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KINGDOM OF BELGIUM

FEDERAL PUBLIC SERVICE FOR THE ECONOMY, S.M.Es, THE MIDDLE CLASSES AND ENERGY AND FEDERAL PUBLIC SERVICE FOR EMPLOYMENT, WORK AND SOCIAL DIALOGUE

Royal Decree amending Articles 47, 192, 196 and 266 of the General Regulations on Electrical Installations

ALBERT II, King of the Belgians,

To all those present and to come, Greetings.

Having regard to the Law of 10 March 1925 on energy distribution, in particular Article 21(1);

Having regard to the Law of 4 August 1996 on the well-being of workers while performing their work, in particular Article 4(1);

Having regard to the Royal Decree of 10 March 1981 rendering obligatory the observance of the General Regulations on Electrical Installations for domestic installations and certain transport and energy distribution lines and the Royal Decree of 2 September 1981 amending the General Regulations on Electrical Installations and rendering their observance obligatory in establishments classed as dangerous, insanitary or in which noisy or noxious trades are carried out as well as those referred to in Article 28 of the General Regulations on Employment Protection, amended by the Royal Decrees of 29 May 1985, 7 April 1986 and 30 March 1993;

Having regard to the General Regulations on Electrical Installations annexed to the Royal Decree of 10 March 1981, in particular Articles 47, 192, 196 and 266, amended by the Royal Decrees of 7 April 1986 and 8 September 1997;

Having regard to the opinion of the Standing Committee on Electricity of 13 February 2003;

Having regard to the opinion of the Higher Council for prevention and protection in the workplace of

Having regard to the fulfilment of the formalities laid down by Directive 98/34/EC of the European Parliament and of the Council laying down a procedure for the provision of information in the field of technical standards and regulations;

Having regard to the laws on the Council of State, consolidated on 12 January 1973, in particular Article 3(1), replaced by the Law of 4 July 1989 and amended by the Law of 4 August 1996;

Having regard to urgency;

Whereas the provisions laid down in this Royal Decree constitute amendments and additions to legislation as far as work in electrical installations is concerned they need to be rendered obligatory without delay in order to guarantee safety and remain consistent with the recent changes in the field of European standardisation;

On the proposal of Our Minister for Work, Our Minister for Energy and Our Secretary of State for the Organisation of Work and of Well-Being at Work,

We have decreed and hereby decree:

Article 1.- For the purposes of this Decree, "Regulations" shall be understood to mean the General Regulations on Electrical Installations, covered by the Royal Decree of 10 March 1981 rendering obligatory the observance of the General Regulations on Electrical Installations for domestic installations and certain transport and energy distribution lines and by the Royal Decree of 2 September 1981 amending the General Regulations on Electrical Installations and rendering their observance obligatory in establishments classed as dangerous, insanitary or in which noisy or noxious trades are carried out as well as those referred to in Article 28 of the General Regulations on Employment Protection, amended by the Royal Decrees of 29 May 1985, 7 April 1986 and 30 March 1993.

Article 2.- In Article 47.01 of the Regulations, item a) is replaced by the following:

a) Competence of persons:

1. Table of codes:

A code, consisting of the letters BA followed by a figure from 1 to 5 as shown in the table below, is used to determine the levels of competence of individual persons:

CODE	STATUS	CONDITIONS	EXAMPLES
BA1	Ordinary	Persons not graded in the categories below	Premises for domestic or similar use, premises visited by the general public, etc.
BA2	Children	Children present in premises designed to accommodate them	Nurseries and child-care centres, etc.
BA3	Disabled	Persons not in possession of their full mental or physical capacity	Homes for the sick or elderly, or the mentally handicapped, etc.
BA4	Aware	Persons who are: - either sufficiently aware of the dangers of electricity with respect to the work entrusted to them - or supervised at all times by a qualified person when carrying out the work entrusted to them in order to reduce the electrical hazards to the minimum	Operating staff or maintenance personnel in electrical installations, etc.
BA5	Qualified	Persons who, by virtue of skills acquired through training or past experience, are able themselves to assess the risks associated with the work to be performed and who are able to decide on the steps to be	Engineers and technicians responsible for the operation of electrical installations, etc.

		taken in order to remove or confine to the minimum specific hazards pertaining to that work	

2. Conditions governing the allocation of codes BA4 / BA5

The competence of persons coded under BA4 or BA5 must be allocated to workers by their employer. The scope of this allocation, depending on the type of electrical installation or the type of work for which that authorisation applies, remains to be decided.

Notwithstanding the decisions of the Royal Decree of 27 March 1998 on the well-being of workers while performing their work, the employer must at least take account of the following when appraising the level of competence and when allocating the BA4 or BA5 codes to those persons:

- the qualifications of the employee with respect to the hazards posed by electrical installations, acquired through training or past experience within or outside of the employer's establishment
- the type and diversity of the electrical installations, e.g., high and low voltage, grid systems, nature of electrical equipment used (e.g. conventional electrical appliances, explosion-resistant equipment), to which such skills are applicable,
- the range of activities in an electrical installation, or in its vicinity (work carried out with power on, in the vicinity of live parts, handling operations in electrical installations, testing, inspection and measurement work, etc) to which such skills are applicable.

This appraisal of skills or qualifications, including a description of the installations and the work to which such an appraisal applies, must be traceable.

The allocation of individual competence codes BA4 or BA5 to a particular employee must be recorded by the employer in a document which, in addition to the name of the employee, must clearly define the levels of competence and electrical installations for which such authorisation is valid (including a description of permitted activities, a description of the electrical installations in which, or in the vicinity of which, that employee may work, etc), together with any particular restrictions, the period of validity and any specific conditions with respect to retaining that level of competence.

Notwithstanding the allocation of a competence coding of BA4/BA5, each employer is bound, within his particular field of jurisdiction, to:
- ensure that each person concerned receives sufficient and appropriate training geared specifically to his individual workstation or duty;
- take due account of the level of competence of the persons concerned with regard to health and safety when they are assigned to perform a task in, or in the vicinity of, an electrical installation;
- check that tasks are distributed in such a way that the individual jobs to be carried out in an electrical installation, or in its vicinity, are performed by persons with or who have maintained the required level of competence, or who have received the necessary training and instructions".

Article 3.- Article 192 of the Regulations is replaced by the following article:
"Article192.- PRECAUTIONS TO BE TAKEN AT WORK
01-. Precautions to be taken when working in the vicinity of overhead lines.

Work carried out in the area adjoining an overhead line with “bare or similarly exposed conductors” is subject to the provisions of Article 266 and prior written permission from the line controller who must inform the applicant of the specific risks and any safety precautions to be taken.

In addition, due account must be taken of the worst-case condition pertaining to the line when determining the adjacent area.

02.- Precautions to be taken when work is carried out in the vicinity of underground electrical cables.

a) Principle
No excavation or paving, or similar work, must be undertaken in the vicinity of an underground electrical cable without first consulting the owner of the ground, the authority responsible for highways management and the cable controller. The presence or absence of the markers referred to in Article 188 does not dispense with the need for such consultation.

Apart from this consultation, execution of the work proper may only proceed after the cables have been located.

b) Emergencies
The provisions of the first paragraph of item a. above are not mandatory if the continuity of service dictates the urgent execution of the work. Only the provision relating to the prior location of the cables remains valid, even where prior consultation has not been possible.

c) Use of mechanical excavating equipment and machinery
Mechanical excavating equipment or machinery may not be used within a boundary defined by two vertical surfaces around the cable at a distance of 50 cm unless the contractor and the cable controller have reached a prior agreement on the conditions to be observed."

Article 4.- Article 196 of the Regulations is replaced by the following article:
"Article 196 .- TEMPORARY PRECAUTIONS

If the presence of a live electrical power line in the public domain constitutes a danger with regard to the execution of work undertaken in the adjoining area, as defined in Article 266 and/or if there is a risk that the adjoining area may be penetrated, the electrical power line controller is bound to adopt and/or institute appropriate measures, such as the following:

- temporary raising of the electrical power line concerned;
- temporary disconnection of the line;
- the positioning of protective screens;
- barring or issuing instructions to bar access to the live area;
- any other means deemed necessary.

After a substantiated request has been lodged with the line controller, the time and period required to execute the work must be agreed jointly."

Article 5.- Article 266 of the Regulations is replaced by the following article:
"Article 266.- WORK IN ELECTRICAL INSTALLATIONS

01.- Scope

This article applies to all construction work carried out on, with or in the environs of

electrical installations.
The article does not apply to persons using electrical installations designed and installed for use by persons graded BA1, BA2 or BA3, as defined in Article 47.

02.- Definitions

02.1.- **Construction work**

Any form of construction work that poses an electrical hazard. This applies equally to electrical and non-electrical work and operating tasks.

02.1.1.- **Electrical work**

Work on, with or in the environs of an electrical installation (including tests and measurements, repairs, cleaning of electrical accessories, replacements, modifications, extensions and maintenance, etc) and which directly concern the electrical installation.

02.1.2.- **Non-electrical work**

Work carried out in the vicinity of an electrical installation (including excavation work, construction work, pruning, cleaning, painting, etc.) not directly concerning the electrical installation.

02.1.3.- **Operating tasks**

Operating and control tasks:

The purpose of operating and control tasks is to change the electrical state of an electrical installation, to use an item of equipment and to connect, disconnect, start up or shut down equipment. This applies equally to the isolation or re-connection of installations to enable work to proceed.

Inspection tasks

Inspection tasks may include:

- a visual examination;
- tests;
- measurements.

Inspection tasks are conducted to check the configuration, maintenance state or the compliance of an electrical installation.

Tests include all activities designed to check operation, or the electrical, mechanical and thermal condition of an electrical installation. Tests also cover activities designed to verify the efficacy of electrical protection devices and safety circuits, for example.
Measurements include all activities designed to measure physical magnitudes in an electrical installation.

02.2.- **Live working**

This refers to work in the course of which persons come into contact with uninsulated live electrical parts, or penetrates the live area either by means of a part of the body, or with the aid of working equipment or devices.

02.3.- **Work in the vicinity of live parts**

This refers to work during which a person penetrates the adjoining live area, either by means of a part of the body, or with working equipment and devices, although not actually entering the live area.

02.4.- **Work in areas not live**

This refers to work on electrical installations that are not live or electrically energised, which work is carried out after having taken all the necessary precautions to prevent electrical hazards.

02.5.- **Work supervisor**

The person appointed to oversee the work.

02.6.- **Installation supervisor**

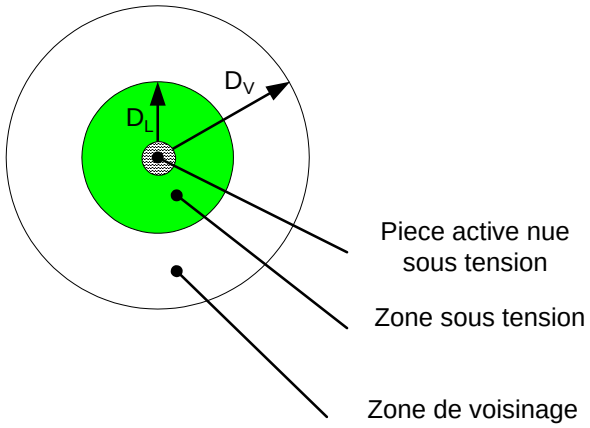
The person appointed to assume responsibility for operation of the electrical installation. The responsibility may be delegated in part to other persons, if necessary.

02.7.- **Working area**
The physical space in which the work is carried out.

02.8.- **Adjoining area**
A bounded space surrounding the live area, as defined in Figures 1 and 2 below and in Table A.

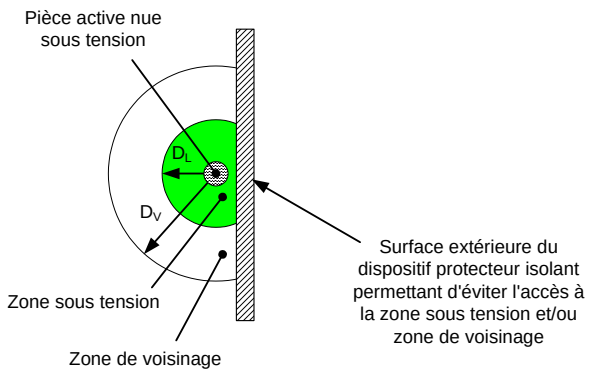
02.9.- **Live area**
A bounded space surrounding the active, uninsulated live parts, as defined in Figures 1 and 2 below and in Table A.

Figure 1:



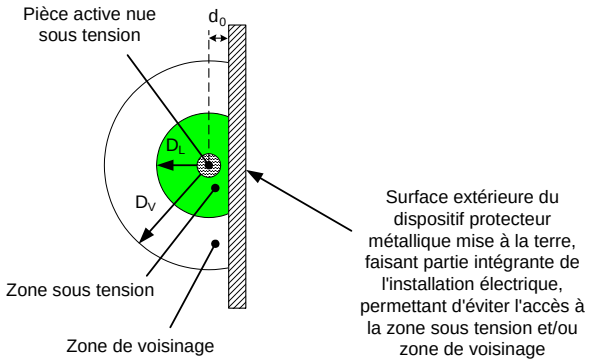
Pièce active nue sous tension - Uninsulated active live part
Zone sous tension - Live area
Zone de voisinage - Adjoining area

D_L: distance defining the outer boundary of the live area.
D_V: distance defining the outer boundary of the adjoining area.
Figure 2a:



Pièce active nue sous tension - Uninsulated active live part
Zone sous tension - Live area
Zone de voisinage - Adjoining area
Surface extérieure du dispositif protecteur isolant permettant d'éviter l'accès à la zone sous tension et/ou zone de voisinage - Outer surface of protective insulating device barring access to the live area and/or the adjoining area

D_L: distance defining the outer boundary of the live area.
D_V: distance defining the outer boundary of the adjoining area..
Figure 2b:



Pièce active nue sous tension - Uninsulated active live part
Zone sous tension - Live area
Zone de voisinage - Adjoining area
Surface extérieure du dispositif protecteur métallique mise à la terre faisant partie intégrante de l'installation électrique, permettant d'éviter l'accès à la zone sous tension et/ou zone de voisinage - Outer surface of protective metal earthing device, which is an integral part of the electrical installation, barring access to the live area and/or the adjoining area

d_0: minimum distance in accordance with Article 44
D_L: distance defining the outer boundary of the live area.
D_V: distance defining the outer boundary of the adjoining area..
The values of the distances D_L and D_V are shown in Table A.

Table A. Distances D_L and D_V

Rated mains voltage U_N [kV] (r.m.s. value)	Distance defining the outer boundary of the live area. D_L mm]	Distance defining the outer boundary of the adjoining area D_V [mm]
≤1	no contact	500
3	120	1120
6	120	1120
10	150	1150
15	160	1160
20	220	1220
30	320	1320
36	380	1380
45	480	1480
60	630	1630

70	750	1750
110	1000	2000
132	1100	3100
150	1200	3200
220	1600	3600
275	1900	3900
380	2500	4500
480	3200	6200
700	5300	8300

Note 1: The intermediate values of D_L and D_V may be determined by linear interpolation.

Note 2: In the case of DC installations, the same distances may be used with reference to the rated mains (utility) voltage values.

03.- General provisions

03.1.- Basic principle

All work must be preceded by an estimated assessment of the risks involved, in order to determine how the work must be prepared and carried out in absolute safety.

In the case of operating tasks or repetitive jobs being carried out in the same circumstances, a general written procedure based on an estimate of the risks will suffice.

All collective and individual means of protection, as well as all working aids (tools, measuring instruments, etc) used must be suitably adapted and maintained in a satisfactory condition for use and they must be used correctly.

If necessary, appropriate warnings must be placed in position throughout the duration of the work.
Any defects that might pose an immediate danger must be remedied without delay.

03.2.- Personnel

Any person engaged in the work in progress must be alerted to the safety provisions and internal safety instructions applicable to his particular task. Reminders must be issued whenever the work in progress extends over a lengthy period, or whenever the working conditions are altered.

03.3.- Organisation

Each electrical installation must be placed under the responsibility of the electrical installation supervisor.

All work must be conducted under the responsibility of the work supervisor.
The work supervisor and the electrical installation supervisor must take the appropriate steps, by mutual agreement, to guarantee safe execution of the work in hand.

The electrical installation supervisor and the work supervisor may be one and the same person.

The working area must be defined by the work supervisor, after consultation with the installation supervisor. Sufficient working space and access facilities must be provided.

If it should prove necessary, on the basis of the risk assessment:

- the working area and/or access to that area must be signposted;
- a written work preparation schedule must be drafted.

Any information needed, whether verbal or in writing, or displayed visually, must be communicated in a reliable, unambiguous manner.

To prevent any mistakes when information is conveyed verbally, the recipient must repeat back that information to the sender, which latter must in turn confirm that it has been received correctly and understood.

Permission to begin work and to restore electrical power to the installation after the work has been completed, may not be conveyed by signals sent automatically, nor by prior agreement after a particular interval of time.

04.- Operating tasks

04.1.- Overview

Operating tasks are subject to the approval of the electrical installation supervisor and must be carried out by qualified persons, or by those acquainted with the risks involved. The installation supervisor must, if necessary, be duly notified when the current operating tasks have been completed.

The persons carrying out operating tasks must take the appropriate precautions against electrical hazards. All collective or individual means of protection as well as all working aids (suitable working apparel, measuring instruments and so forth) must be appropriate to this particular application.

Where necessary, the rules regarding work with equipment powered up, live work, or work in the vicinity of live parts must be applied.

The satisfactory performance of measuring and test instrumentation must be checked before and, if necessary, after use.

Such checks must be carried out by qualified persons with experience in verification work on similar installations. The checks must be conducted using suitable equipment to prevent any danger, whilst taking due account of any limiting factors imposed by the presence of uninsulated live parts.

When tests are conducted using an external power supply source, precautions must be taken to ensure that:

- the installation is isolated from any normal power source;
- the installation cannot be powered up from any other power source;
- safety measures against the electrical risk are applied throughout the tests for all personnel present;
- the isolation points are sufficiently separated to withstand the simultaneous application of the test voltage at one end and the working voltage at the other end.

04.2.- Operating with current and voltage present

In category 2 high- and low-voltage installations, it is forbidden to handle fused circuit-breakers when they are energised; an exception to this rule may apply in the case of fused circuit-breakers that protect voltage transformers and transformers with a power rating of not more than 10 kVA, on condition that in the latter case, the low-voltage circuit is totally isolated before operating the primary circuit-breakers.

Category 2 high- and low-voltage isolating switches may only be operated live during

installation start-up and shutdown operations, where the installed apparent power does not exceed 100 kVA.
However, this provision does not apply in the case of open-air switches on overhead lines, which are operated remotely and fitted with horns or any other device able to withstand current breaks with significant r.m.s. values.
The same applies when the isolators control circuit-breakers fitted with current-limiting devices, provided that personnel are protected during operation.
Operations performed directly on active parts, isolating switches and category 2 fused low-voltage circuit-breakers and high-voltage circuit-breakers, may only be carried out using devices comprising at least two insulating elements in series, whereby each provides sufficient insulation, appropriate to the rated mains voltage. A handling probe with a level of insulation equivalent to that of the entire device may be used for this purpose.
Checking the presence or absence of voltage, loss of phase alignment and so forth, using a portable category 2 high- and low-voltage instrument, may proceed only if the said instrument provides sufficient insulation, appropriate to the rated mains voltage.

05.- Working procedures

05.1.- Overview

The installation supervisor or the work supervisor must ensure that specific detailed instructions are issued before personnel begin their work. He must ensure that those instructions are understood and applied.

Before work begins, the work supervisor must inform the installation supervisor of the nature, location, and schedule with respect to the work envisaged and its consequences with regard to the electrical installation.

Where work is scheduled in advance, apart from operating tasks, the information must be provided in writing.
Only the installation supervisor may give permission to begin work. This procedure must also be defined to accommodate disruptions.

In principle, the work must be carried out with power switched off.

Live working may only be performed when the following three conditions obtain:

- the characteristics of the electrical installation allow this
- an appropriate working method is implemented
- departmental requirements impose such a need.

05.1.1.- Induction

Conductors or conducting parts in the vicinity of live conductors may be affected electrically. Notwithstanding the provisions of sections 05.2 and 05.4, specific precautions must be taken when work is being carried on the said conductors or conducting parts, which are subject to induction:

- by establishing earth connections at suitable intervals, in order to reduce the potential between conductors and earth to a safe level;

- by establishing equipotential connections to the working area, in order to prevent the likelihood of persons penetrating an inductive loop.

05.1.2.- Atmospheric conditions

In the event of unfavourable atmospheric conditions, certain restrictions must be imposed. If it should prove necessary to avoid any danger, where work is being carried out in open-air installations, or on equipment connected directly to such an installation, whenever lightning is seen or thunder is heard, or if a storm breaks out, that work must be halted immediately and the installation supervisor must be notified accordingly.

If visibility is poor in the working area, no work must be initiated or carried out.

05.2.- Working with power off

To ensure that the electrical installation in the working area is powered down and remains so throughout the duration of the work, the following measures must be adopted:

- work must be prepared beforehand;
- the electrical installation must be isolated;
- it must be ensured that power cannot be restored to the electrical installation;
- it must be confirmed that no voltage is present;
- the installation must be connected to earth, discharged and short-circuited;
- it must be ensured that the electrical installation is clearly marked and/or adequately protected;
- the electrical installation may then be handed over.

05.2.1.- Preparing work

Preparation consists in identifying the installations on which work is to proceed and deciding on the steps to be taken in order to guarantee safety and enable the installation handover to take place.

05.2.2.- Isolation

The part of the installation on which the work is to be carried out must be isolated from all power sources, in accordance with the provisions of Article 235.01.

05.2.3.- Ensuring that power cannot be reinstated

All the switching devices used to isolate the electrical installation in the working area must be protected against the possibility of re-activation, preferably by locking the mechanism. If the mechanical locking option is not possible, other arrangements must be made to provide adequate protection against any inadvertent reinstatement of power. If the isolating device is controlled by an auxiliary power source, that source must be rendered inoperative.

Warning panels must be posted to prohibit any accidental operation. This proscription does not apply in the case of the automatic isolating switches specified in Article 235.

05.2.4.- Checking the absence of voltage;

The absence of voltage must be confirmed by positioning suitable devices on all active conductors in the electrical installation within the working area, or as close to them as possible.

05.2.5.- Connecting to earth, discharging and shorting out

05.2.5.1.- Overview

In the working area in all high-voltage installations and certain low-voltage installations (see item 05.2.5.2), all the parts on which work is to be carried out must be connected to

earth and shorted out. The earthing and shorting-out equipment or devices must be connected initially to the earth point and then to the active parts to be earthed.
The active parts in the said electrical installation that still indicate the presence of capacitive charges after isolation must be discharged using appropriate devices.
Those installations which, after isolation, contain any residual voltage may not be shorted out until the residual voltage has disappeared completely.
The earthing and short-circuiting equipment or devices must remain visible, where this is possible, from the working area. If this is not so, the earthing connections must be positioned as close to the working area as is reasonably practicable.
When work is in progress and conductors must be isolated or coupled together and there is a risk of potential differences in the installation, appropriate measures must be taken in the working area before any conductors are isolated or coupled together, such as shunting or connecting to earth.

In all cases, it must be ensured that the earthing equipment and/or devices (earthing isolators, cables and related devices) is/are appropriate with regard to the envisaged short-circuit current.

Precautions must be taken to ensure that equipment connected to earth remains safe throughout the period that work is in progress, except when those earth connections have to be removed during measurements or tests, where these cannot proceed when a short-circuit or earthing current is present. In this case, additional or alternative precautions must be taken.

05.2.5.2.- Provisions relating to low-voltage installations

The obligation regarding the shorting out and earthing of low-voltage installations in the working area are mandatory only if there is a risk of the installations being powered up again; for example:

- overhead lines crossed by other lines or affected by them electrically;

- installations that may be powered by emergency power sources.

05.2.5.3.- Provisions relating to high-voltage installations

a) In the case of overhead lines with bare or similarly exposed conductors, earthing and shorting operations must be carried out as close as possible to the working area, on all conductors running into that area; at least one of the shorting and earthing devices or equipment must be visible from the working area. These rules are subject to the following exceptions:

- for specific tasks, provided the continuity of the conductors is not disrupted as work proceeds, the installation of a single shorting and earthing device is permitted.

- when it is not possible to detect the shorting and earthing devices from within the bounds of the working area, a local shorting and earthing device must be set up.

When work is carried out on one single conductor of an overhead line only, shorting out is not required in the working area, provided that the following conditions are satisfied:

- all isolation points are earthed and shorted out in accordance with the provisions of section 05.2.5.1.

- the conductor on which the work is carried out and all conducting parts in the working area are bunched together electrically and connected to earth via suitable equipment or devices.

- the conductor connected to earth, the working area and the operative himself are at a distance of more than D_L (see Figures 1 and 2) from the other conductors in the same electrical installation.

b) In the case of insulated overhead lines, insulated cables or other insulated conductors, earthing and short-circuiting connections must be made to the uninsulated parts of the isolation points in the installation, as close as possible around the working area.

05.2.6.- Signposting and/or providing protection

When parts of an electrical installation in the immediate environs of the working area remain powered up, signs must be posted and/or protection provided, in compliance with the provisions of section 05.4.

05.2.7.- Handover

Permission to commence work must be given by the work supervisor. He must inform personnel that they may begin work in the part handed over.

The work supervisor may only give the operatives permission to commence work when the measures prescribed in sections 05.2.1 to 05.2.6 have been instituted.

05.2.8.- Reinstating power

Following the shutdown or completion of work and after checks have been carried out, those persons who are no longer essential must leave the working area. All operating equipment, warning indications and collective protection devices used during the work must be removed if they are no longer required during any subsequent resumption of work.

The measures indicated in sections 05.2.2. to 05.2.6 that were introduced to guarantee safety must be dispensed with.
As soon as one of the measures indicated in section 05.2, instituted to render the installation safe, has been dispensed with, that part of the electrical installation must no longer be regarded as an area in which work may proceed with the power off.

Only after the work supervisor has ascertained that the electrical installation is ready to be powered up again safely, may he notify the installation supervisor that work has ceased.

Only at that point may the power supply be reinstated.

Work to restore power to the installation must be carried out under the responsibility of the installation supervisor.
05.3.- Live working

05.3.1.- Overview

- Live working may not begin until all the necessary precautions have been taken to eliminate the risk of burns, fire and explosion.

- Protective measures to prevent electric shock and short-circuits must be instituted wherever personnel are called upon to work when the installation is powered up.

- All collective and individual means of protection as well as all working aids (suitable working apparel, measuring instruments, etc) used must be appropriate to the particular application.

05.3.2.- Job-oriented training and qualifications

Only those persons who have followed a special training scheme may, after positive assessment of their skills, carry out live work.
The ability to perform tasks with power connected must be maintained, either by means of practical application or through continuous or additional training.

05.3.3.- Working methods - Definitions

1. Working at a distance of $>D_L$

A method of live working, whereby the person remains at a specified distance from uninsulated parts and carries out his work using suitably insulated operating equipment.

2. Close-contact work

A method of live working, whereby the person, whose hands are electrically protected by insulating gloves and, where applicable, is wearing protective sleeves for his arms, performs his work in direct mechanical contact with uninsulated live parts.

In low-voltage installations, the use of insulating gloves in no wise dispenses with the need to use insulating or insulated hand tools that afford sufficient protection for the particular environment.

3. Work at rated potential

A method of live working, whereby the person performs his task in direct contact with the active parts, after having been raised to the rated potential and isolated from his environment.

05.3.4.- Working equipment affording collective and individual protection

In pursuance of the provisions of section 03.1, the characteristics, use, storage, maintenance, transport and inspection of working equipment and devices for live working must be defined by specifications.

05.3.5.- Environmental conditions

Restrictions must be imposed for live working in the event of adverse atmospheric or environmental conditions.

When the prevailing conditions dictate that work must be disrupted, personnel must quit the installation and leave insulating and insulated devices in a safe condition. Before work is resumed on category 2 high-voltage installations, the working tools used must be handled in accordance with the manufacturer's instructions, where applicable.

05.3.6.- Special provisions relating to very low-voltage installations

In the case of very low-voltage installations (where the voltage does not exceed the values shown in the table in Article 32.02) live work is permitted without special precautions against direct contact. Appropriate measures must be instituted to prevent any risks of short-circuiting. With regard to other forms of very low-voltage installations, live work may proceed in accordance with the provisions of section 05.3.7.

05.3.7.- Additional provisions relating to low-voltage installations

Irrespective of the special provisions relating to certain dedicated low-voltage installations, the following general provisions are applicable, depending on the degree of risk encountered:

- use of appropriate collective protection tools;
- application of additional insulation and/or the use of insulated tools;
- use of individual protection equipment (gloves, face mask).

05.3.8.- Additional provisions relating to high-voltage installations

Live working is authorised in high-voltage installations, provided that specific safety procedures are observed.

It must be confirmed that all the methods and tools selected are appropriate for the installation on which work is to be carried out. Their dielectrical and mechanical characteristics must be chosen in accordance with their specification or number and must take due account of the physical parameters in the working area.
If the extent of the working area does not allow the person appointed as work supervisor to guarantee all-round supervision, that person must appoint another as his assistant.

05.3.9.- Specific tasks under power

Certain tasks such as cleaning, spraying or clearing deposits of ice on insulating materials must be described in specific job-oriented working instructions. The personnel performing such tasks must be qualified or fully-conversant with the risks.

Cleaning tasks under power in high-voltage electrical installations must be carried out in accordance with the following instructions:

a) The usage characteristics of the working equipment employed for tasks such as spraying cleaning fluid (wet cleaning), or the installation of vacuum cleaners (dry cleaning) and even of the fluid itself must be determined on the basis of the rated voltage U_n of the circuits on which the work is being conducted;

b) The usage characteristics (degree of insulation, leakage current, damp, breakdown

voltage, etc) of the working equipment indicated in a) must be based on a test report issued by an accredited laboratory with respect to the particular application;

c) The dimensions of the hose (wet cleaning) as of the suction nozzle (dry cleaning) must be such that, when work is in progress, their handles always remain outside the area bounded by the protective screens around the high-voltage parts (which may have been removed);

d) The cleaning fluid must be neither flammable nor noxious to the working staff;

e) Cleaning tasks may only be carried out by hazard-aware personnel (BA4) or qualified personnel in the company of another qualified person (BA5), as described in the General Regulations on Electrical Installations (Article 47). The said persons must have undergone a job-specific practical training course adapted to the particular risks associated with this kind of work;

f) When in the vicinity of an unprotected low-voltage distribution board (IP rating of at least XX-A) inside a transformer substation, the person responsible for the cleaning work must wear working apparel that is electrically insulated for low-voltage work;

g) Steps must be taken to ensure that the fluid cannot become saturated with water and that the condensate cannot be splashed about;

h) The cleaning fluid must not contain components that are liable to degrade the insulating materials in the electrical equipment.

05.4.- Work in the vicinity of live parts

05.4.1.- Overview

05.4.1.1.- Work in the vicinity of live parts with a rated voltage in excess of that of the very low voltage installation may only be carried out when safety precautions ensure that the live parts cannot be touched, or that the live area cannot be accessed.

The values of the distances D_V, which define the outer boundary of the adjacent area, are shown in Table A.

05.4.1.2.- In order to overcome the electrical risks in the vicinity of live parts, protection must be provided in the form of shields or obstacles. If such precautions cannot be introduced, protection must be guaranteed by imposing a minimum working distance of not less than D_L with respect to the live parts and, if necessary, providing adequate supervision.

05.4.1.3.- Before work begins, the person appointed as work supervisor must give instructions to the personnel, especially those who are not familiar with working conditions in the vicinity of live parts, with regard to the principle of maintaining a safe distance, the safety precautions in force and the need to adopt a responsible approach in keeping with good safety standards. The boundary of the working area must be accurately defined and attention must be drawn to unusual circumstances or conditions. The instructions must be repeated at appropriate intervals, or following a change in the working conditions.

05.4.2.- Protection using shields or obstacles

05.4.2.1.- When such protective devices are to be installed inside the live area, they must consist of suitable insulating materials and adequate procedures must be applied, both with respect to work where the equipment is powered down and to live working.

05.4.2.2.- When these protective devices are to be installed outside the live area, they must be introduced using the procedures for working with power off, or by employing means that prevent the personnel installing them from entering the live area. Otherwise, the procedures applicable when live working must be instituted.

05.4.3.- Protection by maintaining a safe working distance

When protection by maintaining a safe working distance is employed, this method must embody the following three points at least:

- the distance of not less than D_L to be maintained, allowing for the nature of the work and the rated voltage of the electrical installation;

- the criteria to be adopted when appointing personnel likely to perform such work;

- the procedures to be adopted during work to prevent personnel entering the live area.

If necessary, suitable supervision must be provided.

05.4.4.- Non-electrical work carried out by non-electricians

In the case of non-electrical work, such as:

- construction work;
- erection of scaffolding;
- installation and the use of hoisting equipment, civil engineering plant, fireman’s lifts and ladders;
- installation work;
- transportation work;
- painting and refurbishment work;
- introducing other equipment and construction plant,

the distances shown in Table A of this Article and that specified in Article 28.01 concerning the degree of accessibility by touch must be complied with.

The distance must be determined in the light of:

- the mains supply voltage;
- the nature of the work;
- the equipment to be used;
- the fact that the people concerned are unqualified people.

In the case of overhead lines, due account must be taken of all the possible movements of the lines and all the movements, shifts, swings, lashings or drops that the equipment used to perform the work might undergo.

06.- Maintenance work

06.1.- Overview

06.1.1.- The purpose of maintenance is to keep the electrical installation in a satisfactory working order. The maintenance task may consist of "preventive maintenance" which is carried out on a routine basis to prevent faults, or "remedial maintenance" which is carried

out to repair or replace defective parts.

06.1.2.- There are two types of maintenance work:

- work during which the safety of maintenance personnel is jeopardised, which calls for application of the working procedure described in section 5.
- work where the design of the equipment itself enables maintenance to be carried out in absolute safety, in accordance with the working procedures described in section 6.4 (e.g. replacing fuses or light bulbs).

06.2.- Personnel

06.2.1.- All maintenance work must be subject to the approval of the installation supervisor before it commences.

06.2.2.- When maintenance work is carried out on an electrical installation:

- the part of the installation concerned must be clearly defined;
- the person responsible for maintenance must be appointed.

06.2.3.- If necessary, the provisions relating to work with the equipment powered down, live work, or work in the vicinity of live parts must be applied
06.2.4.- The maintenance personnel performing the work must be alerted to the hazards, or professionally skilled. All collective or individual means of protection and all working aids (suitable working apparel, measuring instruments and so forth) must be appropriate to the particular application.

06.2.5.- All safety precautions must be taken, including those designed to protect persons and property.

06.3.- Repair work

Repair work may comprise the following stages:

- the detection and tracing of the fault;
- clearing faults and/or replacing components;
- reinstating the repaired part of the installation.

It may be necessary to apply different working procedures at each stage.

06.3.1.- Specific working procedures must be applied for detecting and tracing faults on a live installation or during the application of test voltages, based on the working procedures described in section 5.

06.3.2.- Fault-clearing must be carried out in accordance with the working procedures described in section 5.

06.3.3.- Tests and the appropriate adjustments must be carried out to ensure that the repaired parts of the installation are ready for power to be restored.

06.4.- Replacement work

06.4.1.- Replacement of fuses

Normally, fuses should be replaced when the equipment is powered down.

In the case of low-voltage installations, if the fuse is mounted in a way that protects the person against direct contact and prevents short-circuits, the replacement may be carried out by an unqualified person, without the need to check whether the power is on or off.

In the case of high-voltage installations, the replacement must be carried out by a qualified person, in accordance with the working procedures described in section 5.

06.4.2.- Replacement of light bulbs and accessories

In normal circumstances, the replacement of bulbs and detachable accessories (e.g. fluorescent starters) must be carried out with the power off.

In high-voltage installations, the replacement must be carried out in accordance with the working procedures described in section 6.3. Non-detachable accessories must be replaced by applying the working procedures described in section 5.
It should be confirmed that the spare parts used are appropriate for the equipment to be maintained.

06.5.- Temporary shutdown

In the event of a temporary shutdown of maintenance or repair work, the person appointed as work supervisor must take all the necessary precautions to prohibit access to the live parts and any unauthorised operation of the electrical installation.

If necessary, the person appointed as supervisor of the electrical installation must be notified.

06.6.- End of maintenance or repair work

On completion of the maintenance or repair work, the person appointed as maintenance work supervisor must hand the installation back to the person appointed as installation supervisor and must convey a message to him indicating its status at the time of handover."

Article 6.- This Decree applies to electrical installations and important alterations or extensions to be carried out on site that have not already been started three months after the date of publication of this Decree.

Article 7.- Our Minister for Work, Our Minister for Energy and Our Secretary of State for the Organisation of Work and Well-Being at Work are responsible, each for their own part, for the implementation of this Decree.

Done at

By the King:

The Minister for Work,

F. VANDENBROUCKE.

The Minister for Energy,

F. MOERMAN.

The Secretary of State for the Organisation of Work and Well-Being at Work,

A. TEMSAMANI.