

Technical standards

relating to the operating safety of tourist railways



FOREWORD

Regulations governing tourist or historic railways :

The authorisation for the operation and safety control of tourist or historic railways, outside the national rail network, is the responsibility of departmental Prefects.

This principle and the procedures, which are applicable, are defined in the following text:

- decree n° 2003-425 of the 9th May 2003 relating to the safety of guided public transport and particularly its title V dealing with tourist and historical railways;
- Inter ministerial order of the 8th December 2003 (published in the official Journal of 3rd January 2004), relating to the content of safety files of guided public transport systems for tourism or historical ends.
- the circular of 9th December 2003 of the ministry of equipment, transport, accommodation, tourism and the sea, relating to the safety of guided public transport, put in place by the aforementioned decree and for which the title 44 treats such networks.

Development and diffusion of the standards :

In accordance with decree n° 2010-1580 of 17 December 2010, relating to the technical servicing of ski lifts and guided transport, STRMTG produces and diffuses the technical guides and standards in collaboration with its professional partners.

The present technical standards define the technical provisions to be observed to guarantee the safe public operation of a tourist or historic railway network.

It was developed by STRMTG with the contribution of the Union of tourist train operators (UNECTO).

It is designed for operators of the TR network, project managers of these networks, technical experts and is the reference for operation inspections undertaken by the inspection office of STRMTG itself.

Scope :

The provisions contained in the present standards are applicable to all public operations for historic or tourist reasons of railway material of all types, excluding rail bikes, on lines situated outside the national rail network.

This document constitutes a technical recommendation without however it being binding.

Thus, the administrators of networks concerned, project managers or operators, can suggest the implementation of different solutions than those envisaged by the present technical standards, subject to justifying to the authorities responsible for the checking of these systems that they guarantee an operation at least as secure, the safety analysis can be based on comparisons with provisions envisaged in the present standards.

These provisions do not prejudice provisions applicable in terms of other regulations nor the division of obligations between the operators and owners of all or a part of the systems, or the provisions that could be imposed by the managers of the national rail network in the event of interference with the latter.

Update :

The present document is conceived in such a way that its update can be performed by chapter dedicated to each sub system or safety duty, without necessitating the republishing of the whole document. Each update will be the subject of new indexing of the concerned chapter. The first edition of each is denominated: version 1.

<i>Editions performed</i>	<i>already</i>	<i>Chapters concerned</i>	<i>Endorsement date</i>
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		Amended document
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Rédigé par le chargé d'affaires chemins de fer touristiques de la division métros et chemins de fer locaux, le 29 août 2011,  Nicolas MIENVILLE	Vérifié par le chef de la division métros et chemins de fer locaux, le 29 août 2011,  Jérôme CHARLES	Approuvé par le directeur du STRMTG, le 29 août 2011,  Daniel PFEIFFER
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1.1. Braking

1.1.1. Types of brake :

Standard and metric track :

Locomotives :

Locomotives must be equipped with at least one vacuum or air pressure automatic brake control, when they are pulling passenger trains on the line.

Service fleet locomotives must have at least one brake that the driver can operate when driving (for example direct brake or ball break). They cannot pull passenger trains.

In addition, locomotives can be equipped, according to the type of energy used, with a direct brake (or engine brake) or with a rheostatic or recovery brake. Each locomotive absolutely must have an immobilisation brake independently controlled from the automatic or direct brake. This device must be able to hold the vehicle immobile for an indeterminate length of time.

Towed carriages :

The carriages must be equipped with at least the continues automatic brake, that is to say a device which, as soon as it is broken, triggers the braking of braked engines.

Narrow gauge track :

Locomotives :

Locomotives must be equipped with a braking system.

Towed carriages :

The number of carriages with brakes is determined in the following paragraph.

1.1.2. Number of carriages with brakes :

Standard track :

The following table indicates the maximum proportion for carriages without brakes (passenger carriage or wagon, excluding pulling vehicle) for a speed < 40km/h.

The weight of the train does not include the weight of the locomotive.

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The figures placed at the bottom right, represent the value to be considered if the locomotive is equipped with a supplementary braking system (rheostatic, air suppression....)

Weight W of the train in tons Gradient	M < 50	50 < M < 100	100 < M < 150	150 < M < 200	200 < M < 300
< 0 ‰	1/1	1/1	1/2	1/2	1/2
< 5 ‰	1/1	1/2	1/2	1/2	1/3
< 10 ‰	1/2	1/2	1/2	1/3	1/3
< 15 ‰	1/2	1/3	1/3	1/5 1/3	1/5 1/3
< 20 ‰	1/3 1/2	1/3 1/2	1/5 1/3	1/5 1/3	1/8 1/5
< 25 ‰	1/3 1/2	1/5 1/3	1/5 1/3	1/8 1/5	1/10 1/8
< 30 ‰	1/5 1/3	1/5 1/3	1/8 1/5	1/10 1/8	0
< 35 ‰	1/5 1/3	1/8 1/5	1/10 1/8	0	0

Example: for a network on which a 7 carriage train weighs 80 tons excluding the locomotive and the maximum line gradient is between 20 and 25%, only one carriage out of 5 can be without brakes (or one out of 3 if the locomotive is equipped with a supplementary brake). Therefore the train can have one carriage without brakes out of the 7 (or two carriages without brakes out of 7, if the locomotive has a supplementary brake).

It is appropriate to spread the braked weight throughout the length of the train. The last carriage is always braked when the train brakes. Carriages of more than 20 tons must be braked. The isolation of one of the trucks is permitted provided that the total weight is less than 20 tons and the carriage is not at the end of the train.

In the event that the number of carriages with brakes does not correspond to the values presented in the table, the operator must justify the effective braking of the trains.

Metric track :

The following table indicates the maximum proportion for carriages without brakes (passenger carriage or wagon, excluding towing vehicle) for a speed < 40km/h.

The weight of the train does not include the weight of the locomotive.

The figures placed at the bottom right, represent the value to be considered if the locomotive is equipped with a supplementary braking system (rheostatic, air suppression....)

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Weight P of the train in tons Gradient	P < 50	50 < P < 100	100 < P < 150	150 < P < 200	200 < P < 300
< 0 ‰	1/1	1/1	1/2	1/2	1/2
< 5 ‰	1/1	1/2	1/2	1/2	1/3
< 10 ‰	1/2	1/2	1/2	1/3	1/3
< 15 ‰	1/2	1/3	1/3	1/5 1/3	1/5 1/3
< 20 ‰	1/3 1/2	1/3 1/2	1/5 1/3	1/5 1/3	1/8 1/5
< 25 ‰	1/3 1/2	1/5 1/3	1/5 1/3	1/8 1/5	1/10 1/8
< 30 ‰	1/5 1/3	1/5 1/3	1/8 1/5	1/10 1/8	0
< 35 ‰	1/5 1/3	1/8 1/5	1/10 1/8	0	0

The last carriage is always braked when the train brakes.

Occasionally a carriage can exceptionally be added to the end of the train on the condition that:

- it carries no passengers
- it has a double coupling or security chains

It is appropriate to spread the braked weight throughout the length of the train.

Narrow gauge track :

Gradient	Carriage without brakes if:	Carriage partially braked if:
P < 15‰	Locomotive weight empty $\geq \frac{1}{4}$ of the weight towed	Locomotive weight empty + weight of towed carriages braked $\geq \frac{1}{4}$ of the weight towed In addition it is necessary that: the locomotive weight empty $\geq \frac{1}{6}$ of the towed weight.
15‰ < P < 25‰	Locomotive weight empty $\geq \frac{1}{3}$ of the weight towed	Locomotive weight empty + weight of towed carriages braked $\geq \frac{1}{3}$ of the weight towed In addition it is necessary that: Locomotive weight empty $\geq \frac{1}{4}$ of the weight towed
P < 25‰	Locomotive weight empty $\geq \frac{1}{2}$ of the weight towed	Locomotive weight empty + weight of towed carriages braked $\geq \frac{1}{2}$ of the weight towed In addition it is necessary that: Locomotive weight empty $\geq \frac{1}{3}$ of the weight towed

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If none of the above conditions are satisfied, the train must be completely braked.

When the weight of the material is not precisely known, it is calculated according to the weight of comparable existing material, increased by 15%.

1.1.3. Brake tests :

The different brake tests that follow are carried out on standard, metric or narrow gauge track network by the mechanic possibly assisted by an agent.

1.1.3.1 Brake tests on locomotives :

At the beginning of each day, the checks include a test of the locomotive brake before operation.

1.1.3.2. Air brake test on the train :

- General test of complete air brake :

At the beginning of each operating day or in the event of a modification of the carriage layout, a complete brake test is carried out :

1. Filling of pressure brake circuit;
2. Check of the system seal (pressure stability: pressure loss must be less than 0.3 HP/min);
3. Negative pressure in the train pipe (TP); check increase of the locomotive brake cylinder manometer;
4. Check tightening of all brake axles;
5. Complete draining of TP;
6. Check release of all brake axles.

In the event of the addition of one or more carriages a partial brake test limited to the tightness check– release of the carriages concerned and a test of the TP continuity can be carried out.

– Brake test after a short stop :

Object : Check the continuity of the TP after a stop of around two hours. To undertaken just before departure.

1. Negative pressure in the PG then check of the manometer increase BC;
2. Check tightness of first and last axle of the train;
3. Fill TP. Check the release of last and first axle of the train.

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- Test connecting brake :

Undertaken during a pause or traction change without a change in the carriage layout.

1. After filling the main reservoir (MR), fill the TP. Seal check;
2. Negative pressure in the PG: check the increase of the brake cylinder (BC) manometer;
3. Check tightness of first axle of the train;
4. Release control, and check release of first axle of the train.

1.1.3.3. Test of Train vacuum brakes :

- General test of complete air brake :

At the beginning of each operating day or in the event of a modification of the carriage layout, a complete brake test is carried out :

1. Negative pressurisation of the TP;
2. System seal check (negative pressure stability);
3. Open PG at the rear of the last carriage to check continuity;
4. Check tightening of all train brake axles;
5. Closing PG at the rear of the last carriage;
6. Check tightening of all train brake axles;

1.1.4. Braking performance :

Brake tests are carried out at the operator's discretion to :

-check that the equipment brakes in acceptable conditions for old equipment with regards to the layout of the line and chosen operating regime and the age of the equipment.

-make sure that the train drivers can operate the brakes, to adapt his driving to the nature of known points: station, no visibility zones, LC, obstacles or in the event of cautious running...

It represents a practice specific to each network. This must be put in place on new networks before the first public operation.

1.1.5. Warning traction/ braking :

For technical and historic reasons no traction/ braking warning exists for locomotives.

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1.1.6. Lone driver safety :

Steam: The presence of two people is required in the cabin, with the ability for one to operate the brake in the event of the incapacity of the other.

Electric: an automatic system or the presence of a second agent able to operate the break is mandatory.

Diesel: When an automatic system or recall to zero of the traction handle is absent, the presence of a second agent is mandatory and they must have immediate access to the emergency brake.

1.2. Traction :

1.2.1. Electrical traction equipment :

Refer to 1.5.5- Electrical protection of rolling stock

1.2.2. Pressure and steam appliances :

Steam engines and pressurized air reservoirs are constructed according to the decree of 2 April 1926 governing steam appliances other than those aboard ship, the decree of 18 January 1943 governing pressurized gas appliances or the byelaw of 18 December 1989 governing the application of directive n° 87_404 CEE relating to simple pressure containers. These texts govern periodic checks.

This equipment is now subject to periodic checks governed by title III of decree n° 99-1046 of 13 December 1999 modified, relating to pressurised equipment, ministerial byelaw of 15 march 2000 modified relating to the operation of pressurized equipment.

In application of the provisions anticipated by these rules, there must be for equipment (with a volume of more than 25l and air containers for which the PS.V produced is more than 200 bar with PS over 4 bar) :

- regular renewal, undertaken by an expert from an organization qualified by the minister in charge of industry. The maximum interval between two qualifications must not exceed ten years (steam generators and pressurized containers as defined in article 22 of the text of 15 March 200 modified). The renewal includes: equipment inspection, hydraulic test and checking of safety accessories.

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- regular inspections, realized under the authority of the operator by a competent person able to recognize the faults which may be encountered and appreciate the seriousness. These inspections take place as often as necessary; the interval between two inspections must not however exceed 18 months for steam generators and 40 months for containers. The inspection, which must be carried out taking into account the degradations likely to affect the safety of the operation, include a check of the exterior, check of the interior, an examination of safety accessories and additional investigation as necessary.

All locomotives authorized for public operation must have certificates corresponding to the type of on board material (boiler, reservoir....)

1.2.3. Tender, cinders, fire protection :

A cinder grill in the smoke box is mandatory.

The ash box must be in good condition, not deformed and, in an area of high fire risk, equipped with a fire extinguisher system.

1.2.4. Collision / traction devices :

Common devices :

The dimensions and position of buffers must prevent locking (vertically), they must meet (horizontally). The buffers must be in contact and the couplings must be moderately tight.

Standard track :

Coupling systems must be compatible. The height at the axis of buffers varies between 940 to 1065 mm.

Metric track :

Generally in metric track, material is equipped with a single central buffer at each end. The coupling systems must be compatible, except if there is a double coupling carriage- connection in the case of different couplings.

Narrow gauge track :

The coupling systems must be compatible, except if there is a double coupling carriage-connection in the case of different couplings.

In the absence of a continuous brake, the presence of a double coupling or safety chains is required. If not the last carriage must be equipped with an autonomous guard's brake.

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1.3. Bearings :

1.3.1. Bearing and suspension mechanisms :

1.3.1.1. Wheel profile :

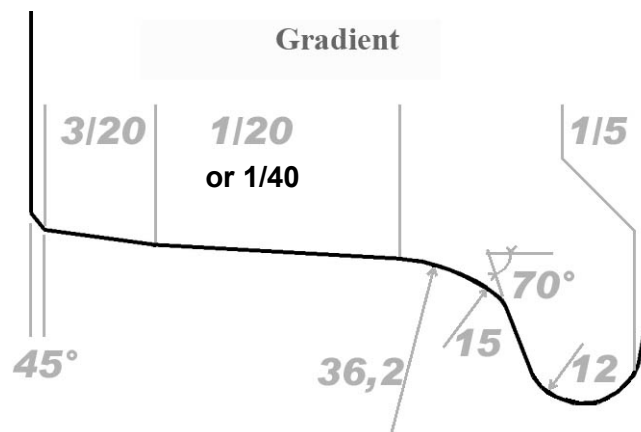
Locomotives with large rigid wheelbase can have thin or non existent flanges on the median axles.

Particular provisions relating to urban tramway wheel profiles are allowed.

Standard track :

The following parameters define a nominal value and an acceptable limit value.

Principal gradient values :



1. Height of flange :

The height of the flange must be between 25 and 36mm.

2. Thickness of tyre :

35mm mini on locomotives

25 mm mini on towed materials.

The wear furrow, if it exists on the original wheel, must be visible for single piece wheels.

3. Qr :

6,5 minimum.

4. Thickness of flange :

$e > 22 \text{ mm}$

The maximum value of flange thickness must be adapted to the spacing of the internal faces.

5. Wheel tread :

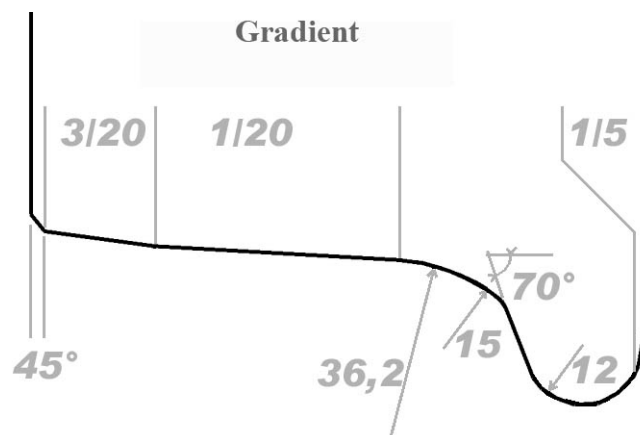
Gradient of $1/20^\circ$ or of $1/40^\circ$ then $3/20^\circ$.

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Metric track :

The following parameters define a nominal value and an acceptable limit value.

Principal gradient values :



1. Height of flange :

The reference height is 30mm without being inferior to 20mm. It must be adapted to the fishplates and the network point frogs, depending on the wear of the railhead.

2. Thickness of flange :

The thickness of the flange must be between 18 and 32.5mm.

3. Thickness of tyre :

The minimal tyre thickness must be 35mm for a locomotive and 25mm for a towed material.

4. Qr :

$Q_r > 5,5$; we refer to the minimal dimensions can be measured annually using for example a key form reproducing the minimal dimensions.

5. Wheel tread : Gradient of $1/20^\circ$ then $3/20^\circ$.

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Narrow gauge track :

The three following parameters define a nominal value and an acceptable limit value.

1. Height of flange :

The height of the flange must be more than 20 mm.

Nevertheless, this height can be reduced to 17mm, when this height is the historical reference of the network and the track condition allows it.

2. Width of the wheel tread :

The wheel tread must have a width of at least 75mm.

If the material is old or classed as historic, the original width may be kept. The operator will be careful to adapt the spacing tolerances according to the width of the railhead and the width of the wheel tread.

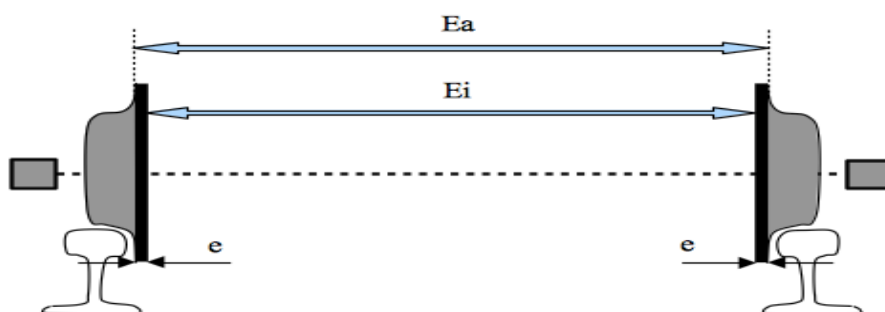
3. Thickness of flange : (to 10 mm under the centre line)

The thickness of the flange must be between 15 and 27.5 mm.

1.3.1.2. Rate of axle calibration :

The rate of calibration E_i is the spacing of the internal faces.

The rate of calibration between the active faces is obtained by adding the rate between the internal faces and the thickness of each of the two flanges: $E_a = E_i + 2e$



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Standard track :

The Ei rate must be between 1357mm and 1363mm. The Ea rate must be between 1410 and 1426mm.

Metric track :

The Ei rate must be between 923mm and 946mm.

Narrow gauge track :

Track of 60 :

The Ei rate must be between 535 mm and 545 mm. The Ea rate must be between 570 and 590 mm.

Track of 50 :

The Ei rate must be from 445mm +/-5.

1.3.1.3. Wheel centre lines :

The wheel centre lines are controlled visually and must not have large cracks or marks.

1.3.1.4. Axle boxes :

All axle boxes must be correctly greased and guided.

For bearing axles boxes, there must be no play in the bearings neither in the axial nor the perpendicular sense and they must not be deformed

For roller bearing axle boxes, there must not be a large play.

1.3.1.5. Suspension :

Concerning suspensions by leaf springs, no leaves may be broken. Concerning suspensions by coil springs, there must be no spiral may be broken.

The springs must not have been shortened.

Concerning silent block suspension, this must be in a good condition and not crackled or "cooked" deeply.

These provisions are valid for primary and secondary suspensions.

If the rolling stock has no suspension, the chassis must be very flat so that the vehicle weight is equally distributed on the wheels.

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1.3.2. Sanders :

Although frequently used, particularly on networks with significant descents, sanders are the object of no particular recommendations taking into account the speeds practised.

1.3.3. Axle weight :

The axle weight empty in running order must figure among the characteristics of the rolling stock for each vehicle. When the weight of the material is not precisely known, it is calculated according to the weight of comparable existing material, increased by 15%.

1.3.4. Pilots :

Two devices are taken into account and distinguished:

-Stone catcher :

It is not indispensable. However, if it is present, it is situated at a height of around 60mm above the rail.

- Cowcatcher :

It aims to knock larger obstacles away. If it is present, it is situated at a height of around 150 mm above the rail.

1.4. Structure :

1.4.1. Nature of flooring :

Non-applicable.

1.4.2. Material characteristics (mechanical, fire, smoke) :

Non-applicable, given the historical character of most of the rolling stock in use.

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1.4.3. Platform / Handrail / Barrier :

On material circulating on standard or metric track :

Every time it is possible, particularly during the renovation or transformation of material, all handrails and platform closing devices will have a continuous height of at least 1,00m. The distance between vertical barriers must be less than or equal to 0,15m.

If the material is old or classed as historic, the original height may be kept. However, public access to platforms during train movement can be restricted or forbidden when the height of the hand rail and closing devices is less than 0,90m or when the netting of their fencing is not adapted to holding back people, particularly small children.

Platform closing devices are made up of barriers that open towards the interior of the carriage. Chains and bars are forbidden. All devices must remain closed during train movement.

Measures to restrict Public access to platforms during train movement are written down in Operation Passenger Regulations and prominently displayed.

On material circulating on narrow gauge track :

All handrails and platform closing devices have a continuous height of at least 0,85m.

If the material is old or classed as historic, the original height may be kept. However, public access to platforms during train movement can be restricted or forbidden when the height of the hand rail and closing devices is less than 0,85 m or when the netting of their fencing is not adapted to holding back people, particularly small children.

Chains or access closing barriers are acceptable. However their opening must not be directly possible by a simple push or lever action. All platform closing devices must remain closed during train movement.

Measures to restrict Public access to platforms during train movement are written down in Operation Passenger Regulations and prominently displayed.

1.4.4. Roofs :

Non-applicable.

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1.4.5. Windows :

It is recommended to use safety glass on new carriages and to replace broken windows.

Technical provisions or operating rules are taken when the window opening heights presents a clear risk of defenestration.

1.5. Interior :

1.5.1. Interior layout :

The interior of carriages must be exempt of all obstacle or protruding part.

1.5.2. Signage :

The Operation Passenger Regulations (OPR) must be displayed inside the carriages, entirely or partially, to reiterate the main safety instructions.

1.5.3. Interior lighting :

Interior lighting is mandatory if the line has at least one tunnel of more than 100 metres. In this case, the electrical supply must be uninterrupted.

1.5.4. Fire risk prevention :

All passenger trains are equipped with one or more extinguishers distributed under the following conditions:

With the exception of steam locomotives, each locomotive must be equipped with one or two extinguishers for which the content is adapted to the propulsion method used.

All trains comprising at least five closed carriages (excluding open cars) is equipped with at least one extinguisher adapted to the nature of inflammable materials and located in one of the carriages.

All trains comprising at least eight closed cars is equipped with at least two extinguishers distributed in the different carriages.

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All trains circulating in tunnels of more than 800m long are equipped with at least one extinguisher for every three carriages whatever the type. These are distributed throughout the carriages and adapted to the nature of the inflammable materials.

When the train has a carriage reserved for handicapped people, this is equipped with an extinguisher that can be one of the extinguishers cited in the preceding paragraphs.

The location of extinguishers is known to train staff and must be easily accessible.

Train staff are trained in the use of the extinguishers.

1.5.5. Electrical protection of rolling stock :

1.5.5.1 General principals :

People on board or coming into contact with the rolling stock must be protected against all electrical shock resulting from contact with live parts, whether this contact is direct with a circuit or indirect with a mass accidentally live following an insulation fault.

1.5.5.2 Protection measures against direct contact :

➤ Class of voltage :

We refer to the norm EN 50-153 for the definition of voltage classes hereafter, according to which protection measures are applied.

Class	Nominal voltage in volt	
	Alternative Current	Continuous Current
I	$U < 25$	$U < 60$
II	$25 < U < 50$	$60 < U < 120$
III	$50 < U < 500$	$120 < U < 750$
IV	$U > 500$	$U > 750$

➤ Class I tensions :

Circuits for which the nominal voltage does not exceed class I, no protection against direct contacts is required. However this provision must not be applied if the circuit concerned is connected to a return circuit, the potential of this latter in relation to the earth being susceptible to exceeding the voltage values of class I.

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- Class II, III et IV tensions :

Active parts of the vehicle submitted to a potential of class II, III, and IV, must be placed in a closed electrical service zone or out of reach of zones normally accessible to the public.

Access prevention must be assured either by mechanical locking or physical separation.

- Danger markings :

A danger sign is affixed at each place where there is a risk of direct contact with a part under an active voltage of class II, III or IV susceptible to cause an electrical shock. This sign must be the following pictogram:



1.5.5.3 Protection measures against indirect contact :

The non-active driving parts of the vehicles must not provoke electric shocks by induction or contact with close active parts in the event of a fault. For this, non-active driving parts must be of the same potential. The protection is obtained by earthing of the mass with an automatic supply cut off.

- Protection links :

To anticipate electrification, all accessible metallic masses must be linked together and to metal parts in contact with the track, directly or by adapted protection link conductors in such away that they have the same potential. The protection link must be electrically and mechanically dimensioned in such away that the non-active conductive parts are incapable of causing an electrical shock in the event of a fault.

- Automatic supply cut off :

A protection device must automatically separate the supply, the circuit or the material protected against indirect contacts by this device in such away that, following a fault between an active and non active conducting part or circuit protection or material link, a contact voltage presumed superior to class II cannot be maintained for a time sufficient to create a dangerous physical risk for the person in contact. Le automatic supply cut off is put in place with a protection link. For this, a protection device (differential circuit breaker) allows the automatic separation of the supply circuit or the material protected against indirect contacts. This differential circuit breaker will be installed conforming to the directives of the norm NFC 154-100.

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1.5.5.4 Equipment and material :

The electrical components equipping the rolling stock accessible to the public must satisfy the French norm. The material used (conductors, lighting, outlets....) must carry the mark "NF" and the installation must satisfy the norm C15-100, for voltage classes above class II.

The material must be chosen according to the conditions of installation, operation, and external influences (example connectors between vehicles....) and protection measures.

➤ Lighting and outlets :

Outlets, or extensions and connectors, must be placed in such away that their bare active parts are not accessible. Outlets must be of a safety type (integrated system of prevention against object introduction "child safety"). The different elements must be maintained in perfect condition and serviced by competent staff.

➤ Surveillance of installations :

A surveillance of electrical installations must be assured during the running of the train. The organisation of this surveillance must be made known to the staff concerned. This surveillance aims to incite, as quickly as possible, the removal of defects and anomalies noticed and the supply cut off if necessary.

1.5.6. Intercommunication :

When intercommunications are forbidden to the public, their access is blocked by a device of the same nature as that described in 1.4.3 and maintained closed by a locking system. A sign warns the public that their use is forbidden.

To be open to the public, the intercommunications must be equipped with at least protection conforming to the following provisions :

- the running boards of each carriage must overlap in all circumstances during the train running; they are equipped with non- slip coating;
- the lateral handrails are composed of a rigid part with a minimum height of 1,00m and a flexible part adapted to train movements and presenting in all circumstances a minimal height of 0,85m;
- spaces must not in any situation present a width of more than 0,15m or a surface superior to 0.05 m²;
- for carriages circulating on a narrow gauge track, the minimum height of handrails is 0,85m and 0,70m respectively.

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Opening of intercommunications to the public is subject to a special declaration by the operator to the control service.

In other cases, the intercommunications can only be used by operating staff according to provisions and instructions defined by the operator.

1.5.7. Doors :

General situation :

In general trains run with the doors closed by the operator. However, in the event of an evacuation the doors must be able to be unlocked by the passengers.

Sometimes in hot weather, the exterior doors of the carriages or rail cars, opening directly on the track, can remain open during running in the following conditions :

- each access must have a rigid barrier for which the width must at least cover the opening width of the door, in such away that this barrier rests against the door supports;
- the barrier height must be at least 1,00m;
- the safety bars must be adapted to supporting a person, in particular a small child. All horizontal safety bars that could be used as a ladder are prohibited;
- the barrier mountings are bilateral and composed of a device preventing the direct lifting or opening of the barriers;
- a sign fixed to each barrier warns of the prohibition of their manipulation before the train has completely stopped.

These particular provisions cannot be applied to carriages with compartments that have individual doors giving directly onto the track.

Provisions relating to open cars :

Open cars are equipped with closing devices. These can be metal chains or non-extensible rope. Their height at maximum sag must be between 0,70 and 0,85m. Their opening must not be possible through direct pressing or simple lever. Particular attention must be given to the solidity of their attachment point.

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Closing devices on open cars are not necessary when :

- these carriages are equipped with a device to attach passengers when seated;
- or the following conditions are met :
 - passengers seated;
 - journey of less than 30mn;
 - speed not exceeding 15km/h;
 - limited exposure to the line (absence of tunnel; no road with rapid or frequent traffic, twinned with the line; no steep slope or relief). continuous visual
 - surveillance of passengers by the operating staff
 - safety instructions given to the public before departure.

1.5.8. Emergency exits :

Non-applicable.

1.5.9. Step height :

The step height between the platform and the first carriage step must be 0,45m maximum.

1.5.10. Alarm signal/ means of communication :

The presence of an alarm signal in the carriage, available to the public or on board staff is mandatory. These function following one of the following pattern:

1) Direct action on the braking system :

- Actioning of alarm signal >> triggering of emergency brake >> no driver action ;
- When the line includes tunnels of more than 300m, a sign under the alarm signal suggesting that they are not used in tunnels.

2) Staff warning :

- Actioning of the alarm signal >> driver warning >> train stopped by driver;

or:

- Actioning of the alarm signal >> Train conductor warning >> communication driver train stopped by driver.

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1.6. Operating conditions :

1.6.1. Stop and go lights :

A white light in front and a red light behind are mandatory in the event of running at night or if the line has at least one tunnel of a length superior or equal to 100m or in the event of running in visibility of less than 150 metres.

1.6.2. Maximum operating speed :

Standard and metric track :

The maximum public passenger operating speed is fixed at 40 km/h for trains towed and at 50km/h for railcars.

Narrow gauge track :

The maximum speed is fixed at 25 km/h.

1.6.3. Speed indicator :

Not required; most material are not equipped.

1.6.4. Data recorder :

Not required; most material are not equipped.

1.6.5. Acoustic warning signal :

An acoustic warning signal must be present and operating in the locomotive.

1.7. Alteration of material :

The resistance of hand rails and overturn sideboards and the system of attachment of roofs and seats from wrenching off, after alterations of material or replacement of existing devices must be justified.

On standard or metric track, carriages altered into open cars are equipped with continuous side boards for which the height excluding everything is at least 1,00m. The access points are assured by gates of the same height and open on the interior.

On narrow gauge track, the sideboards of open cars have a minimum height of 0,85m. Their closing system have a height of between 0,70m and 0,85m at the maximum sag.

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2.1. General characteristics :

Preliminary remark :

The provisions that follow represent a collection of recommendations relating to the safety of infrastructure operations. They are not a design or track laying manual. If required, it is therefore the responsibility of the infrastructure manager to choose the regulations to apply in terms of geometry and equipment, on the laying of new track or renewal of existing track.

2.1.1. Rail outline :

Closed carriages :

The static outline is the stationary envelope dimensions of the whole vehicle. (*ex. a carriage measuring 2,50m wide, 10m long and 3,50m high*)

The dynamic outline is defined as the enveloped formed by the passage of the static outline of the train on the track, taking into account curve and bow effects or eventual distortions of its profile. All interference of objects with this envelope directly engages the train outline.

The air space is defined as the safe space that must remain, on any point of the line, between the dynamic outline and any fixed object. It is fixed as 0,10m.

The dynamic outline increased by the air space can also be indicated by the expression minimum clearance outline (MCO). The passage of MCO must be guaranteed throughout the track.

Open cars or cars with openings :

For these cars, we determine a volume called "free outline" which is obtained by adding to the MCO an additional safety distance linked to the ability of passengers to project part of their body at the exterior.

The safety distance is fixed at 0,50m.

Sometimes, lower values may be imagined if provisions specific to the *operational plan* are put in place or it is demonstrated that there is no risk for passengers.

In the case of railways twinned with other tracks it is necessary to consult the corresponding technical guide published by STRMTG.

Practical application of the rail outline principle :

A distance to the interior edge of the rail called rail outline will be defined by each operator taking into account the largest rolling stock that could run on their network, to cover the MCO or free outline.

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This rail outline distance will be applied for the clearance outline of the track and will be communicated to STRMTG with evidence.

2.1.2. Maximum incline :

There is no fixed maximum limit value. However, the operator must show the coherence of the operational safety rules with the track profile, the quality of track equipment, braking and track grip of the rolling stock.

2.1.3. Gauge :

Tolerances in terms of the nominal gauge are :

Type of track	Nominal gauge	Maximum tolerance	Minimum tolerance
Standard track:	1435 mm	+ 37 mm	Non fixed
Metric track:	1000 mm	+ 30 mm	Non fixed
Narrow gauge track:	< 1000 mm	+ 25 mm *	Non fixed

* This tolerance must be related to the width of the operating table of the material used.

Particular attention must be paid to applying a value of over gauge on large bends depending on the calibration rate of the rolling stock.

2.1.4. Superelevation :

No counter -superelevation is allowed.

For running speeds of less than 30km/h, banking of the exterior rail on the bends is not essential.

For running speeds of more than 30km/h, the exterior rail must be banked on the bends to a value of:

$$S = k \frac{V^2}{R}$$

S: banking of exterior in mm.

R: radius of the bend in m.

k: variable according to the gauge

Gauge	50	60	70	metric	standard
k	3	3.5	4	5	8
S max (mm)	Non-applicable.			100	150

2.1.5. Warp :

The acceptable warp value on a distance of 3m is :

Standard track:	24 mm pour 3 m
Metric track:	30 mm pour 3 m.
Narrow gauge track:	36 mm pour 3 m.

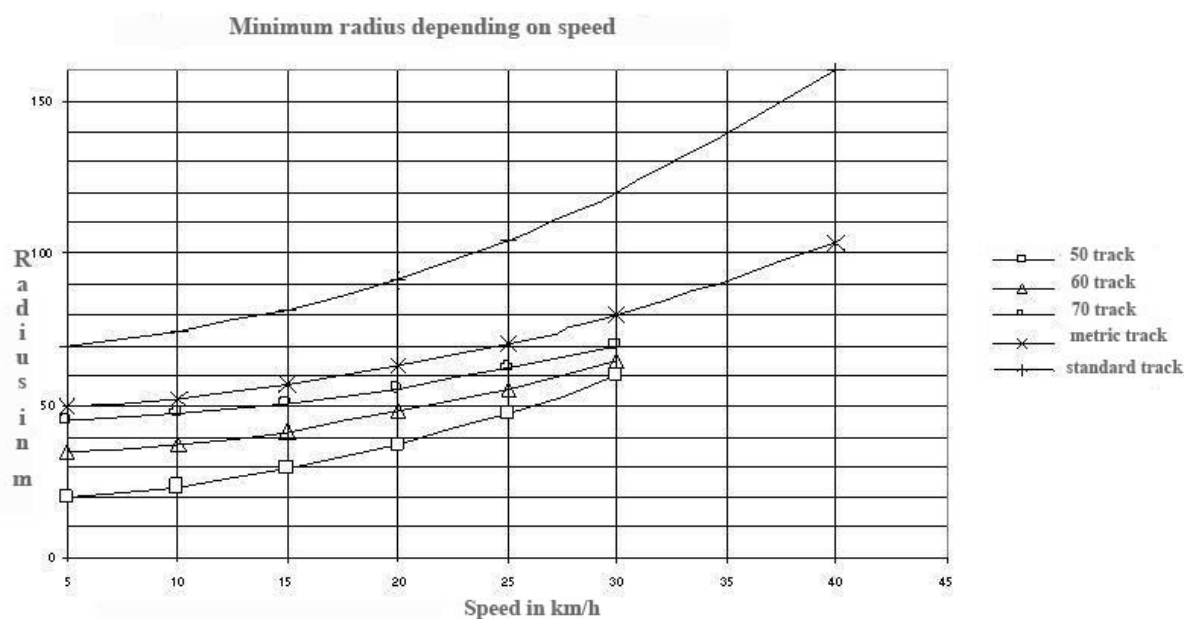
2.1.6. Drop off :

Non-applicable.

2.1.7. Speed limit depending on bend radius :

The following graph presents the minimum radius to be respected depending on the running speed.

The values are defined in absence of superelevation up to 30km/h.



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2.2. Track equipment :

2.2.1. Sleepers, fixations, tie plates :

Sleepers :

A sleeper must guarantee at least one support on each line of rail. A sleeper is considered "good" if:

- it is completely in contact with the ground under the rails;
- it has an effective fixation on both sides of the rail;
- it is well conserved: absence of rot, fracture or splitting for wooden sleepers.

Fixations :

A fixation is considered effective if:

- on vignole rail, a lag screw at least guaranteeing an effective clamping by put weight on the exterior flange of the rail.
- double-headed rail, the wedge is posed and guarantees an effective wedging of the rail, and if

the chair is fixed on the sleeper without trace of lateral movement;

Tie plates :

The pose on tie plates is not mandatory. It does however provide a better track holding on tight bends.

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2.2.2. General rule :

The maximum distance between two sleepers must be 1,00m whatever the gauge, so 1000 sleepers by Km.

The track equipment is determined by combining at least the following parameters : the density of sleeper spacing, the linear weight of the rail and the maximum axle load.

The following combinations must be respected :

Type of track	Maximum axle load on T.	Sleeper spacing Nb / km	Linear weight of rail Kg / ml
Narrow gauge track:	≤ 1	≥ 1000	≥ 7
	≤ 5		≥ 12
	≤ 7		≥ 15
Metric track:	≤ 12	≥ 1000	≥ 20
	> 12	≥ 1250	≥ 30
Standard track:	≤ 17	≥ 1250	≥ 30
	> 17	≥ 1500	≥ 34

In these conditions, we allow one "good" sleeper out of three in normal geometry and one out of two in bends under 200m (without exceeding more than three bad sleepers in succession)

Other parameters such as train speeds, rail wear or the incline of the track can lead to the punctual or generalised reinforcing of the demands concerning the condition of sleeper spacing.

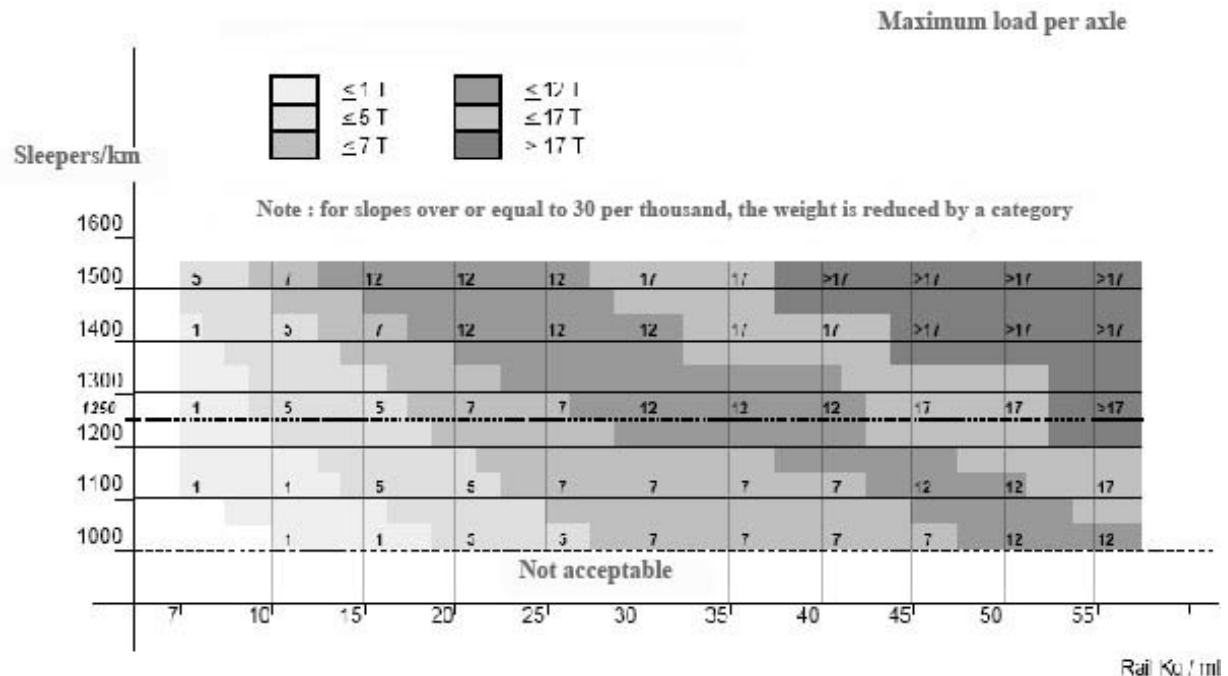
2.2.3. Situation of deterioration :

The deterioration of sleeper condition must be contained within the limit of one sleeper "good" out of four on normal geometry and one out of three on bends of less than 200m (without exceeding more than four bad sleepers in succession), on the condition that the following table values are respected, concerning the parameters of sleeper density, nominal linear mass of rail and maximum axle load.

In addition, it is the responsibility of the operator to apply temporary measures restricting traffic on deteriorated zones, associated with a schedule of replacement.

In this case, the bad sleepers must at least serve as passive support for the rail.

The non-respect of these conditions must lead to the replacement of the defective sleepers.



2.2.4. Joints and switches :

The rail joints must be supported by "good" sleepers.
Under track-to-track equipment, all sleepers must be "good".

2.3. Rail :

2.3.1. Gradient of rail :

To improve wheel alignment, the rails are inclined towards the interior with a gradient of 1/20e in standard and metric track except for tourist trams. This gradient is obtained by inclined notches on wooden sleepers.

2.3.2. Linear weight of rail :

(refer to table in 2.2.2- track equipment)

2.3.3. Cracks :

A broken rail must absolutely be replaced or immediately spliced pending replacement.

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Cracks are unacceptable if they endanger the splice or web resistance.

Oxyacetylene cutting (piercing with torch) is prohibited because of the risk of cracks.

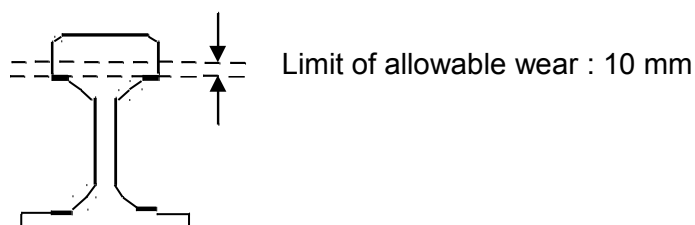
2.3.4. Wear :

The rail web must not be perforated by corrosion.

The thickness of the web must always be more than 2/3 of its initial thickness.

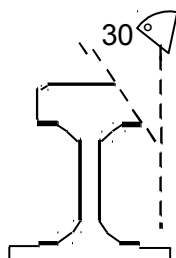
The rail wear, on the vertical plane, must not leave a residual head thickness less than 10mm measured above the throat of the rail, all gauges included.

See diagram opposite :



On standard and metric track, the rail wear on the interior face of the head must not exceed 30° measured in relation to the vertical plane.

See diagram opposite :



2.3.5. Joints and fishplates :

Joints :

A space between two rails is imperative, except in particular cases such as very long tunnels and certain metallic engineering structures. This space must be adapted to the type of rail and possible temperature differences in the zone considered.

Lip phenomena noticed at rail joints must be eliminated.

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Fishplates :

Fishplates go in pairs by rail joint. They must be tight, bolted and adapted to the rail profiles.

There must be:

- for narrow gauge tracks, at least 1 bolt on each side of the rail joint.
- for metric and standard tracks, at least 2 bolts on each side of the rail joint.

In the event of a change in rail profile, there must be a connector fishplate. In the event of different wear on rails of the same line, a wear fishplate must be put in place.

Greasing of fishplate openings is undertaken during dismantling or joint adjustment.

2.3.6. Guide-rail :

The guide rail is imperative on track equipment. The distance between the rail and guide rail must be such that it guarantees a real guide.

2.3.7. Level crossing- road crossing :

A gap must exist in the absence of a guide rail or grooved rail

2.3.8. Safety rail :

A safety rail or "3rd rail" must be in place, as necessary, to limit the consequences of a derailment in particularly exposed zones in the event of a train derailment (bends above a ravine or viaduct for example). This rail is placed between two running rails, in a skewed way, from the opposed line to the exposed zone.

2.4. Ballast :

The ballast bed must be made up of level and stable substrate.

The ballast thickness at the level of the sleeper heads must be at least equal to:

- Half the height of the sleeper head for axle loads inferior to 17 tons.
- The height of the sleeper head for axle loads superior to 17 tons and for low radius bends associated with a superelevation superior or equal to 20‰.

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The ballast profile must be regularly controlled especially to anticipate the appearance of faults such as subsidence, lateral erosion, undermining of sleepers.

Measures must be taken to limit the pollution of the trackbed (earth, other material...)

2.4.1. Width :

Non-applicable.

2.4.2. Thickness :

The sleeper must rest on a bed of ballast with a thickness of 5 cm.

2.4.3. Nature and size :

Non-applicable.

2.4.4. Weed control :

The ballast must be regularly cleared of all invasive vegetation.

2.5. Platform :

The trackbed must be correctly cleaned either by sloping, or by the presence of gutters or lateral ditches. These must be regularly cleaned.

2.6. Track equipment :

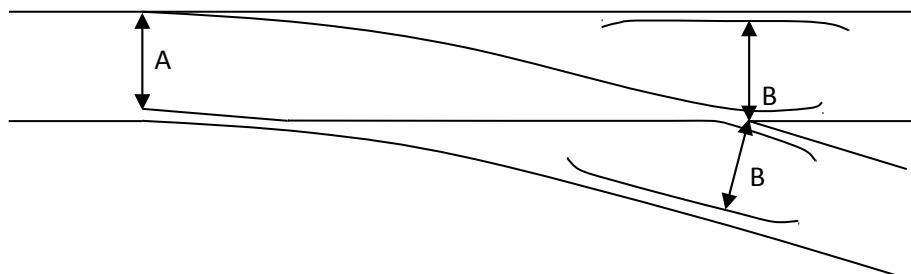
The switch control must allow the maintenance of the switch in position. The switch blades must rest and press against the respective opposing blade.

The track equipment must be regularly cleaned and greased.

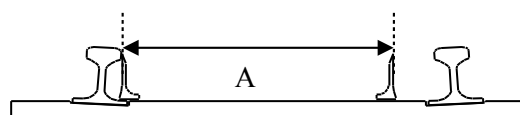
The switches or picket between two tracks must be shown by a safety marker.

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Protection rates of track equipment

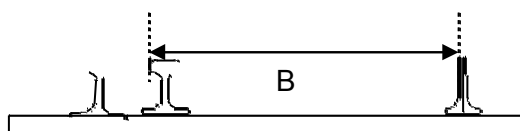


Rate A : Free passage in the sleepers



Standard track :	$A < 1356 \text{ mm}$
Metric track :	$A < 928 \text{ mm}$ (source SNCF ; see nota)

Rate B : Protection of switch diamonds



This measure must be taken orthogonally at 10 cm for the switch diamond.

Standard track :	$1392 \text{ mm} < B < 1399 \text{ mm}$
Metric track :	$957 \text{ mm} < B < 963 \text{ mm}$ (source SNCF ; see note)

Note: concerning metric track, the SNCF rates are given as an example while explaining that other rates can be applied (economic or departmental railways). It is the responsibility of the operator to explain the reference that they use to the control service if requested.

Case of narrow gauge track :

The operator must be able to explain the reference used or the theoretical rates applied to the track equipment.

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2.7. Platforms :

The access platforms to trains must have a flat and continuous surface on the whole length of the longest train that could stop there. Their levelling must respect the maximum step height allowed for carriages.

2.8. Fencing :

As a reminder the provisions resulting from article 4 of the 15 July 1845 law on the governing of railways and law of 26 March 1897 having for object the authorisation of exemptions to article 4 of the law of 15 July 1845 concerning railway gates and barriers, are repealed.

After on site evaluations of risks run, the closure of railway right of ways may sometimes be necessary in the following cases:

➤ Crossing of inhabited places :

In built up zones or close to these zone, when regular pedestrian traffic, and particularly children (access to a school, or local council sport or multipurpose facilities for example), takes place along the track or generating random crossing of these, a fence is placed along a line determined on site.

The fencing of rights of way is unnecessary when the train speed is less than 10 km/h and the visibility is clear.

➤ Parts adjoining public roads or paths :

If there are public roads or paths alongside the railway, the applicable provisions are defined by the technical guide relating to railways twinned with other roads, published by STRMTG.

When a parking zone is built along the track, a device such as a fence, a separator or defensive cone, is placed at the limit of the railway right of way.

➤ At each side of certain level crossings :

In built up zones, when it is necessary to channel pedestrians towards the level crossing, fences can be put in place each side of the LC. Their length is adapted to the zone used by pedestrians next to the track.

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➤ **Aspect of fencing and installation :**

The fences are either defensive if they prohibit all penetration, or simply dissuasive when a definition of spaces and only incitement is necessary to limit intrusion.

The consistence of fences is not the object of particular provisions. Defensive fences must not be aggressive (no barbed wire for example). They can be continuous or discontinuous, have diverse aspects as long as they respond to the safety object required. The minimal height of fences fixed at 0,50 m.

All fencing must be placed at the limit of the railway right of way and must under all circumstances free the rail outline as defined in 2.1.1- Rail outline.

2.9. Engineering structures :

2.9.1. Surveillance :

1. General points :

The present technical reference is not designed to define technical rules pertaining to the resistance, stability or repair of engineering structures. It is limited to regular surveillance and auditing with the goal of anticipating the appearance of structural problems or identifying their presence, with a view to making timely maintenance or renovation operations and, if necessary, to take safety measures allowing the anticipation of any accident resulting from the deterioration of engineering structures.

To guarantee the good condition of the engineering structures, the operator must undertake or have undertaken regular surveillance according to a predefined program or after events that could lead to problems (bad weather, floods, landslides, diverse accidents,.....)

The frequency of engineering structures surveillance must be written down by the operator in the OSR or in the follow up register dedicated to infrastructure. These visits break down into three categories :

- short surveillance visits;
- regular brief and detailed inspections;
- complimentary inspections linked to particular events.

These provisions are applicable to all engineering structures whatever their dimensions: bridges, viaducts, tunnels, retaining structures, block shield, etc. Detailed regular visits are not mandatory for small hydraulic structures or the re-establishment of access, with openings less than 2,00m.

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2. Short surveillance visits ;

This is essentially a visual surveillance. These visits are carried out by the operator who, during tours on the track and during operation, looks at the whole visible condition of the structures. Not all parts are necessarily inspected, particularly those difficult to access. All agents who detect problems must notify the infrastructure manager.

3. Regular brief and detailed inspections :

Regular inspection implies a complete audit of all parts of the structure.

They are of two types :

Brief : These are in general annual visits of a visual nature, possibly accompanied by a photographic report. They can be the occasion for a reading of measures or structural surveillance instruments.

They do not necessarily include the execution of acrobatic work particularly on structures with significant height. In principle, they are undertaken by the operator himself. A visit report, even short, judging the condition of the structure is established and recorded in the register planned for this.

Detailed : in principle these visits take place every five years. Nevertheless their regularity can be increased or reduced, without exceeding 9 years, depending on the condition of the structures, their robustness and their evolution, based on proposition explained by the operator to the control service.

They are undertaken by a qualified agent of engineer level and specialised in the audit and pathology of engineering structures. The constructor or operator must be able to prove the references and competences of the exterior inspector to the control service.

Detailed visits are complete visits examining all parts of the structures, including those difficult to access (very high, submerged foundations, tunnel vaults). They may need special technical inspection methods, soundings, tests, diverse measures or instrumentation. They are accompanied by a detailed report with photographic reporting of problems noted and classification of repairs need by order of urgency, communicated to the control service.

4. Complimentary inspections linked to particular events :

These inspections are carried out on structures that the operator think may have been affected by exceptional phenomena. They may need investigations of the same type as for a detailed visit and require, if necessary, a specialised agent. They are accompanied by a specific report communicated to the control service.

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5. Inspection recap chart :

Engineering structure check	Day-to-day surveillance	Brief regular inspections	Detailed regular inspections	Complementary inspections
Regularity	During operation	Annual	5 years adjustable in principle on suggestion of operator	Linked to particular events
Inspector	Operator	Operator or specialist	Specialist of audit and pathology of engineering structures	Operator or specialist
Content	Complete look at the visible condition of structures. Non complete inspection	In general visual, possibly accompanied by a photographic report	Complete visit looking at all parts of the structure, including those difficult to access.	Investigations as those for a detailed visit.
Traceability	Problems noticed communicated to the infrastructure manager.	Visit report, even brief, with judgement on the condition of the structure recorded in a register.	Detailed report with photographic reporting of problems noticed and a classification of repairs needed by order of urgency.	Specific report
Communicated to the control service	No	On request	Yes	Yes if problems

When the condition of the structure or its exposure to exterior risks justifies, the control service can make provisions for reinforced surveillance for which it fixes the content. These provisions can envisage the regular communication of information on the evolution of parameters affecting the stability or solidity of the structure.

Regular inspections form the basis of maintenance work and repair programming on the structure.

2.9.2. Parts of the structure to inspect :

The following parts of structures are to be inspected meticulously and with particular attention to the following elements :

Masonry structures :

- Vaults and abutments (with research of deformations, cracks, detachment of face, degradation of joints, water infiltration, zones of humidity and concretion, carbonatization);
- Tympanum, piles and abutment (cracks, detachment of stone, degradation of joints, deformations, abnormal inclinations);
- The tie-beam heads (corrosion, unscrewed);

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- The continuity and levelling of the trackbed perpendicular to the abutments (subsidence, undermining on shoulders);
- The behaviour of the track on the structures (overload or insufficient ballast);
- The condition of the handrail (corrosion, uncoupling, detachment of fixations, detachment of stonework even fall of capping elements);
- The foundations in aquatic areas (in particular in rivers with a strong flow variation);
- Landslides near to foundations and abutments of structures; the condition of rafts.

Metallic structures :

- The good condition of montage (cracks and cracking in the paintwork, corrosion, weakening of rivets and bolts, oxidation marks);
- The montage of main parts (girders, main beams, joists and bracings);
- Location of residual humidity zones;
- The floor contacts (contact with earth or ballast);
- The condition of supporting equipment (search for blockages, movement);
- The condition of planking (perforation of flooring);
- The fixation of handrails (corrosion);
- The fixation of joists or wooden crossbeams.

Concrete structures :

- Location of cracks (precise surveillance), rust marks (revealing of armature);
- The appearance of water infiltration (traces of flow, concretions);
- Splitting, detachment or spalling of concrete;
- Faults affecting the box beam;
- Condition of supports.

Supporting structures :

- Structure profiles (regularity of batter, appearance of pressure bulges, spillage, subsidence);
- The condition of anchorage equipment;
- Deconsolidation of masonry (ref. earlier, partial collapse);
- Condition of handrails (ref. earlier);
- Condition of unloading structures;
- Condition of drainage systems (scuppers, drains, ditches).

2.9.3. Regular maintenance of structures :

To limit the appearance of problems, the structures must be regularly maintained clear of all vegetation, particularly trees growing close to or against the foundations or even on the structure, climbing plants (ivy for example) fixed directly to their surface or taking root in the stonework joints and dense bushes hiding certain parts of the structure.

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These provisions are also aimed at making inspection visits more effective.

The structures must be protected from overloading by blocks, earth or other sorts of material, as much from above as laterally. In the event that this overload cannot be avoided (block shield structures for example), they must have a particular inspection.

In addition these procedures must be undertaken:

- the cleaning of water evacuation devices;
- removing of logjams blocking the piles in watercourses;
- maintaining the rafts in good clean condition through regular cleaning;
- the cleaning of support and joint devices;
- protection of metallic elements against corrosion.

2.9.4. Handrails :

Two types of handrail should be distinguished: hand rails for pedestrians and handrails for service. The first category is designed for structures for which public access is authorised. The second can equip all other structures, including if public evacuation by the track could take place.

2.9.4.1. Handrails for pedestrians on bridges, viaducts and sustaining walls :

Requirements concerning handrails for pedestrians :

Handrails for pedestrians are used all along the structures where there are no restrictions on third parties or train passengers traffic, that is to say on structures located alongside stations when they are necessary and on structures where passengers are likely to descend from carriages (train stops with operators authorisation for passengers to descend from the carriages, etc...)

In zones accessible to the public, pedestrian handrails on bridges, supporting structures and shoulders with a gradient superior to 1/1 supporting the railway trackbed, for which the height measured between this last and the reception point below is more than 2 metres, are mandatory.

If this height is between 1 and 2 metres, handrails are recommended except for shoulders. However in the absence of handrails, it is appropriate to establish at the limit adjoining the void a fixed obstacle of low height (small wall, simple fence).

Thin handrail (generally metallic) :

These provisions have a thickness of less than 0,20m

The minimum height is fixed at 1 m.

The bars are normally spaced at 0,15m maximum. When the safety bars have elements other than vertical or straight, the voids from the ground up to 0,60m must not allow the passage of a cylindrical outline of 0,15m diameter (norm XP P98-405- Handrails for bridges and civil engineering structures).

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The control service can request that the operator explain the resistance of the Handrails of structures.

Thick handrails (generally masonry) :

The minimum dimensions result from a combination of the height and width of the hand rail according to the following data expressed in metres, without being able to reduce this side of 0,85m:

Thickness:	0.25	0.30	0.35	0.40	0.45
Minimum height	0.975	0.95	0.925	0.90	0.85

(Note : interpolate for intermediate values)

A tolerance of 25mm is authorised for the minimum height. Mixed provisions :

This relates to devices with a thick foundation topped by a thin handrail.

The minimum total height of these devices is 1,00m. In addition when the foundation is considered as a normally accessible zone, the height of the handrail is measured from the upper face of the foundation. The foundation is considered as normally accessible when the dimensions are the following: width superior or equal to 0,30m, height less than 0,45m, border left free on the interior face of the handrail superior or equal to 0,13m.

Extremities of structures :

These zones can have undercutting flush to the railway trackbed base even locally reducing the width. When these zones need the presence of handrails (Requirements concerning handrails for pedestrians), head of embankments, retaining or breast walls must be equipped with a handrail fixed in the prolongation of the structure.

2.9.4.2. Service Hand rails on bridges, viaducts and sustaining walls :

Requirements of service handrails :

Service handrails concern all other cases.

Only the operator may walk on structures with a service handrail (except in the event of the evacuation of a train in distress on the structure).

Service handrails on bridges, supporting structures and shoulders with a gradient superior to 1/1 supporting the railway trackbed, for which the height measured between this last and the reception point below is more than 3 metres, are mandatory.

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Thin handrail (generally metallic) :

These provisions have a thickness of less than 0,20 m

The minimum height is fixed at 0.90 m..

Thick handrails (generally masonry) :

The minimum dimensions result from a combination of the height and width of the handrail according to the following data expressed in metres, without being able to reduce this side of 0,70m :

Thickness:	0.25	0.30	0.35	0.40	0.45
Minimum height	0.85	0.825	0.8	0.85	0.7

(Note : interpolate for intermediate values)

A tolerance of 25mm is authorised for the minimum height.

Mixed provisions :

It relates to devices with a thick foundation topped by a thin handrail.

The minimum total height of these devices is 0,90m. In addition when the foundation is considered as a normally accessible zone, the height of the handrail is measured from the upper face of the foundation.

The foundation is considered as normally accessible when the dimensions are the following: width superior or equal to 0,30m, height less than 0,45m, border left free on the interior face of the handrail superior or equal to 0,13m.

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2.9.5. Particular provisions for tunnels :

The particular provisions for tunnels are fixed taking into account events that could occur :

- The engineering of the structure must be subject to an adapted monitoring to anticipate structural problems such as rubble fall, subsidence or collapse of walls or arches, large water infiltrations;
- The trackbed and track must be subjected to a reinforced surveillance allowing the prioritised resolution of all problems which may affect them under tunnels (particularly the alignment of track, condition of sleepers and attachments, condition of rails, drainage);
- The track equipment is adapted accordingly and the track fault tolerance is reduced;
- The lateral pathways must be maintained clear at all times of large objects which could be obstacles to evacuation on foot of passengers;
- The rolling stock must satisfy safety requirements specific to tunnel traffic (fire, evacuation...).

The following table distinguishes the structural categories in terms of their length measured between the two heads, each respecting a specific level of recommendations :

- ✓ 1st category: tunnels with a length of less than 100m (excluding lower passages under bridge);
- ✓ 2nd category: tunnels with a length between 100 and 300 m;
- ✓ 3rd category: tunnels with a length between 300 and 800 m;
- ✓ 4th category: tunnels with a length greater than 800 m

A difference in relation to one of these recommendations can be the subject of compensatory measures proposed by the operator or STRMTG.

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Provisions applicable to each category of tunnel	Cat 1 <100 m	Cat 2 100 to 300 m	Cat 3 300 to 800m	Cat 4 > 800m
Operating measures :				
Staff safety instructions	X	X	X	X
Instruction : "Whistle" when approaching the two heads	X	X	X	X
Lighting equipment fixed on each train carriage		X	X	X
Presence of at least one hand held light with charged battery on board the train, available to each member of the train operating team.		X	X	X
Presence of extra extinguishers in the carriages(ref. 1.5.4)				X
Specific operating procedures (1)			X	X
Provisions for structure equipment :				
Indication of the structure name at each head in the case of multiple structures	X	X	X	X
Road access near structure heads (if easily realisable+ parking and turning areas near heads			1 head	2 heads
Motorised railway vehicle available to emergency services to access the heads (if road access is difficult)				X
Safety recesses in the event of maintenance while trains circulate.			X	X
Pathway, lateral by preference or central, with a width minimum on the ground of 0,50m and clear of all obstacle on the ground or protruding Flat and continuous surface throughout the length	X	X	X	X
Hand rail the length of lateral pathway (2)			if tunnel bend (3)	X
Lateral lighting in tunnel or evacuation pathway (4)			if tunnel bend	X
Maximum lighting point spacing 50m			if tunnel bend	X
Resetting of lighting control possible at the heads and from the interior of the tunnel every 200m			if tunnel bend	X
Fire resistant electrical and cable channels				X
Markings under tunnel indicating the distance to each tunnel head (5)				X
Track telephone at the end of each structure unless a station is close by.				X
Radio continuity for emergency services (in the absence of coverage by the national infrastructure) (6)				if L > 2 km
Preliminary consultation for operating authorisation :				
Requirement made by Prefect to consult the CCDSA if the system can carry more than 500 passengers by train.		X		
Requirement made by Prefect to systematically consult the CCDSA.			X	X

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(1) Specific operating procedures, particularly :

- Prioritise the train exit from tunnel on the way or by gravity in the event of an incident rather than stopping it;
- following trains maintained out of the tunnel until the complete removal of all traffic in the tunnel;
- practice reduced speed;
- reinforce the vigilance of train staff;
- regularly undertake emergency and evacuation exercises in collaboration with the relevant services.

In addition, it is recommended to equip carriages :

- with an alarm signal allowing the passengers to warn the train staff without stopping the train in a tunnel or, *failing that, a sign below suggesting not to use in tunnels*;
- with a public address system allowing the diffusion of information or instructions to passengers.

(2) Hand rail the length of lateral pathway :

When a handrail is required, this is made of a rigid material, non-inflammable and is installed at a height of around one meter above the lateral pathway. The handrail is broken at the angle of recesses.

(3) Tunnel bend :

A tunnel length between 300 and 800m is considered "curved" if the visibility of the two heads is lost at any point of the structure, due to a the radius of the bend.

(4) Lateral lighting in tunnel or evacuation pathway :

When tunnel lighting is required, this must be positioned above the pathway.

However, for tunnels that cannot have an electrical supply connected to the concession holder's distribution network, a low intensity light guide can replace the safety lighting, if the pathway is lateral.

This light guide is installed on the sidewall of the tunnel, at a height of one metre.

(5) Markers under the tunnel :

Markers indicating the distance of each tunnel head placed at regular intervals of 50m on the light side are required in structures of large length. These markings must wherever possible coincide with light sources.

(6) Radio continuity :

Conforming to decree N° 2006-165 of 101 February 2006 relating to emergency services radio-electric communications, the operator must ensure radio continuity for emergency services, in the absence of national infrastructure coverage, for structures longer than 2000m.

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3.1 Provisions resulting from the ministerial decree and memorandum of 18 March 1991 :

3.1.1. General points :

The ministerial decree and the memorandum of 18 March 1991 as well as the provisions relating to the highway code (R 422-3 in particular) and of the inter-ministerial instruction on highway signage, applies in entirety to tourist railways. Whatever their nature, rail traffic has priority over road traffic. It is however not as simple to make road users respect this requirement when confronted with very occasional train passages, which is in addition identified as tourist or historic. Therefore sign equipping of LC and respect of crossing procedures demands the same rigour as for regular railways.

The level crossing procedures and approach road signs at the angle of LC are principally determined according to the respective road and train traffic and, for roads with light traffic, the visibility conditions. The LC exclusively for pedestrians or private are subject to particular rules.

It is the convergence of these different parameters that determines the classification of LC :

- 1st category: LC equipped with barriers or half barriers, guarded or automatic;
- 2nd category: LC lacking barriers, non guarded (except in exceptional circumstances);
- 3nd category: LC reserved for pedestrians;
- 4nd category: Private LC

The operator must guarantee the classification of level crossings with the Prefect and undertake the classification of the LC or any modification of this classification with the services. The Prefect announces the classification by Prefectural decree after traffic parameter checks and, if necessary (2nd category), of visibility according to the speed practised.

A joint inspection of these parameters will be undertaken with the operator before the classification proposition.

3.1.2. Staffing of rail crossings :

The use of guarded LC at train passing supposes the train driver ensures the closure of the LC to authorise the train engagement on the LC. The response to this condition can require the stopping of the train before the LC. We distinguish two possible configurations:

- LC crossing equipped with a manual closure, permanently guarded or by an agent taken on site by the train itself or by other means;
- LC crossing equipped with a closure, guarded by an agent taken on site by the train itself or by other means (rarely sedentary);

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These LC must be approached with caution in order to stop the train before crossing the road in the event of non-closure or non-guarding.

When the technique of guarding by railway agents required to stop the traffic themselves is used, these must carry individual protection equipment (IPE) conforming to the interministerial instructions relating to road signing, 8th part, art. 134 (yellow harness with reflective bands).

3.1.3. LC safety with automatic signalling :

a) LC with automatic barriers :

When an automatic barrier device is chosen, the safety of barrier closure is mandatory. This can be done in two ways :

- 1) Balanced barriers on closing: in the event of disturbance, malfunctioning or electrical supply fault, the barriers descend by gravity and the LC remains closed until the operator intervenes. A telephone number, visible to the public, to be composed in the event of malfunction, must be displayed on the LC equipment.
- 2) Conditional crossing system (CC): a device which warns the driver, in advance, of the LC situation so that in the event of a malfunction he can stop the train before the LC. The LC is crossed without stopping the train only on condition of the confirmation of the normal closure of the LC by signal situated next to the track or returned to the driver's cabin.

Otherwise, the crossing takes place after the halting of the train using the manual closing methods described in the regulations. The absence of a signal confirming the functioning of the LC constitutes in itself an obligation on the driver to stop before the LC.

b) LC automatic signal without barriers :

Even if the automatic barrier system presents an undeniable advantage in terms of safety, their generalisation is not the goal, particularly taking into account their cost.

When road traffic is light, the moderate speed of trains allows the use of an automatic light signal without barrier (ALS 0), whatever the visibility conditions for road users.

The ALS 0 device must be subject to a securing in the following conditions :

Conditional crossing system (CC) : a device which warns the driver, in advance, of the LC situation so that in the event of a malfunction he can stop the train before the LC.

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The LC is crossed without stopping the train only on condition of the confirmed functioning of the LC light signal by a signal situated next to the track or returned to the driver's cabin.

Otherwise, the crossing takes place after the stopping of the train using the manual closing methods described in the regulations. The absence of a signal confirming the functioning of the LC constitutes in itself an obligation on the driver to stop before the LC.

3.1.4. Traffic moments :

The railway circulation data is affected by the seasonal character of tourist traffic. In order to better simulate the real operating conditions, the reference period to be taken into account to determine the railway circulation corresponds to the period during which the tourist operation actually takes place(for example from 1st May to 30th September) and not the year.

Road traffic is taken in annual daily average.

3.1.5. Diverse provisions :

The fixation of planking on the road must be undertaken in such away as to limit the risk for road users (particularly bicycles). For light circulation tracks a good solution is to concrete the corresponding area. The wheel flangeways or rail gorges must be regularly cleared of any material that could block them.

The operator is responsible for removing any obstacle parallel to the LC in the safety zone of 0.70m width measured in relation to the edge of the road.

The safe crossing of LC on rural or forestry tracks, non paved, with very light circulation and where regulated visibility conditions are not met, can be subject to particular provisions. When these LC must be maintained, the regime is normally that of automatic or guarding. These two solutions are often impractical: too expensive, penalizing stop for the train, low risk in relation to the speed practised. A signing such as the St Andrew's + STOP with train approach at reduced speed and whistle, can therefore be anticipated.

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3.2 Application table :

Warning: This table is a guide to assist the choice of device adapted to the different situation met on the CFT network (conforming to the ministerial decree and circular of 18 March 1991). It must not be used to determine the signs to be placed (consult example schemes).

3.2.1. 1st category :

Type of LC.	Ref. Regulation	Classification	Device the responsibility of railway system	Moment	Conditions of visibility	Functioning	Application
GA 1-D Permanently guarded barrier	Art. 13 to : 16	1st cat.	Barrier or all device blocking the route from one part to the other of the rail track and moving at the trains approach (regime open)		No conditions	The guard can live permanently next to the LC or taken to the structure, by means of an independent train. The train driver applies a cautious approach, making sure the LC is closed and whistling before crossing.	The closing devices are in general pivoting or rolling barriers, or banner on roller or diaphragm, reflective, red and white. Relatively long manoeuvres so not recommended on high circulation roads; Solution not suitable if the rail track is on a ramp and the train must stop.
GA 1-T a barrier guarded by the train agent	Art. 13 to : 16	1st cat.	Barrier or all device blocking the route from one part to the other of the rail track and moving at the trains approach (regime open)		No conditions	The crossing is conditioned by the prior intervention of one or two train agents for the closure and opening of the LC The train stops before the LC and whistles before crossing.	Exposed situation for railway agents present on the road. The wearing of highly reflective individual protective equipment by agents is mandatory.

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Type of LC.	Ref. Regulation	Classification	Device the responsibility of	Moment	Conditions of visibility	Functioning	Application
SAL 2	Art. 9 stop	1st cat.	A half barrier in each direction controlled at a distance, a bell and 2 flashing red lights on each traffic direction (signal G2)		No conditions	The equipment must be secured at the closing by the automatic descent of the barriers in the event of disturbance. A telephone available to the public allows the notification of all disturbances to the operator.	The most burdensome solution but adapted to all traffic and track profiles. When the visibility of the closed LC from the road is bad, flashing yellow lights set off by the train approach, can reinforce the presignalling of the A7 panel.
SAL 2-FC	Art. 9 stop	1st cat.	The same device as above with conditional crossing		No conditions	The device must be secured by conditional crossing device (described in 3.1.3 -a)	This is the formula generally used in new equipment taking into account the cost. Well suited to roads with heavy traffic by the dependability of its functioning. When the visibility of the closed LC from the road is bad, flashing yellow lights set off by the train approach, can reinforce the presignalling of the A7 panel.

(p.m. : SAL 4 must not be used in CFT).

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3.2.2. 2nd category :

Type of LC.	Ref. Regulation.	Classification	Device the responsibility of railway system	Moment	Conditions of visibility	Functioning	Application
St Andrew's cross alone	Art. 18 stop	2nd cat.	St Andrew's cross alone	< 3000	Conditions 18-b and 18-c combined	The train whistles and passes without stopping possibly at reduced speed. We can modulate the road and train speed to reduce the visibility distance required (see chart)	Well adapted to CFT; good for small roads when the visibility is well clear in both senses. Always try to improve the visibility distance before using other solutions.
	Art. 18 - d stop	2nd cat.	St Andrew's cross alone	< 3000 with road < 10véh/J	Condition 18-b only	The train whistles and passes without stopping possibly at reduced speed.	Used for roads and paths open to public traffic less than 10 veh./ D, with S< km/h.
St Andrew's cross + STOP	Art. 19 stop	2nd cat.	St Andrew's cross + STOP	< 5000 with road < 100véh/J	Condition 18-b only	The train whistles and passes without stopping possibly at reduced speed. A STOP sign does not replace the visibility requirements. The STOP line must be evident each time the road surface allows it. The lowering of the train speed, when it is possible, allows the reduction of the visibility distance required (see chart).	Used on roads with traffic of less than 100 veh./ D. This solution is also possible for crossing "blind" LC on rural or forestry paths unpaved with very light traffic, when the clearing of visibility would be too difficult. The speed of trains must be reduced and the driver must use the whistle; road presigning is optional.

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Type of LC.	Ref. Regulation.	Classification	Device the responsibility of railway system	Moment	Conditions of visibility	Functioning	Application
GA 2	Art.20 – 2 circular	2nd cat.	Guarding by one or two agents stopping traffic with a flag or red lantern	< 5000 Slow and light traffic lines	Allows the management of visibility conditions required in art. 18.	Crossing with the prior intervention of a train agent or supervision. The staff must have a highly reflective individual protection equipment. The train driver applies a cautious approach, makes sure the LC is closed and uses the whistle before crossing.	Used for roads with light traffic with visibility problems. This solution is not adapted if the track is on a ramp and if the train must stop to drop off the agent who manoeuvres the LC. Can be used in deteriorated configuration of a SAL FC device.
SAL 0 (FC)	Art. 20 stop	2nd cat.	St Andrew's cross + 2 flashing red lights and a bell triggered by train approach.	< 5000 with road <500véh/J	No conditions	The device must be secured by a conditional crossing device (described in 3.1.3-b)	The SAL 0 can be applied without visibility requirements for roads with light traffic (500 V/D).

3.2.3.Other categories :

Type of LC.	Ref. Regulation	Classification	Device the responsibility of railway system	Moment	Conditions of visibility	Functioning	Application
Pedestrian crossings	Art. 22 decreed	3rd cat.	No signal		No conditions	In built up areas, can be added to a road LC and possibly equipped with unlocked balanced gates or passage by chicane.	Only pedestrian; hiking tracks but not cycle paths.
Private access	Art. 23 stop	4th cat.	A manual or automatic closing device is required.	Private traffic	No conditions	Closing device under the responsibility of the user, maintained locked when the access is not used.	Under contract made with the user; used for private access (individuals, companies, co proprietors)

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3.3 Fences around the LC :

Article reserved for later writing

3.4.Establishment of crossing regime for LC. of 1st and 2nd categories :

1. Inventory all the LC and search for all earlier documents relating to the regime applied to each one, from the Prefecture, the DDE or SNCF.
2. Collect all the road traffic data available (annual daily traffic average) particularly from the DDE or Conseil General. Do not forget local government roads.
3. Determine the rail traffic taking for reference period the seasonal traffic corresponding to the network exploitation period.
4. Calculate for each LC the traffic moment.
5. Moment > 5000 : automatically proposition of classification in 1st category; determine the crossing technique (see 3.1.2 and 3.1.3-a) and choose between device SAL2 or GA1.
6. Moment <5000: examine visibility conditions as in points 7 to 12:
7. Determine the speed practised :
 - for the road: either the authorised speed (sign), or the average speed usually practised;
 - for the railway: the operating speed of the train taking into account the parameters of the track profile (tight bend; difficulty to stop on a steep gradient for example). This speed can be different in each direction of circulation.
8. Conclude the visibility distance to be respected (using the chart 3.5) to target a classification in 2nd category and the check them in the field on each quadrant of the LC.
9. If no visibility condition is satisfied (after checking the possibility of clearing visibility in the field and adapting the train speed to reduce these distances) :
 - If road traffic > 500V/D, classification in 1st category with device defined in point 5 or device GA2.
 - If road traffic < 500 V/D, classification in 2nd category, determine the crossing technique (see 3.1.2 and 3.1.3-b) with device SAL 0 or GA2.
10. If only the visibility condition "art.18-b" is met :
 - Road traffic < 10V/D and Moment < 3000 : only St Andrew's cross
 - Road traffic < 100 V/D : St Andrew's cross + STOP
 - If the parameters do not enter into any of these limits, apply one of the devices cited in point 9

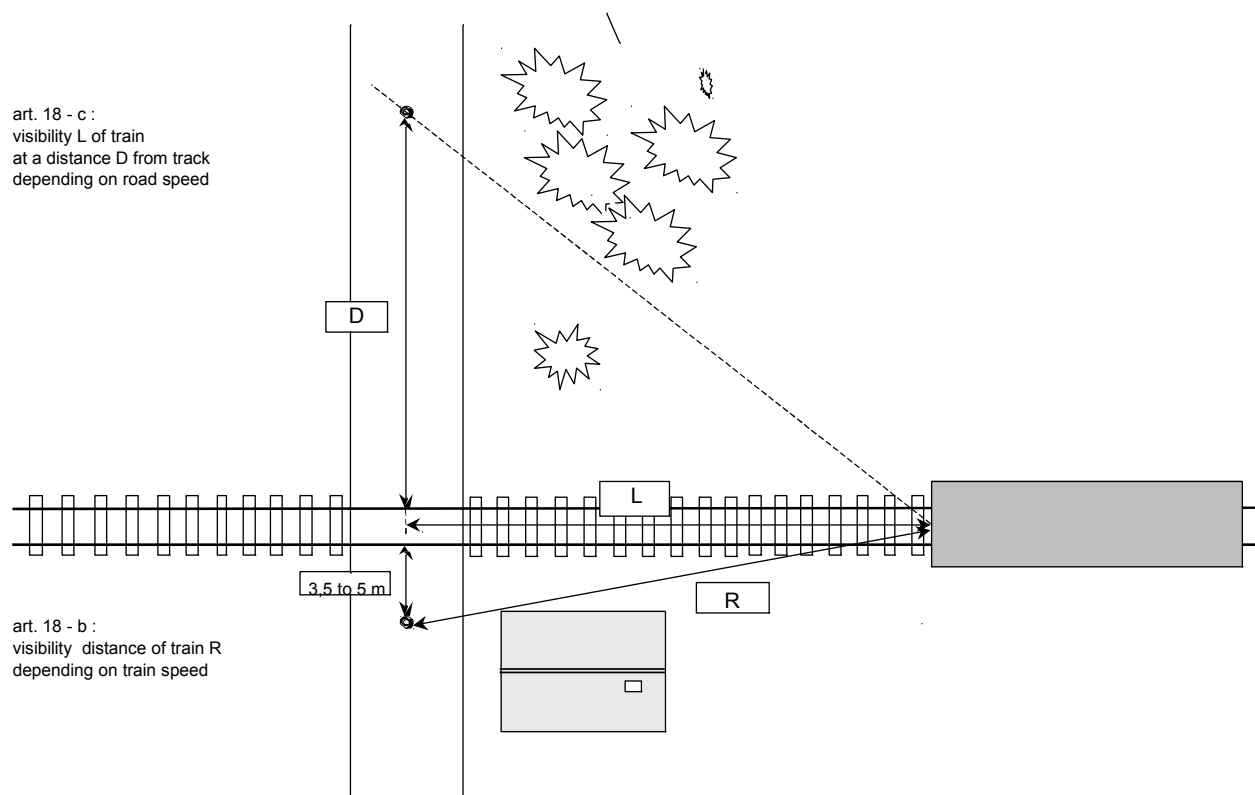
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11. If the two visibility conditions 18-b and 18-c are met :
 - Moment <3000: only St Andrew's cross
 - Moment > 3000: apply on of the devices cited in 9.
12. Calculate the LC crossing time by the train, single and return, and compare to the commercial journey time objectives (credibility of the journey length). If necessary, adapt the procedures chosen to reduce this length, respecting the legislation.

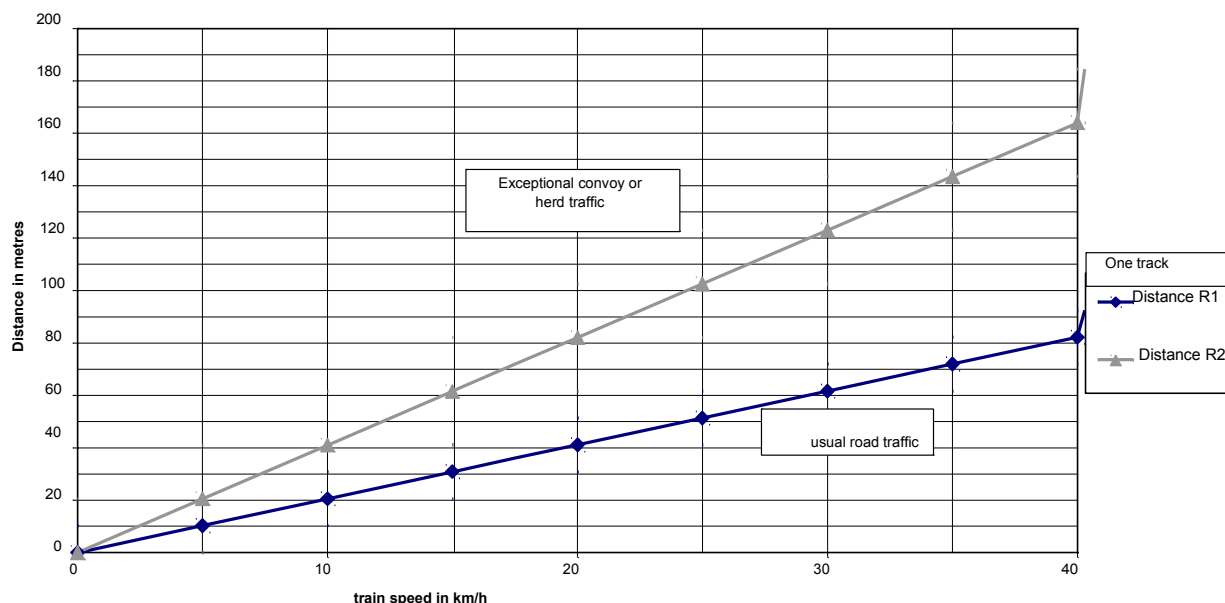
3.5 Rapid calculation of visibility distances :

Reminder : only for 2nd category LCs

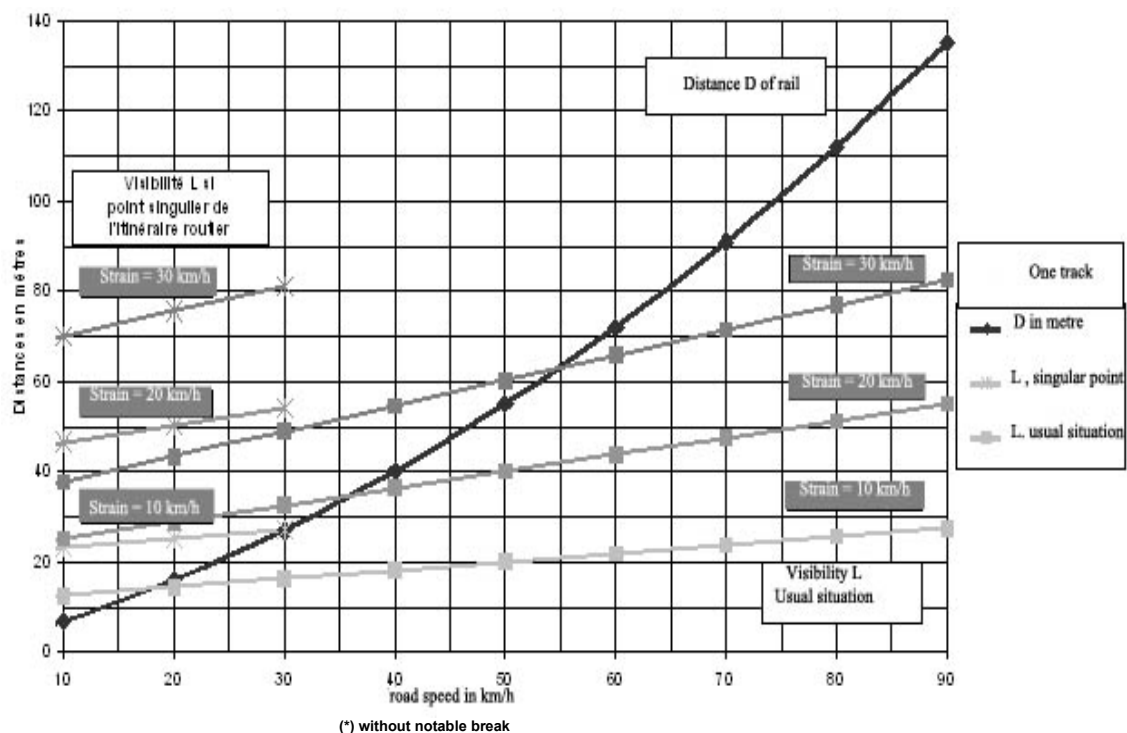
Distance measurement principle: a check must be made in the four quadrants of the LC It is the least favourable measurement that is used. Reduced speed can be required in one direction and not the other.



Art. 18 -b :
Visibility distance R between 3,5 and 5 metres from the closest rail of each side of the track



Art.18 -c :
Train Visibility L (*) at a distance D from the closest rail , of each side of the track



Note : Train speed can only be indicative taking into account the lack of precision of measurements and the provisions outlined in chapter 1.6.

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3.6 Example schemas for Level crossing signs :

(documents : source CETE of the East)

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Level crossing with barriers and guards

(art.34 of LI S.R and article 13 of the decree of 18.03.1991)		
Installation schema	Sign	Nomenclature
Non urban Urban Between 100 and 200 m Between 0 and 50 m	(1) (2) (2) (2)	- Barrier - Flashing red light R2 4 51° J10 (2) J10 (2) A7 J10 (2)
(1) Optional (generally reserved for important urban LC) (2) Optional in urban areas		

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Automatic audio and light signals, completed by 4 half-barriers

(Art.34 of I.I.S.R and article 9 of the decree of 18.03.1991)		
Installation schema	Sign	Nomenclature
Non urban Urban		Signal G2 : - Barrier - Audio signal - Flashing red light R24
	J10 (1)	
	J10 (1)	
	A7 M92	
	J10 (1)	
(1) optional in urban areas		

3- LEVEL CROSSING

Automatic audio and light signals, completed by 2 half-barriers

(Art. 34-1 of I.L.S.R and article 9 of the decree of 18-03-1991)		
Installation shema	Sign	Nomenclature
Non urban Urban 1/3 1/3 1/3 Between 100 and 200 m Between 0 and 50 m	Right hand side of the road Signal G2 : - Barrier - Audio signal - Flashing red light R24 Left hand side of the road - Flashing red light R24 A train can hide an other one from it SM (1) + M9z (1) (2) (2) (2) (2)	J10 (2) J10 (2) J10 (2) A7 M9z J10 (2)

(1) if multiple tracks
(2) optional in urban areas

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Automatic audio and light signals, without half-barriers

(art 34-2 of I.I.S.R. and art. 20 of the decree of 18/03/1991)

Installation schema	Sign	Nomenclature
Non urban Urban	Right hand side of the road : Signal G1 bis or Signal 1a bis if multiple tracks : - St Andrew cross - audio signal - Flashing red light R24 Left hand side of the road : - Flashing red light R24	Signal G1 bis Signal 1a bis St Andrew cross audio signal Flashing red light R24 Flashing red light R24 Barrier J10 (1) Barrier J10 (1) Warning sign A6 Barrier J10 (1)
Between 100 and 200 m Between 0 and 50 m	Barrier J10 (1) Barrier J10 (1) Warning sign A6 Barrier J10 (1)	Barrier J10 (1) Barrier J10 (1) Warning sign A6 Barrier J10 (1)
(1) Optional in urban areas		

Without barrier, with St Andrews cross (without obligation to stop)

(Art. 35-B of I.I.S.R. and article 18 of the decree of 18.03.1991)		
Installation schema	Sign	Nomenclature
Non urban Urban	 	Signal G1 or Signal G1a if multiple tracks - St Andrew cross J10 (1) J10 (1) A8 J10 (1)
Between 100 and 200 m Between 0 and 50 m		
(1) Markings optional but recommended at important LC		

(Art. 35-c of I.L.S.R and article 19 of the decree of 18-03-1991)		
Installation schema	Sign	Nomenclature
Non urban 1/3 Urban 1/3	(1)	Signal G1 - St Andrew cross AB 4 + STOP line markings (Art.114-4)
Between 100 and 200 m 1/3 Between 0 and 50 m 1/3	(2)	Signal J10 (2)
Between 100 and 200 m 1/3 Between 0 and 50 m 1/3	(2)	Signal J10 (2)
Between 100 and 200 m 1/3 Between 0 and 50 m 1/3	(2)	A8 M5 J10 (2)

Installation schema	Sign	Nomenclature
Non urban Between 100 and 200 m Urban Between 0 and 50 m	 	Flag or red light lantern Flashing red light R24 (1) J10 (2) J10 (2) A14 M92 J10 (2)
(1) optional (2) optional in urban areas		

With half barriers, on electrified track, if the height under catenary is under 6m

(Art.35-1-A of I.I.S.R)		
Installation schema	Sign	Nomenclature
non urban urban 1/3 1/3 1/3 Between 100 and 200 m Between 0 and 50 m (2) (2) (2) (2)	Right hand side of the road: Signal G2 - Barrier - Audio signal - Flashing red light R24 Left hand side of the road: - Flashing red light R24 Gantry G3 +B12 A train can hide another one from it (2) (2) (2) (2) (2) (2)	+ M92z (1) J10 (2) J10 (2) A7 M92z M92b B12 J10 (2)

(1) If multiple tracks
(2) optional in urban areas

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without barriers, on electrified track, if the height under catenary is under 6m

(Art 34-2 and 36)		
Installation schema	Sign	Nomenclature
Non urban Urban Between 100 and 200 m Between 0 and 50 m	Right hand side of the road: Signal G1 bis or Signal G1a bis if multiple tracks: - St Andrew cross - audio signal - flashing red light R24 Left hand side of the road: - flashing red light R24 - Gantry G3 + B12	Right hand side of the road: Signal G1 bis or Signal G1a bis if multiple tracks: - St Andrew cross - audio signal - flashing red light R24 Left hand side of the road: - flashing red light R24 - Gantry G3 + B12 J10 (1) J10 (1) A8 M9a M9b B12 J10 (1)
(1) Optional in urban areas		

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4.1 Definition of signals :

The OSR defines the nature of track signals likely to be encountered by train drivers.

4.2 Manoeuvre signals :

The OSR defines the nature and the usage day and night of signals designed to control the movement of trains: pull, push back, slow down, stop, push.

4.3 Hectometric marking :

The railway must have hectometric marking clearly visible from the track.

This provision can be ignored under the following conditions:

- the railway is situated next to or close to a road and accessible to emergency vehicles, and visible without break from there;
- the railway is less than 3km;

The number of structures and particular points of the network (LC, stations accessible by road) offers sufficient means of orientation easily identifiable by passengers and exterior emergency services. At least one of these must be visible and identifiable from any point on the line. Each of the structures or points is given a name or N°, displayed at each of its extremities if it is a viaduct or tunnel.

The orientation sign must not be obscured by the presence of a train at its height.
It corresponds to that figuring in the safety and intervention plan (EIP)

4.4 Speed limit :

Zones where speed is limited must be signalled by a sign measuring at least 250 mm x 250 mm on which the size of characters is at least 150 mm.

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4.5 Signalling of singular points :

The signs are placed at a distance from singular points resulting from the least favourable configuration for stopping the train (speed practised, convoy composition, track profile).

All level crossings must be signalled by permanent signs.

Work zones must be signalled by temporary signs.

In the event of night traffic these signs must be reflective.

4.6 Signal Visibility :

Sign visibility from the track must be constantly maintained: supports in good condition; clearance of vegetation.

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5 - ELECTRICAL TRACTION LINE

5.1. Definition of voltage class :

<i>Class of voltage :</i>	<i>Alternative current</i>	<i>Continuous Current</i>
TBT	$U < 50$ volts	$U < 120$ volts
BTA	$50 < U < 500$ volts	$120 < U < 750$ volts
BTB	$500 < U < 1000$ volts	$750 < U < 1500$ volts
HTA	$1000 < U < 50$ Kv	$1500 < U < 75$ Kv
HTB	$U > 50$ Kv	$U > 75$ Kv

For this chapter reference can be made to the ministerial decree of 17 May 2001 (JO of 12 June 2001) fixing the technical conditions that electrical energy distribution must meet.

5.2. Protection measures against direct contact :

On main line networks one of the following measures must be used for protection against direct contact:

- protection by distancing
- protection by obstacles
- protection by insulation

➤ Contact line :

Regulatory references (see aforementioned decree) :

- Art. 80. - Put out of reach (see conditions of exemption at article 85)
- Art. 15. - Put out of reach by obstacles.
- Art. 16. - Put out of reach by insulation.
- Art. 83. - Siding, garage or depot track
- Art. 85. - Traction installations established on an independent platform.
- Art. 13. - Mechanical resistance of structures

A special protection provision resulting from article 85 allows a line height of less than 6 metres on condition that a level crossing signal gateway is put in place when the contact line height is less than 6 metres. The height of the gateway is equal to the height of the line reduced by 1,00m if the voltage is more than 1500 V and 0,75 m in other cases (*art. 36 IISR*).



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5.3. Protection measures against indirect contact :

The protection against indirect contacts must be guaranteed for the mass and parts of aerial contact lines.

Return current :

Regulatory references (see aforementioned decree):

- Art. 88 bis. - Conductivity of rails
- Art. 90. -Nearby metallic structures
- Art. 91. - Conductivity of rails
- Art. 92. - Return Conductor.

Each sub station must be connected to the rails, to return conductors or to return contact rails by at least two cables. Each of these cables must be able on its own to absorb the maximum return current in the event of either of them being cut.

Rail ground voltage :

Depending on the place and time, the rail/ ground voltages provoke the appearance of contact voltage in the event of a fault or accessible voltage in normal functioning.

Regulatory references (see aforementioned decree) :

- Art. 88 ter. - Rail-ground voltage.

Accessible voltage must not exceed 60V. To determine the risk of dangerous contact or accessible voltages, the rail- ground voltage considered must be evaluated both under normal functioning and with fault from the voltage drop in the return conductor.

5.4. Premises and sites with particular shock risk (electrical posts, sub stations, engine...) :

The manager must identify these premises and work sites and mark them out clearly. They must be kept closed or under surveillance. Access must only be authorised for trained staff or persons placed under their surveillance. Very clear signs must be placed wherever necessary to warn the public of the danger of entering.

Regulatory references (see aforementioned decree) :

- Art. 5. - Special environments. §2

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6.1. Safety document templates :

6.1.1. Operational safety regulations (OSR) :

Objective :

This support is designed to assist with the establishment of Operational Safety Regulations particular to each network, conforming to the contents defined by the ministerial decree of 8 December 2003, relating to the content of safety files of guided public transport systems for tourism or historical purposes.

The detailed content of the OSR can be adapted case-by-case depending on the nature of the network and consistence of its operation.

The parts of the text in letters must be the basic provisions.

The parts in *italics must be completed as fully as possible*. Adaptations and additions can be made as necessary. Unnecessary sections are entitled "non applicable"

The OSR must have a reference (date or indication) allowing the identification of the version in force.

For existing OSR that are being revised, a thorough check of the points treated must be undertaken without necessarily respecting the order of presentation below.

* * *

Content :

1. Object of the operation :

Tourist railway operation, on;(line/ place/ Pk), on the territory of the local council

2. General points :

2.1 Object :

The present Operational Safety Regulations define the general provisions guaranteeing the safety of users, staff and third parties, and anticipate the risk of accident or incidents, during operation of the line.

These general provisions can, when necessary, be completed by particular safety procedures applicable by agents responsible for safety.

Line operation includes tasks relating to preparation, setting in motion and circulation of trains, on principal lines, stations and depots, as well as maintenance operations on railway installations and rolling stock.

The present regulations do not deal with the safety of people undertaking commercial duties or system maintenance, except rail protection measures.

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2.2 Operations safety :

The following provisions aims to anticipate the risks relating to :

- train circulation, in particular :
 - the meeting of two trains running in opposite directions on the same track (nose to nose) ;
 - trains catching up with another train running on the same track ;
 - the meeting of two trains running on two tracks that meet (glancing collision);
 - train derailment ;
 - train collision against an obstacle, particularly at a level crossing ;
 - the failure of a critical part of the infrastructure or rolling stock; for whatever reasons ;
 - events likely to be made worse by the fact that they take place on railways (fire, explosion, pollution...) ;
 - at particular points of the network (tunnels, engineering structures, ramps, ravines...)
 - *poorly timed co-circulation of trains and rail bikes ;*
 - *other railway risks particular to the system configuration identified by the experience feedback or as preventative measure.*
- the movement and behaviour of people concerned :
 - passengers or users, provoked particularly when boarding or descending from trains, or during their presence on trains or their access to rights-of-way, particularly when crossing rails or at level crossings.
 - staff, from railway operation with reception of public *[and from electrical risk]*, during movement and work on rights-of-way;
 - third parties, from railway operation *[and from electrical risks]*.
- the exterior environment of the railway system and its rights-of-way :
 - natural risks : subsidence, bad weather, floods, storms, land slides, tree falls,...
 - industrial risks : classified installations, « SEVESO » perimeter
 - caused by third parties : fall or penetration of vehicle on track, fouling of gauge through malice, vandalism , ...

The operator maintains up to date a list of the identified risks on the network.

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3. Organisation and staff :

Staff occupying safety posts must not leave their post without being replaced, or if they do, without having taken necessary safety measures.

- **Detailed description of the duties of staff responsible for safety:** *operation or line manager, stationmaster, ticket inspector, driver, mechanic, driver's assistant, brakeman, guard....*
- **Means of identification of staff by passengers.**
- **Staff training and accreditation** *training rules, courses, certificates and exams, regular check ups, medical examinations (such as public transport licence or equivalent Work Doctor medical visit, mandatory visit on the NRN in the event of part of the circulation on the National Rail network open to commercial traffic), measures for the prevention of alcoholism and driving under the influence of substances liable to alter behaviour and vigilance....*
- **Documentation relating to safety made available to them :** *mandatory operating rules and procedures written and validated by the operator.*

4. Train circulation :

4.1 Train preparation :

Checks undertaken at the start of each operating day:

- *Coupling devices of train carriages; necessary pneumatic and electrical ducts; braking equipment (depending on weight and braking rules for the train);*
- *Functioning of brakes, clamping and unclamping before leaving the testing area; after the modification of train composition and before restarting;*
- *Signs at ends of train;*
- *Train staff present;*

4.2 Normal circulation :

- **General circulation instructions :** *basic driving rules, line-opening rules (1st circulation or restarting operations).*
 - *Position of driver in relation to the direction of train under normal passenger service; organisation of driving in the event of train switch back.*
 - *Means of contact with the driver under normal conditions; with the train staff; with staff not aboard;*
 - *Driver's responsibilities and obligations during train driving, under normal conditions; in the event of an incident;*

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- **Circulation regimes:** *methods used to anticipate collision risks, respect hours and instructions in the event of delays, meeting, evasion: characterisation of meeting points, methods of meeting....*
- **Composition and nomination of trains:** *a document must detail the type of rolling stock (automotive, pulled; number of carriages, description and order of cars making up the train; if necessary: numbering, priority, direction of circulation...*
- **Method of service transfer:** *between agents with safety duties (dispatch, register)*
- **Indicative maximum circulation speed.**
- **Passenger information** (of a non tourist nature): *method of information, nature of instructions.*
- **Train occupancy:** *a document in annex must detail the passenger capacity of each car and any eventual tolerance allowed; number of accompanying persons,*
- **Stations and stopping points on the line:** *train access conditions (tickets, platform, complete stop of train), functioning and control of door closure, train departure and arrival procedures, instructions for staff in the event of persons present on the track...*
- **Sectors of route presenting configurations which can worsen the situation in the event of an incident :** *Particular measures, information to passengers, staff training and sensitisation,...*

4.3 Circulation disturbances :

Behaviour in deteriorated circulation conditions (description, functioning, precautions to be taken):

- *Procedure to be followed by the driver when the train can no longer run: means to put in place to assist it;*
- *Conditions and authorisation for restarting of train;*
- *Rules to be observed by the staff, to enable continued circulation, in the event of incidents affecting signals or linked to train composition in particular, conditions of brake isolation of one or more carriages;*
- *Driving behaviour in the presence of a track obstacle.*

4.4 Particular circulations :

- **Circulation in convoy :** *distance between two carriages communication between carriages...*
- **Exceptional circulations** (ex: at night) : *train signals, communication, role of line manager, speed...*
- **Circulations of tourist and freight trains on the same line**
- **Circulations of trains and rail bikes on the same line**
- **Service circulations**

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5. Treatment of serious accidents or incidents on the line :

5.1 Informing of the competent authorities :

The operations manager or his designated replacement will inform STRMTG under the following conditions, depending on their assessment of the seriousness of the event.

Seriousness of the event :

Categories of noteworthy events	Characterisation
1- Major event : (catastrophic)	Event leading to several deaths and/or serious injuries and/ or important material damage. This type of event is exceptional. It requires the launching of the EIP and important rescue and evacuation procedures. In general the operations are stopped for a significant length of time. There are, among other things, important media repercussions.
2- Serious event : (critical)	Event leading to one death and/ or one serious injury and/ or several light injuries (at least 5) which can be accompanied by significant material damage. It requires the launching of the EIP for rescue of victims. It is characterised by a momentary halt in operations and can have significant media impact.
3 – Less serious accident or incident : (marginal)	Event leading to light injuries, caused by a system malfunction, at a technical (ex. equipment failure...) as well as an operational level (ex. human error...). The EIP may be activated. The functioning of the system or its environment may be impacted. It can have media repercussions at a local level.
4 - Almost accident : (Precursor of danger)	Event with insignificant consequences (no injuries, little or no damage) but the nature of the incident revealed that there could be significant consequences and/ or damage. An evacuation of passengers is however possible.

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Method of informing the authorities :

Category	Immediate information by telephone or FAX	Written declaration by fax or letter	Detailed report by letter or e-mail
1- Major event :	Inform without delay , whatever the time	Letter to Prefect and STRMTG the same day	Letter within 2 months
2- Serious event :	Inform without delay , whatever the time	Letter to Prefect and STRMTG the same day	Letter within 2 months
3 – Less serious accident or incident :	Inform the same day except in the event of media interest.	Letter to STRMTG within 2 or 4 days	Letter within 2 months if required by STRMTG
4 - Almost accident :	No immediate informing except if media interest	Letter to STRMTG within 2 or 4 days	Letter within 2 months if required by STRMTG

5.2 Protective measures taken on the exploitation :

- *First emergency measures to be taken by on-board strain staff where the accident took place.*
- *Provisions to be taken on the rest of the operation to avoid an additional accident*
- *Means of information and instructions to be passed to other trains*

5.3 Recording of measures taken :

Provisions taken to record the measures taken to allow for the feedback of experience when an accident or serious incident takes place.

6. Joints and switches :

- **Signals on the rolling stock and line :**
 - *Description of signage: type of signs, positioning on the line*
 - *Significance of each signal: Staff behaviour in relation to the signage*
- **Functioning of track equipment:** *tapered or not switches, installation plan*
- **Manoeuvre of track equipment:** *who manoeuvres them? Precautions taken?*
- **Instructions for crossing of track equipment:** *speed, driving on view...*
- **Normal track equipment regime:** *padlocked, free...*

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7. Level crossing :

- LC classification on the line.
- Description of signage and crossing instructions for each LC.
- Instructions in the event of malfunctioning (*from railway and road viewpoints*).

8. Manoeuvres :

- Space for manoeuvres.
- Instructions for the realisation of manoeuvres: *necessary agents, duty, positioning, precautions to be taken...*

9. Work :

- General organisation of work (scheduling, information, signage, presence of staff on the worksites).
- Circulation of work trains:
- Instructions for crossing a work zone:

10. Upkeep and maintenance :

- Nature, content and regularity of rolling stock upkeep and maintenance operations.
- Keeping of rolling stock maintenance register.
- Keeping of engineering structure, L.C. and zones at risk surveillance register.

11. Follow up of operation :

- Operation registers : *explain which are kept for the follow up of rolling stock, route and activity.*

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6.1.2. Operation Passenger Regulations (OPR) :

Objective :

The operator must have Operation Passenger Regulations (OPR) the contents of which are defined in annex 6 by the decree of 8 December 2003, relating to the content of safety files of guided public transport systems for tourism or historical purposes.

It takes into account the particularities of the network and operating conditions. It can be common for rail bike operations when combined circulations are organised.

The parts of the text in normal characters are the basic provisions; adaptations or complements can be made, if necessary. The parts in *italics must be completed as fully as possible*.

The OPR must have a reference (date or indication) allowing the identification of the version in force.

The public must be easily informed of the rules before train departure. A designation usual in relation to the public can be adopted.

Content :

Object of regulations :

Safety rules to be observed by users (passengers or clients) of the network (network name....).

1 - Means of informing users :

The operator must detail the means of informing users (staff concerned, vocal messages, poster, place of display...).

2 - User admissions conditions :

Conditions to be respected before boarding the train;

Conditions of public reception requiring supervision by a responsible person independent from the operating staff (children, groups, handicapped persons,...) ;

3 - Conditions for loads and diverse objects :

(to be written if necessary, animals included);

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4 - Rules to be respected in stations :

Eventual practical information (behaviour in relation to children, approach of material, zones to be respected);

5 - Rules to be respected during the train operation :

Behaviour on the line in relation to manoeuvres in the event of halts; non-accessible zones; driving behaviour when approaching signalled zones (viaducts, tunnels,...)

Behaviour in the interior of the train (stay calm, do not lean out of windows, do not stand on steps or intercommunications,..)

Surveillance of children:

Precautions to be taken in relation to personal objects.

6 - Other rules destined for users :

Considerations linked to the respect of the environment and others; Diverse information on track (particularly hectometric markings).

7 - Means of alert in the event of accident :

Through displayed information: how to give the alert; who to contact and details on location of incident; driving behaviour to be respected.

8 - Display of present regulations and instructions :

The complete OPR is displayed in the station;
Instructions useful for circulation and means of information are displayed in the station, on board the train, on the platforms and possibly on tickets.

6.1.3. Emergency intervention plan (EIP) :

Objective :

The EIP is designed to detail the organisation and methods put in place by the operations manager, or his designated replacement, to:

- 1) Inform the emergency services, as quickly as possible, of any accident or incident, likely to put the passengers at risk, during the operation of the system;
- 2) Allow the rescue victims, in a time frame adapted to the seriousness of the event, at any point of the line.
- 3) Allow the safe evacuation of passengers.

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4) Define meeting points for the emergency services.

The operations manager or his designated replacement calls on exterior emergency services depending on the seriousness of the event using the criteria outlined in the OSR.

The present document must be elaborated with the emergency services and communicated to them.

The EIP must have a reference (date or indication) allowing the identification of the version in force.

Content :

1- Short reminder of the operation objectives :

- Type of rolling stock;
- Traction energy: diesel, electric, steam;
- Network particularities: level crossings, bridges, viaducts, tunnels, natural or industrial risks;
- Length of line and designation of extremities;
- Plan of structures or remarkable points situated on the line (stations, level crossings, bridges, viaducts, tunnels, zones exposed to natural or industrial risks).

2- Roles and responsibilities of operating staff :

- Identification of different persons responsible for the management of rescue and their roles.
- Internal organisation for the management of rescue operations.

3- Methods likely to be mobilised and made available :

- Means of communication made available to passengers, driver, accompanying staff: functioning, position, maintenance.
- Means made available to allow emergency service access depending on the site of the serious accident or incident.
- Means made available to assist the work of the emergency services on the site of the serious accident or incident.
- Location of general safety equipment necessary for the emergency services (emergency electrical points, water points).

4- Methods to alert exterior emergency services :

- Means and methods of communication to alert emergency services.
- Content of information to be supplied to emergency services.
- Means and methods for informing the Prefect.

5- Access of emergency services to the installation :

- Plan of line and road infrastructure showing potential access points from the road network (example: IGN map at 1/25000th).

6- List of services and/or people to whom the Emergency intervention plan is addressed.

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6.2. General points :

6.2.1. Description of staff safety duties

The operator precisely defines the safety role of each staff member. These definitions are noted in the OSR. As an indication, the following attributions can be made for usual duties. These attributions can vary according to the network, but we must find all the safety duties described below.

1. Organisational duties :

- Operations manager :

The designation of an operations manager is mandatory.

They are unique and have a permanent role.

They are the contact for the control services.

They manage all the operational staff and direct staff training.

They maintain up to date the list of risks identified on the network and present them during training sessions.

- Infrastructure manager :

They are in charge of track maintenance. They schedule interventions, regularly check the observations made on the track and noted in the circulation register and undertakes regular inspections for faults. They maintain the register of track maintenance, up to date.

- Rolling stock manager :

They are in charge of rolling stock maintenance. They regularly check the observations relating to the rolling stock and noted in the circulation register or log books. They insure the removal from service of rolling stock and the scheduling of interventions. They maintain the maintenance manuals for each vehicle, up to date.

2. Operational duties :

- Line manager :

They are responsible for the line and the operating staff for a determined length of time. During this period, they manage the train schedules and all movements, management of train composition, put in place circulation, enforce the Operation Safety Regulations and manage the eventual rescue operations. They ensure the correct use of the transport system and the discipline of the staff under their authority.

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- Stationmaster :

Under the authority of the operations manager, they are responsible for the general station safety, relating to the public as well as manoeuvres that are undertaken. They authorise the departure of trains.

- Train manager :

Under the authority of the operations manager, the train manager is in charge of certain safety operations on the line. They also ensure the safety of movements at unmanned (no station master) stations or stops. They can stop the train if circumstances require.

- Mechanic or driver :

Whatever the locomotive, they are responsible for the train running and the respect of signals and operational instructions. The mechanics must observe, under ordinary regulatory conditions, hand or sound signals that may be addressed to them, in addition to the fixed or mobile signals in the field. He must also oversee the track and train.

- Driver :

Under the authority of the mechanic, other than his duties linked to the train running, the driver assists the mechanic. He can participate in manoeuvres at stations and the observation of track and train, during train operation.

- Manoeuvring agent :

Under the authority of the stationmaster, this agent is responsible for guiding manoeuvres, to intervene on track equipment, to undertake coupling and uncoupling of vehicles, to ensure the itinerary of manoeuvres and apply the corresponding safety measures. They ensure the immobilisation of trains at the station. Under the authority of the line manager or train manger, they can undertake level crossing guarding and closure.

- Brakeman :

Under the authority of the mechanic, this agent is responsible for using the brakes to stop the vehicle at the station or on the line on the demand of the latter or directly in an absolute emergency.

- Guard :

Agent who ensures the rear protection of the train in the event of an accidental stop on line.

3. Accumulation of safety duties :

When safety duties accumulate, the operator must take into consideration the capacity of the staff concerned to assume these duties without compromising safety, in terms of their skills and experience.

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In particular :

- a train manger is necessary when the driver cannot undertake both the driving of the train and maintain a vision of all the passengers while having a permanent means of communication with them;
- in the event of multiple circulations on a line, the presence of a dedicated line manager without accumulation of duties is indispensable. However, the accumulation of functions of train and line manager is possible if the person has the skills and material means.

6.2.2. Organisational chart :

An organisational chart must figure in the Operation Safety Regulations and show all safety duties. When this chart specifies names, it is placed in annex to the OSR.

During each day of operation, a person must be assigned to each safety function dedicated to train circulation. Several safety duties can be filled by one person

6.2.3. Training and accreditation of safety personnel :

1. Qualification of personnel :

The qualifications of staff exercising safety duties meets the following requirements, which requires that the operator:

- calls on people with the physical and professional skills necessary;
- establishes a document describing the basic training by post, according to a predefined method and program;
- have a training plan and recycle "occasional" agents from the voluntary sector and seasonal workers;
- make known to staff the regulations, notices, instructions and diverse orders, relating to the operational safety;
- authorize staff to exercise safety duties and have proof of their qualifications;
- anticipate accident risks through staff sensitisation about dangerous situations and to identify risks on the network through the setting up of a provision for Experience feedback ;

In addition the operator must put in place individual staff follow up.

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2. Physical and professional aptitude :

Drivers/ mechanics must undertake a medical examination corresponding to the nature of the duties they are called on to carry out. An aptitude file is delivered to each agent and given to the operator.

Staff must pass the following medical examinations:

- employees: professional medical visit
- volunteer drivers of standard and metric track networks: medical visit at the level of that of "heavy goods" (C) driving licence, or "Public transport" (D), or medical visit for NRN;
- volunteer drivers on narrow gauge network: valid drivers licence, or failing that an attestation from their doctor.

The validity of medical visits for voluntary drivers is 5 years, reduced to 2 years for persons aged between 60 and 76 and one year above that.

3. Staff training :

The knowledge of agents must relate to the following fields :

- principles of system functioning and safety mechanisms;
- roles of different agents responsible for safety duties;
- knowledge of railway risks, sensitisation to dangerous situations and identified risks on the network;
- Operation Safety Regulations (OSR):
- Operation Passenger Regulations (OPR):
- railway signals and communication systems used; specific knowledge needed for
- the tasks given to the agent; emergency intervention methods (EIP).

The operator sets up and puts in place basic training for each safety duty including at least:

- one theoretical training relating to the operation safety documentation; the safety procedures; provisions specific to the tasks to be undertaken;
- practical training in the form of an accompaniment in real service conditions by an experienced agent (double execution of tasks).

For driving staff, the operator defines, according to an adapted timetable, the steps of progression of responsibility until the independence of the agent.

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Regular verification or revision of knowledge is organised by the operator, paying particular attention to seasonal workers and occasional agents, before their return to work.

The operator chooses agent trainers.

If it is a new network, the training of personal can be done by companioning from operators of existing networks of a similar nature and for which the experience is recognised as sufficient.

4. Accreditation of personnel and proof of qualifications

The operator must authorize personnel for the safety duties on which he has been trained. This authorisation takes the form of a certificate of capacity delivered by the operator to the agent.

The certificate is signed by the operations manager. It can be collective. This operation must be repeated at each update. The operator must be able to produce these certificates on request from the service in charge of control.

The age required for the exercise of safety duties is the majority, 18 years. Minors from 16 can exercise certain duties, except for train driving and supervision duties, on the condition that parental authorisation has been given and the insurance policy of the operation covers the participation of minors in the exercise of safety duties.

Continuous attention by the operator on the skills, practice and seriousness of the agents will enable them to decide if their behaviour is in line with system safety requirements.

The certificate has no limit in time. In the event of shortfall, serious fault or negligence directly threatening the safety of the public or staff, the certificate can be suspended or removed.

The authorisation of occasional agents must be subject to particular attention by the operations manager

5. Measures to prevent dangerous behaviour

The operator must prohibit the exercise of safety duties for any agent whose alcohol level is at superior to 0,5 gr by litre of blood, or 2,0 gr/l when the ability to drive public transport vehicles is required. Moreover, the consumption of alcohol during the operation is totally prohibited. In order to anticipate all risk of creating a dangerous situation, the operator can demand that an agent takes an alcohol test.

Access to the network must be prohibited to any personnel in a clear state of drunkenness. The exercise of safety duties, in particular the driving of trains, under the influence of substances such as drugs, narcotics or therapeutic substances with

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a psychoactive effect is also prohibited and can be subject to a medical check ordered by the operator.

An agent holding safety duties must inform the operator when taking treatment likely to alter their vigilance.

The operator adapts the safety duties taking into account the eventual stress the agent is under, particularly after an accident or all other personnel event likely to disturb his attention.

6. Sensitisation of personnel to dangerous situations :

Agents must be prepared to manage emergency situations and apply rare procedures through regular safety practice in situations defined by the operations manager in view of the dangerous situation or risks identified on the network.

In addition, the practice of rescue exercises on a train in distress in intervention coordinated with the emergency services, is recommended. The theme is chosen in coordination with the emergency services and the Prefect is kept informed.

7. Setting up of experience feedback :

In order to anticipate future events, each event affecting safety or each dangerous situation during operation must be the subject of a discussion comprising, with the operations manager, the personnel concerned either individually or collectively. The experience feedback can take the form of a verbal or written reminder of the safety instructions or can lead to a modification of these instructions.

6.2.4. Principal of traceability :

The principal of traceability of the activity linked to the exploitation must be integrated into its organisation. This means that all significant actions, such as train movements, abnormal events or malfunctioning noticed on the different parts of the system, and maintenance, must be recorded in registers envisaged for this.

The date, place if necessary, and the name of the person making the observation must accompany these records.

They must allow the identification of all elements necessary to ensure the correct operation of the system and prevent any future malfunctioning. The operations manager checks these registers and follows up the observations recorded.

These documents can be demanded by the authority in charge of controlling the operation.

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6.3.Organisation of circulations :

Whatever the operating regime, the simultaneous circulation of two trains in the opposite direction on the same section of line not allowing for train meeting is prohibited.

In the event of circulation in opposite directions, the first to arrive at a meeting point must wait for the other.

6.3.1. Definitions of train operation :

Circulation on the line :

Movement of a train aimed at undertaking a mission using the full or partial route of the line. The mission can be public transport: presence of passengers holding tickets on the train, service or work: only operation personnel are on the train.

"Light running" circulation :

All circulation empty of passengers without any mission other than testing, the set up or removal of the train itself.

Manoeuvre :

Occasional movement, or movement in a station, depot or stopping point, linked to the preparation or the implementation of circulations on line. The conditions for the execution of manoeuvres are defined by the OSR.

Backing up :

Inversion of train direction without returning the locomotive to the head of the train. Backing up must be piloted by an agent placed at the head of the convoy and with the ability to stop the train.

Visual running :

Visual running requires the driver to drive prudently, by regulating their speed taking into account the portion of the track that they see in front of them, in such away as to be able to stop before the rear of another train, stop signal or obstacle, without exceeding the speed of 30km/h.

This regime also applies to manoeuvres.

Cautious running :

Occasional instruction for which the reason is indicted to the driver. The driver must advance cautiously on the portion of track concerned by adapting his speed depending on the motive indicated.

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6.3.2. Train spacing :

1. Normal running as shuttle :

Engagement of one train at a time, circulating as shuttle on the same section of line. Only signals and instructions or procedures linked to the track are observed by the driver.

A second departure can only be made after having obtained confirmation of garaging and immobilisation of the first train at a protected passing point (the position of the switches having been checked).

2. Normal running as shuttle :

Engagement of several trains circulating in the same direction on the same section of the line. Meeting is prohibited.

The movement of the following train is conditional on the respect of a time delay determined by the sum of the following times:

- time necessary for the stopping of the following train in the least favourable conditions;
- time necessary for the protection of the previous train in the event of it unexpectedly stopping;
- safety margin determined by the operator and recorded in the OSR.

If the first train is delayed and exceeds a time defined by the OSR (depending on speed and departure time delay), the train is stopped and protection ensured to allow a redefinition of the time delay.

The pertinence of these parameters must be justified with regards to operational safety.

3. Succession or tandem running :

Engagement of several trains circulating in the same direction on the same section of the line. The driver of the following train respects a time delay separating them from the previous train, allowing the stopping of the train in the least favourable conditions.

This method necessarily supposes that the following train driver is in permanent visual contact with the previous train, either in radio contact with its driver or an agent on the train and that the speed does not exceed 20km/h. It is not adapted for networks with numerous LC, frequent non-visibility zones or steep gradients.

Any loss of these two conditions leads to the immediate adoption of cautious running by the following train.

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Any degradation in the braking of the following train leads to the proportional adaptation of time delays.

The pertinence of these parameters must be justified with regards to operational safety.

4. Block system :

Engagement of several trains circulating in the same or opposite direction on the same section of the line, this line is divided into zones of circulation called blocks.

The train driver may not enter a block unless he is sure that it is free and will remain so.

Authorisation may take diverse forms, which may be redundant: signals, verbal order from line manager, circulation diagram, pilot baton, freeing of block seen by each driver.

In the absence of authorisation or explicit instruction, the driver must respect the limit of the block.

6.3.3. Train meeting :

Train meeting rests on superfluous information or decisions to overcome any human errors.

Train meeting is scheduled in advance according to a procedure described in the OSR (timetable documents, specific written order by line manager, pilot baton...)

For example: a circulation diagram is established by the line manager and mentions the stops and eventual meeting points of trains. This document is given to train managers and mechanics. During stops, each train manager checks if there should be meeting and applies the corresponding procedures described in the OSR.

The driver may not leave the meeting station until after the complete freeing of the track by the train to be met or, in absence a written order or dispatch, from the line manager to the train manager, advising of the deferment of the meeting to another station or the cancellation of the train to be met.

The authorisation to depart cannot be delivered until all the checks defined in the OSR have been made.

The OSR must also mention the conditions for the restart of the train when the planned meeting has not taken place.

6.3.4. Scheduling of circulations :

The scheduling of circulations is subject to a timetable determined for a defined period. This is accessible to the public. The timetable can be adapted in terms of the availability of personnel, material, track condition or any other unanticipated event.

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The operations manager decides the organisation of circulation respecting the Operation Safety Regulations. They are obliged to pay particular attention to the safety conditions in which they organise any exceptional missions the nature of which is specified in the OSR.

Unexpected modifications in the train running table, except when justified by safety imperatives or availability of material, are forbidden

Organisation of service :

When the operation involves the organisation of simultaneous circulation by several trains and meeting on line, the traffic regulation duties must be separated from commercial activity.

In addition, the post of regulator or line manager must allow them to remain concentrated, in particular in relation to the ticketing and commercial counter. In the event of heavy or exceptional circulation, access to the regulation room must be restricted.

Above all, the personnel must be aware of the instructions applicable for the day in consideration. The operations manager or line manager writes these instructions on the notice board intended for this, or distributes them in writing to each person in the event of multiple circulations.

These instructions are displayed in full view and accessible to the personnel or given to them in writing.

They relate to:

- Assignment of personnel
- Train schedules and, if necessary, their composition
- Circulation of exceptional services
- Events on the line such as speed reductions, work zones affecting the safety of the operation.
- Any particular information or instruction to be known before starting service.

The forms of service renewal must be defined when agents are called away during operation.

Therefore, the transmission of instructions at service changeover must be subject to a strict formalisation to avoid any misunderstanding or oversight.

Timetable changes in the operating day, must be communicated to all personnel under the responsibility of the line manager.

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6.3.5. Departure procedure :

The departure procedure for a publicly operated train must be repeated completely for each mission and after each new link up or train modification.

It includes at least and in the following order:

- a check on the coupling device and brake pipe if there is one ;
- a brake test adapted to the conditions of circulation of the train (first departure, modification of train composition, return to train head of the locomotive, confinement of a carriage (see 1.1.3) ;
- the check by the train manager of the presence of all train staff ;
- an audible pre-announce of departure for passengers with, if necessary, reminder of safety instructions ;
- a systematic check of the closure of all doors or other devices, intercommunications;
- a global check on passenger behaviour;
- a visual check of the clearance of track and signals, if they exist ;
- if necessary, closing of the level crossing next to the station ;
- a visual or audio departure command given at the tail or head of the train following the procedure defined in the OSR ;
- movement of the train ;
- permanent surveillance of the carriages on the platform side by a train agent until they have completely left the station ;

The departure procedure is fully described in the OSR.

The person responsible for the departure is freely able to interrupt the procedure for a motive they judge appropriate.

Information and surveillance of public at the station, during departure :

The operator ensures that :

In the station :

- the safety instructions are displayed as indicated in the Operation Passenger Regulations (OPR) – article dedicated to «displaying of present regulations and instructions» ;
- the safety instructions are understandable to customers by adapting the information medium and diffusion (*for example* : personnel available, relevant extracts of OPR in several languages, pictogram or signage,...) ;

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- the admission conditions and particularly the supervision of the public will be respected as indicates the Operation passenger rules (OPR), - article dedicated to «user admission conditions» ;

Before departure and during the departure procedure :

- the safety instructions are reiterated by the operator if they judge it necessary;
- a visit of the carriages is undertaken to given any eventual complementary explanations or discover any abnormal behaviour ;
- in the case of children, the responsibility of the parents of supervisors is pointed out;

All these measures are to be linked to the train composition and corresponding risks.

For example, when trains have open carriages, it could be useful to speak with people responsible for children, particularly in groups, to explain the rules. The creation of fun supports (colour codes), to sensitise them, could be anticipated.

These provisions are very important during busy periods.

6.3.6. Control during train running :

The train personnel pay regular attention to the normal behaviour of passengers. This surveillance is attributed by name to one or two agents on the train and must be appropriate to the context of the exploitation, as much in terms of risks as for crowds.

For this, personnel in charge of surveillance must be available, by avoiding wherever possible the accumulation of functions, particularly when this interferes with the function of tourist presentations.

Good visibility of the whole train, either through the ability to circulate throughout the train, or through good "transparency" of the train (by the exterior or through the train), is essential to ensure this surveillance.

If necessary, a reminder of safety rules or intervention to stop any behaviour judged dangerous for passenger safety, in particular: gesticulations, commotion, people hanging out of the train or passing a part of the body out of the train such as for photographs, individuals present on the steps or in intercommunications closed to the public.

A heightened surveillance is put in place at singular points on the line such as certain narrow structures or all other sensitive zone, or even during a stop on the line.

If necessary, the rules are repeated by announcement in the train. Responsible personnel must stays close to the emergency stop button when approaching and crossing these singular points.

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An individual call to order may sometimes be necessary; even stopping of the train with the restart conditional on the calming of the passenger or passengers concerned.

The train personnel must not themselves behave dangerously. In general, they pay attention to the respect of the Operational Passenger and Safety Regulations and respect them themselves.

6.3.7. Arrival at the station :

During station arrival, if the stop is missed (too short or too long), the mechanic must immobilise their convoy. They may not restart running to advance or reverse their train until having received the reassurance of the train manager that no passenger is getting off or on the train.

Beforehand, the train manager must have advised the passengers of the intention to manoeuvre and guarantee their safety.

6.3.8. Reception and safety of persons with reduced mobility (PRM) :

The regulations in place do not anticipate any obligation on tourist railways to modify either fixed installations (platforms, stations) or rolling stock to for PRM.

However, when reception of these persons is proposed, the operator is obliged to ensure their safety at all points of the network :

- boarding and descending the train, by adopting devices allowing the easy and safe transfer of these persons between the platform and carriages ;
- during running, by providing wheelchair spaces that do not block circulation in the carriages; guardrails or handrails placed at an adapted height made available to people who wish to use it.

The operation personnel must know how many PRM are aboard the train and must be able to help these people.

If necessary, train personnel assist these people first in the event of an evacuation. In an emergency, carrying can be exceptionally accepted.

6.3.9. Means of communication :

The use of communication methods at distance, radio or telephone, is mandatory. The system chosen must be compatible with the length of the network and the presence of "grey zones" masking communication on certain parts of the network, the objective is the largest coverage possible.

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This coverage is indispensable in all stations and stops, at meeting points as well as tunnel entrances.

The communication methods used must be at least be available and active during the whole operation time, with the line manager, at the departure station and on each train on the line. These means are not mandatory for visual movements in the station or depot.

They must allow for:

- the alerting of the operation emergency services;
- the alerting of external emergency services.
- the alerting of operations manager or line manager, or station to all critical event affecting the safety of trains and public;
- the confirming of manoeuvres.

With a view to ensuring the redundancy noted in 6.3.3, the use of the radio or telephone as unique means of regulating circulations in opposing directions is not sufficient. It can however be used to back up the system used.

In good time before each departure or start of service, the holder of a communication device must ensure that its battery is sufficiently charged.

The call channel N° must be displayed at each of the points where communication takes place: in particular, stations, train driver cabins. On mobile telephones, the pre- registering of useful numbers, such as stations, the operations manager or line manager and that of emergency services is recommended.

6.3.10. Traceability of circulations :

Each line movement is subject to written record. The register can be common for all circulation, and be maintained up to date either by the operations manager or line manager, or on board each train and maintained by the train manager or mechanic. The recording of station or depot manoeuvres is optional.

The maintaining of a circulation register is necessary when there are multiple circulations and the organisation is the responsibility of the line manager. In other situations, the information is at least recorded in a train logbook or on the circulation or work schedule.

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The following information regarding the mission undertaken should be recorded :

- Date;
- Public transport mission: regular / special / supplementary
- Service circulation: tests /work / HLP / rescue
- Destination ;
- Hour expected: Departure: Arrival:
- Hour maintained: Departure: Arrival:
- Intermediary station stops or halts (if necessary);
- Personnel: train manager, driver or mechanic, train agents;
- Train composition: traction and towing;
- Observations / anomalies noticed, mechanical or circulation incidents (rolling stock, track, passengers, external environment);
- Repairs required.

6.3.11. Dispatches notebook :

The maintenance of a dispatches notebook, containing all instructions exchanged during operation is optional.

6.3.12. Signals carried by trains :

All trains on the line (outside depots or stations) must carry the following signalling equipment:

- one or several red flags or pennant according to the presence or not of level crossings;
- a red and white lantern in the event of circulation at night;
- a white light at the front and a red light at the rear, lit at night or in tunnels;
- if necessary (1st category level crossing), a LC barrier replacement device.

6.3.13. Protection of work zones and obstacles :

1. Work site markings :

A work site is announced at a distance by a sign that obliges the mechanic to increase his attention and whistle when crossing the work site if it is active.

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2. Temporary speed limits :

In the event of work demanding speed reduction, the mechanics receive instructions from the operations manager or line manager indicating the speed to be respected (or a cautious running order) at the crossing of the zone pinpointed by the kilometre points. It may also be indicated next to the track with an appropriate signal.

3. Protection of obstacles :

Any obstacle to circulation must be immediately protected by an agent (mechanic, train manager, track agent, station master or line manager....) who noticed or has been advised of it, to stop circulations that are heading towards it.

This protection is, in emergencies, ensured by a hand signal for stop (red flag, for example) positioned at a distance allowing the stopping of the train before the obstacle.

4. Disorder affecting the track (abnormal impact, stray animal....) :

As soon as it is known, it is the responsibility of the operations manager or line manager to order the train mechanics to adopt cautious running, delimiting the zones (singular points, KP...) where the disorder has been noticed.

5. Train distress :

In the event of a following train on the same space of a single track, the train personnel must quickly protect the immobilised train using a hand signal for stop (red flag or other device detailed in the OSR) positioned at a distance allowing for the stopping of the train before the obstacle.

The location of trains for the intervention of emergency services is then undertaken.

In the event of train distress, the mechanic requests rescue from the line manager. They are formally prohibited from restarting the train themselves, except if instructed to do so by the line manager.

The line manager takes measures to assist, depending on the means he has available, the reason for the distress and respecting the safety procedures governing train circulation.

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6.3.14. Particular events relating to security :

1. Principles :

In the event of accident or serious incident, the operator first takes necessary emergency measures to ensure the safety of users, of emergency teams, operation personnel and third parties.

It is the responsibility of the operator to appreciate the seriousness of events according to the following criteria linked to the number of victims, to the level of injury or loss of life, as well as damage caused to the system or the notion of risk in a potential accident situation.

The following table allows the classification of "particular" events according to their seriousness that determines the declaration procedure that follows.

The media repercussions must be taken into consideration. This table is reproduced in the OSR model.

Categories of noteworthy events	Characterisation
1- Major event : (catastrophic)	Event leading to several deaths and/or serious injuries and/ or important material damage. This type of event is exceptional. It requires the launching of EIP and important rescue and evacuation procedures. In general the operations are stopped for a significant length of time. There are, among other things, important media repercussions.
2- Serious event : (critical)	Event leading to one death and/ or one serious injury and/ or several light injuries (at least) which can be accompanied by significant material damage. It requires the launching of EIP for rescue victims. It is characterised by a momentary halt in operations and can have significant media impact.
3 – Less serious accident or incident : (marginal)	Event leading to light injuries, caused by a system malfunction, at a technical (ex. equipment failure...) as well as an operational level (ex. human error...). The EIP may be activated. The functioning of the system or its environment may be impacted. It can have media repercussions at a local level.
4 - Almost accident : (Precursor of danger)	Event with insignificant consequences (no injuries, little or no damage) but the nature of the incident revealed that there could be significant consequences and/ or damage. An evacuation of passengers is however possible.

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2. Method for informing the authorities:

The operator is legally bound to inform the Prefect without delay of all "Remarkable" event linked to the safety of the operation. The operator establishes and sends a report as rapidly as possible to the Prefect.

The immediate information is sent to the Prefect (or the Prefectoral representative) or the DDT (service in charge of transport or its representative), as well as STRMTG, by the operations manager or his designated replacement.

The table below defines the methods of informing the authorities depending on the category of event. It is reproduced in the model OSR.

Category	Immediate information by telephone or FAX	Written declaration by fax or letter	Detailed report by letter or e-mail
1- Major event :	Inform without delay , whatever the time	Letter to Prefect and STRMTG the same day	Letter within 2 months
2- Serious event :	Inform without delay , whatever the time	Letter to Prefect and STRMTG the same day	Letter within 2 months
3 – Less serious accident or incident :	Inform the same day except in the event of media interest.	Letter to STRMTG within 2 or 4 days	Letter within 2 months if required by STRMTG
4 - Almost accident :	No immediate information except if media interest	Letter to STRMTG within 2 or 4 days	Letter within 2 months if required by STRMTG

Apart from these events, the operator can be confronted with incidents affecting the operation and needing corrective measures. They do not need to be notified to the authorities but must be taken into account internally by the operator as part of the experience feedback and be part of an annual information to STRMTG.

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3. Classification of particular events :

The different events identified by their known origin and listed hereafter can be considered as particular. They can however result from the succession or accumulation of several causes.

The present list is given as indicative. It does not give an exhaustive list of all events that can affect the system.

N°	EVENT		DESCRIPTION	Category
1	Fire/ explosion	1.1	Fire on train in circulation, necessitating the use of an extinction method by the operator.	4
		1.2	Fire or explosion on a train in circulation, necessitating the intervention of emergency services	1 to 3
2	Derailment	2.1	Track disorder or malfunction, provoking a derailment (ex. rail break, poor positioning of track equipment)	1 to 3
		2.2	Derailment following excess speed	2 to 3
		2.3	Derailment following a rolling stock fault	2 to 3
3	Panic	3	Panic movement on the train or platform	1 to 3
4	System collision	4.1	Head to head train collision	1 to 3
		4.2	Train catch up collision	2 to 3
		4.3	Side on train collision	2 to 3
		4.4	Collision situation of type 4.1, 4.2 or 4.3, fortunately avoided	4
		4.5	Collision with fixed object or structural collapse damaging the train.	1 to 3
		4.6	Collision situation of type 4.5 fortunately avoided.	4

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N°	EVENT		DESCRIPTION	Category
5	Exterior risks	5.1	Animal collision, only when this type of event leads to train evacuation.	4
		5.2	Collision with an obstacle resulting from natural causes: collapse, landslide, rock falls or trees on the track)	1 to 3
		5.3	Subsidence of track provoking a derailment or overturning of the train.	1 to 3
		5.4	All natural phenomena damaging the infrastructure and provoking the interruption of circulation but having no impact on the trains.	3 to 4
6	Fall/ or impact of person	6.1	Impact of a carriage at a level crossing or following intrusion on the track.	2 to 3
		6.2	Impact with person on the line, at a level crossing or following intrusion on the track.	2 to 3
		6.3	Impact with a person at a station following a fall on the track or dangerous crossing	2 to 3
		6.4	Dragging of person on platform	2 to 3
		6.5	Electrocution of passenger or third party by contact with installation under voltage	2 to 3
7	Incident with media interest	7	All incident having potential media repercussions (ex. evacuation of the train immobilised on the line following an incident necessitating the assistance of the emergency services)	3 to 4

NOTE: events such as illness, aggression or vandalism do not enter into the category of events representing the safety of the system to be declared to STRMTG, even if the EIP can be triggered for certain of them.

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4. Provisions relating to victims :

Death : all persons killed instantly or within thirty days (known to the operator).

Serious injury : all persons injured and hospitalised for more than 24 hours.

Light injury : all persons unharmed not entering into the category " serious injury".

5. Declaration of accident or incident on the operation :

The following document represents a framework for written declaration of an accident or incident. The circumstances report, when it is demanded, takes a freely written form depending on the importance of the event.

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DECLARATION FORM of accident or operational incident on the tourist railway
--

General data :	Network : Date of event : Place/ KP : Direction of circulation :	Hour of event :																				
Type of event :	Derailment :..... Fire :..... Explosion :..... Fall of person :..... Impact with person :..... Impact with vehicle :..... Collision with a third party (to be detailed) :..... Collision with an obstacle (to be detailed) :..... Collision with a train (to be detailed) :..... Collapse, cave in (to be detailed) : Other event (to be detailed) :																					
Material in question (type, n°) :																						
Circumstances of event :	<table border="0"> <tr> <td>Exploitation :</td> <td>☐ Normal</td> <td>☐ Deteriorated</td> </tr> <tr> <td>condition of track :</td> <td>Good / bad :</td> <td>Rail dry/ wet</td> </tr> <tr> <td>Atmospheric Conditions:</td> <td>☐ Good</td> <td>☐ Rain ☐ Fog</td> </tr> <tr> <td></td> <td>☐ Frost</td> <td>☐ Snow ☐ Strong wind</td> </tr> <tr> <td>Visibility:</td> <td>☐ Good</td> <td>☐ Bad</td> </tr> <tr> <td>Light:</td> <td>☐ Full daylight</td> <td>☐ Dawn or dust ☐ Night</td> </tr> </table>		Exploitation :	☐ Normal	☐ Deteriorated	condition of track :	Good / bad :	Rail dry/ wet	Atmospheric Conditions:	☐ Good	☐ Rain ☐ Fog		☐ Frost	☐ Snow ☐ Strong wind	Visibility:	☐ Good	☐ Bad	Light:	☐ Full daylight	☐ Dawn or dust ☐ Night		
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Superelevation:	☐ No	☐ Yes																				
Gauge	☐ Standard	☐ Metric	☐ Narrow :.....																			
Localisation of the event :	☐ Current section ☐ Station ☐ LC ☐ Track equipment ☐ Other (to be detailed):																					
Description of facts :																						
Victims :	Passengers : Third : parties: Operational staff :	Number of killed Number of severely injured Number of lightly injured																				
Damage	Track : Other structures : Rolling stock : Third party : vehicles :																					
Material :																						

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<u>Recognised or supposed causes of the event :</u>			
<u>Emergency services intervention :</u> Y/N which ?		Alerted by whom ? Time of call : Time of arrival :	
<u>Measures taken by operator to ensure the safety of persons on site :</u>			
<u>Organisation of evacuation :</u>			
<u>Disturbances caused to different circulation :</u>			
TR :	Road :	NR :	Other :
<u>Authorities notified :</u>			
Prefect :	DDT :	Control service :	
<u>Technical and/ or administrative measures taken in the short term :</u>			
<u>Sketches of the event :</u> (if necessary)			
<u>Established by : Surname / first name :</u>			
Date :		Tel :	
Duty :		Fax :	
Email :			

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7.1. General principals :

The maintenance, or improvement, of safety levels on the operation requires the operator to have an organisation which allows him to maintain the different material parts of the system in good working order and available.

To achieve this, the operator must put in place preventative or corrective maintenance work, according to procedures they define. All surveillance operations, maintenance and interventions must be recorded in writing.

In respect of the inter-ministerial decree of the 8th December 2003, relating to the content of safety files for Tourist railways, the OSR contains at least the following information:

- Nature, content and regularity of upkeep and maintenance operations on rolling stock.
- Rolling stock maintenance register.
- Structure surveillance register, L.C. and zones at risk.

If necessary, the OSR details the demarcation of intervention responsibilities in terms of maintenance between the operator and owner or owners of rolling stock and infrastructure.

The OSR may just mention the general principles respected and refer to specific documents such as :

- instructions relating to the organisation and procedures of upkeep and maintenance ;
- The registers themselves.

Instructions and model documents must be approved by the operations manager.

7.2. Maintenance organisation :

The operations manager can delegate the duties linked to maintenance. The operation organizational chart defines the responsibilities by name in each maintenance field of the system by activity, in general :

- rolling stock ;
- fixed installations (track, engineering structures, level crossings and the environment).

The operations manager, or his delegates :

- determine the qualifications required and attests to the possession of these same by the personnel affected to each maintenance tasks..
- define the consistence and scheduling of preventative operations by field: regular inspections, occasional visits linked to particular circumstances, everyday fault research, systematic replacement of parts.

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- prescribe intervention procedures (regularity of each type of intervention; weather conditions, temperature; safety measures for personnel and the operation).
- define the form of reports established during or after preventative operations in the form of follow up registers or model documents destined for measurement.
- analyse disturbances or malfunctions noticed, decide on treatment priorities and verify the respect of deadlines and the conditions for restart.

7.3. Internal Network Feedback (INF) :

The summary of disturbances and their correction must contribute to improving the quality of the operation through the search for solutions allowing the preparation for or limiting of the occurrence of events and optimise the treatments undertaken. This mission is the responsibility of the operations manager.

7.4. Traceability of maintenance operations :

The operator defines the most adapted form for the network of registers or notebooks and visit reports allowing the written recording of maintenance operations and ensures the up date of these documents.

The train circulation register must also allow agents to record their own observations.

For this the documents at least mentions:

- For inspections or visits

The date of tour or visit;

The reason for the tour or visit;

The localisation or indication of marks if it refers to fixed installations

The name of the agent intervening and their signature;

The identification of disturbances and malfunctions noticed with description;

Appreciation of the emergency and the nature of the intervention necessary;

- For preventative or corrective maintenance actions :

The nature of operations undertaken (repairs, replacement,.....);

The schedule planned for these interventions;

The effective completion date or return to service;

The name on the agent intervening or responsible and their signature;

- For malfunctions or disturbances recorded during circulation on the line, other than the usual elements recorded in the circulation register :

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The localisation of faults noticed;
 Their nature;
 An evaluation of the degree of urgency of the intervention,

The scheduling of the most important work must be in a written record of decisions or minutes taken by the authority empowered to decide.

7.5. Scope of maintenance operations :

It is the responsibility of each operator to determine the scope of maintenance operations, the most appropriate for each part of the system.

For this, the operator defines the nature of control points and regularity of preventative interventions, by paying attention, for the former, to the respect of requirements stated hereafter. The list of control points that follow are given as an indication.

7.5.1 Rolling stock :

A thorough visit of each vehicle, looking at the chassis and safety devices such as the braking system, suspension and coupling / buffer devices, must be undertaken annually.

All maintenance and repairs must be undertaken respecting usual practice, particularly concerning the quality of materials and parts used and their assembly.

A maintenance notebook must be kept for each vehicle.

Control points	Results required	Referential rulings	Regularity and period of intervention
Braking system: air pipes, supple connectors; half coupling hose	Seal regularly controlled during brake tests		<i>Defined by operator</i>
Principal and auxiliary air reservoirs	Check of control deadlines ; satisfaction of seal tests	1.2.2	
Purge valves and taps, triples valves and distributors	Seal regularly controlled during brake tests		
Brake shoe	Reasonable wear : no excessive overlap on the rim or wear beyond the wear bars		
Rigging	Regularly controlled during brake tests		
Coupling and buffer devices	Buffers and couplings well greased ; no obvious cracks		
Chassis	No excessive corrosion on the chassis		
Intercommunications	Good condition of closure and linking		

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Control points	Results required	Referential rulings	Regularity and period of intervention
Doors, handrails	Latches free, not sticking		
Steps, handrails	Steps not slippery and well fixed ; presence of handrails		
Steam boiler	Check on inspection dates ; validation by regular controls and tests	1.2.2	
Wheel profiles	Respect of the limit values of wheel profiles (slope, height, thickness, Qr)	1.3.1.1	
Axles and gates : spindle ; axle box ; suspension blades et springs	Respect of blocking rates ; lubrication ; absence of cracks or visible rupture signs	1.3.1.2 1.3.1.3 1.3.1.4 1.3.1.5	
Passenger safety	Displaying of instructions in coherence with the OPR Alarm signal working	1.5.1.0	
1 st aid pack	Pack complete and product dates valid		
Signal lights, safety apparatus and extinguishers	Presence of all accessories, in good condition ; equipment dates valid	1.5.4	
Communication equipment	Batteries well charged ; pre-recording of frequencies or important numbers	6.3.9	
Electrical supply circuits	Correct insulation		

7.5.2 Track :

The regularity and consistency of the inspections must be adapted to the length of the network, to the traffic it supports, to local climatic conditions and the general condition of the track.

Detailed inspection of the track must be undertaken with a minimum regularity of one year. In addition, a daily surveillance during the operation is ensured during circulation or in the form of track tours. Particular attention must be paid to difficult profiles (pronounced bends, steep super elevations). Each inspection is followed by a summary of the visit showing the disturbances observed, there localisation, define the urgency and the nature of interventions need and if necessary the palliative measures applied while waiting for the interventions.

The operations manager or his representative has daily knowledge of the condition of the track and circulation restrictions linked to disturbances identified. They decide the schedule of daily interventions and the most important works.

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Control points	Results required	Referential rulings	Regularity and period of intervention
Outline	Maintain railway outline ; pruning ; weed clearing	2.1.1	Defined by operator
Cleanliness of track and trackbed	Weeding ; weed clearance ; clean ballast ; elimination of causes of ballast pollution (mud, earth)	2.4.4	
Trackbed drainage	Existing ditches, with an outlet and suitably clean	2.5	
Track dressing, levelling of trackbed	Correct thickness of ballast ; absence of distortion, subsidence of trackbed or undermining of ballast (animals...)	2.4	
Track profile	No excessive over gauge, super elevation in right angle alignment, yaw phenomena	2.1.3 2.1.4 2.1.5	
Condition of rail	Wear on head and internal face within tolerable limits ; absence of burrs ; web and flange non-perforated by corrosion ; no cracks or ruptures ; rail ends non-crushed	2.3.3 2.3.4	
Sate of rail welding	Absence of cracks in solder or around it		
Condition of sleepers	Number and spacing of defective sleepers within tolerable limits ; no defective sleepers under joints or principle track equipment ; sleepers suitably supported	2.2.1 2.2.2 2.2.3 2.4	
Condition of rail ties	Little corrosion on lag screw and firmly anchored ; sufficient number on each sleeper ; DC rails : presence and correct blocking of wedges	2.2.1	
Condition joints and fishplates	Joint openings adapted to temperature conditions ; absence of closed joints or distended (in normal temperature conditions), lips, rail pathways ; fishplates without cracks ; correctly tightened and sufficient number of bolts	2.2.4 2.3.5	
Condition of track	Cleanlinessof track on each side of LC (ballast, sleeper)	2.4.4	
Track equipment	Greasing of track equipment ; absence of play in the mobile parts ; greasing of control organs of the switch	2.3.6	
Condition of point frog	Light wear at the frog point ; protection rates respected	2.6	
Condition of adjustment of switch blades	Absence of detachment of switches ; space between blades conforms ; geasing of shoe	2.6	
Condition of fencing	Stability of supports, grill or bars in good condition ; limited corrosion ; separator equipment placed between track and roads or paths parallel undamaged		

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Control points	Results required	Referential rulings	Regularity and period of intervention
Railway signals	Complete signals in coherence with OSR ; good condition of fixations ; clear visibility	2.8	<i>Defined by operator</i>
Platforms	Good and continuous level ; no holes or obstacles ; masonry in good condition	2.7	
Overhead electrical lines : posts and pylons	Absence of corrosion or deterioration on the material ; good insulation		
Suspension of contact wire or catenaries ; bracket, stay and tensioner	Good condition of fixation ; insulation ensured		
Insulation of sections	Unbroken, effective insulation		

7.5.3 Level crossing :

Level crossing maintained under the same conditions as the track.

Control points	Results required	Referential rulings	Regularity and period of intervention
Functioning of trigger controls	Effective functioning of remote controls		<i>Defined by operator</i>
ALS system delay	Closing and re opening times adapted		
Clearance of visibility in each quadrant (2 nd category)	Vegetation cut back or limited in height even in summer	3.5	
Condition of barriers, R24 light and bells	Complete barriers ; fixations in good condition, reflecting red and white road		
Condition of road signs of position and advanced	Complete, well fixed, clean and visible, correct positioning ; notify faults in advanced signals to road manager	4.6	
Condition of rail groove and road surface	Cleanliness of grooves ; planking fixations good ; road surface smooth and connected to rail	3.1.5	

7.5.4 Engineering structures :

The surveillance methods of engineering structures is defined in chapter 2.9 of the present

reference They are divided into two groups:

- daily or continuous surveillance relate to easily seen aspects ; these take place during circulation or on track tours;

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- Regular surveillance, which includes annual visits and detailed inspections or complete visits.

When the operator is not responsible for undertaking the regular inspection of engineering structures themselves, the infrastructure manager must communicate the audit reports to the operator so that they can decide the eventual consequences for circulation.

All interventions result in a report of work undertaken on an individual follow up document, for each structure.

Control points	Results required	Regularity and period of intervention
Structure visibility	Removal of vegetation climbing or growing against the structure	Defined by operator
Vaults (lower surface) abutments	Absence of masonry dislodging or loosening of, cracks particularly at the keystone or spandrels or the structure, detachment, bulges, water infiltration, concretions or carbonation ; correct drainage ; no failure of stone	
Piles ; tympanum		
Abutments		
Foundations	Removal of bulky material ; absence of subsidence	
Submerged foundations ; piles in river	Stability of foundations ; presence of rock fill ; absence of subsidence or cavity	
Metallic apron	Treatment of corrosion and perforations ; elimination of water retention zones ; freeing of contacts	
Condition of masonry parapets	Correctly sealed masonry coping and crown	
Condition of metal handrails	Correct seals, height and spacing conform, absence of corrosion	
Main structure of metallic structures	Treatment of corrosion particularly under the surface ; good condition of assemblies ; absence of play	
Condition of support equipment	Absence of movement and cleanliness of support equipment	
Condition of fixations of the track on the structure	Good fixation of track lateral, concrete supports and sleepers ; material clean	
Trackbed level from one side to the other	Absence of subsidence or collapse of shoulders	
Supporting walls : Structure profile	Regularity of batter ; absence of bulges, spillage or subsidence ; consolidated masonry	
Supporting walls : Condition of anchorage equipment.	Absence of corrosion, correctly tightened	
Supporting walls : drainage system	Good condition and functioning correctly	

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7.5.5 System environment :

The environment of the system is checked in the same way as the track. In some cases zones with a geological risk can be surveyed according to the methods applied to engineering structures.

Control points	Results required	Regularity and period of intervention
Classified industrial installations	Check protection perimeters ; good condition of any fencing	Defined by operator
Fires originating from system	Weed clearance of at risk zones ; rapid means of operational intervention ; displaying of instructions in rolling stock	
River rising ; floods	Banks adjoining the trackbed in good condition (see also foundations of structures) ; maintenance and clearance of unloading structures	
Cliffs, rock fill or slopes at risk of landslides	Regular monitoring of evolution ; check of measured zones ; purge	
Fallen trees	Preventive pruning or felling	

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8.1.Nature of risk :

Non-exhaustive list of risks linked to the exterior environment (outside level crossings) :

Natural risks

- Subsidence/ Land slides;
- Rock falls, cave -in (cliff...);
- Fallen trees;
- Fire;
- Floods;
- Lightening;

Industrial and other risks:

- Grain silos;
- Installations classed as industrial;
- Weed cutting (products to be used on areas receiving the public....);
- Adjacent to a road or path

8.2. Applicable provisions :

The operator must identify zones concerned by permanent or intermittent risks linked to the exterior environment as well as the possible consequences of these phenomena.

Two types of event can be encountered:

- of external origin to the system and affecting it (landslide for example) ;
- of internal origin and affecting the external environment (fire risk provoked by the train or its passengers for example)

This identification must look at all influences on the operation network as well as the immediate surroundings from where these risks can come or they could on the other hand effect.

The operator can turn to the Prefecture services (DDE or DRIRE) to obtain information on the nature and occurrence of risks and appropriate measures to be prepared.

They must in relation to these risk zones, taking into account their possible seasonal nature, take preventative provisions of a type such as:

- a closed and signed protection perimeter ,
- particular instructions imposed on the public and personnel (ex: no smoking);
- organisation of surveillance by operational personnel or by a specialised organisation;

and prepare emergency service interventions :

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- by the identification in the EIP of appropriate intervention methods, ready to be used, possibly positioned for use;
- by the organisation of particular action plans written in the EIP if necessary.

The OSR mentions the risks and their localisation and describe the surveillance methods with its regularity, if certain risks require it.