

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 derailleurs. 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
Acronym of European Reference Frame 1989: Geodetic datum for Europe, introduced as the new official geodetic datum in Norway on 1 January 1993. Together with UTM, it forms the new coordinate-based reference system in Norway.

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 2/3 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 2/3 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

Global Navigation Satellite System. Russian satellite navigation system.

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 μ 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) \geq 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 disconnect 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, C_u

The grain uniformity coefficient compares the grain diameters of 60% diameter (d_{60}) and 10% diameter (d_{10}), and is stated as $C_u = d_{60}/d_{10}$. The value d_{60} means that 60% of the material has a grain diameter of less than d_{60} . The same applies to d_{10} .

$C_u > 15$ means well graded material.

$C_u < 5$ 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 disconnecter that in the open position satisfies the insulation level requirements stipulated for a disconnecter.

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) derailleurs 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 derailleurs 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 (D_{max}.)

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

Overtoltage 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 lighting 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 16 $\frac{2}{3}$ 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

Realigning 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 through 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 16 $\frac{2}{3}$ 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 16 $\frac{2}{3}$ 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

is specified in S/km.

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 \pm 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

Acronym. Universal Transverse Mercator: Global map projection system. Together with EUREF89, constitutes the new coordinate-based reference system in Norway.

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	International Electrotechnical Commission. Standardisation organisation.
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)
HCI/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

rl	High pressure sodium lamps
RTU	Return wire
sbli	Remote Terminal Unit
sek	Messenger wire tension
sh	Insulated overlap section
SI	System height
skt	Section insulator
str	Contact wire tension
utl	Draining transformer
	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_e [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
dI/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
Ψ [m/s ³]	jerk

4.2 Bridge symbols

α	load classification factor, speed coefficient
δ	deformation (general), vertical sag
ρ	density
σ	tension

Θ	end rotation of structure (general)
$\varphi, \varphi', \varphi''$	dynamic components of actual trains
Ψ_0	reduction factor for combination value for a variable load
Ψ'_1	reduction factor for irregular value for a variable load
Ψ_1	reduction factor for regular value for a variable load
Ψ_2	reduction factor for quasi-permanent value for a variable load
Φ_2, Φ_3	dynamic factors for railway loads
γ_G	partial factor for permanent loads
γ_D	partial factor for deformation loads
γ_Q	partial factor for variable loads
δ_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_δ	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_Φ	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	

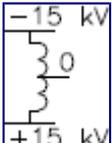
equivalent distributed load from pressure and suction effects

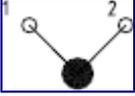
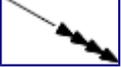
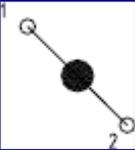
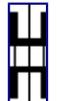
Q_{la}	acceleration force
Q_{lb}	brake force
Q_r	resulting force (general)
Q_s	roll force
Q_t	centrifugal force
Q_v	vertical axle load
q_v	vertical distributed load
Q_{vi}	wheel load
R	curve radius
s	track gauge (for normal track is $s = 1435$ mm)
t	spin (change of cant over 3 m)
V	speed in km/h
v	speed in m/s
V_R	resistance of track to longitudinal displacement
W	wind force

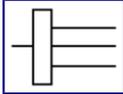
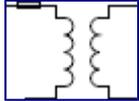
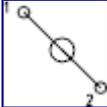
4.3 Electrical energy symbols

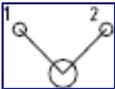
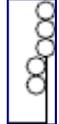
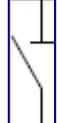
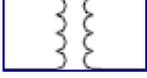
4.3.1 Overhead contact line system and traction power supply symbols

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

Symbols	Station/s ection plan	Circuit diagram for overhead contact line system	Return circuit diagram	General plan	Explanation
	x	x		x	Autotransformer

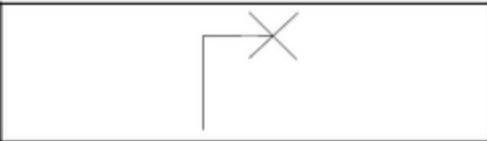
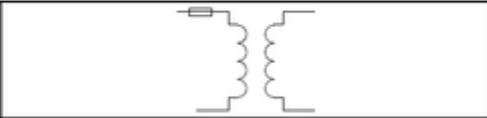
						Tensioning
						[F] Fixed
						[L] Weighted
						[H] Hydraulic
						
						Tensioning with anchoring wires. Indicates the side on which the anchor is brought down.
						Tensioning with an anchoring wire
						Tensioning with two anchoring wires
						Tensioning with three anchoring wires
						Tensioning with four anchoring wires
						Tensioning, anchoring wires to the left and right of the track.
						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

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

					x	brought down. Section with anchoring wires. Indicates the side on which the anchor is brought down.
	x	x	x		x	Section insulator
	x			x		Signal with 2 lights
	x	x		x		Main signal with 3 lights
	x			x		Signal with 5 lights
			x			Disconnecter
	x					Track on curve. The text indicates whether it is a plus or minus curve. The curve bends around the text.
					x	Track on curve. The text indicates whether it is a plus or minus curve. The curve bends around the text.
	x					Crossing with overhead contact line
	x					Points guiding towards main track or diverging track
	x					Points guiding towards main track and diverging track
	x					Points with no overhead contact line
	x	x		x		Station
	x					Strut (arrow towards mast)
	x	x		x		Draining transformer showing primary or secondary side
	x	x		x		Transformer, 1000 V
	x					Wooden mast
	x	x		x	x	Tunnel

	x		Tunnel attachment point
		x	Equalising connection to rail
	x		Portal structure
	x		Extension of portal structure with free end terminating towards the right

4.3.2 Circuit diagram, low-voltage symbols

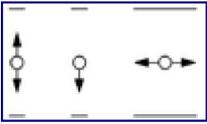
SYMBOL	FORKLARING
4.3.2.1 Belysning	
	Plattformbelysning på mast med lengde (i mm).
	Plattformbelysning på mast med lengde (i mm).
	Belysning i åk.
	Belysning på spir i åk.
4.3.2.2 Reservestrømsystemer	
	Reservestrømstransformator.

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.

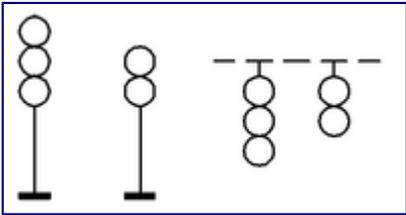
4.5 Interlocking table symbols

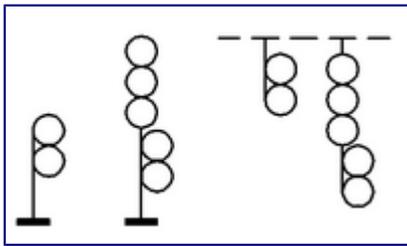
Tabell 1: Interlocking table symbols

No	Symbol	Explanation
		Control panel.
a)		The dot shows where the control centre operator sits.
b)		Indicates that the track circuit is clear
Key symbols:		
c)	 1) 2)	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)	+ - 1) 2)	1) + indicates 'normal position' 2) - indicates 'not normal position'
Levers		
e)	 1) 2) 3)	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

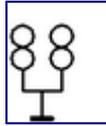
No	Symbol	Explanation
Main signal		
a)	 1) 2) 3) 4)	1) 3-light 2) 2-light 3) 3-light, mounted on portal structure 4) 2-light, mounted on portal structure
Distant signal		
b)		1) Free-standing 2) Mounted on main signal's mast



1) 2) 3) 4)

- 3) Mounted on portal structure
- 4) Mounted together with main signal on portal structure

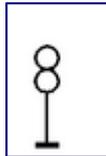
c)



Bridge signal

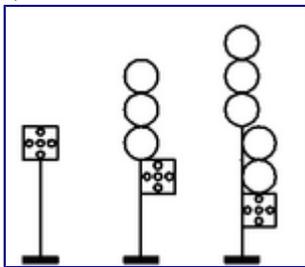
Distant signal for bridge signal

d)



Single home signal apparatus

e)

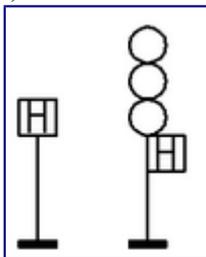


1) 2) 3)

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)

f)

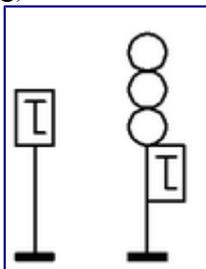


1) 2)

Main line signal

- 1) Mounted on separate mast
- 2) Mounted on main signal's mast

g)



1) 2)

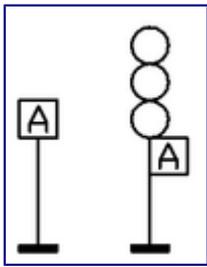
Brake test signal

- 1) Mounted on separate mast
- 2) Mounted on main signal's mast

h)

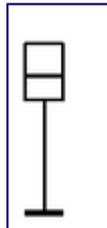
Departure signal

- 1) Mounted on separate mast
- 2) Mounted on main signal's mast



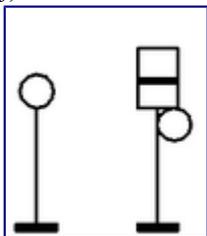
1) 2)

i)



High shunting signal

j)



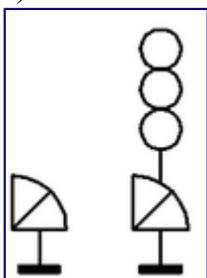
1) 2)

'Rear of train clear of fouling point' lamp

1) Mounted on separate mast

2) Mounted on high shunting signal's mast

k)



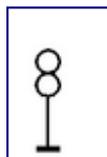
1) 2)

Dwarf signal

1) Mounted on separate mast

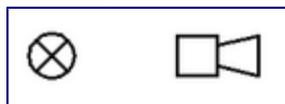
2) Mounted on main signal's mast

l)



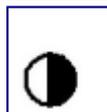
Running line signal

m)



Audio and light signal for signalling during shunting

n)



Points signal

o)



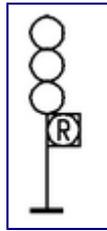
Double points signal

p)



Derailer signal

q)



Landslide warning signal

4.5.2 Train detection symbols

4.5.2.1 Insulated track circuit

Tabell 3: Insulated track circuit

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

4.5.2.2 FTG-S

Tabell 4: FTG-S

	Symbol for track insulation	Symbol for single-line diagram	Explanation
a)			S-bond FTG-S 917/917
b)			S-bond FTG-S 46/46
c)			S-bond FTG-S 46/917

d)			Bond with potential equaliser
e)			Terminal bond FTG-S 46
f)			Terminal bond FTG-S 917
g)			Short-circuit bond
h)		-	Tuned unit (for two track circuits) Transmitter and receiver
i)		-	Earthed segmented earthing conductor with filter (FTG-S)

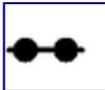
4.5.2.3 TI21

Tabell 5: TI21

No	Symbol for track insulation	Symbol for single-line diagram	Explanation
a)			Transmitter
b)			Transmitter with LMU (amplifier)
c)			Receiver

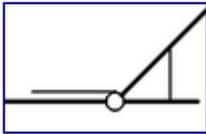
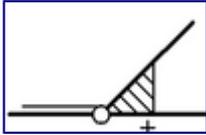
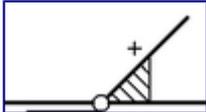
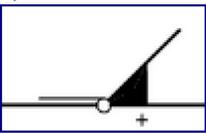
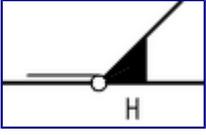
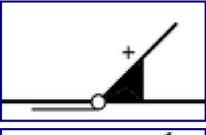
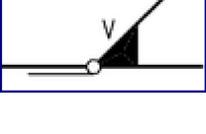
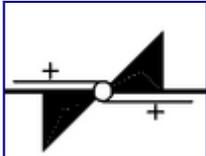
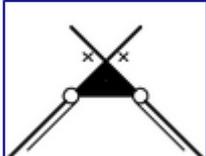
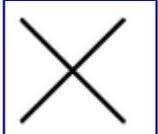
4.5.2.4 Axle counter

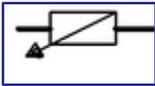
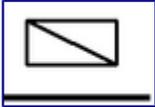
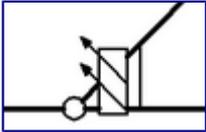
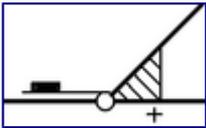
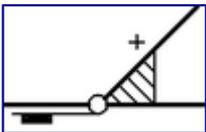
Tabell 6: Axle counter

No	Symbol for track insulation	Symbol for single-line diagram	Explanation
a)	-		Counting head

4.5.3 Points and derailer equipment signals

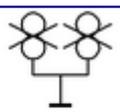
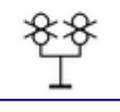
Tabell 7: Points and derailer equipment signals

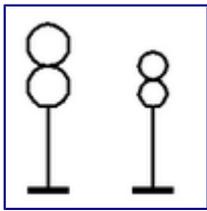
No	Symbol	Explanation
a)		Manually operated points that do not form part of the interlocking system
b)		Manually operated points that form part of the interlocking system. Normal setting to straight track.
c)		Manually operated points that form part of the interlocking system. Normal setting to diverging track.
d)	 1)  2)	Centrally operated points 1) Normal setting to straight track 2) Normal setting, route to right
e)	 1)  2)	Centrally operated points 1) Normal setting to diverging track 2) Normal setting, route to left
f)		Centrally operated double cross-over Normal setting for route from a to b
g)		Centrally operated single cross-over Normal setting for route straight ahead
h)		Crossing

- 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

Tabell 8: Road barrier system signals

No	Symbol	Explanation
a)		Road signal
1)		1) Single signal on separate cable plan
2)		2) Double signal on separate cable plan
3)		3) Single signal on other drawings
4)		4) Double signal on other drawings
b)		Level crossing signal
1)		1) Signal on separate cable plan
2)		2) Signal on other drawings
c)		Distant signal for level crossing signal

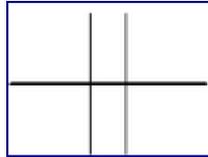


1) 2)

1) Signal on separate cable plan

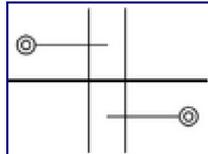
2) Signal on other drawings

d)



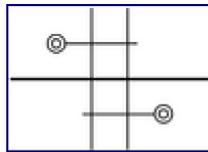
Level crossing (unsecured)

e)



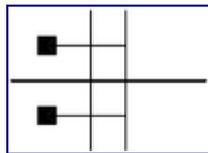
Level crossing with half-barriers and crossing barrier motors

f)



Level crossing with full barriers and crossing barrier motors

g)

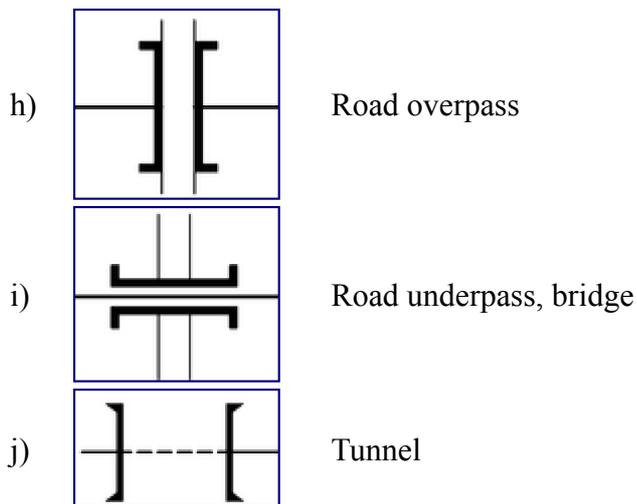


Level crossing secured with mechanical road barriers

4.5.5 Other symbols

Tabell 9: Other symbols

No	Symbol	Explanation
a)		Cable trench route
b)		Jointing sleeves
c)		Branch sleeves
d)		End of route
e)		Landslide warning fence
f)		Control cabinet (AS)
g)		Telephone



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.

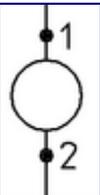
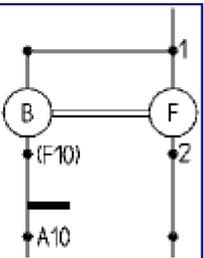
All split connection points (terminal numbers) must be indicated on the circuit diagram.

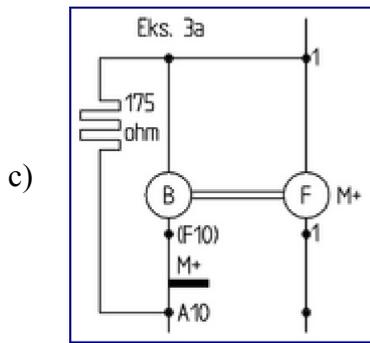
Exceptions:

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

Tabell 10: Relay coils and relay contacts

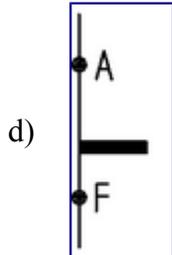
No	Symbol	Explanation
a)		Magnetic relay Relay coil
b)		Steel core relay Relay coil and self-contact to a standard steel core relay with 10 contacts.



Steel core relay

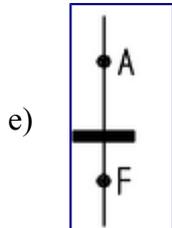
Relay coil and self-contact to a steel core relay comprising 10 contacts.

The relay has an inbuilt resistance of 175 Ω and is used in relay object controllers for points.



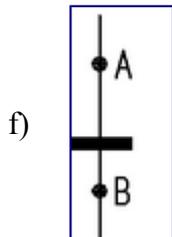
Relay contact - front contact.

The relay is normally operative and the front contacts are closed.



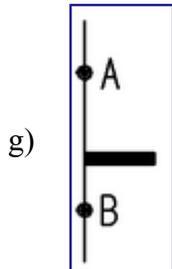
Relay contact - front contact.

The relay is normally unenergised and the front contacts are open.



Relay contact - back contact.

The relay is normally energised and the back contacts are open.



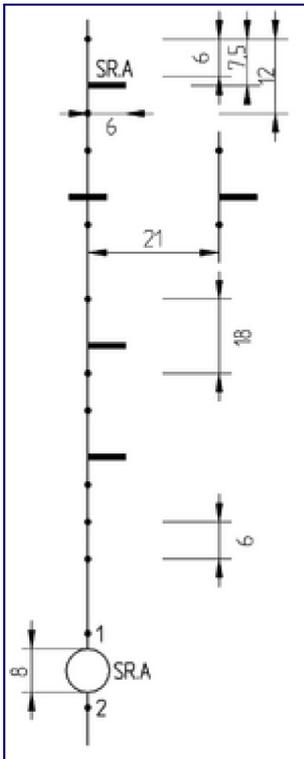
Relay contact - back contact.

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

No	Symbol	Explanation
----	--------	-------------



a)

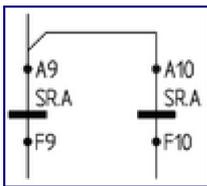
1. Relay contacts must be laid out as shown in the figure on the left.
2. Letters and numbers must be 3 mm high.
3. Line spacing on circuit diagrams must be 21 mm.

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.

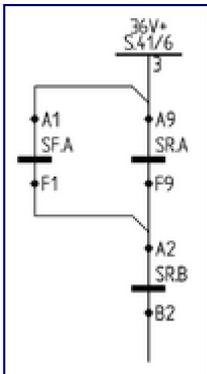
1. The relay symbol diameter must be 8 mm.



b)

1. Wiring must always be indicated on circuit diagrams.

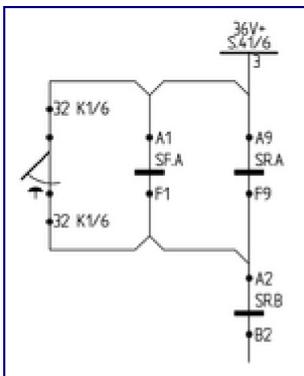
E.g.: The figure shows that contact A9 on relay SR.A has two cables and contact A10 on relay SR.A has one cable.



c)

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).



d)

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).

4.5.6.4 Fuse rails (S) and terminal strips (K)

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

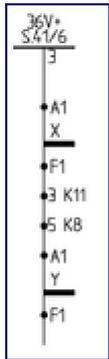
No	Symbol	Explanation
----	--------	-------------

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+.

a)



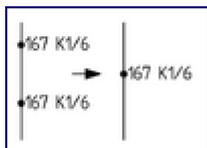
2. Terminal strips must be indicated with the letter K, as long as they are not to be perceived as rails.
3. All terminal strips must be marked with a number.

'Terminal strips' refer to connection point in which the individual terminals are or can be independent of each other.

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.

b)



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).

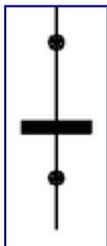
4.5.6.5 Other contacts and knobs

Tabell 13: Other contacts and knobs

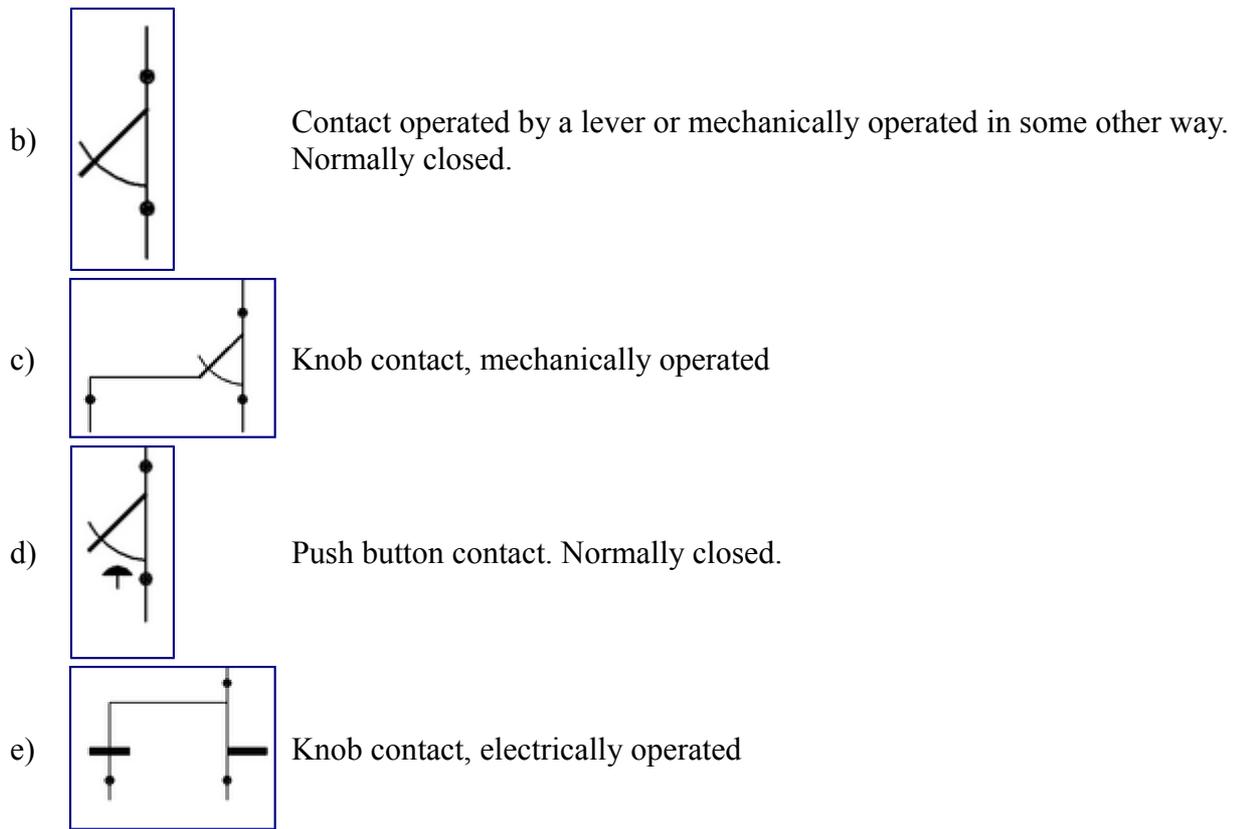
No Symbol

Explanation

a)

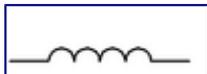
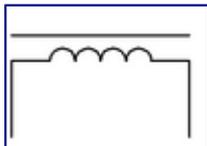
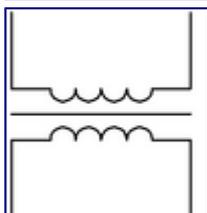
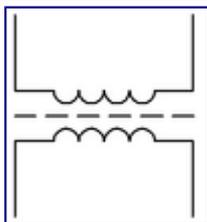
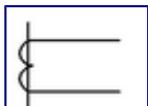


Contact operated by a magnet. E.g. relay contact (see above), contact in key-operated lock or lock operated by an electromagnet.

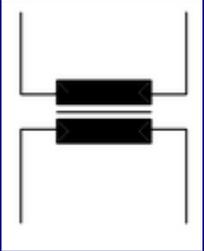
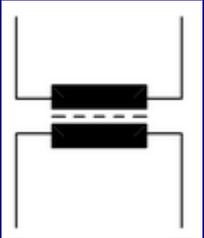


4.5.6.6 Coils and transformers

Tabell 14: Coils and transformers

No	Symbol	Explanation
a)		Coil/winding, general symbol
b)		Coil with core (ferromagnetic unless otherwise indicated)
c)		Transformer with two separate windings and cores, general symbol
d)		Transformer with screen
e)		Current transformer, general symbol
f)		Coil/winding, general symbol

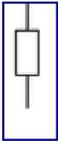
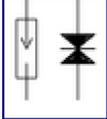
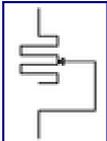
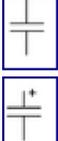
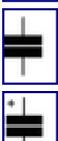
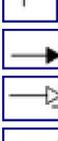
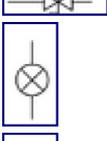
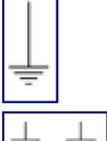
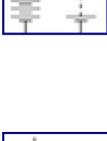
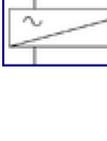
1. The symbol must be used with tone frequencies and higher frequencies.

- g)  Coil with core, variable. Tone frequency or higher frequency.
- h)  Coil with core, tone frequency or higher frequency
- i)  Transformer with core. Tone frequency or higher frequency.
- j)  Transformer with screen. Tone frequency or higher frequency.

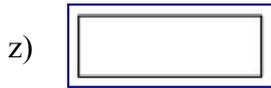
4.5.6.7 Other circuit diagram symbols

Tabell 15: Other circuit diagram symbols

No	Symbol	Explanation
a)	=	Direct current
b)	+	Positive polarity – plus
c)	-	Negative polarity – minus
		Alternating current, general symbol.
d)		Used for relatively low frequencies: 50 or 95 Hz.
The numeric value of the frequency may be placed to the right of the symbol. E.g.: 10 kHz.		
e)		Fuse, general symbol. The supply side is indicated by a solid marking.
f)		Knife blade fuse or fuse on cable rack

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. Static converter, general symbol
y)		The symbol is used, for example, in connection with: <ol style="list-style-type: none"> 1. static converter DC/AC. 2. static converter AC/DC (rectifier)

Units that have no special symbol may be indicated thus.

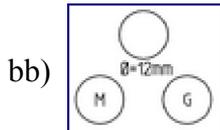


1. The symbol must always be specified with text.



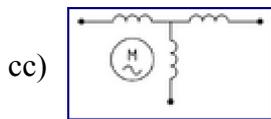
If it is necessary to note that several symbols belong together in a group, the symbols may be framed by a line of demarcation.

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

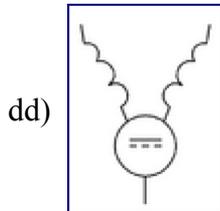


Rotating electrical machine, general symbol

Motor and generator

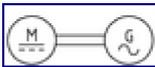


AC motor, single phase with separate windings for each direction of rotation (point machine motor).

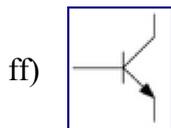


DC motor, series motor (road barrier motor)

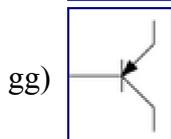
Separate windings for each direction of rotation.



ee) Mechanically connected machines Converter with DC motor



NPN transistor



PNP transistor

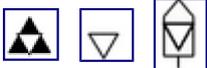


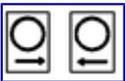
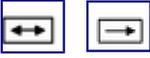
Thyristor

4.5.7 Symbols for use in ATC and signage plan

Tabell 16: Symbols for use in ATC and signage plan

No	Symbol	Explanation
a)		Fixed balises
b)		Controlled balises
c)		Prefix balise (P-balise)
d)		N-balise

- 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
- ee)  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.

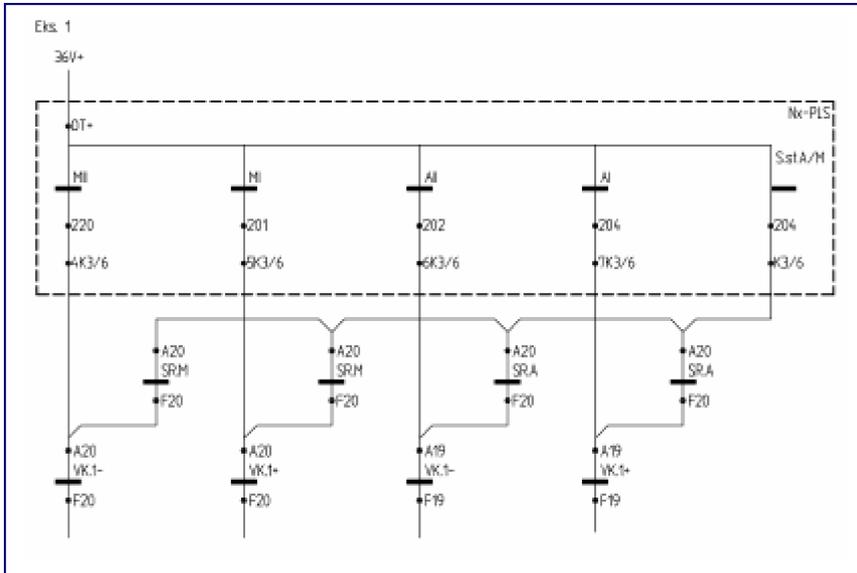


Figure 1: PLC route report diagram

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.

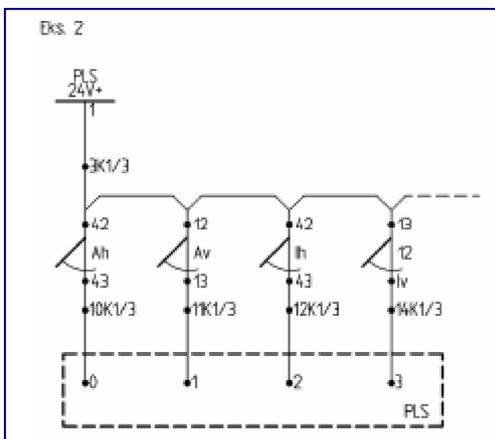


Figure 2: PLC lever diagram

4.5.9 Autocad® – symbols

4.5.9.1 Cable plan

KABELPLAN					
AS-ATS AAA BBB CCC DDD	AS-SKAP AAA BBB CCC DDD	DRVMASK X	GRUPSK AAA BBB CCC DDD	ISO-SK10 X	ISO-SK11 X
ISO-SK1	ISO-SK12	ISO-SK13	ISO-SK14	ISO-SK15	ISO-SK17
KABEL-S 	LOKSTILL X	OVERDR1 	OVERDR2 	RIGEL X	S-LAS
SIGTRAF 	TILF-RET X	S-LAS2 	KABEL-S2 		
X = INNSETTINGSPUNKT					



4.5.9.2 Road barriers

VEIBOM					
SIGNV001 AAA CCC	SIGNV002 AA CCC	PLD001 AAAA CC	SIGNV003 AA BBB C	SIGNV004 AAA B CCC	PLD002 BBB A CCC
ELE001 AAA 	MEK001 BB 	SIG3MM_1 AAA CCC	SIG3MM_2 AA BBB C	SIG3MM_3 AAA CCC	ELE002 AAA
MEK002 AAA	SIG3MM_4 AAA BBB C	SIG3MM_5 A BBB CCC	SIG3MM_6 BBB AAA CCC	ELE003 AAA BBB	SIG2SID AAA
X = INNSETTINGSPUNKT					



4.5.9.3 Miscellaneous

DIVERSE					
IS-S.002 	SPNR001 	SPNR002 	SPNR003 	TLP001 	STAPP001
STL001 	AVG001 	AVG002 	ZL001 	BAL002 	BAL004
LYS001 	AVL001 	AVS001 	AVS002 	AVL002 	AVS003
AVS004 					
X = INSETTUNGSPUNKT					

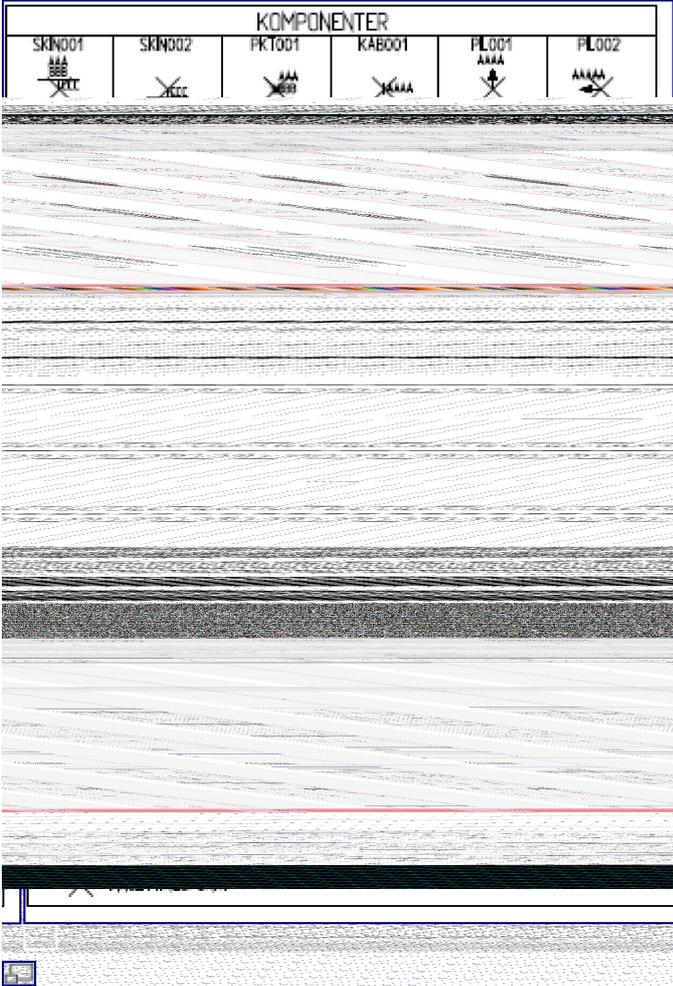


4.5.9.4 Track circuits

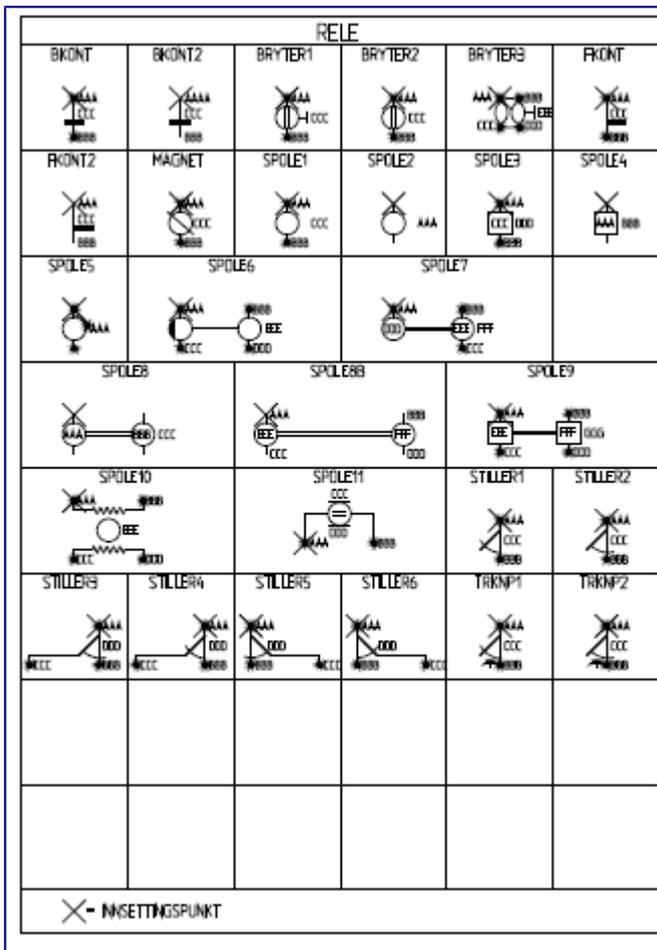
SPORFELTER					
BYGGESE 	SPORF-NR 	SPORIS01 	SPORIS02 	SPORIS03 	SPORIS04
SPORIS05 	SPORIS06 	SPORIS07 	SPORIS08 	SPORIS09 	OVER01
OVER02 	OVER03 				
X = INSETTUNGSPUNKT					



4.5.9.5 Components



4.5.9.6 Relays



4.5.9.7 Signalling

SIGNAL (1)					
AVGSIGN1 	AVGSIGNB 	BREMS1 	BREMS2 	OVERG1 	OVERG2
OVERG3 	OVERG4 	OVERG5 	OVERG6 	FORSIGN 	FORSIGNB
FORSIGNC 	FORSIGND 	FORSIGNE 	FORSIGNF 	FORSIGNG 	H-SHIFT1
H-SHIFT2 	H-SHIFT3 	H-SHIFT4 	HOSIGNB 	HOSIGNC 	HOSIGND
HOSIGNE 	HOSIGNF 	HOSIGNG 	HOSIGNH 	HOSIGNI 	HOSIGNU
HOSIGNK 	HOSIGNL 	HOSIGNM 	HOSIGNN 	HOSIGNO 	HOSIGNP
HOSIGSG 	MODEL1 	MODEL2 	MODEL3 	MODEL4 	PL1
SMASST1 	TGVSLUT1 	TGVSPOR 	TGVSPR2 	TGVSPR3 	TGVSPR4
X - INSETTSPUNKT					

SIGNAL (2)				
TOM1 	V-TGV1 	BROSIGN1 	BROSIGN2 	BROSIGN3
X - INSETTSPUNKT				

4.5.9.8 Points

VEKSEL					
VK001	VK002	VK003	VK004	VK005	VK006
VK007	VK008	VK009	VK010	VK011	VK012
VK014	VK015	VK016	VK017	VK018	VK019
VK020	VK021	VK022	VK023	VK024	VK025
VK026	VK027	VK028	VK029	DSP001	DSP002
DSP003	DSP004	DSP005	DSP006	DSP007	DSP008
X = INSETTSPUNKT					



4.5.9.9 Points

SKORVEKSEL					
VKS001	VKS002	VKS003	VKS004	VKS005	VKS006
VKS007	VKS008	VKS009	VKS010	VKS011	VKS012
VKS013	VKS014	VKS015	VKS016	LAAS001	LAAS002
LAAS003					
X = INSETTSPUNKT					



4.5.9.10 Tables

TABELL					
KEY004 	KEY005 	KEY006 	KEY007 	STL002 	AUT001
STL003 	STL004 	STL005 	F.IERN001 	STL008 	KEY008
MINUS 	PLUSS 	LK 	PL-MIN 		
X = INSETTSPUNKT					



4.5.9.11 Transformers

TRANSFORMATOR					
MOTOR1 	MOTOR2 	MOTOR3 		MOTOR4 	
MOTOR5 		MOTOR6 		MOTOR7 	
STAT0M1 		STAT0M2 			
STAT0M3 			TRAF01 	TRAF02 	TRAF03
TRAF04 	TRAF05 	TRAF06 	SPOLE012 	SPOLE015 	SPOLE016
SPOLE015 	SPOLE016 	SPOLE017 	SPOLE018 		
X = INSETTSPUNKT					

