

## SECTION 6

### MINIMUM SAFE DISTANCES BETWEEN CONDUCTORS OF DIFFERENT CIRCUITS, TELECOMMUNICATION LINES AND STAY WIRES

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#### 6.1 GENERAL

- 6.1.1 This section sets minimum safe distances for overhead electric lines to prevent conductors contacting other conductors, or stay wires, or approaching sufficiently close to cause a fault condition. This section also applies to telecommunications lines.
- 6.1.2 The requirements of this section do not apply to substations and generating stations and unless specifically identified, traction system conductors.
- 6.1.3 The distances specified in Table 7 do not apply where the conductors of all relevant circuits are insulated. In the case of any of the insulated conductors operating at a voltage in excess of 1 kV, the conductor, or bundle of conductors, shall include an earth screen.
- 6.1.4 Where two circuits of different voltage cross each other, are attached to the same support, or share spans, the conductors of the higher voltage circuit should be placed above those of the lower voltage circuit. Earth wires may be above power circuits.
- 6.1.5 Telecommunications lines shall always be below power circuits.

#### 6.2 CONDUCTORS OF DIFFERENT CIRCUITS ON DIFFERENT SUPPORTS (UNATTACHED CROSSINGS)

- 6.2.1 Under still air conditions, the vertical distance between any conductor or telecommunications line of the lower circuit at minimum sag and any point to which a higher circuit conductor may sag under the influence of short time overload current and solar radiation shall not be less than specified in Table 7.
- 6.2.2 The minimum vertical distance to a traction system is 2 m.

**TABLE 7** MINIMUM VERTICAL DISTANCES BETWEEN CONDUCTORS  
(unattached crossings)

Higher voltage of either circuit	Minimum distance between conductors (unattached crossing) (m)
Below 1 kV a.c.	0.6
1 kV to 33 kV a.c.	1.2
Exceeding 33 kV but not exceeding 66 kV a.c.	1.8
110 kV a.c.	2.4
220 kV and 270 kV d.c.	2.8
350 kV d.c.	4

### 6.3 CONDUCTORS (SAME OR DIFFERENT CIRCUITS) ON THE SAME SUPPORT (ATTACHED CROSSINGS) INCLUDING SHARED SPANS

- 6.3.1 Where a detailed engineering study of the over-voltages and the conductor motion has not been undertaken, the distances between conductors of different circuits at any point on the same support under normal working conditions shall not be less than specified in Table 8.

**TABLE 8 MINIMUM SAFE DISTANCES BETWEEN CONDUCTORS**  
(attached crossings)

Higher voltage of either circuit	Lower voltage of either circuit	Distance between circuits (m)
Not exceeding 33 kV a.c.	Less than 1 kV	1.0
	Greater than 1 kV	1.2
Exceeding 33 kV but not exceeding 110 kV a.c.	Less than 1 kV	1.5
	Greater than 1 kV	2.0
Exceeding 110 kV a.c. or d.c.	All	2.5

- 6.3.2 The distances in Table 8 may be reduced if a detailed engineering study of the maximum probable over-voltages and conductor motion establishes that there will be no adverse effects from a shorter distance.
- 6.3.3 Where lines operate at less than 1 kV, adequate measures should be taken to protect against unacceptable voltage rise between the lower voltage line and any structure energised due to the occurrence of a fault on the higher voltage line.
- 6.3.4 Where conductors are taken down a pole or other support to or from a transformer or other fittings, the distance between any conductors (*not being insulated to full working voltage*) shall be not less than the following:
- 600 mm between any line of low voltage and a line of 11 kV.
  - 750 mm between any line of low voltage and a line of 22 kV.
  - 900 mm between any line of low voltage and a line of 33 kV.
- 6.3.5 A reduced distance may be used at or near the terminals of any such transformer or other fittings where those terminals have a lesser distance between them than the minimum distance specified.

### 6.4 TELECOMMUNICATION LINES NEAR CONDUCTORS AND STAY WIRES

- 6.4.1 Subject to clauses 6.4.2 and 6.4.3, the minimum distance at any time between any telecommunication line (*including traction communication lines or signal wires*) and a conductor or stay wire shall not be less than the distances specified in Table 7.
- 6.4.2 Notwithstanding the distance specified in Table 7, at a shared support, the minimum distance of:
- a telecommunications line from a high voltage conductor that is not insulated shall not be less than 1.6 m; and
  - a bare telecommunications line from a bare low voltage conductor shall not be less than 1.2 m.
  - a covered telecommunications line from a bare low voltage conductor shall not be less than 0.6 m.

- (d) For insulated conductors, and/or covered low voltage conductors, and covered telecommunications conductors, the distance shall not be less than 300 mm. This distance also applies to shared spans.

6.4.3 The minimum distance requirements specified in Table 7 between conductors and telecommunication lines do not apply to fibre optic cables that are:

- (a) bound to a live conductor for support; or
- (b) contained inside the lightning protection or earth conductor.

6.4.4 A bare catenary wire supporting a telecommunication line is deemed not to be bare for the purpose of this sub-section if the catenary is earthed at not less than every 10th pole in straight runs and at every pole when a cross-over or tee junction occurs.

## SECTION 7

### DESIGN AND INSTALLATION REQUIREMENTS FOR SUPPORTS AND STAY WIRES OF OVERHEAD ELECTRIC LINES, AND CONTROL OF ACCESS

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#### 7.1 SUPPORTS

- 7.1.1 All supports (*including stay wires, stay anchors, and other supporting equipment*) for conductors shall be so located as to avoid undue obstruction to pedestrian or vehicular traffic.
- 7.1.2 Poles or other supports shall not be erected closer than 4 m to the centre of the nearest railway track (*being measured horizontally from the centre of the nearest two rails to the nearest face of the pole or other support*) unless by agreement with the owner of the railway.
- 7.1.3 Live conductive parts less than 4.5 m above ground level, and attached to any pole or other support, shall be protected in such a manner as to prevent any accidental contact in reasonably foreseeable circumstances.
- 7.1.4 Any metal attached to a pole or other support, that is placed less than 2.5 m above ground level and that could become accidentally charged, shall be in direct contact with the earth, earthed or else adequately protected to prevent human contact.

#### 7.2 STAY WIRES

- 7.2.1 Any stay wire less than 2.5 m from the ground in any direction that is likely to be a hazard shall be conspicuously marked.
- 7.2.2 Stay wires that are less than 2.5 m from the ground shall be earthed unless they are in direct contact with the earth. Alternatively, an insulator having a wet flashover value not less than that of the overhead electric line shall be inserted in the stay in a suitable position.
- 7.2.3 Stay wires that are erected across the part of any public road used by vehicular traffic shall have a minimum vertical distance above the ground of 5.5 m.
- 7.2.4 Stay wires shall not be less than 300 mm from any bare telecommunications line.

#### 7.3 CONTROL OF ACCESS

- 7.3.1 Every conductor of an overhead electric line shall be so erected that it is not readily accessible to any person without the use of a climbing device.
- 7.3.2 Climbing steps on overhead electric line support structures shall not be placed at a height of less than 3 m above ground level.

## **SECTION 8**

### **SAFE DISTANCES FOR THE DESIGN OF SUBSTATIONS, GENERATING STATIONS, SWITCHYARDS AND SWITCHROOMS**

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#### **8.1 GENERAL**

- 8.1.1 Safe distances in substations, generating stations, switchyards and switch-rooms where access to electricity supply works is required for operation, maintenance and installation activities, undertaken by competent employees, shall be suitable for the activities being undertaken and shall allow safe and unobstructed egress in emergency situations.

#### **8.2 METALCLAD SWITCHGEAR**

- 8.2.1 At the front of any low voltage and high voltage metalclad switchgear, there shall be a clear and unobstructed passageway at least 1 m wide and 2.5 m high.
- 8.2.2 Where frequent access is required for work at the sides or rear of any metalclad switchgear, there shall be clear and unobstructed passageways at least wide 1 m wide and 2.2 m high.

#### **8.3 BARE CONDUCTORS WITHIN EARTHED ENCLOSURES**

- 8.3.1 This subsection does not apply to bare conductors on or within panels or within fenced enclosures within buildings.
- 8.3.2 Any passageway at the side of or under any earthed enclosure containing bare conductors shall be clear and unobstructed and at least 800 mm wide and 2.2 m high.

#### **8.4 BARE CONDUCTORS IN SUBSTATIONS, SWITCHYARDS, GENERATING STATION BUILDINGS AND OTHER LOCATIONS**

- 8.4.1 In substations, switchyards, generating station buildings and other locations where there are bare conductors, the design and layout of the conductors shall be such that persons can carry out work without hazard.
- 8.4.2 Safety to persons shall be maintained by the provision of adequate distances to live parts for maintenance, vehicular access and pedestrian access, and if necessary to barriers or fences.
- 8.4.3 In fenced or other enclosed areas where access is restricted to situations where all conductive parts have been de-energised, distances may be reduced below those required by clauses 8.4.1 and 8.4.2, in accordance with a specific engineering design.
- 8.4.4 The distance from any bare conductor to any boundary fence or wall or similar enclosure boundary shall not be less than specified in Table 3.
- 8.4.5 The distances specified in Table 3 are generally applicable for bare conductors adjacent to substation buildings or other structures. These distances do not apply for situations where conductors are supported on buildings or other structures and may be reduced with a specific engineering design.

## SECTION 9

### MINIMUM SAFE APPROACH DISTANCE LIMITS FOR PERSONS WORKING NEAR EXPOSED LIVE PARTS

#### 9.1 GENERAL

- 9.1.1 This section sets out minimum safe approach distances limits for persons working near exposed live parts.
- 9.1.2 Minimum safe distances limits are provided for non-competent persons. Reduced safe distances are provided for where;
- the owner of the live parts gives written permission; and
  - competent employees are working near exposed live parts.
- 9.1.3 Minimum safe distances from exposed live parts shall be maintained at all times. Where necessary, insulating barriers shall be used to maintain minimum safe approach distances.
- 9.1.4 This section does not apply to work near conductors of extra-low voltage, or live line or live substation work.
- 9.1.5 Figure 6 illustrates the measurement of minimum safe approach distances from exposed live parts.

#### 9.2 MINIMUM APPROACH DISTANCE LIMITS FOR NON-COMPETENT PERSONS WORKING NEAR EXPOSED LIVE PARTS

- 9.2.1 For non-competent persons working near exposed live parts, where written consent from the owner of the live parts has not been obtained, the minimum safe approach distances limits are:
- For circuit voltages 110 kV and below - 4 m.
  - For circuit voltages above 110 kV - 6 m.
- 9.2.2 Where written consent from the owner of the live parts has been obtained, the minimum safe approach distance limits for non-competent persons working near exposed live parts shall not be less than those specified in Table 9.

**TABLE 9** MINIMUM SAFE APPROACH DISTANCE LIMITS FOR PERSONS FROM EXPOSED LIVE PARTS (*Where consent from the owner of the live parts has been obtained*)

Circuit Voltage	Distance Limits (m)
Below 1 kV	0.5
11 kV	1.5
22 kV	2.0
33 kV	2.5
66 kV	3.0
110 kV	4.0
220 kV and above	6.0

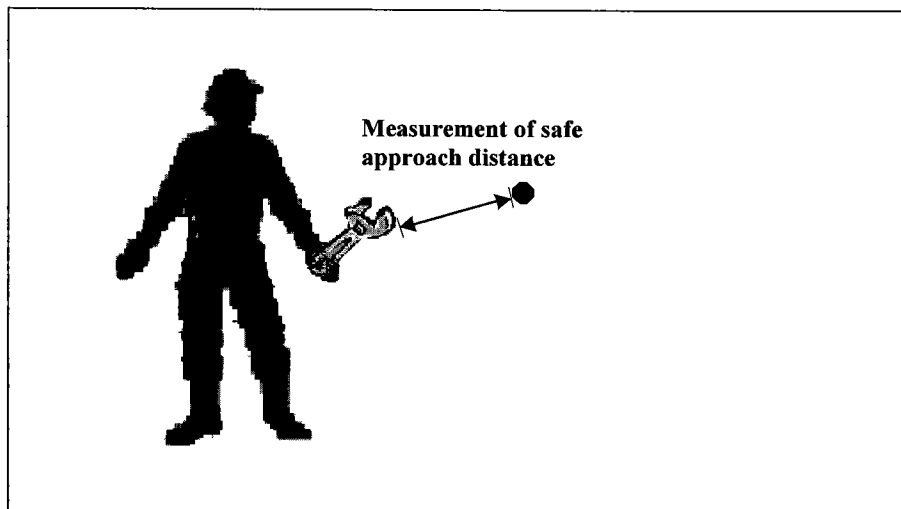
**9.3 MINIMUM SAFE APPROACH DISTANCE LIMITS FOR COMPETENT EMPLOYEES FROM EXPOSED LIVE PARTS**

- 9.3.1 The minimum safe approach distance limits for competent employees carrying out electrical or telecommunications work near exposed live parts shall not be less than those set out in Table 10.
- 9.3.2 The minimum safe approach distance for competent employees shall be maintained by keeping all parts of the body, clothing and any hand held tools (except those tools designed for contact with live parts) beyond the safe distances set out in Table 10.

**TABLE 10 MINIMUM SAFE APPROACH DISTANCE LIMITS FOR COMPETENT EMPLOYEES FROM EXPOSED LIVE PARTS**

Nominal Voltage	Distance Limits (m)
Not exceeding 1 kV a.c. or d.c.	0.15
Exceeding 1 kV but not exceeding 6.6 kV a.c. or d.c.	0.25
Exceeding 6.6 kV but not exceeding 11 kV a.c. or d.c.	0.3
Exceeding 11 kV but not exceeding 22 kV a.c. or d.c.	0.45
Exceeding 22 kV but not exceeding 33 kV a.c. or d.c.	0.6
Exceeding 33 kV but not exceeding 50 kV a.c. or d.c.	0.75
Exceeding 50 kV but not exceeding 66 kV a.c. or d.c.	1
Exceeding 66 kV but not exceeding 110 kV a.c. or d.c.	1.5
Exceeding 110 kV but not exceeding 220 kV a.c. or d.c.	2.2
Exceeding 220 kV d.c. but not exceeding 270 kV d.c.	2.3
Exceeding 270 kV d.c. but not exceeding 350 kV d.c.	2.8
Exceeding 220 kV a.c or 350 kV d.c.	4

**FIGURE 6 MEASUREMENT OF MINIMUM SAFE APPROACH DISTANCES**



**SECTION 10**  
**REQUIREMENTS FOR INSPECTION AND RECORDS**

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**10.1 INSPECTION**

10.1.1 The owners of electrical works shall inspect and review overhead electric line installations at intervals not exceeding five years to ensure that the requirements of sections 2 to 8 have not been compromised by changed circumstances.

**10.2 RECORDS**

10.2.1 The following records shall be maintained to ensure that safe minimum distances are not compromised and to provide information to other parties:

- (a) Asset register;
- (b) Results of periodic inspections; and
- (c) Dispensations or justifications for reduced distances (where applicable).