INTERNATIONAL TELECOMMUNICATION UNION

ITU-T K.19

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

PROTECTION AGAINST INTERFERENCE

JOINT USE OF TRENCHES AND TUNNELS FOR TELECOMMUNICATION AND POWER CABLES

ITU-T Recommendation K.19

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation K.19 was published in Volume IX of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Recommendation K.19

JOINT USE OF TRENCHES AND TUNNELS FOR TELECOMMUNICATION AND POWER CABLES

(Geneva, 1980)

1 General

The joint use of trenches and tunnels for telecommunication and power cables may, under favourable conditions, offer the following advantages:

- the overall costs are reduced;
- available space for underground services is used more efficiently;
- there is a reduced amount of roadway surfacing work and consequently less delay to traffic;
- the separation of power and telecommunication cables is more precisely assured.

2 Electrical safety

If power and telecommunication cables are not easily distinguished from each other they should be clearly marked.

Power cables should generally be buried deeper than telecommunication cables.

Power and telecommunication cables should be separated by a suitable distance according to:

a) the voltage of the power cable;

b) the type of the power cable;

c) the type of the telecommunication cable;

d) the nature of the separating material.

The minimum distance is often stipulated in national standards.

Under the following circumstances national standards may allow reduced distances:

- the power cable having a concentric neutral operates at low voltage and the telecommunication cable has an earthed armouring, or
- the cables are separated by concrete fillings or similar material.

If there is danger to staff doing manual excavation, high voltage power cables should be protected by covers of suitable material (brick, concrete, etc.).

3 Electromagnetic induction

In order to avoid inadmissibly high danger and interference to telecommunication cables from power cables the *Directives* must be observed. Such effects are especially to be expected when:

a) the power cable belongs to a network with a directly earthed neutral;

b) the individual phase conductors of the power line are run in separate cables (e.g. three-phase single-core cables); or

c) the currents in the power lines have a high harmonic content.

Danger and interference are not to be expected when:

- the power cable works under normal operational conditions, and in case of three-phase single-core cable the individual phase cables are properly arranged and transposed; or
- the length of the parallel running is relatively small (e.g. some hundred metres).

Proper arrangement and transposition of phase conductors of the power cable system are effective for reducing electromagnetic induction.

Other metallic conductors in the tunnel (e.g. pipe-lines, concrete reinforcements) have normally a reducing effect on the induced longitudinal voltages. The magnitude of this screening factor depends to a great extent on the arrangement of the various installations in the tunnel and on the construction of the tunnel and can, therefore, only be determined for each individual case.

4 Other dangers

The joint use of trenches and tunnels may increase the exposure of telecommunications staff to other dangers such as:

- striking power cables during excavation;
- access difficulties and isolation problems while working inside tunnels;
- explosions due to leakage from gas pipes if these are also present in jointly-used tunnels;
- foul air accumulations in tunnels.

Suitable safe working methods to overcome such dangers should be incorporated in the joint working agreement.

5 Practical limitations

The successful use of joint trenches and tunnels requires a disciplined cooperation by all parties concerned. The duties and responsibilities of each party should be precisely defined. Special measures may be necessary to overcome limitations of space underground and to facilitate subsequent maintenance of the cables, and such special measures need to be agreed before the joint construction work commences.