Common provisions. Definitions, abbreviations and symbols

1 Purpose and scope

The purpose of this chapter is to provide an overview and explanation of the definitions, abbreviations and symbols used in the regulations applying to maintenance.

The definitions are not categorised, whereas the abbreviations and symbols are categorised by technical field. Not every technical field contains all three categories, i.e. definitions, abbreviations and symbols.

Definitions, abbreviations and symbols are shown in alphabetical order for ease of reference.

2 Definitions

A-advancing
Refer to advancing.

access control
Installation, procedure or routine to control which personnel have access to areas containing equipment that is critical to safety.

aggregate
Combination of several individual machines that have been connected for a particular purpose. For example, for producing electrical power.

axle load
The vertical static load exerted by a wheel pair (axle) on the track.

alarm system
System for collecting and transferring various status and equipment alarms.

aluminothermic welding
Method of welding joints in rail tracks.

anchor
Ring for attaching spring (fastening component), set into concrete sleeper, made of forged steel or cast iron.

approach warning
Device that rings a bell or sounds a similar warning when a train with a given direction of travel passes a defined point.

construction track
Temporary track used for the delivery of rails and sleepers for new installations.

ATC
Refer to Automatic Train Control.

audio-frequency track circuit
Refer to jointless track circuit.

automatic command
Command issued automatically in accordance with certain conditions.

Automatic Train Control (ATC)
A technical system that transfers signal information from track to train and that also monitors trains to ensure that they proceed in accordance with the signals given. There is a difference between partial ATC and full ATC.

Automatic Train Control (ATC), FATC
Full ATC. The signal information that has been transferred contains information about the permitted maximum speed.

Automatic Train Control (ATC), DATC
Partial ATC, formerly known as ATS (Automatic Train Stop). Information about permitted
maximum speed is not used.
Automatic Train Control (ATC), ATC marker board
Signal sign indicating that speed information may be indicated by the ATC system.

**automatic route release**
Route released automatically by the passage of a train.

**uninterruptible power supply**, UPS
System that maintains the power supply to an installation (or parts of an installation) using an alternative power source, ensuring that the power supply is not disrupted if the normal power supply fails.

**branch point**
Electrical junction of three or more lines without 15 kV switchgear.

**branch**
Wire branching down from the switch, line or insulator to the overhead contact line system.

**diverging points**
Refer to **run-off points**.

**discharge voltage**
Highest value of the voltage between the overvoltage arrester's terminals during a power surge, also known as the protection level or residual voltage.

**protective screen**
Refer to **protective barrier**.

**termination**
End of section of overhead contact line, attached to a mast or other permanent structure. The termination may be fixed or flexible.

**spacer block**
Cast iron spacer block in rail crossings, at check rails and in joint tongue structures, in order to ensure that the flange groove is the correct size.

**pull-off**
Non-bearing side extender used to keep the overhead contact line within permissible limits in curves between cantilevers. Pull-offs must be insulated from masts.

**divergence, diverging track**
The track diverging from the main track at a set of points.

**diverging radius**
Radius of circular curve formed by a diverging track at a set of points.

**Backplate**
Plate (generally black) placed behind signal lamps in order to improve visibility.

**Rear edge of points**
Joints where points meet the fixed rails behind the rail crossing.

**Track realignment**
Work of moving the track laterally (track realignment).

**Balise**
A device in the track that transfers information at intervals to locomotives. Balises provide information about speed, distance and uphill/downhill gradients. They can also pass information to the train radio. A balise may be controllable or a fixed data balise.

**Balise, A-balise**
Balise providing information about speed, permitted and/or target speed.

**Balise, B-balise**
Balise providing information about distance and/or indicating direction.

**Balise, C-balise**
Balise providing information about distance and uphill/downhill gradient.

**Balise, N-balise**
Balise providing the train radio with positional information.

**Balise, P-balise**
Balise providing additional information (distance information) by signalling across more than one signal section.

Balise signal
Signalling information transferred from track to train via balises.

Balance weight assembly
Balance weight that evenly distributes the total tensioning between messenger wire and contact wire.

**Ballast**
Layer of crushed stone or gravel on the track formation, providing drainage from the track and distributing pressure from the sleepers to the substructure.

**Depth of ballast**
Vertical distance from the track formation to the top edge of the rail.

Ballast material
Material from which the layer of ballast is formed (e.g. gravel).

Ballast resistance
Ohmic resistance between the two lengths of rails, represented in sleepers and ballast.

Ballast profile
Cross-sectional profile of ballast layer.

Ballast cleaning machine
Rail-based machine for screening ballast.

Ballast screening
Work operation to remove fine debris or particles from the layer of ballast.

Ballast resistance figure
Figure expressing the resistance (force) against the vertical deformation exerted by the rail foundation, independent of the supporting area of sleepers. Usually measured in the unit N/mm³. The ballast resistance figure may be interpreted as the force exerted by the base of the rail, by millimetre sag per millimetre rail per millimetre width of theoretical longitudinal sleeper. The width of the theoretical longitudinal sleeper can be found by converting the supporting area of the cross-sleepers to longitudinal sleepers under each rail.

Ballast shoulder
The portion of the ballast profile lying outside the ends of the sleepers.

Ballast stress
The stress (defined as force per unit of area) occurring in ballast.

Ballast wagon
Railway wagon used to deliver ballast material.

Track priority
The rail network has priority classifications mainly based on: Current use of the rail network, anticipated growth in traffic and benefit to society.

Section of line
A defined section of a railway line.

Traction current
The electric current used for the electric propulsion of trains and for heating rolling stock.

Anchoring wire
Steel line used to brace masts.

Bracing wire anchor
Flat, round concrete plate or foundation that is buried in order to tie down anchoring wires.

Anchorage bolt
Bolt in rock used to secure anchoring wire.

Base station
Physical outdoor location used for static radio equipment, mast and antennae.

Battery back-up
Back-up batteries that automatically supply technical telecom installations in the event of
primary power supply failure.

Battery bank
Collection of batteries used to achieve desired capacity.

Fastener
Structural component connecting rail and sleeper.

Start point
Signal that marks the start of a route or shunting route.

Occupied track circuit
A track circuit that is electrically short-circuited through the axles of the rolling stock, contact magnets or similar.

Coiling
Method of attaching cable to insulator using wire or spiral.

Protective barrier
Barrier of approved design, to prevent access to live components.

Protective earth
Permanent conductive connection from exposed parts of installations to earth or other conductive objects that themselves have a good earth connection. The protective earth network must ensure that persons are protected from hazards that may arise as a consequence of coming into contact with live components or components that may become live as a result of a fault.

Protective conductor
Conductor that, in order to prevent dangerous shocks, connects exposed components and other live parts either to: main earthing terminal/main earthing bar, earthing electrode, earthed point or artificial neutral point in the power source.

Insulated section
Short section between a live and an earthed section; this is normally disconnected without being earthed.

Protective screen
Refer to Screen.

Manually operated points
Points controlled by a shunter from the immediate vicinity. The points are fitted with a point lock or point clip.

Automatic tensioning
Anchorage of a section of overhead contact line that ensures constant tensioning despite temperature variations.

Moveable frog
The nose of a crossing in a set of points that moves when the points are switched over, ensuring that the wheels are supported at all times through the points.

Moveable wing rail
The wing rail in a set of points that moves when points are switched over, ensuring that the wheels are supported at all times through the points.

Manned level crossing
Level crossing with barrier that is controlled by a gate-keeper.

Bit error rate
Number of bit errors received against the total number of bits sent.

Block check
Interlocking that prevents a block section from being released before a positive message has been received from the adjacent station or block post that the line is clear, that opposing signals are set at stop and that the signal behind the train is set at stop.

Block post
Boundary between two block sections.

Block telephone
The block telephone is an external telephone used by the train crew for communications with the traffic controller regarding train operation. It is located adjacent to all main signals along the NNRA's tracks on CTC sections of line.

**Block telephone installation**
- The block telephone installation comprises several block telephones, including a central unit/control system. It is used for communications regarding train operation between train crew and traffic controllers.

**Block telephone centre**
- Central unit in the block telephone system used to control and direct voice communications.

**Drill template**
- Template that indicates the locations of holes used to attach sleeper screws to wooden sleepers.

**Advancing**
- Advancing target point using ATC. A balise indicates a new target speed (stop or new speed limit) applicable beyond the nearest signal. The distance beyond the signal is the 'advancing distance'. A-advancing is used when speed indication is given via points. P-advancing is used when through signalling is used. The signal value for the main signal is indicated beyond the nearest main signal.

**Vignoles rail**
- Rail with a broad base; normal rail.

**Broad-gauge track**
- Railway track with a nominal track gauge greater than 1,435 mm.

**Flash-butt welding**
- Electrical resistance welding, for welding joints on rails in stationary installations or tracks, using a rail-based machine.

**Rail fracture indication**
- Defect in a rail that leads to a rail fracture.

**Rail fracture frequency**
- Number of rail fractures per 10 km within a given time frame.

**Reference point**
- Geodetic reference point, specific to the NNRA, where ground plan and height coordinates have been determined by the use of polygons.

**Bridge sleeper**
- Special wooden sleeper used in tracks on steel bridges.

**Switch cable**
- Cable connection leading to or from a switch.

**Overall length**
- Length of a set of points, measured from the stock rail joint to the joint at the rear edge of the rail crossing.

**Messenger wire**
- Wire made from copper, copper-steel or bronze, in which the contact wire is suspended by droppers or hangers.

**CTC**
- Refer to Centralised Traffic Control.

**Run-off points**
- Points that are locked in a position that prevents routes or shunting routes from coming into conflict with each other.

**Partial route release**
- Route that is gradually released as the train passes the points in that route.

**Expansion**
- Length variation of rail or bridge structure caused by temperature changes or traffic load.

**Expansion dimension**
The calculated length of expansion which a rail must be given in order to obtain its neutral length before welding (continuous welded rail).

**Expansion gap**
- Gap between two rail ends, allowing longitudinal movement.

**Design speed**
- The speed that all technical installations must satisfy as a minimum.

**Registration tube**
- Structure that keeps the contact wire in the horizontal plane.

**Direct fastening**
- Fastening system whereby the rail is fastened directly to the sleeper, if necessary in conjunction with a baseplate.

**Direct interlocking**
- Interlocking that is a result of the direct effect of an interlocking device. It is independent of other devices and thus does not require operation in any particular sequence.

**Direct command**
- Command that can only be effectuated if every condition is fulfilled at the time the command is issued, e.g. points operation.

**Spark gap**
- (Refer to Electric breakdown protection) Overvoltage protection that forms a permanent earth connection when a power frequency overvoltage occurs over the arrester.

**Double-insulated track circuit**
- Both rails are insulated from each other. The traction current is fed to a filter impedance bond that ensures it is split into two equal parts that feed to each of the rails. The design of the filter impedance ensures that the track circuit current has a relatively large impedance. The track circuit relay is connected as for a single-insulated track circuit.

**Double-curved points**
- Curved points in which each of the two tracks curves in a different direction.

**Twin sleeper**
- Two wooden sleepers screwed together with connecting bolts.

**Drainage ditch**
- Structure that absorbs or collects groundwater and directs it away to a secure outlet.

**Train formation yard**
- Area mainly used for the operation and maintenance of rolling stock, where rolling stock is moved in shunting operations.

**Operating speed**
- The speed that in practice is the maximum achievable speed for rolling stock. This speed must form the basis of timetable planning.

**Operational earthing**
- Good conductive connection between an installation's operational circuit and earth.

**Drive mechanism**
- Mechanical, electrical or hydraulic device for switching points.

**Drive unit**
- Refer to Point machine.

**Drive device**
- Refer to Point machine.

**Point machine**
- Machine that operates points or derailers. May comprise one or more points of application.

**Dwarf signal**
- Signal, usually positioned low to the ground, to provide signals for shunting movements. Also used for signalling other train movements.

**Dowel**
- Sleeve of synthetic material or cast iron, used when attaching sleeper screws to sleepers; used
to line worn screw holes in wooden sleepers and when attaching sleeper screws to concrete sleepers.

**Dynamic gap**
Temporary distance between live component and non-live component when one of the components is moving.

**Dynamic track stabilising machine**
Rail-based machine that uses vibrations against the rails to compact the layer of ballast, enabling it to regain some of its stability after works on the line.

**Vigilance button**
Device for monitoring alertness. If the train driver does not react to certain indicators, the train is stopped automatically. This device does not form part of the signalling system.

**Dead section**
A short section that is disconnected to prevent the current collector from connecting two feeder stations.

**Usable length of track**
Length between two centre points; i.e. the length of a track on which it is possible for rolling stock to stand without blocking the adjacent track.

**Electrical interlocking**
Interlocking by means of an electric current that acts on equipment either by directly preventing any adjustments or by breaking the command circuit.

**Electric lock**
Equipment that prevents a moving part from changing its condition, by means of a mechanical part that is operated electrically.

**Electric resistance welding**
Flash-butt welding, used for welding joints on rails in stationary installations or in tracks, with rail-based machines.

**Electric command**
The issuance of commands using electric currents.

**Electric point detection**
Device that is connected to the blades on a set of points and fitted with contacts that can be used for interlocking, command or monitoring purposes.

**Electromagnetic compatibility**
EMC, the capacity of equipment to function satisfactorily in its own zone without causing intolerable electro-magnetic interference with other equipment within the same zone.

**Electrotechnical building**
Blanket term for buildings housing electrical installations, such as relay rooms, block post cabins, radio cabinets, etc.

**EMC screen**

**Proposal 1:** Physical or virtual barrier to prevent electromagnetic interference between sensitive circuit elements. The shield must prevent emissions from electronic circuits to the surrounding area, or protect equipment from electromagnetic radiation from the surrounding area.

**Proposal 2:** Screen that reduces the electromagnetic influence of objects surrounded by the screen, or the influence from objects surrounded by the screen.

**Proposal 3:** Delimitation of an area with specific requirements regarding limit values for radiation emitted to or absorbed by electromagnetic fields. The screen may be formed of a cabinet, enclosure, walls, air corresponding to the distance requirement indicated, etc.

**End crossing**
Rail crossing at each end of a slip switch.

**Energy supply**
Energy supplied from energy supplier via feeder stations to the overhead contact line network.

Single points
Points consisting of one main track and one curved diverging track.

Single-insulated end-fed track circuit
One rail is insulated at both ends of the track section that requires inspection. A voltage source is connected to the two rails at one end (the supply end) and collected at the other end (return end).

EUREF89, European Reference Frame 1989

Power plant earth
Term used to describe the earthing network that is connected to the power plant's protective earth.

Qualified expert
Person with sufficient expertise and approvals to perform work on a specified installation.

fail safe
The characteristic that an installation goes to a safe state in the event of a fault. That means that a safety-critical situation must not arise as a result of a fault in the installation. (Fail to safe).

Downhill/uphill gradient
Longitudinal profile, with reciprocal distance of 1,000 m, in a straight line. For a longer section, the ruling downhill/uphill gradient is the greatest value that can be calculated for the section using this method.

False signal aspect
A signal showing a different aspect than the intended one.

Phantom signal aspect
False signal aspect showing because of optical conditions such as reflections, background light, etc.

Phase voltage
Voltage between neutral and phase.

Fixed termination
Fixed anchorage at the end of a section of overhead line.

Permanent joint
Welded or fishplated joint supported by a sleeper or twin sleeper.

Geodetic reference point register
Systematic catalogue of geodetic reference points that exist or have existed for an area, including information about individual geodetic reference points.

Common tangent point (FK)
Point at which two circular curves meet, with no transition curve in between.

Fictive signal
Signal given only as a balise signal. No optical signal aspect is shown.

Filter
Generic designation for filter impedance, impedance pole or other filter, which is high-ohmic for track circuit current and low-ohmic for 16 ⅔ Hz, which, for a duration to be specified, must be capable of conducting power under abnormal conditions, such as short circuits in the overhead power line network. The filter connection should also be low-ohmic for atmospheric overvoltages.

Filter impedance, impedance pole
Filter that blocks signalling current and allows traction current through.

Filter layer
The filter layer must prevent fine subsoil particles from penetrating and degrading the
formation materials and ballast. The filter layer must be formed of specially graded sand and gravel materials, if necessary in combination with a fibre membrane. The filter layer will form the bottom part of the reinforcing layer or the frost-protection layer.

Midpoint anchor
Permanent anchorage of a section of overhead contact line, close to the central point.

Current supply line
A 16 ⅔ Hz single phase or two-phase distribution system from converter station or power station, with a higher voltage level than on the overhead contact line to the transformer station.

Centralised traffic control (CTC)
Control of signalling system from a traffic control centre. Commands are sent to, and indications are received from, a wide geographic area.

Remote control (electrical energy)
Control and monitoring of electrical power installations from energy centres. Commands are sent to, and indications/measurements are received from, relevant switches/objects within a wide geographic area. Most of the installations included in remotely controlled electrical power installations comprise remotely controlled high-voltage switchgear in feeder stations, switching posts and the overhead contact line system.

CTC
Centralised traffic control/section with Centralised Traffic Control

Spring (fastening component)
Fastening component that forms an elastic connection between rail and sleeper, by pressing the base of the rail down onto the sleeper or baseplate.

Elastic fastening
Fastening that provides an elastic connection between rail and sleeper.

Spring fastening
Fastening system that provides an elastic connection between rail and sleeper.

Spring rail blade
Blade in points in which the movement of the blade occurs through an elastic stretching of a rail profile to the rear of the blade, which has a reduced cross-section.

Spring spike
Spike that forms a direct elastic connection between rail and sleeper.

Spring blade
Blade in points in which the movement of the blade occurs through elastic stretching of the entire blade.

Flat fish-plate
Fish plate of rolled or forged flat bar, used for fishplated rail joints.

Multi-aspect block signalling
Block signalling system that provides information about several block sections ahead.

Multi-aspect block signalling, two-aspect block
An automatic block signalling system in which the signals can display:

- First block section occupied.
- Next block section clear.

Multi-aspect block signalling, three-aspect block
A block signalling system in which the signals can display:

- First block section occupied.
- Next block section clear, but following block section is occupied.
- At least two block sections clear.

Multi-aspect block signalling system, four-aspect block
A block signalling system in which the signals can display:

- First block section occupied.
- Next block section clear, and following block section is occupied.
- Next two block sections clear.

With additional information from the ATC system, the following information is also provided:
- Next two block sections clear, and following block section is occupied.
- At least three block sections clear.

Change (modification)
- Change in existing installation, resulting in an expansion or reduction in the size of the installation, or a change in the operating method of the installation.

Bridging feeder
- Cable that feeds traction current past a station or section.

Bridging connector cable
- Cable that connects a section of rails in parallel in order to guide traction current past a rail fracture.

Connector bolt
- Bolt used to connect two sleepers to form a twin sleeper.

Formation level (FL)
- The formation level (FL) is the top of the reinforcing layer = the bottom edge of the ballast profile.

Position light signal
- Light signal on which the reciprocal position of the lights (normally white) determines the meaning of the signal.

Interlocking
- Mutual dependence and interaction between items such as points, signals, etc. that makes it impossible for these to enter positions or states that are incompatible with traffic safety (Locking).

Interlocking monitoring
- Monitoring of a function that affects the issuance of commands or the functions of other equipment.

Interlocking table
- A tabulation of all the routes, signals and points, etc. associated with the interlocking system. The interlocking table must show how the various routes are secured, which levers, signals, points, insulated track circuits, etc. are used for each route, and their mutual dependence.

Proceed with caution
- Signal that means a train must proceed with particular caution. The signal is used to notify that the train must proceed along a short section of track (truncated route, dead-end track or track that for any other reason is considered to be particularly difficult).

Reinforcing layer
- The reinforcing layer must form a pressure-distributing layer between the ballast and the deeper, less load-bearing materials and must safeguard the substructure's draining capacity, as well as provide strength and evenness in terms of even elasticity to the superstructure. The upper part of the reinforcing layer may comprise a levelling course as a base for the ballast.

Reinforcing feeder
- Cable connected in parallel to the overhead contact line in order to increase the cross-section of the cable.

Pedestrian crossing
- Level crossing that is only intended for pedestrians.

Drop-out current
- Resistance value of the highest electrical resistance that causes the track circuit relay to drop
out when this is positioned between the rails in the track circuit.

Pre-distant signal group (FF)
Balise group controlled by distant signal, located at braking distance to main signal when line speed is greater than 130 km/h.

Open line
Those portions of sections of line that lie between stations and outside station boundaries.

Friction joint
Insulated joint, the axial forces of which are partially transferred by friction between fish plate and fishing surface.

Clear profile
A positive acknowledgement that no rolling stock is located where it will obstruct a train route or shunting route.

Clear track
A positive acknowledgement that there is no rolling stock on the track.

Frost protection layer
The frost protection layer is the portion of the substructure between the reinforcing layer and the formation bed. The frost protection layer must prevent penetration of frost to the formation bed and subsoil. The thickness of this layer depends on the materials and the local frost levels, as well as the design speed of the section of line.

Function-safe cable
Cable with particularly good fire-retardant properties that ensure the provision of power supply or signal transfer during a fire. Refer to the IEC 60331 series; the cable must satisfy the requirements stipulated in this series. The series covers functionality requirements for various types of cables at a given temperature condition.

Signal repetition in the driver's cab
Signal in the driver's cab that provides the driver with full information for train operation.

Cable routes
All cable ducts and physical installations used to carry the NNRA's cables.

Generic
Generic is understood to mean a high degree of similarity and transferability between components and systems, in terms of technical construction, method of operation and causes of failure.

Geodetic datum
Size and shape of a rotational ellipsoid and its position and orientation in relation to the physical ground. Forms the basis for defining three-dimensional and horizontal coordinate-based reference systems.

Geodetic reference point
Permanent marked point, marked with a bolt or other suitable permanent marker, where horizontal and/or vertical coordinates are determined or planned to be determined in a coordinate-based reference system.

Geodetic reference point network
Geodetic reference points systematically linked on the basis of observations (vectors, differences in level, angles, distances and gravity). Forms the basis for taking measurements for new geodetic reference points, taking measurements of objects, locations and identifiers.

Geodetic quality
Accuracy of determining position, in terms of reliability of determining position. Expresses the degree to which a possible major residual error in the observation material may affect the final result (i.e. the position determined). Described as deformation indices in ground plan (scale differences and angle errors) and level (errors in differences in level).

Geodetic 'Landsnett' (reference network)
Geodetic reference point network included in the national geodetic framework, often referred to as 'Landsnett', for which the Norwegian Mapping Authority is responsible. Densifies the
geodetic 'Stamnett', reducing the lengths between points to approximately 5 km in built-up areas. Replaces the previous second order to fifth order triangulation network. Forms the basis of the reference network of the lower order (detail network), for which the local authorities and some other public bodies are responsible.

Geodetic reference system
Basis for unambiguous results, stated as unit of measurement, datum, specific time and mathematical models. Defined by physical constants and ground parameters, and made available using coordinates for a selection of points.

Geodetic 'Stamnett' (reference network)
Geodetic reference point network included in the national geodetic framework, often referred to as 'Stamnett', for which the Norwegian Mapping Authority is responsible. Lengths between points is approximately 20 km in built-up areas. Replaces the previous first order triangulation network. Forms the basis of the geodetic 'Landsnett'.

Permissive block
Signalling system at a station, on a section of line using the block signalling system, set so as to cause the signals on the station's priority route to be set automatically.

Through connection
The signalling system is set for unmanned stations so that an approaching train causes the signals on the station's priority route to be set automatically.

Electric breakdown protection
Component consisting of an overvoltage arrester in series with a fuse. If the fuse blows, a short-circuit is formed across the arrester's fuse. Requires manual reset/repair. Various type designations: Spark gap and neutral protection.

Reciprocal interlocking
Interlocking of the locking component as a result of the position or state of the locked component.

Fence
Barrier of approved design, to prevent access to live components.

Slide chair
Plate attached to sleepers, across which point blades slide when moving.

Expansion joint
Rail joint allowing rails to move longitudinally in relation to each other in the joint; used with continuous welded rails on bridges.

GLONASS

Rodent protection
Physical protection to prevent rodents damaging cables and technical equipment.

Spark gap
Overvoltage protection used in high voltage installations to divert impulse overvoltage.

Approved design
A design that has been approved for use by the owner.

GPS
Global Positioning System. American satellite navigation system.

Gate-keeper
Any public employee serving as a guard at a level crossing, irrespective of whether this is secured by gates, a road barrier or other method.

Control cubicle
Distribution box containing protection and regulation of point heating elements. Can control one or more sets of points.

Gravel ballast
Crushed stone bed formed of gravel.

GSM-R
A type of digital train radio system defined by the UIC as a standard for European railways in order to comply with international requirements for cross-border traffic.

GVUL
Acronym of ‘Geodetisk Varig Utfesting av Linjen’ (geodetic support of track construction): System used for defining the theoretical position of the track as a linear calculation (horizontal and vertical) in a coordinate-based reference system.

Hook bolt
Bolt with a hook that is used to fasten bridge sleepers to bridge girders.

Hook lock
Device used to fix the switch blade component in a set of points.

Tail magnet
For some types of block signalling system, a tail magnet is fitted to the last carriage/wagon of the train. This is used to check that the final carriage/wagon has arrived at the destination.

Hazard
A situation that may result in an accident (Norwegian: Fare).

Hazard analysis
Identification and classification of hazards that the use of a product may result in: (‘What could happen?’) Norwegian: Fare-analyse).

Hazard log
Log of safety non-conformities.

Hazop
Study of identified hazards (from hazard analysis). How could it happen?

Full route release
Train route that is locked until the entire train has passed the entire route.

Continuous welding
Welded joints on rails in CWR (continuous welded rail) tracks, the rails of which have neutral lengths after welding.

Continuous welded rail (CWR)
Railway track on which the rails have been welded into continuous lengths of more than 100 metres.

Suspended mast
Mast fixed to tunnel roof or portal structure.

Hanger
Metal strip used as a short dropper.

Suspension frame
Frame under portal structure to which cantilever bracket is attached.

Dropper
Vertical wire between contact wire and messenger wire in which the contact wire is suspended.

Dropper table
Table showing the length of droppers and distance from each other, depending on span, droop, tensioning and curve radius.

Hold order
Order that is held for a specific length of time and affects several units that change their position successively or in parallel, e.g. to set a train route.

Horizontal alignment
The horizontal geometry of the track, comprising successive alignment elements. Stated as characteristic alignment points (OB, OE, FOB, KP, FKP).

Main earth bar
Terminal or bar for the connection of protective conductors, including conductors for equalising connections and any system earthing conductors, enabling these to connect to earth.
Main connection
Central connection point where several local connections are grouped in a shared rack (patch panel).

Priority route
The priority route is the track along which trains run when the points are in their normal position. Stations on a double-track line have one priority route for each direction of travel.

Main equalising connection
Connection from longitudinal earthing conductor to rails (via filter).

Horn
Sounder or horn that is located at the top of a block telephone.

Hydraulic tensioner
A gas-hydraulic tensioning device that maintains a constant tension in the overhead contact line (used where there is insufficient space for a weight).

Height deviation
Difference between the track's theoretic and actual (absolute) position on the vertical plane.

Height realignment
Adjustment of the track's position and/or geometry on the vertical plane.

Loudspeaker system
Information system used to broadcast voice announcements or audio messages to passengers at stations and stops.

Manually operated points
Points that are operated manually.

Impedance pole
Refer to filter impedance.

Impedance bond
Equalises potential between the rails; also known as filter impedance. Used on electrified lines, usually at the end of a track circuit on which both rails are insulated, and permits the return current to pass the insulated joints.

Impulse electrode
Crow's foot electrode or equivalent, used in connection with overvoltage protection, which provides a connection to earth and is also suitable for diverting high-frequency lightning overvoltages.

Impulse withstand voltage
Voltage level that equipment is designed to tolerate if impulse voltage is applied. The size of the impulse withstand voltage depends on the normal voltage and the classification of the equipment's area of application.

Impulse earth
The term is used to specify that there is or must be an impulse electrode present.

Impulse resistance
Transition resistance to impulse earth on an impulse electrode for an impulse voltage.

Impulse voltage
High-frequency voltage; standard impulse voltage 1.2/50 or 8/20 s is often used.

Indirect fastening
Fastening system in which the rail is fastened to a baseplate that is in turn fastened to the sleeper.

Indirect interlocking
Interlocking that is a result of the indirect effect of two or more interlocking devices. This type of interlocking arrangement does not lock the first device separately.

Induction-fed alternating current track circuit
Track circuit fed by alternating current through an inductive coupling.

Industrial siding
Private railway siding used for transporting goods to and from industrial areas.
Information point
A fixed point on a section of line where balises are fitted in order to transfer information to locomotives. An information point consists of a maximum of five balises.

Classification of light signals
Classification of light signals according to the meaning of the aspects they show: main signals, distant signals, combined-aspect signals, shunting signals, etc.

Insulation sheath
Sleeve of insulating material used to insulate fish bolts in insulated joints.

Insulation coordination
The selection of the dielectric withstand required for equipment in relation to voltages that may occur in the system in which the equipment is to operate, including the operational conditions and characteristics of the available protection (IEC 60071-1).

Insulated fishplate
Fishplates used for insulated joints; these are made from, or are coated with, insulating material.

Insulation cuff
Cuff of insulating material used to insulate steel or cast iron fish bolts in insulated joints.

Insulator (fastening component)
Fastening component made from synthetic material, located between rail base and spring, to insulate against electric current between rail and sleeper.

Insulating material
Material that is not electrically conductive at the level of moisture, temperature and other operational stresses for which the material is designed.

Insulated joint
Joint that is insulated in order to prevent current passing through.

Insulated component
Component that is insulated, enclosed or screened so as to render it safe to touch.

Insulated enclosure
Enclosure that insulates the equipment inside it against flashover from high voltage (overhead contact line system 15 kV).

Insulated rail
A rail in a track that is insulated electrically at either end and from the other rail in the track.

Insulated joint
Fishplated rail joint, designed so as to insulate against electric current across the joint; used to separate the track into sections for the signalling system and return current from traction vehicles.

Insulated track circuit
The portion of an insulated track that ends at insulated joints.

Railway bridge
Structure with open aperture (span) \( \leq 2.0 \) m that carries railway traffic.

Soil (substructure)
Loose materials on top of the solid bedrock, that may be formed of mineral and/or organic material. Only mineral soil types are suitable for structures that must tolerate forces; these are categorised as clay, sand, gravel, stone and blocks.

Earth (electrical)
The Earth's conductive surface, of which the overall defined electric potential is regarded as equal to zero.

Earthing switch
Switch with earth contact that connects a section of overhead contact line to an earth wire when the switch is in the disengaged position. Unlike the earthing device, this switch (if designed for the anticipated current) can feed current to a section of the installation when the switch is in the engaged position. Refer to earthing device.
Earthing device
Mechanical connection device designed to earth installation components, that is capable of conducting power under abnormal conditions, such as short-circuits, but that is not designed to conduct power under normal conditions.

Cable installation
Every type of cable that is connected along, or is associated with, the NNRA's infrastructure.

Cable-free profile
Area where it is prohibited to lay cables. 2,500 mm out to each side of the centre of the track, and down to a depth of 900 mm below the top rail level.

Cable penetrations
Area where cable feeds through another medium such as a wall, roof, embankment, etc.

Characteristic impedance
Describes the ratio between voltage and current along an infinitely long transmission line.

Characteristic alignment point
Point on a track that expresses the change from one alignment element to another:

Horizontal alignment:
- OB: Start of transition curve, where the radius is greatest
- OE: End of transition curve, where the radius is smallest
- FOB: Start of common transition curve, where the radius is greatest for adjacent transition curves
- KP: Tangent point, where the curve meets the straight line
- FKP: Common tangent point, where one curve meets another with a different or opposite curvature

Vertical alignment:
- HBK/LBK: Hump or dip on a track, where two different gradients intersect each other
- SE: End of vertical curve, end points of vertical circular curve connecting two gradients

Map projection
Mathematical or graphic transfer of the Earth's curved surface, or parts of it, to a digital or scaled-down graphic representation on the plane.

Kilometre indicator
Position indicators along the track.

Chemical resistance
Development of tolerance or resistance to pesticides (chemicals).

Running surface
Top of the rail head on a railway line, on which the wheels run.

Running speed
Momentary speed of the rolling stock in accordance with the timetable.

Rail edge
The edge of the rail head on a rail that guides the flange of a wheel.

Running rail
Rail on which trains run.

Anti-climb protection
Installation that prevents unauthorised persons from climbing masts.

Point clip
Device used to lock points.

Clamping force
The force exerted by a fastening system on the rail base.

Terminal
Press and screw connectors in overhead contact line system.

Clamp plate
Fastening that provides a non-elastic connection between rail and sleeper.

Coaxial cable
Cable that, in railways, is used to transfer radio signals.

Switchgear
Busbar installation with all switch, protective and control equipment for incoming and outgoing lines.

Switching post
Separate 15 kV switchgear located at an electrical junction, in order to improve segmentation and protection of the overhead contact line.

Encoder
A device fitted between signal and associated information balise. The encoder converts the signal aspect to the speed information in the balises. The codes can also be used to control distance information in the balises.

Coded track circuit
Pulsed track circuit on which number, frequency, polarity or duration of pulses or combinations of these parameters, separately or together, determine the reaction of the receiver units that are calibrated for and connected to the circuit.

Combined curve
Curve that is formed of two or more uniform circular curves of different radii.

Combined electric lock and control (locking device)
A unit that acts both as an electric lock and control circuit.

Capacitor bank
Bank of capacitors placed either in series or in parallel with overhead contact line.

Overhead contact line
Messenger wire, droppers and contact wire.

Overhead contact line system
Complete overhead line system, including foundations, wires, cables, masts, cantilevers, portal structures, attachment points, switches, autotransformers (AT), draining transformers, impedance poles, rail connectors and earthing devices, etc.

Disconnect switch
This is a disconnector or load break switch used for segmenting or disconnecting parts of the overhead contact line system.

Overhead contact line impedance
Impedance in electric circuit of traction current.

Section of overhead contact line
Overhead contact line with tensioners at both ends.

Contact wire
Wire suspended above the track, against which the pantograph's collector shoes slide.

Height of contact wire
Height of contact wire, measured perpendicularly to the top rail level.

Reverse curves
Curves oriented in opposite directions.

Control
Control, usually by electric control equipment, of the actual state or position of a device.

Correspondence control
Control that confirms the actual position of an object corresponds with the command equipment.

Control circuits
Electric circuits used in control equipment for checking position or state.

Control equipment
Equipment used to control a device or group of devices.

Control lock
Lock on points or derailer, designed to ensure that the points or derailer are in a particular position in order for it to be possible to secure the lock and remove the control lock key.

Control locked points/derailer
Points or derailer with control lock that prevents the points or derailer from becoming unlocked. The points or derailer are regarded as control locked only when the control lock key has been removed from the lock.

Coordinate
One of a set of numeric values that defines the position of a point in a coordinate system.

Coordinate-based reference system
Geodetic or vertical datum with associated coordinate system, to uniquely indicate the position of a point, line or surface on or beside the surface of the Earth.

Coordinate system
Set of mathematical rules specifying how the coordinates must, in order to be able to fix the position of points in space, be on the plane or at an elevation.

Grain uniformity coefficient, Cu
The grain uniformity coefficient compares the grain diameters of 60% diameter (d60) and 10% diameter (d10), and is stated as Cu = d60/d10. The value d60 means that 60% of the material has a grain diameter of less than d60. The same applies to d10.

Cu > 15 means well graded material.
Cu < 5 means uniformly graded material.

Short rail
Rail from 10–45 m long.

Short rail track
Rail track on which the rails are jointed using fishplates at 10–45 metre intervals.

Tilting train
Train on which the car body has a negative roll angle on curves.

Shrinking
Straightening rails using heat from a gas flame.

Crossing
A point where two contact wires cross each other in order to touch the pantograph simultaneously, and where the contact wires may move in relation to each other in the longitudinal direction.

Crossing leg
Rails welded to the frog block in a rail crossing, forming the rear part of a crossing nose.

Crossing locking
Time delay used in Centralised Traffic Control that prevents a route from being set across the safety zone of another route for a given time after the latter has been released.

Crossing section
The part of a points that is made up of the rail crossing and check rails.

Nose of crossing
That part of a rail crossing where the two stretches of rail crossing each other meet at a point.

Frog block
Forged or milled steel block that forms the outermost part of a crossing nose.

Scissors crossing
Overlapping points used where two tracks cross, where there is an option to select the route using the points.

Crow's foot
Earth electrode split into forks from a central point; see also impulse electrode.

Tangent point
Point at which a circular curve and a straight line meet, with no transition curve in between.

Horizontal component of the catenary force
Horizontal force exerted by the contact wire on a cantilever or a pull-off.

Curve extension
Extension of track gauge in sharp curves, in order to avoid excessive variations in the rotational speed of wheels on inner and outer rails.

Curved point
Simple set of points that is curved in such a way that the main track and diverging track form a circular curve.

Quality class
Classification with regard to line speed in terms of track geometry requirements:

- Quality class, K0: 145– (km/h)
- Quality class, K1: 125–140 (km/h)
- Quality class, K2: 105–120 (km/h)
- Quality class, K3: 75–100 (km/h)
- Quality class, K4: 45–70 (km/h)
- Quality class, K5: 0–40 (km/h)

Lamp proving
Equipment indicating whether a lamp is illuminated or dark.

'Landsnett'
Geodetic reference point network that is a densification of 'Stamnett' down to approximately 5 km lengths between geodetic reference points in built-up areas.

Lineside cable
Cable used to transmit telecommunication signals over long sections of line.

Lineside earthing conductor
Earthing conductor laid parallel to the track alignment. All exposed conductive components are connected to the lineside earthing conductor.

Long welded rail
Rail that has been rolled or welded together into lengths exceeding 100 metres.

Long welded track
Railway track on which the rails have been welded into continuous lengths of more than 100 metres.

Long welded rail train
Train that transports rails that have been welded together or rolled into lengths exceeding 120 metres.

Longitudinal voltage
Voltage between two geographically separate points on a conductor. Normally used as voltage between conductor and earth. Longitudinal voltage is often known as common mode voltage.

Fish plate
Flat bar used to join rails.

Fish bolt
Bolt used to screw fish plates together in rail joints.

Fish bolt hole
Hole drilled into rail stem in order to attach fish plates to rail joints.

Fishing surface
That part of a rail that is filled by a fish plate at a fishplated rail joint.

Fish screw
Bolt used to screw fish plates together in rail joints.

Jointed track
Rail track on which the rails are jointed using fishplates at 10–45 metre intervals.

Loading gauge
Indicates the maximum permissible height and width of rolling stock including its loads.

Rail tractor
Rail-based machine used to transport tools and material for the maintenance and construction of railway lines.

Load break switch
A switch disconnector that in the open position satisfies the insulation level requirements stipulated for a disconnector.

LCC
Refer to Life-cycle cost.

Joint tongue
Tongue in a set of points that moves by pivoting around a joint at the rear edge.

Check rail
Rail intended to guide the wheel flange at: a) parts of the points where there is a gap, and b) derailers on bridges and in tunnels.

Check rail profile
Cross-sectional profile of check rail.

Cable
Wire, conductor, cable or line used in electrical installations or other constructions.

Laying temperature
Temperature of rail at the time rails are laid.

Creep resistance
Resistance against longitudinal movement between rail and sleeper or sleeper and ballast, indicated in kN/m.

Linking distance
Distance from linking balise to nearest subsequent balise group. Refer to Linking balise group.

Linking balise
Refer to Linking balise group.

Linking balise group (L)
Balise or group of balises, installed in order to update linking distance/target distance.

Steady arm
Refer to registration tube.

Direct current track circuit
Track circuit fed by direct current.

Balance speed
The speed in a circular curve with cant, at which the lateral acceleration is equal to the gravitational component parallel to the track plane.

Glued joint
Fishplated joint, usually insulated, the axial forces of which are transferred through glued joints between fish plate and fishing surface.

Line
Multi-wire conductor used as an overhead line.

Block signalling
A technical system intended to ensure that main signals can show 'Proceed' to a block section for only one train at a time. The "Proceed" signal from a main signal towards a block section must verify that the block section is free.

Lineside ditch, open or closed
A structure that prevents surface water from running into the substructure, and which drains the superstructure.

Line
Section of line between two stations. On sections of line without Centralised Traffic Control, unmanned stations form part of the line.

Line voltage
The voltage between two phases.
Line inspection
   Visual inspection of a section of line.
Letter designation
   Combination of letters used to mark signals, etc. (Derived from the Greek word for 'letter'.)
Life Cycle Cost (LCC)
   Total cost of a product summarised over the product's service life. (Maintenance costs are included.)
Weight set
   Weight at the moving end of a catenary-type overhead contact line.
Local release, Locomotive
   A defined track area in which all points and derailers are released for local setting of points.
Local earthing conductor
   An earthing conductor to which several exposed conductive components or large conductive structures are connected. Local earthing conductors are connected to longitudinal earthing conductors.
Local points switching
   Commands to switch over points that are issued at locally operated points.
Local telecommunications cable
   A cable that connects end equipment and which is used as a link to the nearest connection point to lineside cables, fibre cables or the transmission network.
Air section
   A span in which two approaching catenary-type overhead contact lines are run in parallel without any electrical connection.
Light signal
   Signal information transferred from the track to the train via a signal light.
Lock
   Device that prevents any change occurring in the condition or position of another device.
Locked points
   Points with tightened and locked clip that prevents adjustment of the points. The points are regarded as being locked only when the key has been removed from the lock and securely stored.
Stored command (storing)
   A command that is stored and executed once conditions have been met, for example, storing a crossing route.
Magnetic lock
   Refer to Locks.
Maximum grain size (Dmax.)
   The mesh aperture of the smallest mesh screen through which 100% of stones can pass. 'Mesh screen' in this context refers to square openings of equal size between the wires or square holes in a punched board.
Maximum speed
   The maximum permitted speed for rolling stock on a given section of line, stipulated on signs.
Cant deficiency
   The increase in cant necessary to compensate for the uncompensated lateral acceleration.
Manual route release
   Route release with a specified time delay (NNRA: 90 seconds) without trains running on the route.
Machine welding
   Joint welding of rails undertaken by a stationary or mobile electric resistance welding machine.
Mast table
   Table containing essential data for the erection of masts.
Mast warning signs
Elastic cord suspended approx. 2 m from masts that are located closer to the track than normal.

Feeder unit
Collective term for converter units, power transformers and generators in power stations, including equipment (switches, protection and control equipment, and for converter units, also transformers) for each individual unit.

Feeder cable
Cable between a 15 kV switchgear (both in the feeder station and switching post) and overhead contact line.

Feeder line
Feeder cable laid as an overhead cable.

Feeder point
Connection point for feeder cables or feeder line to the overhead contact line.

Feeder station
Collective term for converter substations, power stations and transformer substations that supply traction current to the overhead contact line.

Feeder section
Section of line between two feeder points.

Trailing points
Points that have blades lying in the direction of travel. The blades must be set correctly in relation to the track the train is approaching on, or it must be possible for trains to run through the points.

Gasket
Plastic or rubber pad inserted between the rail base and concrete sleeper or baseplate. Used to diminish vibrations, increase creep resistance, insulate electric current and prevent wear.

Closure rails
Rails in the points that are located between the blade section and the crossing section.

Intermediate welding
Welding of short rails to long rails on CWR without prior neutralisation.

Metal oxide surge arrester
Overvoltage protection that has non-linear metal oxide resistors coupled in series and/or in parallel.

Centre mark
Mark indicating the centre of the track.

Temporary installation
An installation that is used for a maximum of one year.

Minimum infrastructure gauge
Cross-section of the space on each side of the track, above the track and between the rails that must remain free of obstacles in order to ensure the necessary clearance for the movement of trains.

Mobile welding machine
Rail-based machine for welding of rail joints using electric resistance welding.

Monitors
Part of information system for displaying free text on screens.

Mounting dimensions
The dimension of a component's height above a reference point, for example, the top of the rail.

Moraine
Ungraded glacial deposits that may contain all grain sizes from clay to block.

Facing points
Points that have blades lying against the direction of travel. The tongues' position determines
which track the train will run on to.

**Track geometry car**
Rail-based vehicle with equipment for measuring the condition of the track at speed.

**National geodetic basis**
Geodetic reference point network administered by the Norwegian Mapping Authority. Covers the geodetic 'Stamnett' network, geodetic 'Landsnett' network, benchmark network and gravity network. The older first order to fourth order triangle networks are also considered to form part of the national geodetic basis.

**Droop**
The vertical distance between the contact wire and the straight line between its suspension points when the contact wire is beneath this line.

**Benchmark point**
Geodetic reference point where the height coordinate is determined by precise levelling.

**NN 1954, 1954 Normal Null**
Acronym. Normal Null 1954: Vertical datum in the vertical coordinate-based reference system (the height system) for the Norwegian mainland defined through an adjustment/calculation from 1954.

**Normal rail**
Rail with a wide base: normal rail.

**Standard gauge railway**
Railway with a nominal track gauge = 1435 mm.

**Neutral protection**
Refer to electric breakdown protection.

**NX (eNtrance - eXit)**
Allocation of a route by indicating the route's starting and finishing point.

**Emergency lighting**
Collective term for all types of lighting that has an alternative power supply. Installed for use when there is a failure in normal lightning or the main power supply.

**Emergency radio**
The rescue services' radio communications system

**Emergency communications system**
Communications system that is vital in tunnels for rescue purposes but which is not normally used in connection with train movement. Examples of emergency communications systems are emergency radios and emergency telephones.

**Emergency telephone system**
Telephone system in newer tunnels with fixed apparatus that may be used to establish contact with the duty traffic controller/local traffic controller for the relevant section of line.

**Neutralisation**
Work operation that neutralises lengths of rail through continuous welding of the rail (CWR).

**Neutral length**
Length of a rail at neutral temperature.

**Neutral temperature**
Rail temperature at which the rails must be free of axial tension.

**OC (Order Control)**
The part of an interlocking system that receives commands from a traffic controller or local traffic controller.

**Public level crossing**
Level crossing on a public road, i.e. road administered by a public authority.

**Converter substation**
An installation that feeds traction current to the overhead contact line by converting energy from 50 Hz 3-phase to 16⅔ Hz single phase.

**Zone control**
Controlling a defined zone at a larger station or section of line.

Switch-over
Operation that moves the blades in a set of points from one position to the other.

Trailable points
Points that permit a train to run through them without causing them damage or derailing the train. Non-trailable points cannot withstand this.

Running through the points
Running over a set of points in the direction of the tip of the point's blade when set to the adjacent track.

Approach panel
Wooden board placed at the end of where the check rails meet at the track on bridges or level crossings.

Hog
The vertical distance between the contact wire and the straight line between its suspension points when the contact wire is above this line.

Command
Operation affecting one or more objects. This may be adjusting individual points or allocating a route affecting several signals and sets of points.

Command issuing equipment
Manually operated equipment for issuing commands. This may include, for example, lever, switch, knob, push button, key, etc.

Command circuits
Electrical circuits used in the issuing of commands.

Superstructure
The part of the railway line located above the formation level: ballast, sleepers, fastening system and rails.

Superstructure classes
Division of track structures for which specific requirements have been imposed regarding rail profile and distance between sleepers within each superstructure class.

Flyover
Road and pedestrian bridges that cross the railway line.

Transition curve
Alignment element between two alignment elements of varying radius.

Transition resistance for earthing system
The resistance between the earthing system and neutral earth.

Cant
Height difference between rails.

Change in cant
Refer to ramp increase.

Cant block
Wooden block located beneath track baseplates on bridges to achieve the correct cant.

Cant ramp
Change in cant on transition curves (refer to ramp increase).

Cross-connection
Permanent electrical connection comprising wire used to convey return and/or track circuit current between two rails.

Overlap
Refer to Safety zone.

Cant excess
The cant which, at a specific speed, is excessive in relation to the theoretical cant if the same speed is regarded as the balance speed.

Excess lateral acceleration
The tangible lateral acceleration of a slow-moving train that is not compensated for by a sufficient level of speed.

**Overvoltage**
A voltage between one phase conductor and earth, or between phase conductors with a peak value that exceeds the corresponding peak value of equipment (IEC 60071-1 - translated).

**Overvoltage arrester/protection**
Apparatus that limits the potential voltage differences above a given level.

**Stormwater drainage pipes**
Structure whose purpose is to ensure that stormwater and drainage water, primarily from sand trap basins, is drained and led away to outlets in water channels/culverts, streams or rivers.

**Monitoring card**
Electronic card that monitors the condition of heating elements in a group of points heaters.

**Tamping**
Realignment of the track's vertical plane; raising and compaction of the track.

**Tamping machine**
Rail-based machine for realigning and tamping a railway track.

**Wedge lock**
Device used to fix the blade section in a set of points.

**Parallel balise**
Balise that receives information from the interlocking system in parallel.

**Parallel field**
Span section with two parallel contact wires.

**Train passage control**
Part of the interlocking system: electric verification that rolling stock has passed a defined point.

**Plug rail**
10–15 metre long rail inserted into a section of rail to repair a broken rail, etc.

**Patch panel**
Termination unit for fibre or coaxial cable.

**Patch cord**
Used in a patch panel to connect fibre cable or coaxial cable to another cable, or technical equipment.

**P advancing**
Refer to Advancing.

**Formation level width**
Width of the formation level of a railway line.

**Level crossing**
Crossing on the same level between a road and railway line or tramway on a special ballast bed.

**Platform**
Structure at the side of a railway track for boarding and alighting from trains.

**Platform lighting**
Light fittings that illuminate public areas at stations and stops.

**Gantry crane**
Rail-based crane used for replacement of rails or sleepers.

**Position information**
Information regarding the train's position on the track in relation to the location of the main signals.

**Position control**
Control of one or more positions in one device.

**Private level crossing**
Level crossing over which one or more landowners have a right of way.
Profile
A height and curve dependent distance from the centre of the track to the sides of the track.

Profile template
Template for verifying the rail profile.

Profile gasket
4–6 mm gasket of insulating material with the same shape as the rail profile; used in insulated joints as insulation against current between the rails over the joint.

Psophometric weighting
Measuring noise in a voice frequency range. A psophometric filter is used to imitate the ear's perception of noise in voice communication.

Pulse track circuit
Track circuit fed with current that is regularly switched off and on, often with reversed polarity, and which reacts to the total impact of the current pulses on the receiver units without regard to frequency and pulse duration.

Pupin coils
Transmission of speech via cable over long transmission lines requires an increase in the transmission line's inductance. This is achieved through the introduction of Pupin coils at frequent intervals along the transmission line.

Breathing length
Length of the breathing section in CWR.

Breathing section
The area at each end of a section of CWR in which longitudinal movement occurs in the rails due to temperature change.

Build-up welding
Building up of worn out materials on rails and points through electric-arc welding.

Radio installation
Telephone system that transmits electronic information wirelessly.

Radio frequencies
Frequencies suitable for the transmission of electronic signals in free space, measured in Hz.

Radio-relay system
Radio based transmission system that transmits electronic information wirelessly and which is used when it is not practical to use cable.

Radio mast
Fixed installation upon which to affix antennae for radio systems.

Ramp increase
Changes in cant per length.

Ramp increase speed
Gradual changes in cant height.

Landslide warning system
Part of interlocking system intended to notify when a landslide occurs on the tracks.

Landslide warning group (RVG)
Balise group whose function it is to transfer information from the landslide warning system.

Reduction factor
A mathematical factor that characterises a cable's suppression of induced longitudinal stress. A good (minimal) reduction factor is achieved by reinforcing the cable (e.g. sheathing with aluminium wires, steel strips and/or full-cover metal coating).

Travelling speed
The average speed rolling stock achieves between two points along the line when braking, acceleration and stopping time are taken into account.

Relay room/relay cabinet
Cabinet, building, cabin containing technical equipment.

Repair welding
Building up of worn out materials on rails and points through electric-arc welding.

Repeater balise
Balise that repeats and updates, where necessary, information from the preceding balise.

Repeater signal
Repeats the aspect of the associated main signal.

Auxiliary power supply
Supply system designed to maintain functionality of an installation, or part of an installation, when the normal power supply is interrupted, for reasons other than personal safety. [NEK 400].

Auxiliary power transformer
Transformer (16 kV/0.23 kV) for auxiliary power supply to electro-technical building.

Response time
The time from when an event occurs to when a specific sequence of operations has been completed.

Residual voltage
Refer to discharge voltage.

Directional interlocking
Interlocking that prevents any change in the permissible direction of travel along a section of line.

Return cable
Return wire laid as a cable.

Return wire
Wire connected in parallel to the rail in order to reduce its traction current.

Return current
Current through the tracks and return wire from the consumer to the feeder station.

Return current circuit
The current circuit that the traction current is looped though from the consumer to the feeder station.

Rib plate
Baseplate used when clamping plates are utilised for fastening purposes.

Lock
Locking device that prevents adjustment of points/derailers and which is released from the CTC centre or control panel, also referred to as a magnetic lock.

Grooved rail
A rail profile designed so that the wheel flange runs in a track formed by the rail edge and guiding edge; used when the track lies in a road (tram rails).

Ring earth
Earth electrode established as a continuous ring around/underneath buildings/foundations.

Rotary converter unit
Unit that converts electrical energy from 50 Hz 3-phase to 16⅔ Hz single phase via a rotary electrical machine: one motor is coupled to a generator via a common axle.

RTU (Remote Terminal Unit)
Term used to describe substations or secondary substations in current supply line systems.

Rolling stock
Rail-based locomotives, traction vehicles, wagons and track maintenance vehicles.

Jerk
Sudden change in uncompensated lateral acceleration.

Rod pit
Area between two sleepers in a set of points in which the ballast layer has been removed in order to make space for the driving device.

Rod pit heating element
Mechanically protected heating element/heating cable for heating the rod pit, to ensure that
the point machine operates properly during cold, icy and snowy weather.

Hollow sleeper
Sleeper in the points to which the driving device is attached.

Safety Case
A documented description of how a product satisfies specific safety requirements.

Key lock cabinet
Device for storing a control lock key (keys) with a safety lock or locking magnet that locks the control lock key (keys) in the key lock cabinet. It is included in locking systems for A, B, C, D and S type locks.

Satellite-based position finding
Determining a position/coordinates of a point via a satellite, e.g. GPS and GLONASS.

Section
Part of the overhead contact line that may be electrically separated from the other part via a switch.

Segmentation
Electrical segmentation of the overhead contact line with insulated overlap sections or section insulators.

Segmented longitudinal earthing conductor
Longitudinal earthing conductor segmented in terms of the traction current's return circuit or in terms of the track circuits' function.

Insulated overlap section
Overlap section in which two sections are electrically insulated from each other.

Section insulator
Insulator in the overhead contact line that may be passed with a raised pantograph.

Sequential interlocking
Interlocking that requires operation in a special sequence.

Self-extinguishing cable
Cable with fire-retardant properties meaning that if the cable burns, it will extinguish itself once the source of the fire has been removed, ref. [IEC 60332-serien].

Centralised Traffic Control
Refer to Centralised Traffic Control.

Centrally operated points
Points that can be set from a control panel or CTC system.

Serial balise
Balise that receives information from the interlocking system in serial form.

Lateral deviation
The sum of the overhead contact line's mechanical/static deflection.

Lateral deviation
(Line) : Deviation between the track's theoretical and actual (absolute) position on the horizontal plane.

Lateral displacement
Track displacement on the horizontal plane.

Side feeding
Supplying traction current without using a switching post.

Lateral re-alignment
Alignment of the track's position and/or geometry in the horizontal plane.

Side crossing
Point at which the lines cross in the central part of a slip switch.

Signal
Defined signals concerning train movement which are communicated to personnel possessing the requisite skills to comprehend such signals and act accordingly. A signal may be acoustic and/or visual. The designation 'signal' without any additional term usually describes visual
signals. The generic term 'signal' is used to describe fixed installations, on which the defined signals are displayed visually, for example, main signal, departure signal, etc.

Signal (Geodata)
Physical structure (cairn, pillar, tower, foot signal, backstay signal, etc.) which represents a geodetic reference point.

Signalling installation
Complete installation or parts of an installation. Collective term for interlocking system, block signalling, road barrier system, Centralised Traffic Control, marshalling yard control centre, etc.)

Signal inspection
Refer to Lamp proving.

Signal lamp
Device in a sealed unit that includes all components required to display a signal light: lamp, lamp base, lenses, coloured glass, coupling terminals, LEDs, optical fibres, etc.

Signal light
Luminous indication constituting part of a signal or a whole signal.

Signal section
Section of line between two signals for train operation in the same direction.

Safety zone
A defined section of line beyond the end point of a route. No route may be set within the safety zone and it must remain clear of rolling stock.

Stagger
Distance from the contact wire in the cantilever to a line perpendicular to the top of the rail plane in the centre of the track.

Secured shunting route
A shunting route in which the centrally controlled points are secured in conjunction with a dwarf signal.

Secured route
A route in which the points are secured in conjunction with a main signal in accordance with the interlocking regulations.

Interlocking system
Installation whose function is to safeguard train operation and shunting. An interlocking system may comprise a traffic control centre for main signals for arriving and departing trains, insulation of running tracks, and centrally controlled points and derailleurs. An interlocking system may also comprise a single home signal.

Manually operated points/derailleurs that form part of an interlocking system include locks or control locks.

Protection point
Geodetic reference point, specific to the NNRA, at which the horizontal coordinates are determined via satellite-based position finding and the height coordinate is determined by precise levelling.

Shunting radio installation
Radio installation that may be used by shunting personnel.

Marshalling track
Railway track (siding) on which wagons are shunted.

Marshalling yard
Marshalling yard in which railway wagons are shunted.

Marshalling yard control centre
Interlocking system not applicable to routes; secures shunting routes only.

Shunting route
'Route' initiated and terminated by shunting signals.
Rail  
Structural element forming the running surface and guideway for the train.

Rail drilling machine  
Machine for drilling fishbolt holes in the rail stem for the installation of fishplates.

Rail fracture  
Rail that has split into two or more pieces or rails in which the fractured piece has loosened to the extent that at least 50 mm of the running surface is deficient to a depth of at least 10 mm.

Secondary winding switch  
Switch for short-circuiting a draining transformer's secondary winding.

Rail joist  
Joist beneath the rails on a railway bridge.

Rail end  
The end of a length of rail.

Rail defect  
Visible or invisible defect in a rail: crack, cut, etc.

Rail bond  
Longitudinal conductor over more than one rail joint.

Traction bond  
Bond that ensures an electrical connection between one rail and the next.

Base of rail  
Lowest wide part of a railway track.

Rail cant  
Gradient fraction that specifies the angle of inclination of a rail.

Rail head  
Uppermost part of a rail.

Rail earthing  
Term used to describe the earthing network connected to the railway's operational and protective earthing.

Rail stub  
Section of rail less than 10 metres long.

Rail clip  
Clip fastened around the rail head in order to lift rails.

Rail coupling  
Wagons loaded with rails and sleepers that are connected in a certain way.

Rail tong  
Tong used to drag rails into place.

Crossing  
Structure in a set of points or location where two rails cross each other; comprises a crossing nose and two wing rails.

Rail quality  
Quality of the steel that the rails are made from.

Fish plate  
Flat bar used to join rails.

Track laying  
Laying of track on a railway line.

Rail length  
Distance between two joints in a section of rail.

Rail stem  
The part of a rail cross-section that connects the rail base to the rail head.

Track measurement gauge  
Measuring hook for laying track to ensure the correct gauge is used.

Top rail level - SOK
A theoretical plane that makes contact with the tops of both rails on one track.

Rail profile
Cross-section profile of a rail specifying the weight per running metre and the geometric design.

Rail joint
Joint between two lengths of rail.

Rail wear
Reduction in the cross-section of the rail head resulting from abrasive wear between the wheel flange and the rail head.

Rail wear gauge
Instrument for measuring rail wear.

Dog spike
Spike with hook to fasten rails to wooden sleepers.

Rail stem
The part of a rail cross-section that connects the rail base to the rail head.

Anchor
Structure placed on the rail base to prevent longitudinal movement of the rails (rail creep).

Section of rail
One part of the pair of rails in a railway track.

Rail temperature
Average temperature measured on the shaded side of the rail stem by a minimum of two rail thermometers.

Track transporter train
Train that transports rails.

Top of the rail
The rail profile's highest point on the lowest rail.

Rail-pulling machine
Apparatus designed to pull rails in the longitudinal direction of the track.

Rail creep
Longitudinal movement of rails resulting from forces transferred by rolling stock (braking, acceleration) or resulting from longitudinal forces in the rails due to variations in temperature.

Weight of rail
Mass per unit length of rail.

Screen
Approved mesh frame designed to prevent contact with live components.

Jointless track circuit
Track circuits that do not use insulated joints to demarcate the area of the track circuit. The track circuit is fed by an audio-frequency (high frequency) alternating current.

Joint regulating
Regulates the joint gap in a fish plated rail joint.

Joint gap
Distance between the two rail ends in a fish plated rail joint.

Shoulder width
Distance from the end of a sleeper to the beginning of the ballast slope.

Endpoint
Signal, sign or mark that indicates the end of a route.

Final welding
Welding joints on long rails in CWR in which the rails are of neutral length at point of welding.

Overhead contact line zone
Distance of less than 5.0 metres from the centre of the track on an electrified line. The area which theoretically may be affected in the event of the overhead contact line breaking or
collapsing.

Narrow gauge railway
Railway with a nominal track gauge of less than 1435 mm.

Sun kink
Lateral displacement of a railway track due to major compressive forces resulting from high temperature in the rails.

Zone
A physically or virtually segregated area that stipulates a given electromagnetic environment (insulation level, noise level, screening level, etc.)

Zone limit switch
Automatically acting 3-pole circuit-breaker for the dead section between two feeder points.

Prestressed-concrete sleeper
Concrete sleeper with prestressed reinforcement.

Stress relief
Operation to relieve rails of friction forces between rail and gasket through neutralisation.

Span
Distance between the nearest suspension points of catenary equipment.

Closure of block signalling
Interlocking that prevents a signal being set for a train to enter a block section.

Closure of running line
Interlocking that prevents a signal being set for a train to enter a running line.

Special interlocking
Interlocking between two components resulting from a special position or condition in other components.

Acute angle
The angle between the two rails in a crossing.

Guideway pitch
Perpendicular distance between the centre lines of two railway tracks.

Track diagram
Graphic representation in which the track is reproduced schematically and which permits continuous monitoring of the condition of various items of equipment, as well as the position of trains.

Position of the track
The location of the track in an external reference system, i.e. information registered by means of positioning methods (VUL/GVUL).

Track geometry
Reciprocal relationship between the two sections of track and the unevenness in each of the two sections, i.e. parameters measured by the track geometry car.

Centre of the track
The point where the distance between two tracks is so large that between the loading gauge designated to the one track and the minimum infrastructure gauge of the other track, the clearance is 100 mm, including curve overthrow for each track.

Track defects
Geometric defects in a railway track.

Track circuit
An electrical circuit in which the rails in a section of track form part of the circuit, usually with the power supply connected to one end and the track circuit relay to the other.

Track circuit relay
Relay that receives all or part of the operating current of a circuit where the track forms a significant part of the circuit, and which is affected by trains on the rails.

Tracker
Device to detect track circuit current at a given frequency. (The frequencies most commonly
used by the NNRA are 95 Hz and 105 Hz.)

Track insulation
Track insulation means that the rails are insulated from each other so that there is no conductivity between sections of rail and rail components in the same stock rail.

Track re-alignment
Re-alignment of the track's position and/or geometry. Refer also to lateral re-alignment and height re-alignment.

Track structure
Structure on a railway track comprising superstructure components.

Crossing
Structure used where two tracks must cross each other.

Track geometry car
Rail-based vehicle with instruments for measuring the geometry of the track at speed.

Track replacement
Ongoing replacement of superstructure components: sleepers, rails, ballast.

Track replacement train (SPOT)
Rail-based machine for automatic track replacement.

Track plane
The plane that runs through the upper edge of both sections of rail. Additionally, the plane above the track layout.

Cross-over
Section of double-track line with two sets of points that enable trains to switch tracks.

Derailer
Derailers are designed to prevent rolling stock from entering the middle of an adjacent track, either by stopping the rolling stock before this occurs, or, as a last resort, by derailing the rolling stock. Derailers may be placed on one or both rails and must facilitate a controlled derailing in such a way that the derailing occurs away from the adjacent track.

Dynamic track stabiliser
Mechanical equipment designed to increase the track's stability by compacting the ballast.

Track stability
The railway line's capacity to withstand lateral displacement.

Buffer stop
Structure placed at the end of a dead-end track that absorbs the kinetic energy of rolling stock unable to stop in time.

Widening of track gauge
Increasing the width of the track.

Points
Track structure that enables two or more routes to be selected.

Points lighting
Illumination of an area containing points.

Point machine
Refer to point machine.

Point machine with crank handle
Point machine which, in the event of an interruption to the normal power supply may, in specific circumstances, be operated with a crank handle or similar device.

Group of scissor crossings (SVG)
Speed signal balise group that performs the function of stipulating the target speed at points set in the diverge position.

Point detection
Detecting the position of blades in a set of points. The gap between the stock rail and adjoining blade must not exceed 3 mm when the blade is set in the end position.

Point heater
Electric heating of points to ensure faultless operation during cold, icy and snowy weather.

Point heater installation
Complete distribution box, heating elements, (stock/blade rail) and any transformer.

Track gauge
The horizontal perpendicular distance between the rail edges of the two rails measured 14 mm beneath the top of the rail.

Track measurement gauge
Instrument used to manually measure the track gauge.

'Stamnett' network
Primary geodetic reference point network established by the Norwegian Mapping Authority following the transition to EUREF89. Replaces the previous first-order network of triangles and comprises approx. 900 reference marks.

Station manoeuvring
An operational situation in which the interlocking system at a station on a centrally controlled section of line is operated by a traffic control centre operative under the orders/commands of the traffic controller.

Station radio installation
Radio installation that may be used by station personnel.

Station control
An operational situation in which the interlocking system at a station on a centrally controlled section of line is operated by a local traffic controller.

Static converter unit
Unit that converts electrical energy from 50 Hz 3-phase to 16⅔ Hz single phase based on power electronics.

Static distance
Permanent minimum distance between live components and non-live components.

Gradient
The tangent of the angle between the centre line of a main track and the tangent of the diverging track's centre line at the circular arc's endpoint in a set of points.

Water channel
System of passages permitting water to pass through the railway line.

Control panel
Control equipment/interface from which commands regarding the securing of routes/shunting routes are sent to the interlocking system. The status of the interlocking system is indicated on the control panel.

Traffic control centre
Refer to Interlocking system.

Stock rail
Rail in a set of points that the blade rests against; comprises a section of normal track which has been planed on the underside in the area that the blade rests against.

Stock rail joint
Joint between the stock rail and the adjoining rail that marks the beginning of a set of points.

Stock rail heating element
Mechanically protected heating element/heating cable that prevents ice and snow from accumulating on the stock rail.

Stopping sight distance
Unrestricted view from a motorist's eye to an object of a specifically defined height, covering the theoretical minimum length required by reaction time and braking manoeuvre in order to stop the vehicle.

Tension
The tension force of a wire.

Tensioning apparatus
Hydraulic apparatus used to stretch railway tracks in connection with CWR.

Tie bolt
Bolt attached to the rail base of both sections of rail as a temporary measure to protect against widening of the track gauge.

Line speed
The line's design speed, in which the restrictions relating to all types of installations have been taken into account.

Struts
Inclined brace for stiffening masts.

Current bridge
Lead that connects the contact wires to, respectively, messenger wires in an overlap section or crossing.

Equalising connection
Lead that connects the messenger wire to the contact wire.

Draining transformer
A current transformer with transformation ratio of 1:1 with primary winding for the overhead contact line current and secondary winding for the return current. The draining transformer helps to guide the return current along the railway line.

Welding zone
The area around a welded rail joint that includes the fusion zone and the heat-affected zones on each side of the weld.

Welding gap
The distance between two rail ends that have been welded together via the aluminothermic welding method.

Overhead crossing
Crossing that does not have a cantilever close to the crossing point.

Suspended joint
Welded or fishplated joint located between two sleepers.

Sleeper
Structural element that transfers the load from the rails to the ballast.

Sleeper spacing
Horizontal distance in the track direction between the centre lines of the sleepers.

Sleeper distribution
Stipulates the distance between the centre lines of the sleepers in, for example, points and on steel bridges.

End of sleeper
Short side of a railway sleeper.

Sleeper screw
Screw that connects the baseplate or spring to the sleeper.

System documentation
Documentation that is generic, i.e. that describes a system, component, object or similar that is standardised and that may be used in several locations. System documentation is not tied to specific geographic locations.

System height
Distance between centre messenger wire and centre contact wire measured at the cantilever.

System voltage
Effective value of the voltage between two phases (outer conductors).

System drawings
Detailed drawings, assembly drawings and layout drawings of systems and components approved by the NNRA. Form part of system documentation.

Special speed group (SH)
Balise group that increases the train's maximum permitted speed at the main signal, according
to information received previously from the signal group.

Telecommunications installation/system
Complete installation or part of an installation (Collective term for technical telecom buildings/rooms, cable installations, transmission systems, telecommunications systems for train operation, radio installations, train information systems, etc.)

Telephone system for train operation
Telephone system used for communication in connection with the issuing of commands between the traffic controller/local traffic controller and train driver.

Telephone system for traffic controller (TLT)
Specially developed system for gathering all telephone systems utilised by the traffic controller in a separate terminal.

Telecommunications cables
Cables for transferring communications signals.

Technical telecom buildings and rooms
All rooms, cabins or buildings that contain technical telecom installations.

Theoretical crossing point
Point of intersection between the tangents of the tracks' centre lines in a set of points.

Terrain/slope ditch
Structure that prevents water from running out uncontrolledly and down the slope of cuttings.

Thermite welding
Joint welding of rails via the aluminothermic welding method.

Back feed
Trains that feed energy back to the overhead contact line by means of regenerative brakes.

Reset mechanism
Device that enables equipment to be reset to its default position (Reset).

Closure rail
Rail in connection with, for example, a crossing nose in a set of points.

Operation shunt
The resistance value of the greatest electrical resistance that prevents the track circuit relay from drawing current when it is positioned between the rails in the track circuit.

Train indicator system
System at stations and stops that visually displays traffic information to passengers.

Local traffic controller
Local traffic controllers are responsible for monitoring and overseeing train movements and other activities at their own station and adjoining non-CTC block sections.

Train information system
Collective term for all systems connected with traffic information at the NNRA.

Traffic controller
The traffic controller is responsible for monitoring and controlling the movement of trains and other operations that impact traffic safety.

Traffic controller area
Defined section of line that a traffic controller is responsible for.

Train radio system
Radio system for communication between the traffic controller and train driver.

Train shunt
The resistance value of the connection between two rails in a track circuit through a train's axles.

Train shunt, T - train shunt
In respect of station track circuits and the line, this is the resistance that represents the resistance that is found between the rail head, tyre and axle.

Train shunt, G - train shunt
This is a term that describes current leakage (earthing) between the rails in a track circuit and
Running line
A running line is a track at a station designed for the arrival and departure of trains.

Train telephone system
Telephone system comprising telephone contacts located along the track at intervals of 1400 m. The contacts are suspended in parallel in pairs on the lineside cable and, through the utilisation of a separate apparatus, it is possible to make direct contact with the traffic controller/local traffic controller responsible for this section of line.

Train Telegram System (TTS)
The TTS application forms part of the NNRA's electronic messaging system and is used to send and receive commands regarding train operations (train telegrams).

Preheating equipment for trains
System that provides parked passenger carriages/goods wagons with a power supply for lighting, heating, generators, etc. The nominal voltage is 230 V/400 V or 1000 V.

Train heating post
Cabinet with flexible rubber cable connection to supply current to passenger carriages/goods wagons. May also contain switches for connection and disconnection of voltage, and possible warning lights for operation status.

Train notification
Device that notifies the next interlocking system that a train may be approaching the area (flashing block light).

Route
The track/s or part/s of the track/s allocated to an individual train to run into a station.

Route locking (prior to passage of train)
Locking of a route that prevents points along the route, and points that lead to the route, from being adjusted, once the route has been set.

Route locking (during passage of train)
Locking of a route that prevents points along the route, and points that lead to the route, from being adjusted, when there is a train on the route.

Route lever
Lever or push button marked in red. Used for setting and releasing routes.

Train weight
Total static weight of a train including locomotive.

Transformer sleeper
Special sleeper with space to house a transformer and cable guides for a point heater.

Transformer station
An installation that feeds the overhead contact line with traction current by transforming voltage from the current supply line level down to the 15 kV level of the overhead contact line.

Transmission system
System for transferring audio, text, images and other data via light, radio signals or other electromagnetic signals.

Transmission media
Metallic/optical cables or ether.

Transmission equipment
Equipment connected to transmission media.

Formation
'Formation' is used as a term to describe the reinforcing layer, frost protection layer and any filter layer.

Formation bed
The formation bed is the base of the reinforcing layer, frost protection layer and any filter layer.
Tree structure
   Radial network, radiation network.

Wooden sleeper
   Sleeper made of wood.

Blade (A)
   Movable point component that guides the wheel flange onto the selected track; made from a rolled steel profile that has been planed to a wedge shape at one end.

Blade (B)
   Slip joint component comprising a rail that has been planed to a wedge shape at one end.

Blade device
   Structure in a set of points comprising a blade and a stock rail with adjoining slide chairs and fastening components.

Blade detection
   Refer to Point detection.

Point locking
   Mechanical locking of points (hook, wedge lock or mechanical locking in the point machine) that keeps the adjoining blade fixed in the end position.

Blade section
   The part of a set of points in which the blades and stock rails are located.

Blade profile
   Cross-section profile of a blade in a set of points.

Heel
   Rear edge of a blade in a set of points.

Blade secured points
   Points that are set in conjunction with the main signal and/or dwarf signal in such a way that the points cannot be switched when the signal permits a train to proceed over the points.

Blade rail heating element
   Mechanically protected heating element/heating cable that prevents ice and snow from accumulating on the blade rail.

Tip of blade
   The outermost free end of a point blade.

Tunnel radio installation
   Separate installation to secure radio coverage in a tunnel.

Forced point
   Point where the track is locked and cannot be adjusted.

Rail bond
   Cable that creates an electrical connection across two or more sections of rail.

Uncompensated vertical acceleration
   The acceleration of weight ± centripetal acceleration resulting from summits/sags.

Substructure
   The railway's substructure includes all structures necessary to support the superstructure and provide it with an even and stable bed. This comprises cuttings, embankments, tunnels, bridges, water channels, ditches, landslide barriers, acoustic barriers, snow fences, etc.

Baseplate
   Steel or cast iron plate between the bottom of the rail base and the sleeper.

Clock
   Information system for indicating the time.

Asymmetric double points
   Points composed of two individual sets of points in which the blade sections of the two sets of points are positioned directly one after the other.

Outdoor unit
   Portable radio unit used by operators to make contact with the radio network.
Positioning
   Determining the position of the track in an external reference system.

Cross bond
   The connection from exposed conductive components to earthing conductors.

Cantilever
   Structure that supports the overhead contact line and which is insulated from the anchorage points.

Cantilever table
   Table containing data for assembly and installation of overhead contact line material.

Cantilever yoke
   Short portal structure with a mast at one end on which to suspend the overhead contact line for two tracks.

UTM

Exposed (conductive) installation component
   A conductive component that may be easily touched, and which is not normally live but which may become live as a result of a defect. [NEK 400].

 Clearance
   The distance of the contact wire in the centre of a span from a line perpendicular to the top of the rail plane in the centre of the track measured in non-windy conditions.

Deformation
   Flow of material flow in the head of a rail resulting from the yield stress of the steel being exceeded during traffic loads.

Varistor
   Metal oxide surge arrester for low voltage networks (lower voltage rating and output).

Heat-treated rail
   Rail tempered by heat treatment.

Heat expansion gap
   Dimension of a joint gap in a fish plate rail joint.

Heat expansion gap table
   Table of prescribed joint gaps in jointed track, dependent on rail length and rail temperature.

Heating wagon
   Rail based wagon with propane burner used to stretch railway tracks in connection with CWR.

Warning light
   Single white light that goes out as trains approach.

Warning tone in the shunting radio system
   A special tone indicating that voice communication between shunting personnel is taking place.

Maintenance radio installation
   Radio installation incorporating separate handheld units for use by operating and maintenance personnel along the track or by trains/locomotives fitted with SCANET train radio.

Road barrier installation
   Installation with barriers (marked with warning signs) that block half (1/2 barrier) or all (1/1 barrier) the carriageway. The installation is also equipped with road signals.

Clearance of undergrowth
   Manual, mechanical and chemical clearance of undergrowth.

Road signal
   Road signal, comprising 2 light heads with flashing red lights in the upper and flashing white lights in the lower aperture.

Road barrier system
NNRA term for signalling installations on level crossings, light and audio signals, or just light signals facing the road. The road barrier system is considered to be automatic when it is equipped with technology enabling it to be reset by the passage of a train.

Point locking
Centrally operated points that are set in conjunction with insulated track circuits so that the points cannot be centrally operated when the track circuit is occupied.

Alternating current track circuit
Track circuit fed by alternating current.

Overlap section
A span in which two approaching sections of overhead contact line are run in parallel up to tensioning points.

Rail turning bar
Instrument with which to turn rails.

Standby speed
The speed encoded in balises as the maximum permitted speed following the next measuring point.

Protection level
Refer to discharge voltage.

Vertical datum
Reference surface and fundamental point that defines the origin level of a vertical coordinate-based reference system (height system) in which height is calculated along the perpendicular line in the earth's actual or theoretical gravity field.

Vertical alignment
The vertical geometry of the track comprising successive alignment elements. Indicated by characteristic alignment points (refer to SE, HBP, LBP)

Vignoles rail
Vignoles rail, normal rail.

Wing rail
Rail in a crossing that is bent to the side in the area where the wheel runs from the wing rail to the crossing nose.

Angle fishplate
Angle fishplates for joining railway tracks together.

Balance weight assembly
Refer to balance beam.

VUL
Acronym. Permanent support of track construction. System of defining the track's theoretical position as a relative position in relation to dedicated VUL-markers along the track.

Stitch wire
Short wire that carries the horizontal strut and contact wire at a cantilever. Does not apply to System 20 and System 25.

Portal structure
Steel structure with a mast at each end for suspending overhead contact lines.

Open rail joint
Joint between two rails using fishplates where longitudinal movement of the rails is possible.
3 Abbreviations

3.1 Abbreviations for multiple technical fields

ATC
    Automatic Train Control
CEN
    European Committee for Standardization
CENELEC
    European Committee for Electrotechnical Standardization
CTC
    Centralised Traffic Control
DSB
    Norwegian Directorate for Civil Protection and Emergency Planning
EMC
    Electro Magnetic Compatibility
EN
    European Standard
ERTMS
    European Rail Traffic Management System
ETCS
    European Train Control System
FAT
    Factory Acceptance Test
FEF
    Regulations relating to electrical supply installations (in Norwegian only)
FEL
    Regulations relating to low-voltage electrical installations (in Norwegian only)
FEU
    Regulations relating to electrical equipment (in Norwegian only)
FMEA
    Failure Mode and Effect Analysis
FMECA
    Failure Mode, Effect and Criticality Analysis. Analysis in which critical incidents are documented and the effects of these are studied.
FTA
    Fault Tree Analysis
Hazop
    Hazard and Operability study. Study of identified hazards (risk analysis).
IEC
ISO
    International Organisation for Standardization
LCC
    Life Cycle Cost
LED
    Light Emitting Diode
MDT
    Mean Down Time
MTBF
    Mean Time Between Failure
MTTR
Mean Time To Repair

NEK
Norwegian Electrotechnical Committee

SAT
Site Acceptance Test. Acceptance test carried out after installation of the equipment has been completed.

STM
Specific Transmission Module. Enables trains fitted with ETCS on-board equipment to operate on ATC sections.

SOK
Top of rail

UIC
Union Internationale des Chemins de Fer (International Union of Railways)

UPS
Uninterruptible Power Supply

3.2 Abbreviations for superstructure

BK
Rear edge – set of points

FKP
Common tangent point

FOB
Start point of common transition curve

KP
Tangent point

OB
Start of transition curve

OE
End of transition curve

RE
End of cant ramp

SE
End point of vertical curve

SS
Stock rail joint – set of points

TK
Theoretical crossing point – set of points

3.3 Abbreviations for electrical energy

at
Pull-off

avsp.
Tensioning

B
B masts (steel)

ba
Bracing wire anchor

bb
Anchoring wire bolt
bbs
Anchoring wire bolt with pin
BEJ
Industry standard for electrified railway installations
bli
Messenger wire
br
Switch
brl
Switch cable
DS
Dead section
ENØK
Energy efficiency
FG
Norwegian Insurance Approval Board
fjl
Current supply line
fl
Bridging feeder
fsl
Reinforcing feeder
H
H masts (steel)
HCl/CDM
Master Colour Lamp
HQL
Metal halide lamps
ht
Dropper
imp
Filter impedance
jL
Earthing conductor
kl
Overhead contact line
kl-anlegg
Overhead contact line system
kls
Section of overhead contact line
kt
Contact wire
kth
Contact wire height
Lcc
Life Cycle Cost
ml
Feeder line
mst
Feeder station
NAV
High pressure sodium lamps
rl
Return wire
RTU
Remote Terminal Unit
sbli
Messenger wire tension
sek
Insulated overlap section
sh
System height
SI
Section insulator
skt
Contact wire tension
str
Draining transformer
utl
Cantilever

3.4 Abbreviations for Signals

AS
Control cabinet for interlocking system and block signalling
FF
Pre-distant signal group (ATC)
KTP
Simulated train passage
L
Linking group (ATC)
RVG
Landslide Warning Group (ATC)
SH
Special speed group
SVG
Group of points (ATC)
Txp
Local traffic controller
VAS
Road signal control cabinet

3.5 Abbreviations for Telecommunications

ADM
Add-Drop Multiplexer
BSC
Base Station Controller (GSM-R)
BSS
Base Station System (GSM-R)
BTS
Base Transceiver Station (GSM-R)
BVH
  The Swedish Rail Administration's ATC Manual
EIRENE
  European Integrated Railway Radio Enhanced Network
ERO
  European Radiocommunications Office
ETSI
  European Telecommunications Standard Institute
GGSN
  Gateway GPRS Service/Support Node (GSM-R)
GPRS
  General Packet Radio Service (GSM-R)
GSM-R
  Global System for Mobile Communications - Railway
HLR
  Home Location Register (GSM-R)
H.O.-mux
  Higher Order multiplexer
ISDN
  Integrated Services Digital Network
ISUP
  ISDN User Part (GSM-R)
ITU
  International Telecommunication Union
LCD
  Liquid Crystal Display
MAP
  Mobile Application Part (GSM-R)
MSC
  Mobile Switching Centre
NMS
  Network Management System
N – balises
  Balises for signal number, position control
OLT
  Optical Line Terminal
PABX
  Private Automatic Branch Exchange
PLMN
  Public Land Mobile Network
PSTN
  Public Switched Telephone Network
PT
  Norwegian Post and Telecommunications Authority
Q.3
  ITU-standard/interface for NMS, complete
Q.X
  ITU-standard/interface for NMS, substandard
RASTI
  Rapid Speed Transmission Index
RO – balises
  Radio area balises
SDH
Synchronous Digital Hierarchy

SGSN
Serving GPRS Support Node (GSM-R)

SH-gruppe
Signal elevation balise

SMS-C
Short Messaging Service Centre (GSM-R)

SPT
System Performance Test

SPV
System Performance Verification

TLT
Telephone system for traffic controllers

TM
Terminal Multiplexer

TRX
Transceiver

VLR
Visitor Location Register (GSM-R)

4 Symbols

4.1 Superstructure symbols

\( a_c \ [m/s^2] \)
excess lateral acceleration

\( a_v \ [m/s^2] \)
uncompensated vertical acceleration

\( A_0 \ [mm] \)
distance from centre of track to platform edge on a straight track

\( A_i/A_y \ [mm] \)
horizontal distance from centre of track to platform edge on a curved track

\( dh/dt \ [mm/s] \)
speed of ramp increase

\( E \ [mm] \)
cant excess

\( h \ [mm] \)
cant

\( H_p \ [mm] \)
platform height measured perpendicularly to the track plane

\( H_i/H_y \ [mm] \)
vertical distance from the top of the lowest rail to the top of the platform

\( I \ [mm] \)
cant deficiency

\( j_u \ [m/s^2] \)
uncompensated lateral acceleration

\( K_i \) [mm]
curve overthrow towards the inner side of a curve

\( K_y \) [mm]
curve overthrow towards the outer side of a curve

\( K_v \) [mm]
supplement for overthrow resulting from a vertical curve with \( R_v \leq 1500 \) m

\( dl/dt \) [mm/s]
change in cant deficiency/jerk

\( L \) [m]
length of transition curve

\( r \) [N/m]
ballast resistance (creep resistance sleeper-ballast)

\( P \) [%]
ramp increase (ramp increase is often expressed as slope 1:n)

\( R \) [m]
horizontal curve radius

\( R_{12} \) [m]
theoretical radius used to calculate permissible speed on the basis of lengths of transition curves between two circular curves in a combination curve

\( R_v \) [m]
radius of vertical curve

\( S \) [N]
axial force in continuous welded rail

\( S_b \) [%]
characteristic downhill/uphill gradient

\( S_p \) [m]
guideway pitch – distance between centres of lines

\( t_n \) [°C]
neutral temperature

\( t_s \) [°C]
rail temperature

\( V \) [km/h]
speed

\( V_L \) [km/h]
balance speed

\( \Psi \) [m/s³]
jerk

### 4.2 Bridge symbols

\( \alpha \)
load classification factor, speed coefficient

\( \delta \)
deformation (general), vertical sag

\( \rho \)
density

\( \sigma \)
tension
\[ \Theta \] end rotation of structure (general)
\[ \varphi, \varphi', \varphi'' \] dynamic components of actual trains
\[ \Psi_0 \] reduction factor for combination value for a variable load
\[ \Psi_1' \] reduction factor for irregular value for a variable load
\[ \Psi_1 \] reduction factor for regular value for a variable load
\[ \Psi_2 \] reduction factor for quasi-permanent value for a variable load
\[ \Phi_2, \Phi_3 \] dynamic factors for railway loads
\[ \gamma_G \] partial factor for permanent loads
\[ \gamma_D \] partial factor for deformation loads
\[ \gamma_Q \] partial factor for variable loads
\[ \delta_h \] horizontal displacement
\[ A \] area of rail cross-section
\[ a \] sleeper spacing, length of distributed loads (Load models SW)
\[ a_g \] horizontal distance to centre of track
\[ b \] length of the longitudinal distribution of a load through sleepers and ballast
\[ c \] distance between distributed loads (Load models SW)
\[ c_p \] aerodynamic coefficient
\[ d \] normal axle position
\[ e \] eccentricity of vertical loads, eccentricity of resultant force (on reference plane)
\[ f \] reduction factor for centrifugal force
\[ F_\delta \] interaction force due to sag
\[ F_w \] wind loads
\[ F_{L} \] formation level
\[ F_b \] interaction force transferred to bearings (general)
\[ F_{la} \]
interaction force due to acceleration
\( F_{lb} \)

interaction force due to braking
\( F_T \)

interaction force due to temperature
\( G \)

specific gravity (general)
\( g \)

acceleration due to gravity
\( h \)

height (general)
\( h_g \)

vertical distance from railway level to underside of a structure
\( h_u \)

cant
\( k \)

suffix that defines a characteristic value
\( k_1 \)

coefficient for shape of train
\( k_2 \)

specific factor for pressure and suction effects on vertical surfaces parallel to the tracks
\( k_3 \)

reduction factor for pressure and suction effects on horizontal surfaces along the tracks
\( k_4 \)

increase factor for pressure and suction effects on surfaces around the tracks (horizontal forces)
\( k_5 \)

increase factor for pressure and suction effects on surfaces around the tracks (vertical forces)
\( L \)

length (general)
\( L_\Phi \)

characteristic load length
\( L_f \)

influence length
\( L_T \)

expansion length
\( n_o \)

natural frequency of unloaded bridge
\( Q \)

force (general)
\( q_{Ai} \)

accident line load
\( q_f \)

walkway load
\( Q_h \)

horizontal force (general)
\( q_i \)
equivalent distributed load from pressure and suction effects

\[ Q_{la} \]
acceleration force

\[ Q_{lb} \]
brake force

\[ Q_r \]
resulting force (general)

\[ Q_s \]
roll force

\[ Q_t \]
centrifugal force

\[ Q_v \]
vertical axle load

\[ q_v \]
vertical distributed load

\[ Q_{vi} \]
wheel load

\[ R \]
curve radius

\[ s \]
track gauge (for normal track is \( s = 1435 \) mm)

\[ t \]
spin (change of cant over 3 m)

\[ V \]
speed in km/h

\[ v \]
speed in m/s

\[ V_R \]
resistance of track to longitudinal displacement

\[ W \]
wind force

### 4.3 Electrical energy symbols

#### 4.3.1 Overhead contact line system and traction power supply symbols

These symbols may be downloaded electronically. Refer to [Felles bestemmelser/Generelle bestemmelser/Vedlegg g: Tegningsmaler og symboler for EK-tegninger](#).

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Station/section plan</th>
<th>Circuit diagram for overhead contact line system</th>
<th>Return circuit diagram</th>
<th>General plan</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="15 kV" /></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>Autotransformer</td>
</tr>
</tbody>
</table>
Tensioning

[F] Fixed

[L] Weighted

[H] Hydraulic

Tensioning with anchoring wires. Indicates the side on which the anchor is brought down.

Tensioning with an anchoring wire

Tensioning with two anchoring wires

Tensioning with three anchoring wires

Tensioning with four anchoring wires

Tensioning, anchoring wires to the left and right of the track.

Indicates the side on which the anchor is brought down.

Concrete mast with square cross-section

Concrete mast with rectangular cross-section

Beam mast, narrow section

B-mast

Railway bridge

Road bridge

Dead section

Circuit breaker

Cable termination

Filter impedance

Midpoint anchor
Suspended mast in tunnel
Suspended mast in portal structure
H-mast. Mast with square cross-section
Stop
Insulator in cable
Insulated rail joint, signal rail on both sides
Insulated rail joint, signal rail to the right
Insulated rail joint, signal rail to the left
Earth
Earthing conductor, lineside
Terminal board for return wire
Connection point
Tangent point
Load break switch
Non-electrical connection
Feeder, bridging feeder and reinforcing feeder in earth
Feeder, bridging feeder and reinforcing feeder in air
Overvoltage arrester
Level crossing
Auxiliary power transformer
Return wire in earth
Return wire in air
Brace
Section
Section with anchoring wires to left and right of track. Indicates the side on which the anchor is
brought down. Section with anchoring wires. Indicates the side on which the anchor is brought down.

Section insulator

Signal with 2 lights

Main signal with 3 lights

Signal with 5 lights

Disconnector

Track on curve. The text indicates whether it is a plus or minus curve. The curve bends around the text.

Crossing with overhead contact line

Points guiding towards main track or diverging track

Points guiding towards main track and diverging track

Points with no overhead contact line

Station

Strut (arrow towards mast)

Draining transformer showing primary or secondary side

Transformer, 1000 V

Wooden mast

Tunnel
4.3.2 Circuit diagram, low-voltage symbols

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>FORKLARING</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.2.1 Belysning</td>
<td>Plattformbelysning på mast med lengde (i mm). 5000</td>
</tr>
<tr>
<td></td>
<td>Plattformbelysning på mast med lengde (i mm). 5000</td>
</tr>
<tr>
<td></td>
<td>Belysning i åk.</td>
</tr>
<tr>
<td></td>
<td>Belysning på spir i åk.</td>
</tr>
</tbody>
</table>

4.3.2.2 Reservstrømsystemer

Reservstrømtransformator.

4.4 Signalling symbols

The following section shows symbols to be used in signalling drawings. The use of these symbols is also described in an explanation. Section 4.4.10 provides an overview of AutoCad symbols to be used in the NNRA's drawings.

4.5 Interlocking table symbols
### Tabell 1: Interlocking table symbols

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Control panel" /></td>
<td>Control panel. The dot shows where the control centre operator sits.</td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Track circuit" /></td>
<td>Indicates that the track circuit is clear.</td>
</tr>
</tbody>
</table>
| c) | ![Key symbols](image) | Key symbols:  
   1) Solid key symbol indicates that the key has been inserted and turned  
   2) Outline key symbol indicates that the key has been removed |
| d) | ![Lever symbols](image) | Levers  
   1) Lever that can be moved both up and down  
   2) Lever that can only be moved down  
   3) Lever that can be moved both to the right and left |

### 4.5.1 Light signals symbols

Tabell 2: Light signals symbols

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| a) | ![Main signal symbols](image) | Main signal  
   1) 3-light  
   2) 2-light  
   3) 3-light, mounted on portal structure  
   4) 2-light, mounted on portal structure |
| b) | ![Distant signal symbols](image) | Distant signal  
   1) Free-standing  
   2) Mounted on main signal's mast |
1) Mounted on portal structure
4) Mounted together with main signal on portal structure

Bridge signal
Distant signal for bridge signal

Single home signal apparatus

Light signal proceed with caution
1) Mounted on separate mast
2) Mounted on main signal's mast
3) Mounted on main signal's mast (together with distant signal)

Main line signal
1) Mounted on separate mast
2) Mounted on main signal's mast

Brake test signal
1) Mounted on separate mast
2) Mounted on main signal's mast

Departure signal
1) Mounted on separate mast
2) Mounted on main signal's mast
i) High shunting signal

j) 'Rear of train clear of fouling point' lamp
   1) Mounted on separate mast
   2) Mounted on high shunting signal's mast

k) Dwarf signal
   1) Mounted on separate mast
   2) Mounted on main signal's mast

l) Running line signal

m) Audio and light signal for signalling during shunting

n) Points signal

o) Double points signal

p) Derailer signal
4.5.2 Train detection symbols

4.5.2.1 Insulated track circuit

Tabell 3: Insulated track circuit

<table>
<thead>
<tr>
<th>Symbol for track insulation</th>
<th>Symbol for single-line diagram</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td>Track circuit with insulated joints</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td>Track circuit with supply, return and impedance pole</td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td>Track circuit with junction transformer (impedance pole is not shown on drawing)</td>
</tr>
<tr>
<td>d)</td>
<td></td>
<td>Terminal box for track circuit (TK)</td>
</tr>
</tbody>
</table>

4.5.2.2 FTG-S

Tabell 4: FTG-S

<table>
<thead>
<tr>
<th>Symbol for track insulation</th>
<th>Symbol for single-line diagram</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td>S-bond FTG-S 917/917</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td>S-bond FTG-S 46/46</td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td>S-bond FTG-S 46/917</td>
</tr>
</tbody>
</table>
d) Bond with potential equaliser

e) Terminal bond FTG-S 46

f) Terminal bond FTG-S 917

g) Short-circuit bond

Tuned unit (for two track circuits)

Transmitter and receiver

Earthed segmented earthing conductor with filter (FTG-S)

4.5.2.3 TI21

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol for track insulation</th>
<th>Symbol for single-line diagram</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Transmitter" /></td>
<td><img src="image" alt="Transmitter" /></td>
<td>Transmitter</td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Transmitter with LMU" /></td>
<td><img src="image" alt="Transmitter with LMU" /></td>
<td>Transmitter with LMU (amplifier)</td>
</tr>
<tr>
<td>c)</td>
<td><img src="image" alt="Receiver" /></td>
<td><img src="image" alt="Receiver" /></td>
<td>Receiver</td>
</tr>
</tbody>
</table>
4.5.2.4 Axle counter

Tabell 6: Axle counter

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol for track insulation</th>
<th>Symbol for single-line diagram</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>-</td>
<td>![symbol]</td>
<td>Counting head</td>
</tr>
</tbody>
</table>

4.5.3 Points and derailer equipment signals

Tabell 7: Points and derailer equipment signals

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>![symbol]</td>
<td>Manually operated points that do not form part of the interlocking system</td>
</tr>
<tr>
<td>b)</td>
<td>![symbol]</td>
<td>Manually operated points that form part of the interlocking system. Normal setting to straight track.</td>
</tr>
<tr>
<td>c)</td>
<td>![symbol]</td>
<td>Manually operated points that form part of the interlocking system. Normal setting to diverging track.</td>
</tr>
<tr>
<td>d)</td>
<td>![symbol]</td>
<td>Centrally operated points</td>
</tr>
<tr>
<td></td>
<td>1) ![symbol]</td>
<td>1) Normal setting to straight track</td>
</tr>
<tr>
<td></td>
<td>2) ![symbol]</td>
<td>2) Normal setting, route to right</td>
</tr>
<tr>
<td>e)</td>
<td>![symbol]</td>
<td>Centrally operated points</td>
</tr>
<tr>
<td></td>
<td>1) ![symbol]</td>
<td>1) Normal setting to diverging track</td>
</tr>
<tr>
<td></td>
<td>2) ![symbol]</td>
<td>2) Normal setting, route to left</td>
</tr>
<tr>
<td>f)</td>
<td>![symbol]</td>
<td>Centrally operated double cross-over</td>
</tr>
<tr>
<td>g)</td>
<td>![symbol]</td>
<td>Centrally operated single cross-over</td>
</tr>
<tr>
<td>h)</td>
<td>![symbol]</td>
<td>Crossing</td>
</tr>
</tbody>
</table>
i) Derailer, normal setting 'engaged'
   - Derailment to left

j) Derailer, normal setting 'disengaged'

k) Double derailer, normal setting 'engaged'
   - Derailment to right

l) Control locked points
   - Control lock that locks points to straight track

m) Control lock that locks points to diverging track

n) Point machine

o) Points operated locally

p) Lock

q) Key apparatus (key-operated lock)

4.5.4 Road barrier system signals

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image1" alt="Symbol" /></td>
<td>Road signal</td>
</tr>
<tr>
<td>1)</td>
<td>1) Single signal on separate cable plan</td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>2) Double signal on separate cable plan</td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>3) Single signal on other drawings</td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>4) Double signal on other drawings</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td><img src="image2" alt="Symbol" /></td>
<td>Level crossing signal</td>
</tr>
<tr>
<td>1)</td>
<td>1) Signal on separate cable plan</td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>2) Signal on other drawings</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td><img src="image3" alt="Symbol" /></td>
<td>Distant signal for level crossing signal</td>
</tr>
</tbody>
</table>
1) Signal on separate cable plan
2) Signal on other drawings

d) Level crossing (unsecured)
e) Level crossing with half-barriers and crossing barrier motors
f) Level crossing with full barriers and crossing barrier motors
g) Level crossing secured with mechanical road barriers

4.5.5 Other symbols

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a)</td>
<td>Cable trench route</td>
</tr>
<tr>
<td></td>
<td>b)</td>
<td>Jointing sleeves</td>
</tr>
<tr>
<td></td>
<td>c)</td>
<td>Branch sleeves</td>
</tr>
<tr>
<td></td>
<td>d)</td>
<td>End of route</td>
</tr>
<tr>
<td></td>
<td>e)</td>
<td>Landslide warning fence</td>
</tr>
<tr>
<td></td>
<td>f)</td>
<td>Control cabinet (AS)</td>
</tr>
<tr>
<td></td>
<td>g)</td>
<td>Telephone</td>
</tr>
</tbody>
</table>
4.5.6 Circuit diagram symbols

4.5.6.1 General
Circuit diagrams that are both principle diagrams and assembly diagrams are used.

a) Relay contacts in circuit diagrams must be drawn independently of the associated relay coils so that the diagrams are as simple as possible.

b) Terminal numbering, as well as cables and wiring must be drawn in such a way that circuit diagrams are as simple as possible.

As a consequence, terminal points on one and the same terminal strip will not be drawn together but may be distributed over the diagrams in the same way as relay contacts.

All split connection points (terminal numbers) must be indicated on the circuit diagram.

Exceptions:
1) Terminal numbers in cable sleeves must not be indicated as these must always agree with the wire numbers in the associated cable. The same rule applies to a cable ending in a terminal strip as to a cable ending in a cable sleeve.

4.5.6.2 Relay coils and relay contacts

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Magnetic relay" /></td>
<td>Magnetic relay</td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Steel core relay" /></td>
<td>Steel core relay</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Relay coil and self-contact" /></td>
<td>Relay coil and self-contact to a standard steel core relay with 10 contacts.</td>
</tr>
</tbody>
</table>
c) Steel core relay
Relay coil and self-contact to a steel core relay comprising 10 contacts.
The relay has an inbuilt resistance of 175 Ω and is used in relay object controllers for points.

d) Relay contact - front contact.
The relay is normally operative and the front contacts are closed.

e) Relay contact - front contact.
The relay is normally unenergised and the front contacts are open.

f) Relay contact - back contact.
The relay is normally energised and the back contacts are open.

g) Relay contact - back contact.
The relay is normally unenergised and the back contacts are closed.

4.5.6.3 Relay coils and contacts used in circuit diagrams
Tabell 11: Relay coils and contacts used in circuit diagrams

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Relay contacts must be laid out as shown in the figure on the left.
2. Letters and numbers must be 3 mm high.
3. Line spacing on circuit diagrams must be 21 mm.
   
   **Exception to point 3:**
   1. In the case of corrections, smaller spacing may be used, where necessary, although not less than 15 mm.
4. Contact distance must be 18 mm.

The distance between two terminal strip points must be at least 6 mm.

1. The relay symbol diameter must be 8 mm.

1. Wiring must always be indicated on circuit diagrams.

E.g.: The figure shows that contact A9 on relay SR.A has two cables and contact A10 on relay SR.A has one cable.

E.g.

Wiring is indicated with one line per cable. On contact A9 relay SR.A there are two cables, one running to point 3 on rail S41 and one running to A1 on relay SF.A. In the same way, contact A2 on relay SR.B has two cables, one of which runs to contact F1 on relay SF.A and the other cable running to contact F9 on relay SR.A (see figure on the left).

E.g. 2:

From rail S41/6 on frame 6 point 3 a cable runs to contact A9 on relay SR.A. From here, a new cable runs to contact A1 on relay SF.A. A new cable continues to terminal strip point 32K1/6 on frame 6. A cable then continues from terminal strip point 32K1/6 on frame 1 (part 1) to the push button contact 11 (see figure on the left).

### Tabell 12: Fuse rails (S) and terminal strips (K)

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
</table>

4.5.6.4 Fuse rails (S) and terminal strips (K)
1. Fuse rails must be indicated with the letter S.

A rail is any terminal strip on which all points have the same potential. The voltage (potential) of the rail is also normally indicated.

**E.g.** The figure on the left shows terminal point 3 on rail S41. This point has the potential 36 V+.

2. Terminal strips must be indicated with the letter K, as long as they are not to be perceived as rails.

3. All terminal strips must be marked with a number.

**E.g.** The figure on the left shows a connection between contact F1 on relay X to point 3 terminal strip 11, then to point 5 terminal strip 8 and to contact A1 relay Y.

The terminal number for the connection between two corresponding terminal strips must only be written once. Two corresponding terminal strips normally have the same terminal strip numbers. ‘Corresponding terminal strips’ refers to two physically separated terminal strips where all of the terminal numbers used on the one terminal strip are linked to corresponding terminal numbers on the other terminal strip.

1. Rails and terminal strips within a construction site must have individual rail and terminal strip designations.

**Exceptions:**

1. Separate areas associated with the same site may, however, have identical terminal strip designations, provided that no misunderstandings can arise.

A terminal strip may be divided into several physically separate strips if the marking allows it to be perceived as one strip (see figure on the left).

### 4.5.6.5 Other contacts and knobs

**Tabell 13: Other contacts and knobs**

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Diagram" /></td>
<td>Contact operated by a magnet. E.g. relay contact (see above), contact in key-operated lock or lock operated by an electromagnet.</td>
</tr>
</tbody>
</table>
b) Contact operated by a lever or mechanically operated in some other way. Normally closed.

c) Knob contact, mechanically operated

d) Push button contact. Normally closed.

e) Knob contact, electrically operated

### 4.5.6.6 Coils and transformers

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td><img src="image" alt="Coil/winding, general symbol" /></td>
<td>Coil/winding, general symbol</td>
</tr>
<tr>
<td>b)</td>
<td><img src="image" alt="Coil with core (ferromagnetic unless otherwise indicated)" /></td>
<td>Coil with core (ferromagnetic unless otherwise indicated)</td>
</tr>
<tr>
<td>c)</td>
<td><img src="image" alt="Transformer with two separate windings and cores, general symbol" /></td>
<td>Transformer with two separate windings and cores, general symbol</td>
</tr>
<tr>
<td>d)</td>
<td><img src="image" alt="Transformer with screen" /></td>
<td>Transformer with screen</td>
</tr>
<tr>
<td>e)</td>
<td><img src="image" alt="Current transformer, general symbol" /></td>
<td>Current transformer, general symbol</td>
</tr>
<tr>
<td>f)</td>
<td><img src="image" alt="Coil/winding, general symbol" /></td>
<td>Coil/winding, general symbol</td>
</tr>
</tbody>
</table>
1. The symbol must be used with tone frequencies and higher frequencies.

   g) 
   ![Coil symbol](image)  
   Coil with core, variable. Tone frequency or higher frequency.

   h) 
   ![Coil symbol](image)  
   Coil with core, tone frequency or higher frequency

   i) 
   ![Transformer symbol](image)  
   Transformer with core. Tone frequency or higher frequency.

   j) 
   ![Transformer symbol](image)  
   Transformer with screen. Tone frequency or higher frequency.

4.5.6.7 Other circuit diagram symbols

Tabell 15: Other circuit diagram symbols

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>=</td>
<td>Direct current</td>
</tr>
<tr>
<td>b)</td>
<td>+</td>
<td>Positive polarity – plus</td>
</tr>
<tr>
<td>c)</td>
<td>-</td>
<td>Negative polarity – minus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternating current, general symbol.</td>
</tr>
<tr>
<td>d)</td>
<td>~</td>
<td>Used for relatively low frequencies: 50 or 95 Hz.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>The numeric value of the frequency may be placed to the right of the symbol. E.g.: 10 kHz.</strong></td>
</tr>
<tr>
<td>e)</td>
<td><img src="image" alt="Fuse symbol" /></td>
<td>Fuse, general symbol. The supply side is indicated by a solid marking.</td>
</tr>
<tr>
<td>f)</td>
<td><img src="image" alt="Fuse symbol" /></td>
<td>Knife blade fuse or fuse on cable rack</td>
</tr>
</tbody>
</table>
g) Isolating blade. The symbol may not be used as a terminal strip point.

h) Hose clamp Normally described as an 'American clamp'

i) Surge diverter Varistor

j) Resistance (ohmic), general symbol

k) Resistance, adjustable

l) Capacitor, general symbol

m) Polarised capacitor

n) Electrolytic capacitor, non-polarised

o) Electrolytic capacitor, polarised

p) Rectifier element (semiconductor diode), general symbol

q) Zener diode (regular diode)

r) Bidirectional (two-way) zener diode

s) Rectifier element (semiconductor diode), general symbol

t) Zener diode (regular diode)

u) Bidirectional (two-way) zener diode

v) Incandescent lamp, general symbol. Wattage may be entered to the right of the symbol.

w) Earth connection, general symbol

x) Accumulator battery. The battery's voltage or number of cells should be specified.

y) Static converter, general symbol

The symbol is used, for example, in connection with:

1. static converter DC/AC.
2. static converter AC/DC (rectifier)
Units that have no special symbol may be indicated thus.

1. The symbol must always be specified with text.

If it is necessary to note that several symbols belong together in a group, the symbols may be framed by a line of demarcation.

1. The unit must always be specified with text, e.g.:

OC II

Rotating electrical machine, general symbol

Motor and generator

AC motor, single phase with separate windings for each direction of rotation (point machine motor).

DC motor, series motor (road barrier motor)

Separate windings for each direction of rotation.

Mechanically connected machines
Converter with DC motor

NPN transistor

PNP transistor

Thyristor

### 4.5.7 Symbols for use in ATC and signage plan

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>△ ▲</td>
<td>Fixed balises</td>
</tr>
<tr>
<td>b)</td>
<td>△ ▲</td>
<td>Controlled balises</td>
</tr>
<tr>
<td>c)</td>
<td>▲</td>
<td>Prefix balise (P-balise)</td>
</tr>
<tr>
<td>d)</td>
<td>△</td>
<td>N-balise</td>
</tr>
</tbody>
</table>
e) First balise at information point
f) Collection of balises drawn on another diagram
g) Covered balise
h) DATC commences
i) FATC commences
j) ATC ends
k) ATC disabled
l) ATC enabled
m) Centrally controlled section (FJS) commences
n) Centrally controlled section (FJS) ends
o) Section without block signalling commences
p) Reduced speed (Signal 68A)
q) Increased speed (Signal 68B)
r) Variable reduced/increased speed (Signal 68C)
s) Indicator marker (Signal 68D)
t) Temporary speed restriction (Signal 69A)
u) Temporary speed restriction ends (Signal 69B)
v) Level crossing
w) Stop
x) ATC sign 1
y) ATC sign 2
z) ATC sign 2 with measuring point sign (Used with simultaneous train movement)
aa) ATC sign 2 (Specifies repeater balise with ATC crossing barrier)

bb) ATC sign 3

cc) Derailment indicator/balise post

dd) Boundary/connection post

ev) Brake post

ff) Segmentation post

gg) Balise sign (platform edge)

hh) Uphill gradient indicator

ii) Downhill gradient indicator

jj) Signal 65G, Stop for electric locomotive

kk) Supplementary sign for track allocation

ll) Distance marker 1

mm) Distance marker 2

nn) Metre marker (for stopping at a platform)

oo) Metre indication/supplementary sign

pp) Chain break

qq) Chain break

rr) Landslide warning marker

ss) End of route

tt) Level crossing marker

uu) Running line letter designation
4.5.8 PLC drawings

Example 1 shows the top of a route report diagram where the route command relays are replaced by PLC. The outputs are schematically represented as contacts and assigned names in the usual way (MII - MI - AI - AII). The outputs (addresses) are numbered with the connection's number. This PLC has + voltage throughout on OT+ taken from the interlocking system. The OT+ point reappears on several diagrams.

Figur 1: PLC route report diagram

Example 2 is an extract from a lever diagram where the levers are connected to the PLC inputs. The inputs are controlled from an internal voltage source and retrieved from the connection point marked 24 V+. Lever Ah runs to input 0 on the PLC, Av to input 1, etc.

Figur 2: PLC lever diagram
4.5.9 Autocad® – symbols

4.5.9.1 Cable plan

4.5.9.2 Road barriers
### 4.5.9.3 Miscellaneous

<table>
<thead>
<tr>
<th>DIVERSE</th>
<th>SPOR001</th>
<th>SPOR002</th>
<th>SPOR004</th>
<th>TLP001</th>
<th>STA0001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STP001</td>
<td>AVS001</td>
<td>AVS002</td>
<td>ZLE001</td>
<td>BAL002</td>
<td>BAL004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LYS001</td>
<td>AVL001</td>
<td>AVS001</td>
<td>AVS002</td>
<td>AVL002</td>
<td>AVS003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVL004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[X=\text{INSITZENSPUNKT}\]

### 4.5.9.4 Track circuits

<table>
<thead>
<tr>
<th>SPORFILTER</th>
<th>SPORF001</th>
<th>SPORF002</th>
<th>SPORF003</th>
<th>SPORF004</th>
<th>SPORF005</th>
<th>SPORF006</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYGELSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPORF006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[X=\text{INSITZENSPUNKT}\]
4.5.9.5 Components

4.5.9.6 Relays
4.5.9.7 Signalling
4.5.9.8 Points
### 4.5.9.9 Points

<table>
<thead>
<tr>
<th>VEKSEL</th>
<th>VEKSEL</th>
<th>VEKSEL</th>
<th>VEKSEL</th>
<th>VEKSEL</th>
<th>VEKSEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td><img src="image15.png" alt="Image" /></td>
<td><img src="image16.png" alt="Image" /></td>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image19.png" alt="Image" /></td>
<td><img src="image20.png" alt="Image" /></td>
<td><img src="image21.png" alt="Image" /></td>
<td><img src="image22.png" alt="Image" /></td>
<td><img src="image23.png" alt="Image" /></td>
<td><img src="image24.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image25.png" alt="Image" /></td>
<td><img src="image26.png" alt="Image" /></td>
<td><img src="image27.png" alt="Image" /></td>
<td><img src="image28.png" alt="Image" /></td>
<td><img src="image29.png" alt="Image" /></td>
<td><img src="image30.png" alt="Image" /></td>
</tr>
</tbody>
</table>

\(\times = \text{INNINGSPUNKT}\)

### 4.5.9.10 Tables

<table>
<thead>
<tr>
<th>SKORVEKSEL</th>
<th>SKORVEKSEL</th>
<th>SKORVEKSEL</th>
<th>SKORVEKSEL</th>
<th>SKORVEKSEL</th>
<th>SKORVEKSEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image31.png" alt="Image" /></td>
<td><img src="image32.png" alt="Image" /></td>
<td><img src="image33.png" alt="Image" /></td>
<td><img src="image34.png" alt="Image" /></td>
<td><img src="image35.png" alt="Image" /></td>
<td><img src="image36.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image37.png" alt="Image" /></td>
<td><img src="image38.png" alt="Image" /></td>
<td><img src="image39.png" alt="Image" /></td>
<td><img src="image40.png" alt="Image" /></td>
<td><img src="image41.png" alt="Image" /></td>
<td><img src="image42.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image43.png" alt="Image" /></td>
<td><img src="image44.png" alt="Image" /></td>
<td><img src="image45.png" alt="Image" /></td>
<td><img src="image46.png" alt="Image" /></td>
<td><img src="image47.png" alt="Image" /></td>
<td><img src="image48.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image49.png" alt="Image" /></td>
<td><img src="image50.png" alt="Image" /></td>
<td><img src="image51.png" alt="Image" /></td>
<td><img src="image52.png" alt="Image" /></td>
<td><img src="image53.png" alt="Image" /></td>
<td><img src="image54.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image55.png" alt="Image" /></td>
<td><img src="image56.png" alt="Image" /></td>
<td><img src="image57.png" alt="Image" /></td>
<td><img src="image58.png" alt="Image" /></td>
<td><img src="image59.png" alt="Image" /></td>
<td><img src="image60.png" alt="Image" /></td>
</tr>
</tbody>
</table>

\(\times = \text{INNINGSPUNKT}\)
4.5.9.11 Transformers