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Electric lighting
in passenger rolling stock

International Union of Railways

Leaflet to be classified in Volumes:

V - Transport stock
VI - Traction

Amendments

1	1.1.79	7	1.1.91
2	1.1.82		
3	1.1.83		
4	1.7.85		
5	1.7.88		
6	1.7.89		

Obligatory provisions are preceded by an asterisk: *

Contents

Note

This leaflet is part of a set which also includes:

- Leaflet 532 : Trailing stock: Signal-lamp brackets - Coaches: fixed electric signal lamps.
- Leaflet 533 : Protection by the earthing of metal parts of vehicles.
- Leaflet 550 : Power supply installations for passenger stock.
- Leaflet 552 : Electric power supply for trains taken from the train cable.
- Leaflet 553 : Ventilation, heating and air-conditioning in coaches.
- Leaflet 554-1 : Power supply to electrical equipment on railway vehicles from a local mains system or from another power source at 220 V or 380 V, 50 Hz.
- Leaflet 568 : Loudspeaker systems in coaches.

* O - General

0.1 - This leaflet applies to all passenger stock accepted for routine working on international services.

0.2 - This leaflet includes:

- general provisions with which lighting installations must comply, irrespective of their design, and
- special provisions for components which it is wished to standardise.

1 - Basic equipment

***1.1** - Each coach must be provided with an electric lighting installation.

***1.2** - As regards the installations for the electric power supply for lighting purposes, Leaflet 550 shall be applicable.

***1.3** - Emergency lighting facilities must be provided.

2 - Lighting in compartments

***2.1** - The equipment in compartments must comprise a general lighting system which can be reduced at night.

***2.2** - For safety reasons, the reduced lighting must remain on if the normal lighting in the compartment is off, so that a compartment cannot be in complete darkness.

2.2.1 - This provision does not apply to couchette coaches and to the areas of a vehicle not accessible to all passengers on the train.

2.2.2 - General lighting system

Depending on the design chosen, the general lighting system may be adjustable between two levels of light intensity.

2.2.3 - Seat lighting

***2.2.3.1** - Individual reading lights must be provided for each 1st class seat. They must be able to be switched on when the general lighting system is functioning at its weakest as well as when it is off.

2.2.3.1.1 - It is recommended that individual reading lamps also be provided for each 2nd class seat.

2.2.3.2 - It is possible to make provision for the reading lamp to function whatever the level of general lighting.

***2.2.3.3** - Individual seat lighting must not inconvenience passengers in neighbouring or opposite seats.

***2.3** - The switch for reducing the general lighting must be situated on the right and above the compartment door, and must be marked by the relevant pictogram, in accordance with Leaflet 413.

***2.4** - The fluorescent lamps of the general lighting system must be arranged so that passengers cannot touch or damage them accidentally.

***2.5** - Extra individual lamps for use as reading lamps shall be arranged as follows:

- a reading lamp with a directional pencil of light, placed at right angles to each 1st class seat, above the passenger's head;
- a reading lamp placed at the top end of each berth in 1st and 2nd class couchette compartments.

* **2.6** - The lighting system must be designed to ensure that the light intensity values specified in point 4 can be attained:

- either through an adequately-calibrated general lighting system. In this case, it shall merely be a matter of ensuring that the reading lamps specified in point 2.5 only light up after the general lighting has been switched off,

- or through a less-bright general lighting system combined with individual lamps that can be switched on concurrently with the general lighting.

* **2.7** - The reading lamp switch must be situated in the immediate proximity of the reading lamp or form part of it.

* **2.8** - The design of reading lamps placed above seats must be such that other passengers placed opposite these reading lamps are not dazzled by them and are unable to see the incandescent lamps.

* **2.9** - If reading lamps are installed in 2nd class seater coaches, they must comply with the provisions of paragraphs 2.6 to 2.8.

1-7-89

2.10 - It is recommended that light bowls be designed to keep dust and drips to a minimum.

3 - LIGHTING IN ANCILLARY COMPARTMENTS

* **3.1** - The lighting in ancillary compartments, such as the side corridor, vestibules, washrooms and toilets shall be switched on and off simultaneously with the general lighting system in the coach.

* **3.2** - It must also be possible to switch on the lighting in washrooms and toilets when the general lighting system, referred to in point 5.1, is switched off. The lighting may be switched on with an automatic time-switch which switches the light off after a few minutes.

* **3.3** - The lighting of vestibules must be so designed that the steps are sufficiently illuminated when passengers join the coach or alight from it.

1-7-89

3.4 - It is also recommended that light bowls be designed as described under 2.10.

4 - ILLUMINATION INTENSITY

* **4.1** - The general lighting in compartments must be powerful enough, so that seated passengers can read. The average minimum illumination intensity, in all classes must be equivalent to:

- 150 lumens for lighting by fluorescent lamps;

- 120 lumens for lighting by incandescent lamps,

with a degree of uniformity of at least 1 : 1.3; It may be less if the degree of uniformity provided is better than the above value and if the lighting provided in the least favourable seat is not less than the minimum value obtained by applying the above condition.

* **4.2** - The degree of uniformity of the lighting shall be equivalent to the following quotient:

$$\frac{\text{level of illumination in the least favourable seat}}{\text{average level of illumination}}$$

★ *4.3* - The average level of illumination shall be equivalent to the result obtained when deviding the sum of the illuminations recorded for each seat by the number of recordings taken.

★ *4.4* - The level of illumination provided in other parts of the coach must be approximately in the following proportion to that of the compartments :

- in the side corridor :	1/4
- in vestibules, near the access doors, at least	1/2
- in toilets and lavatories	1/1.

The seat reservation frame must be adequately illuminated.

★ *4.5* - The level of illumination shall be measured :

- in compartments, along the vertical median plane of each seat and along the horizontal plane situated 0.80 m above the floor and 0.60 m from the back of the seat.

- in the side corridor, along the vertical median plane of the corridor, between compartment doors and along the horizontal plane situated 0.80 m above the floor, with the lighting of the compartments switched on and the curtains of the partition between the corridor and the compartments drawn,

- in vestibules, adjacent to the access doors and along the horizontal plane situated 0.80 m above the floor,

- in toilets and lavatories, in the centre of the compartment and along the horizontal plane situated 1.50 m above the floor.

★ *4.6* - The recordings shall be made with an achromatized lux-meter, under the verified conditions of nominal voltage checked at the output from the distribution cupboard of the installation.

★ *4.7* - In the case of fluorescent lamps, the recordings must be taken after a period of operation of approximately 150 hours.

4.8 - In order to avoid dazzle, it is advisable for the luminosity of light sources to be low towards the eyes and compatible with that of their surroundings (luminosity of the general surroundings : ceiling and walls).

4.9 - To obtain a pleasant colour rendering, it is recommended that light sources which emit light with a sufficient proportion of red should be used.

5 - CENTRALISED LIGHTING CONTROL AND MONITORING DEVICES

★ *5.1* - Each coach must be provided with a master lighting control device for the whole of the lighting installation. It must be placed on the control panel (see Leaflet 550).

* 5.2 - This device shall consist essentially of a master switch which can be combined either with a special switch for half-lighting, or with a remote control of the lighting, or with both.

* 5.3 - To operate the controls, square socket keys, push-buttons or rotating switches shall be permissible.

* 5.4 - It must be possible for switches which can be operated by means of the square socket key to be actuated from the outside of the electrical box or cupboard in which they are situated. It must only be possible to operate push-buttons or rotating switches after the door of the box or cupboard has been opened with the square socket key.

5.5 - It is recommended that the lighting control be designed to enable the half-lighting or subdued lighting to be switched on also.

* 5.6 - Each coach must be provided with a device for remote control of the lighting of the entire train. This shall conform to one of the two diagrams in Plate I. Instead of the electromagnetic components shown, it is also possible to use electronic components satisfying the same conditions.

5.6.1 - In dining cars, sleeping cars and other vehicles running exclusively with a specially assigned train crew, the lighting may be arranged to meet particular requirements. However, adequate lighting should be provided in areas accessible to all the passengers on a train and should be connected to the lighting remote-control device.

1-7-85

5.12 - As regards the design of the control panel, the layout of fuses, as well as the marking of components and the inscriptions to be displayed theron : see UIC Leaflet 550.

6 - SPARES

* 6.1 - At least two spares of each type of lamp used in the coach must be carried.

* 6.2 - The cupboard containing the spares must bear the inscription : "Spares cupboard" in all languages specified by the RIC.

7 - OPERATING INSTRUCTIONS AND DIAGRAMS

* 7.1 - A notice, in several languages, giving the operating instructions must be placed on the inside of the door of the electric cupboard, as well as a notice concerning the power supply, heating and air-conditioning installations.

* 7.2 - The following documents must be placed in the electric cupboard so that any defect may be identified and the inconvenience resulting therefrom remedied :

- a diagram indicating the layout of the main components,

- a basic electric diagram,

- a short explanatory note giving information relating to breakdown repairs.

8 - ADDITIONAL PROVISIONS APPLICABLE TO Z-TYPE COACHES

★ 8.1 - The fluorescent lamps provided in compartments, as well as those fitted in other parts of the coach, must be supplied through individual static convertors with an output frequency of $\geqslant 16\,000$ Hz to avoid objectionable noise and physiologically perceptible frequencies.

★ 8.2 - The fluorescent lamps fitted must be of a type in current use and standardised internationally.

★ 8.3 - When the lamps are protected by a casing, the casing must be dusttight and must not prevent the lamps and any existing additional equipment from being replaced easily.

★ 8.4 - In the case of general lighting with ~~an illumination intensity~~ lighting level of 150 lumens, as specified in point 2.6, it must only be possible to switch on the reading lamps when the general lighting is switched off. If the illumination intensity of the general lighting is lower, it must be possible to switch on the reading lamps simultaneously. The power absorbed by a compartment for lighting purposes must not exceed 150 W.

8.5 - It is recommended that the general lighting system giving the illumination intensity specified in § 4 be provided with two-stage intensity switching so that the level of general lighting can be regulated in a way that meets the varying requirements of passengers.

***8.6** - A 5 W-lamp, which can be placed in the ceiling electric fitting itself or in a holder above the door, must be used for the dimmed lighting (night lighting).

***8.7** - Lamps with a total power of a least 10 W, placed above the seat reservation frames, shall be used for the lighting of the side corridor.

***8.8** - A pilot lamp, indicating that the relevant lavatory is engaged or free, must be placed at each end of the side corridor above the door separating the corridor from the vestibule.

***8.9** - Two 20 W- lights must be positioned on the vestibule ceiling, parallel to the access doors and so that they clearly light the intercommunicating gangway and the steps when the access door is open.

***8.10** - Each lavatory is illuminated:

- by means of a fluorescent tube placed above the mirror,

- or by means of two fluorescent tubes, each one being placed vertically on each side of the mirror.

*8.11 - The rear electric signal lamps placed at the ends of coaches must comply with the conditions defined in UIC Leaflet 532. It must be possible to switch them on and off by means of a switch placed on the lateral corridor side, close to the signal lamp. This switch can only be operated by means of the square socket key (RIC, Plate 8).

9 - Emergency lighting system

9.1 - Definition of emergency lighting system

The emergency lighting system is the minimum of light necessary to enable passengers to move about inside and leave coaches and, in particular, to recognise the presence of obstacles.

*9.2 - When the general lighting system has been turned off because of consumption from the battery, the emergency lighting system must remain in operation for a minimum of 5 hours.

*9.3 - Lighting of obstacles and the floor on the exit route from the vehicle must be:

9.3.1 - based on a minimum illumination of 5 lumens,

9.3.2 - sufficiently uniform to guarantee clear visibility.

To achieve this, a darker area of lighting equivalent to less than 1/10 of the maximum level of illumination of the adjacent source of light must not exceed one linear metre on the exit route, as shown in Plate 2.

*9.4 - The above-mentioned values must be achieved with a discharging battery for the whole of the independent operating period stipulated.

*9.5 - The light sources for this lighting must not cause dazzle, either directly or by reflection.

*9.6 - If high-frequency converters are used, they must be installed in the vicinity of the fluorescent lamps.

9.7 - The emergency lighting system is one of many power consumers connected to the vehicle battery. In order to guarantee a battery power reserve for the emergency lighting system, it is recommended that the different sources of consumption be turned off as follows once the battery stops charging:

9.7.1 - fresh air ventilator: immediately or at the end of one minute maximum.

9.7.2 - reading lamps: after approximately 10 minutes.

9.7.3 - approximately half the general lighting system: after some 30 minutes.

9.7.4 - the rest of the general lighting system after approximately 2 hours.

*9.8 - The lamps of the emergency lighting system form part of the general lighting system, including the down-graded general lighting system.

*9.9 - The lamps of the emergency lighting system must be powered directly from the battery - without the interposition of central conversion units. The use of individual converters to supply a maximum of two lamps is permitted.

*9.10 - The lamps of the emergency lighting system shall be connected to a minimum of two electric distribution circuits protected by separate fuses.

*9.11 - Estimates of the battery capacity necessary for the main lighting system in accordance with point 2, the emergency lighting system in accordance with point 9.2, and the power supply for sources of consumption, in accordance with point 9.7, should be based on a new fully-charged battery.

COMMANDE A DISTANCE DE L'ECLAIRAGE - REMOTE CONTROL FOR LIGHTING - FERNSCHALTUNG DER BELEUCHTUNG

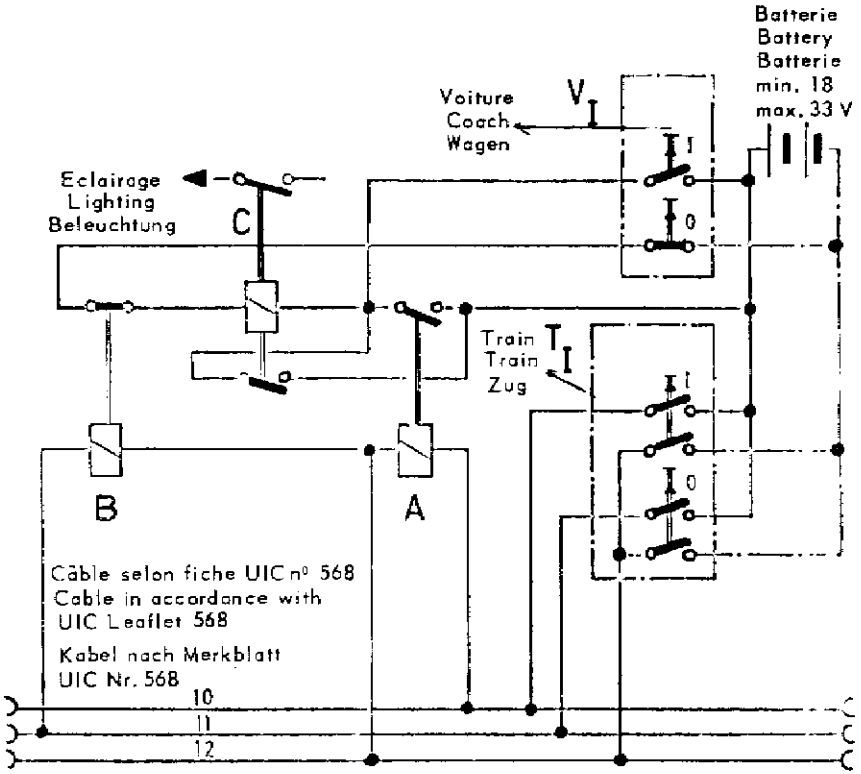
Schéma de principe des connexions - General wiring diagram - Prinzipschema der Schaltung

I

Commande par boutons-poussoirs

Push-button control

Betätigung mit Druckknöpfen

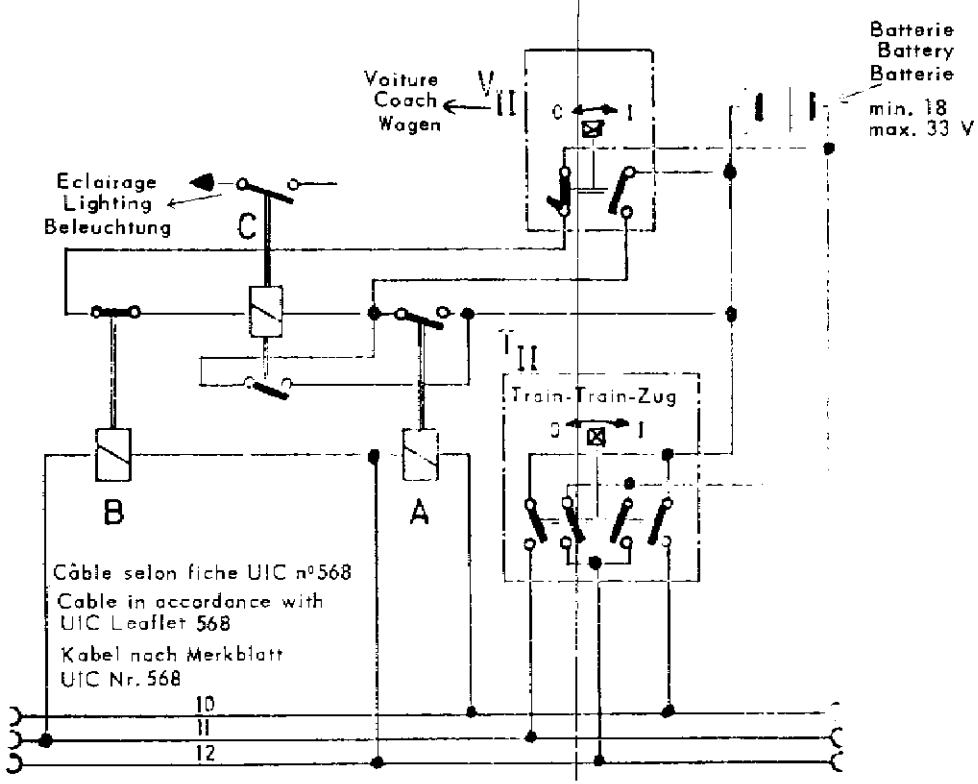


II

Commande par interrupteur à clé carrée femelle de l'Annexe B de l'UT

Control by switch operated with a female-type carriage key as shown in Appendix B of the Technical Unity

Betätigung mit Vierkant-Hohlschlüssel nach Anlage B der TE



1-1-63

A et B : Relais d'impulsion avec une impédance d'entrée ⩾ 1 200 ohms tension minimum d'enclenchement 15 V.

A and B : Impulse relays with input impedance ⩾ 1 200 Ohm minimum starting voltage 15 V.

A und B : Impulsrelais mit Eingangsimpedanz ⩾ 1 200 Ohm, Mindestansprechspannung 15 V.

C : Relais de maintien.
Maintenance relays.
Halterelais

T I/II : Boutons-poussoirs/ Interrupteur à clé femelle de l'Annexe B de l'UT pour l'éclairage du train entier.

T I/II : Push-buttons/ switch with female-type key as per Appendix B of the Technical Unity for lighting of the entire train.

T I/II : Druckknöpfe/Impulsschalter mit Vierkant-Hohlschlüssel nach Anlage B der TE für die Beleuchtung des Zuges.

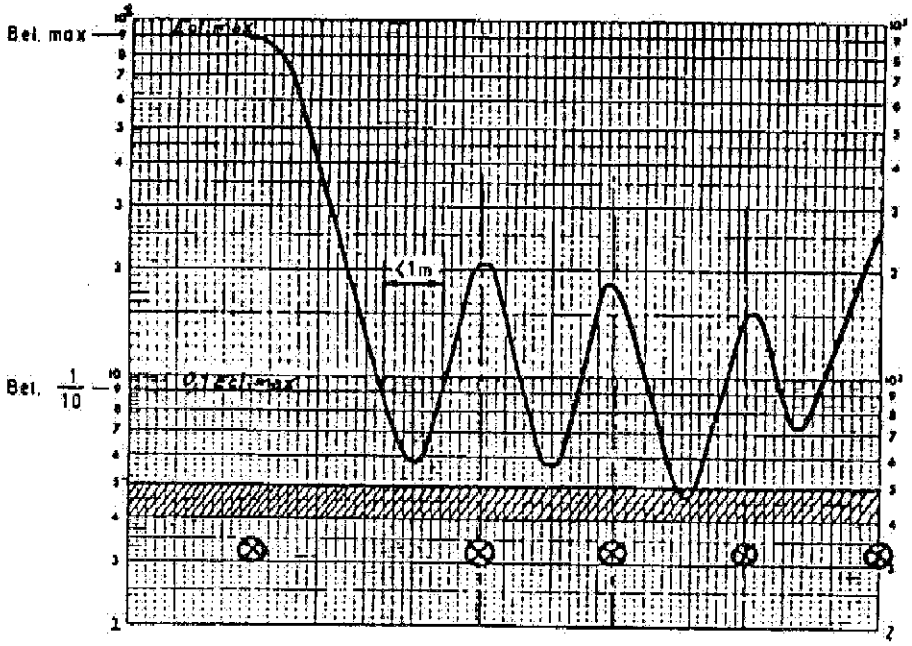
V I/II : Boutons-poussoirs/ Interrupteur à clé femelle de l'Annexe B de l'UT pour l'éclairage de la voiture.

V I/II : Push-buttons/ switch with female-type key as per Appendix B of the Technical Unity for lighting of the coach.

V I/II : Druckknöpfe/Impulsschalter mit Vierkant-Hohlschlüssel nach Anlage B der TE für die Beleuchtung des Wagens.

PLANCHE 2
TAFEL 2
PLATE 2

Uniformité de l'éclairage de secours
Gleichmäßigkeit der Notbeleuchtung
Uniformity of emergency lighting system



Application

With effect from 1 January 1978 for obligatory provisions, with the following exceptions:

- point 1.3 ..... 1-1-89 (for coaches to be built)
- points 2.2.3.1, 2.2.3.3 1-1-91
- points 2.5, 2.6 and 2.9 .... 1-1-82 (for vehicles to be built)
- point 5.6 1-1-73 (for coaches to be built)
  (except 3rd sentence) ..... 1-1-87 (for all coaches accepted for running in international traffic)
- point 5.6 (3rd sentence) .. 1-1-83
- point 5.6.1 ..... 1-1-86 (for vehicles to be built)
- points 5.7, 5.8 and 5.9 1-1-83
- points 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 9.9, 9.10 and 9.11 1-1-93

All UIC railways.

Record references

This leaflet, which was included in the UIC Code in 1977, as No. 555, corresponds to the definitions of electric lighting installations in coaches, previously shown in Leaflet 550, which, earlier, bore the Number 51.

Latest headings under which the subject has been examined:

- *Question 5/R/FIC* - Revision of leaflets.
(Working Party for electronic equipment in coaches and wagons, Paris, January 1985)

- *Question 5/R/FIC* - Revision of Leaflet 555 "Electric lighting in passenger rolling stock".
(Working Party for electronic equipment in coaches and wagons: Paris, January 1988).

- *Question 45/A/FIC* - Revision of leaflets.
Alignment of RIC Regulations with UIC regulations.
(Working Party for electronic equipment in coaches and wagons: Paris, January 1989).

- *Question 45/A/FIC* - Revision of leaflets.
17.5 - Amendments resulting from the creation of Leaflet 567.
(Traction & Rolling Stock Committee: Paris, June 1990).

- *Question 5/R/FIC* - Revision of leaflets.
4.2 - Approval of amendments to Leaflet 555.
(Traction & Rolling Stock Committee: Paris, June 1990).