for zero toe load. Note: Also known as elastic fastenings.
<b>right of way</b>	the area of land extending to the railway boundaries Note: Also known as the rail corridor.
<b>RIM</b>	rail infrastructure manager; in relation to rail infrastructure of a railway, means the person who has effective control and management of the rail infrastructure, whether or not the person – (a) owns the rail infrastructure; or (b) has a statutory or contractual right to use the rail infrastructure or to control, or provide, access to it.

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>rolling stock cross-section</b>	static cross-sectional dimensions of the rolling stock symmetric about the rolling stock centreline
<b>rolling stock outline</b>	combination of rolling stock cross-section, bogie centres (or wheelbase for non-bogie rolling stock) and body overhang, and applied rolling stock tolerances, which define the swept path of the rolling stock
<b>rolling stock tolerances</b>	allowable displacements of the rolling stock from the design rolling stock outline centred on the guiding wheels Note: Rolling stock tolerances are described in terms of translations and rotations of rigid bodies relative to infrastructure.
<b>RS</b>	rolling stock; any vehicle which operates on or uses a railway track, including any loading on such a vehicle, but excluding a vehicle designed for both on and off track use when not operating on the track such as a hi rail vehicle
<b>running surface region</b>	area on top of the rail head where contact between the wheel and rail occurs
<b>safe place</b>	place where workers and equipment cannot be struck by rail traffic such as: <ul style="list-style-type: none"> <li>• a properly constructed refuge to an approved design</li> <li>• behind the safety line on a platform</li> <li>• a structure or a physical barrier that provides protection for example an OHWS</li> <li>• a place that is not on or near the track.</li> </ul>
<b>safety clearance margin</b>	defined clearance beyond the kinematic envelope (for example, KE+200 mm) necessary for safe operation using specified track and rolling stock tolerances
<b>Scharfenberg coupler</b>	type of multifunction fully automatic railway coupler, called a 10A, used on passenger rolling stock
<b>second-hand rail</b>	see cascaded rail which is the preferred term
<b>service requirement</b>	clearance beyond the safety clearance margin that enables defined service tasks to be undertaken.
<b>Sharon interlocking coupler</b>	type of automatic coupler, called an AAR 10A, generally used on freight rolling stock and older passenger rolling stock
<b>shielding</b>	when ultrasonic testing of the rail for defects is inhibited by physical or metallurgical alteration to the rail at the rail head
<b>short rail</b>	see loose rail.
<b>shoulder ballast</b>	ballast placed outside the end of sleepers
<b>sidings</b>	all operating lines which are not main lines
<b>single or double slip</b>	special trackwork that combines turnouts and diamond crossings Note: Single or double slips allow train movements both across, onto and out of a track.
<b>six foot</b>	area between two tracks

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>sleeper plates</b>	steel plates that are fastened to the top of sleepers and onto which rails are placed Note: In plain track they are sloped inwards to provide the rail base with a 1 in 20 cant.
<b>sleepers</b>	timber, concrete, steel or composite material planks of defined dimensions that are spaced at intervals on the ballast and on which sleeper plates and rails are laid and fastened Note: Sleepers provide the method of fixing track gauge and transferring vertical, lateral and longitudinal loads to the ballast.
<b>sleeper spacing</b>	distance between the centrelines of adjoining sleepers nominally 600 mm
<b>special trackwork</b>	all track arrangements that are not plain track (that is, only two rails in parallel) Note: Special trackwork includes turnouts, diamond crossings, catchpoints and expansion switches.
<b>special loads or profiles</b>	rolling stock or loading envelopes that infringe approved rolling stock outlines Note: An example is out of gauge loads.
<b>spring wing crossing</b>	switchable V crossing with both a fixed and spring wing leg Note: The spring wing effectively eliminates the flange way gap when using the main line thus reducing the wheel generated impact in the crossing area. The wheel flange forces the spring wing open when taking the turnout road.
<b>SC rail</b>	standard carbon rail; rail manufactured to AS 1085.19 Note: Also known as plain rail or rolled rail.
<b>standard welded track</b>	track on which rail adjustment can be measured by the methods available to track staff (gap measurement, creep measurement and alignment measurement) and, for which, as installed reference information, where required, is available Note: Standard welded track includes JWR and CWR.
<b>stockrails</b>	part of the special trackwork unit that provides support for the closed switch and become the running rail when the switch is open Note: Stockrails can be curved, set or joggled.
<b>stress free</b>	rail that has balanced stresses neither in tension nor compression in relation to rail adjustment
<b>stress free temperature</b>	see neutral temperature which is the preferred term
<b>structure gauge</b>	defined envelope around the track within which no structure is permitted
<b>subgrade</b>	engineering material above the formation of the track and below the capping layer
<b>summer period</b>	the period from 1 November to 31 March related to hot weather instructions applicable in the MRA

Term or abbreviation	Definition or term in full
<b>superelevation</b>	vertical distance that the outer rail is raised above the inner or grade rail  Note: This is the preferred term. The term cant is not to be used in this context.
<b>swage fasteners</b>	high tensile, high clamping strength bolts and fastenings that may be used as replacements for conventional fishbolts for specified applications
<b>swept path</b>	maximum three dimensional volume taken up by a specified rolling stock outline (including rolling stock tolerances) as it moves along a track at specified track tolerances
<b>swing nose crossing</b>	switchable V crossing with a nose assembly that moves from the main line rail to the turnout rail, depending on the train movement and providing a continuous surface for the wheel to run through the crossing  Note: Part of special trackwork. Swing nose crossings are intended for use with straight crossings only. No checkrails are required with this crossing type
<b>switch</b>	machined tapered rail that allows the direction of a train to be altered to another line  Note: Part of special trackwork. A switch consists of a section of rail set and machined to a design shape, drilled to detail to accommodate switch operating rodding and heel blocks or chocks to allow attachment to a stockrail.
<b>switchable crossing</b>	see swing nose crossing
<b>switch rollers</b>	rollers that support the switch of special trackwork during opening and closing operations  Note: Switch rollers can be located in the bay between bearers, usually bolted to the stockrail, or be fabricated as a part of the plate assembly under the switch. Switch rollers eliminate the need to lubricate the switch plate or switch interface.
<b>switch stops</b>	stops bolted to the web of the stockrail in special trackwork that make contact with the web of the switch when the switch is in the closed position, providing lateral support  Note: Switch stops can be manufactured from castings, rolled angle section or extended bolts.
<b>switch tip</b>	point at the end of the switch  Note: Also known as a switch toe or switch end. Preferred term is switch tip.
<b>take-off pad</b>	structure to allow vehicular access to the track for hi-rail vehicles  Note: Also known as a pad.
<b>TAL</b>	tonnes axle load (in terms of allowable track capacity)

Term or abbreviation	Definition or term in full
<b>tangential switch</b>	switch manufactured from an asymmetric rail section flashbutt welded to a normal rail section towards the fixed end of the switch in special trackwork  Note: A tangential switch has a continuous curve through the full length of the switch. The curved gauge line of the switch is tangent to the gauge line of the attached stockrail at a distance in front of the switch tip to a point known as the turnout tangent point (TOTP).
<b>tangential turnout</b>	turnout consisting of a geometrically curved flexible switch on the turnout road leading into curved geometry through the crossing  Note: The bearers for this turnout are set at a half angle (fanned) to both roads.
<b>temporary rail joint</b>	non-welded rail joints intended for temporary joining of rails only, and generally requiring special measures to be implemented with their use  Note: A temporary rail joint permits the short-term passage of trains and may include special inspections or speed restrictions.
<b>tension</b>	state of rail at low temperature where in jointed rail, the rail contracts and gaps are fully opened
<b>terminal</b>	when the track or route ends, a station is known as a terminus or terminal, for example, Richmond
<b>TCI</b>	track condition index; numerical evaluation of track geometry condition used to establish and compare standards of track
<b>TCM</b>	track control mark; mark specifically placed to provide a reference to the adjacent track, to allow rail maintenance and construction personnel to locate the track in its correct spatial location
<b>TfNSW</b>	Transport for NSW
<b>theoretical measured temperature</b>	anticipated rail temperature predicted by a given set of rail gaps for known rail lengths if that rail is to be in correct adjustment
<b>theoretical point</b>	this point is located on the crossing nose at the intersection of the gauge lines of the two running rails, forming the crossing in special trackwork  Note: Normally identified by punch marks.
<b>tie and surfacing</b>	process by which sleepers are installed in partial resleepering and the ballast packed under and around the sleepers to the required track geometry and ballast profile tolerances
<b>TMC</b>	technical maintenance code; used to identify the variation of unique technical specifications for an asset type. Assets are assigned a TMC to reflect their configuration based on the asset type and specification and to define the applicable maintenance plan
<b>TMP</b>	technical maintenance plan; a document which details which items are to be maintained, what maintenance tasks are to be done, and when and where the maintenance task is to be performed including required materials, consumables, tools and equipment
<b>toe load</b>	the force in kilonewtons applied on the rail foot flange by one clip of a pair acting through the insulator
<b>top</b>	vertical alignment of the rails

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>TOR</b>	top of rail
<b>track clearance</b>	the space between the kinematic envelope of approved rolling stock and an adjacent structure, or between rolling stock on adjacent tracks
<b>track examination system</b>	group of examinations of the track and right of way which are carried out on a scheduled basis
<b>track geometry</b>	design horizontal and vertical alignment including superelevation of the track
<b>track geometry tolerance</b>	allowable displacement of the track (for construction and maintenance) from its design track alignment
<b>track slab</b>	track structure consisting of mass concrete with plates and rails attached
<b>track stability loss</b>	estimate of the vulnerability of a track section to misalignment (or curve pull in) due to variance in rail adjustment and loss of resistance to lateral movement  Note: Track stability loss is calculated by assigning % values to a set of negative factors (rail adjustment, ballast profile, disturbance, condition and so on).
<b>trailable point lever</b>	manual point lever that is designed to allow for rolling stock wheels trailing through points set the wrong way to re-set the points for the trailing movement without the need to operate the lever
<b>transition</b>	track geometry component which joins a straight to a circular curve or connects circular curves of different radii  Note: For the TfNSW heavy rail network, the transition is based on a cubic parabola. Normally superelevation is applied linearly along a transition.
<b>transit space</b>	clearance envelope that provides for the safe passage of defined rolling stock and for infrastructure service requirements  Note: The clearance envelope is defined by a transit space outline referred to as structure gauge.
<b>transom</b>	transverse members of track-supporting structures for underbridges to which the running and guard rails are fastened  Note Transoms are designed specifically for track support but should not be treated as sleepers. Transoms are normally made from timber or composite materials.
<b>TSR</b>	temporary speed restriction; a temporary reduction in authorised track or line speed due to abnormal conditions (such as a hot weather WOLO) or an exceedance of a track parameter limit.  Note: A TSR can implemented by Network Control or the Track Maintenance representative.
<b>turnout</b>	special trackwork that allows rail traffic to converge or diverge into or from a single track
<b>turnout length</b>	distance from the tip of the switch to the theoretical point measured along the main line running rail containing the crossing

<b>Term or abbreviation</b>	<b>Definition or term in full</b>
<b>turnout radius</b>	radius of the centreline of the curved turnout track Note: The turnout radius is tangential to the switch at the heel (real or imaginary) and to the appropriate leg of a straight crossing. The radius is carried through a curved crossing.
<b>turnout rail</b>	closure rail that joins the turnout switch to the crossing, as part of the secondary track. It may consist of more than one rail length
<b>twist</b>	variation in actual track cross level between two locations separated by a nominated distance (along the track) Note: Short twist is measured over 2 m (which is indicative of the wheels on one RS bogie set) and long twist is measured over 14 m (which is indicative of the RS bogie centres).
<b>underbridge</b>	bridge supporting the track and passing over waterways, roadways, pathways and flood plains
<b>undercut switch</b>	switch typically installed in conventional turnouts Note: An undercut switch is a full depth rail, machined from a full rail at the heel to a tapered point which fits closely against a machined undercut stockrail which allows the switch tip to move partially under the stockrail head. Both the switch and stockrail foot sit at the same level.
<b>underground services</b>	pipes, cables and other services facilities including combined service routes located underground which may include signalling, power and communications cables, water, drainage and sewerage pipes, gas and other fuel supply lines Note: Services in the MRA are captured under the detailed site survey (DSS). Other services are identified using the "Before You Dig" resource.
<b>up rail</b>	rail on the right on a single track when facing away from Sydney
<b>V crossing</b>	a unit of special trackwork that allows a train travelling on the turnout direction rail to cross the mainline rail Note: The crossing rate is a measure of the angle made by the main line and turnout rail gauge faces that intersect at the theoretical point. All crossings are identified by markings on the wing rail which are provided during manufacture. The catalogue number allows the geometry of the particular crossing to be identified.
<b>vibration isolating track fasteners</b>	See resilient baseplates
<b>VPR</b>	virtual planroom; TfNSW engineering document management system for storing electronic drawing files, project documentation and archives Note: The VPR is also known as the asset lifecycle information management (ALIM) system.
<b>windrow</b>	build-up of material on the edge of newly graded ballast

Term or abbreviation	Definition or term in full
<b>wing rail</b>	<p>rails of a crossing (on the end closest to the switch in a turnout) that are flared to allow the passage of the wheel to transfer to or from the crossing nose</p> <p>Note: Wing rails are named for their resemblance to a wing in shape. There is a difference between a wingrail and a checkrail – a wingrail bears load from wheels while checkrail checks wheels against lateral movement. Wingrails in K crossings perform both functions (they bear and check).</p>
<b>wheel burns</b>	<p>damage to the surface of the rail in the form of sharp dips or head flow caused by continuous slip of rolling stock traction wheels</p> <p>Note: Damage can be from abrasion or from heat generation.</p>
<b>WOLO</b>	track speed restrictions applied during hot weather
<b>WTSA</b>	<p>welded track stability analysis; process used to assess potential for track to misalign during hot weather</p> <p>Note: This contributes to the measure of track stability loss.</p>