RAIL SAFETY AND STANDARDS BOARD

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AC electrified lines

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This handbook is for those personnel who need to go on the operational railway in an AC electrified area to carry out their duties, with the exception of a:

- **train driver**
- **guard**
- **shunter**
- **signaller**
- **crossing keeper**
- **designated person (DP).**

The personnel listed above will not receive this handbook but will get Rule Book module AC AC electrified lines.

All personnel, other than those listed above, who go on to the operational railway are defined as track workers for the purpose of the Rule Book.

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For information regarding the Rule Book, contact: https://customer-portal.rssb.co.uk/

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1 Definitions

Automatic power changeover
A changeover from one form of traction power to another by a multi-mode train that is carried out by on-board or trackside equipment without any action by the driver.

Discontinuous electrification
A line of route where overhead line equipment (OLE) is not provided throughout and there are some sections of line that are referred to in this handbook as 'unwired sections'.

Earthed
When applied to OLE which is normally live, this means that the OLE is connected to the traction return running rail by a portable earth or fixed earthing device. The connection can be either direct or through a structure that is connected to it.

Emergency switch-off
An emergency switch-off is carried out by the electrical control operator (ECO) when it is essential to switch off the electrical supply immediately, when someone is in danger from live overhead line equipment (OLE).

The ECO will switch off the electrical supply to all lines:

- between neutral sections, or
- between a neutral section and the end of an electrified line.

In certain locations, equipment is provided to shorten the area of the emergency switch-off.

Isolated
Electrical equipment is isolated when it is disconnected and separated from all sources of electricity supply in such a way that this disconnection and separation is secure. It is not possible to isolate return conductors as they are a part of the return current system and in this handbook 'isolated' refers to the disconnection, separation and securing of those parts of the OLE normally live at 25kV.

Multi-mode train
A train that can either provide its own traction power, or take this from the electrification system on an OLE electrified line.

Nominated person
A person certified as competent to carry out isolation and earthing, to issue and cancel overhead line permits. The person is nominated with the electrical control room to carry out these duties for particular equipment or locations.

Overhead line permit
A permit (known as form C) signed and issued by the nominated person (NP) and given to a controller of site safety (COSS) or designated person (DP) who is to work on or near to the OLE.

This permit states exactly what electrical equipment is isolated and earthed and on which, or near to which it is safe for the specified work to begin.

If an overhead line permit has been issued, it does not mean train movements have stopped.

2 General

You must not go on or near the line in an area with OLE unless your certificate of competence in personal track safety states that it is valid on lines electrified by the overhead system.

Table A of the *Sectional Appendix* shows which lines of route are electrified by the overhead system.

Some lines or sidings along a line of route may not be provided with OLE.

Some parts of an electrified line of route can be unwired sections where no OLE is provided.

If new OLE is being installed, or an electrified area is being extended, the instructions in this handbook will not apply until the equipment has been declared live.

You will be told about this in an energisation warning notice.

If you are not sure whether the OLE is live, you must treat it as live and dangerous to life.

3 Dangers of the system

3.1 Treating the OLE, pantographs and electrical equipment as being live

OLE, pantographs and associated roof-mounted electrical equipment on trains are dangerous. It may be fatal if you touch or go near any of them, or if you allow anything to touch or go near them.

You must treat all parts shown in red on diagram HB16.1,1 or HB15.1.2 as being live at all times unless they have been made safe as shown in the instructions in this section.

If you have been told that the ECO has confirmed that the electricity has been switched off, you must treat any OLE, pantographs and associated roof-mounted equipment as dangerous and not touch any of those parts.

You do not have to treat the OLE, pantographs and associated roof-mounted equipment as being dangerous if either of the following applies.

- If work is to take place on or near to the OLE, an overhead line permit has been issued to the COSS to state that the OLE has been isolated and earthed.
- Local isolation is allowed, and you are sure that the OLE is isolated and earthed and an electrical safety document has been issued as required in the applicable local isolation and earthing instructions.

You do not have to treat wiring shown on the diagram as 'along track conductors' as being dangerous as long as both of the following apply.

- You are using a method statement which says you do not have to do so if the wiring is provided with green diamond markers.
- Those markers have been provided.

3.2 Objects on or near to the OLE

You must treat broken or displaced wires and anything attached to, or near to, the OLE as live and dangerous.

You must not remove or approach anything attached to, or near to, the live OLE.

You must not try to remove or approach an object hanging from, in contact with or close to the OLE, unless you have been specially trained and authorised to do so.

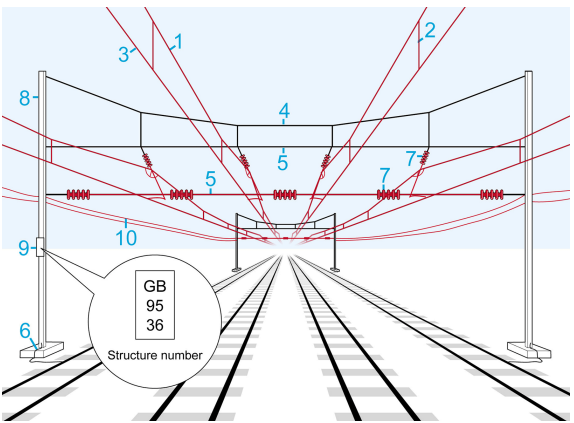

Diagram HB16.1.1

Typical headspan construction

1 Catenary wire **2** Dropper **3** Contact wire **4** Headspan wire

5 Cross span wires **6** Structure bond **7** Insulators **8** Mast or structure

9 Structure number plate **10** Along-track conductors

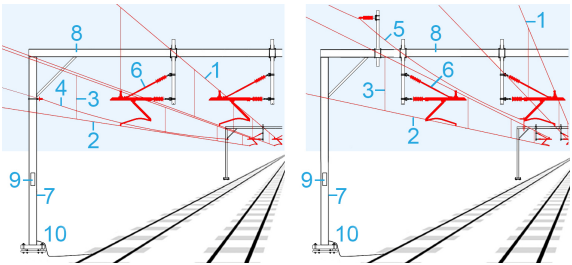

Diagram HB16.1.2

Typical portal construction

1	Catenary wire	6	Cantilever
2	Contact wire	7	Mast
3	Dropper	8	Portal bridge
4	Return conductor	9	Structure number plate
5	Autotransformer feeder	10	Structure to rail bond

3.3 Reporting objects and defects

You must immediately make sure the following are reported to the ECO. If the damage or defect will affect the normal operation of trains, or if you do not normally speak directly to the ECO, you must tell the signaller.

- Objects that have been thrown onto, are hanging from, or are otherwise touching the OLE.
- Damage to the OLE.
- OLE that is smoking, excessively flashing or fusing.
- Broken or displaced along-track conductors.
- Broken or displaced wires connected to the OLE.
- Damaged or loose automatic power control (APC) track inductors.
- A broken or parted rail.
- A broken or defective bond, in which case you must state the colour of the bond.
- Damaged cables associated with the electrification system.

You must not touch the rails if they are broken or parted, neither must you touch a broken or defective bond if it is marked red, nor any equipment connected to the bond.

You must also carry out the instructions concerning a broken or parted rail, or a broken or defective bond, on an unwired section of an AC electrified line of route.

3.4 Reporting defects to the signaller

You must immediately make sure that damaged or loose automatic power changeover (APCo) balises, which would prevent power changeover taking place automatically, are reported to the signaller.

4 Personal safety

4.1 Working near OLE

You must not carry out any work that will bring you or anything you are holding nearer than 2.75 metres (9 feet) in any direction from live OLE, pantographs or associated roof-mounted equipment unless all of the following conditions are met.

- A method statement or company instruction is in place.
- All specified precautions to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment are in place.
- You carry out the specified precautions in the method statement.

4.2 Working on vehicles

You and anything you are holding must never go above the cant rail level and you must not climb above the floor level of the driving cab, or climb on the roof or open upper deck of a vehicle, or on steps giving access to the roof of any vehicle unless one of the following applies.

- You are on a line where there is no OLE above or adjacent to the vehicle.
- The OLE has been isolated and earthed as shown in the infrastructure manager's instructions . The COSS has been issued with an overhead line permit that states this
- The specific conditions in your company instructions have been met and you carry out the specified precautions required to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment.
- Local isolation is allowed, and you are sure that the OLE is isolated and earthed and an electrical safety document has been issued as required in the applicable local isolation and earthing instructions.

4.3 Using long items

You must carry out the precautions specified in the method statement or your company instructions to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment and take extreme care when:

- holding and moving long items
- using brake sticks and shunting poles
- selecting and using the correct type of electrically insulated ladders.

You must carry long items horizontally and, if necessary, get other people to help you.

5 Communicating with the ECO

5.1 Directly or by another person

You can contact the ECO direct, or you can ask another person to contact the ECO on your behalf.

If another person asks you to contact the ECO, you must make sure that you get the necessary information from that person before speaking to the ECO. You must also get any other information that the ECO asks for.

5.2 Identifying yourself and the location

When contacting the ECO, you must state:

- your name, job title and employer
- the line or lines concerned
- the location (for example, the nearest bridge, station, signal, block marker or other structure)
- the number on the nearest OLE structure or identifying plate (this will tell the ECO exactly where you are)
- the telephone number or radio call number (whichever you are using) so that the ECO can contact you if necessary.

If the ECO gives you a message identification number, you must state it each time you speak to the ECO.

6 Emergency switch-off

Note: An emergency switch-off of the OLE does not mean that train running has been stopped.

6.1 Immediate actions

You must immediately contact the ECO (or arrange for this to be done) if you become aware of any incident or accident requiring, or likely to require, the electricity to be switched off. This can include:

- a derailment
- a fire on a vehicle, train or on the lineside
- a person in contact with or in danger of coming into contact with the OLE

If you receive a message from another person about an emergency, you must pass on all this information to the ECO.

When you contact the ECO, you must first say, '**This is an emergency call**'.

You must tell the ECO:

- the reason why you want the electricity to be switched off
- whether any person is in danger from live OLE
- whether the emergency services are waiting to give assistance.

If you are not at the site, you must relay information from the ECO to the site and from the site to the ECO.

6.2 Further actions

You must stay in contact with the ECO or, if you have reported the incident through another person, stay in contact with that person until you have been told that:

- the electricity has been switched off and the OLE has been made safe to be approached but not touched, or
- other arrangements have been made.

If the ECO agrees to the emergency switch-off, the ECO will decide who will be regarded as the person in charge of electrical emergency (PICEE).

If you are a person passing on this information on behalf of someone else, you must stay in contact with the ECO until you have been told that one of these arrangements has been put in place.

6.3 PICEE managing the emergency switch-off

If you are appointed by the ECO as the PICEE, the ECO will tell you the limits of the emergency switch-off.

You must identify yourself to anyone arriving on site.

If the emergency services arrive on site, you must tell the officer in charge from each emergency service about the presence of the OLE and which parts have been switched off.

The ECO will tell you before shortening the area of the emergency switch-off. You must tell everyone at the site about the new limits.

If passengers are to get out of a train which is not at a platform, you must make sure that all passengers are kept clear of the OLE.

If you hand over the responsibility of the emergency switch-off to someone else, you must tell the ECO immediately. You must give the name, job title and employer of the new PICEE taking over.

If you are the new PICEE, you must immediately confirm the emergency switch-off arrangements with the ECO.

As soon as the emergency is over and the affected section can be re-energised, you must warn everyone involved that the electricity is about to be switched on and make sure they are clear of the OLE.

You must then tell the ECO that the emergency is over and wait for further instructions.

If the emergency will go on for a long time or it will be necessary to issue an overhead line permit, the nominated person (NP) will contact you when arriving on site.

You and the NP must both contact the ECO so that responsibility for the emergency switch-off can be transferred from you to the NP.

7 Rescuing a person

You must make sure the OLE is isolated and earthed before you attempt to rescue a person that is within 2.75 metres (9 feet) of the OLE, pantograph or associated roof-mounted equipment, unless you are sure about all of the following.

- The electricity is switched off.
- The person is alive and can be reached from ground level.
- The person is more than 600 mm (2 feet) away from the OLE, pantograph or associated roof-mounted equipment and anything touching it.
- You and anything you are holding will not come within 600 mm (2 feet) of the OLE, pantograph or associated roof-mounted equipment and anything touching it.

8 Isolation of the OLE

Note: An isolation of the OLE does not mean that train running has been stopped.

When a section or sub-section of OLE has been isolated, you must continue to treat it as being live until:

- an overhead line permit has been issued, or
- where local isolation instructions allow this, the OLE has been isolated and earthed and an assurance received as shown in the local instructions.

9 Overhead line permits

9.1 Issuing an overhead line permit

When the NP has made sure that the OLE has been isolated and earthed, the NP will hand the COSS an overhead line permit. The COSS must understand:

- the working limits on the overhead line permit
- where live equipment is adjacent to, or crosses over earthed equipment, which equipment is live and which is earthed
- the issue of the overhead line permit does not mean that train movements have been stopped.

The COSS must make sure they see the 'test before touch' process carried out.

The COSS must sign the overhead line permit to show they understand the conditions.

The COSS must then make sure everyone in the group fully understands the conditions shown on the overhead line permit, before work is allowed to start.

9.2 During the work

The COSS must keep the overhead line permit until:

- work is completed and the COSS and the group the COSS is responsible for is clear of the line, or
- the COSS is relieved by another COSS, in which case the overhead line permit must be handed to the new COSS and both people must sign it.

The COSS must tell the new COSS about the conditions shown in section 9.1 of this handbook, unless sure that the NP has already told the new COSS.

The new COSS must make sure they understand about the conditions shown in section 9.1 of this handbook.

The new COSS must tell the NP (either directly or through the ECO) that they have taken over the duties of the COSS.

The COSS must immediately tell the NP if the overhead line permit is lost. The NP will arrange to issue another overhead line permit endorsed ‘Duplicate’.

If during the work it is necessary to move to a different part of the OLE, the COSS must ask for the 'test before touch' procedure to be carried out again before starting work.

9.3 Changes of personnel within the work group

The COSS must make sure that each person coming onto the site of work after the overhead line permit has been issued fully understands the conditions shown below before being allowed to start work.

- The working limits on the overhead line permit.
- Where live equipment is adjacent to, or crosses over earthed equipment, which equipment is live and which is earthed.
- Whether trains are continuing to run on the lines concerned, and, if so, the arrangements that have been made for the protection of staff.

9.4 When the work is suspended or completed

When the work is suspended or completed, the COSS must make sure all personnel and materials are removed from, and are no closer than 2.75 metres (9 feet) from, the OLE.

The COSS must then:

- instruct each person in the workgroup to treat the OLE as live and dangerous to life
- complete the overhead line permit
- give the overhead line permit to the NP who will countersign it.

If you have lost your OLE permit, you must tell the NP. You must carry out a visual inspection with the NP to make sure that all persons and materials are clear of the OLE.

10 Arranging coasting under the OLE

If you are the responsible person, when you arrive on site, you must decide whether the object or OLE defect means that trains, including both multi-mode trains and electric trains with the pantographs lowered, can run or continue to run safely through the affected area.

You can allow trains to do so if all the following apply.

- Any obstruction is not more than 150 mm (6 inches) below the contact wire.
- Not more than two consecutive droppers have come off.
- The object or defect is more than five OLE structures away from a tunnel or overbridge.
- No other defect is obvious.

You can allow trains to run or continue to run if the object or defect is five OLE structures or fewer away from a tunnel or overbridge, as long as a competent engineer has given permission.

If trains can run or continue to run but with multi-mode trains operating in self-powered mode and electric trains coasting with the pantographs lowered, you must decide whether the driver can easily identify the location. You must take account of the weather conditions and any other factor that may make this difficult.

If you believe it will be difficult for the driver of each train to easily identify the exact location, you must make sure that the following boards are erected.

Lower pantograph

Raise pantograph

Uncontrolled when printed
Supersedes GERT8000-HB16 Iss 6 with effect from 07/03/2026
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