

Principle



Standards



Theory

1

Cables may be used for all power connections.

Nevertheless, connection becomes more difficult after a given power owing to:

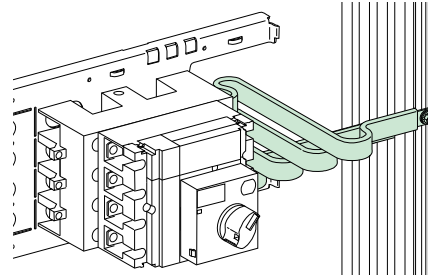
- the large cable cross-section,
- the minimum radius of curvature to be complied with,
- the available volume inside a switchboard,
- the number of conductors.



Example



After more than 125 A, Schneider Electric recommends the use of insulating flexible bars instead of cables to connect the distribution busbars with the devices.



2

By convention, power circuits use cables upper section over 6 mm².

Cable connections (conductor cross-section, connection type) must be defined based on:

- the characteristics of the switchgear/controlgear to be connected,
- the length of the connection,
- the thermal environment of the connection.

> See the chapter "Beyond Basics – Wiring Techniques".

3

Cables must be formed using tools or machines in good working condition and correctly followed in calibration.

They must be connected according to trade practice to avoid all risks of temperature rise and/or deterioration of devices.

> See the chapter "Beyond Basics – Wiring Techniques".

General routing rules



Standards



Good practice

1

Power cables can be routed inside the switchboard:

- using cable strands,
- by individual installation.

Do not place power cables in ducts or straps.

2

Do not route cables between or too close to power busbars to avoid a temperature rise and deterioration of the insulator.

3

Avoid all risks of damage or cutting of the insulating sleeve:

- do not route cables on parts with sharp edges.
- cables that are routed through a hole in a sheet must be protected with grommets, cable glands, gaskets, plastic rings, etc.



Tip

A damaged insulating sheath increases the risk of sparking and therefore of a short-circuit.



Example



Cable glands are used to protect cables from the hole in the sheet.



Tip

It is essential to comply with the permissible radius of curvature for each type of cable.

> See the chapter "Beyond Basics – Wiring Techniques".

4

Comply with the general wiring rules described in the chapter

> "Beyond Basics – Wiring Techniques".

Cable stranding



Standards



Good practice

1

The number of cables allowed per strand depends on the cable cross-section.

Cable cross-section	Maximum number of cables per strand
$\leq 10 \text{ mm}^2$	8
16 to 35 mm^2	4

They must be assembled before being fastened to their support.

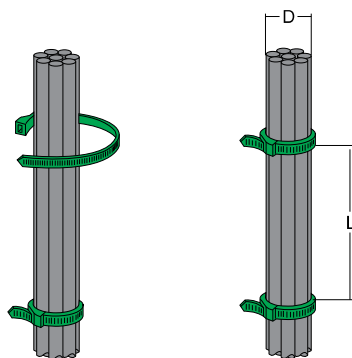
2

Choose ties that are adapted to the strand to be made. They must:

- be mechanically resistant enough to keep the cables fastened in case of a short-circuit.
- be of a length that is adapted to the strand circumference.
- be wide enough not to damage the cable insulating sleeve.

Centre distance recommended according to strand diameter:

Diameter D of strand (in mm)	Distance L between ties	
	Mini (in mm)	Maxi (in mm)
< 20	60	120
Between 20 and 30	70	140
Between 31 and 45	90	180
Between 46 and 75	125	200



3

Never run a strand in contact with or between power busbar conductors to avoid temperature rise and damage to insulators.

Fastening power cables



Standards



Good practice

1

You must fasten power cables on supports to make sure that they remain in place during a short-circuit.

Fit a sufficiently large number of ties to ensure that cables are properly held in place. The distance between ties depends on the electrodynamic forces produced in the event of a short-circuit and the type of tie used.

Recommended distance between ties:

Type of tie	Maxi. Ipk (kA)	Distance between ties (in mm)
Width: 4,5 mm Load : 22 kg	10	200
	15	100
	20	50
Width: 9 mm Load: 80 kg	20	350
	25	200
	35	100
	45	70

Ties must be installed as close as possible to the cable connection points.

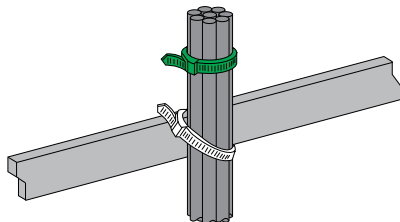


Tip

Cables meeting the class 2 requirements cables with operating voltages that are lower than half their insulation voltage.

2

- If the cables don't meet the class 2 requirements, fasten them on insulation supports. If they are metal supports, insert an insulating wedge between the cable and each metal support.



- If cables meet the class 2 requirements, they may be fastened directly on metal supports.



Example

Cables with a 1000 V insulation voltage meet the class 2 requirements if they are used in a switchboard with an operating voltage of 500 V. They may be fastened directly on the metal cable tie-bars.