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**LAYING OF TELECOMMUNICATIONS AND
SIGNALLING CABLES AND THEIR PROTECTION
AGAINST MECHANICAL DAMAGE (1)**

I - INTRODUCTION

Under present technical conditions, cabling of telecommunications and signalling circuits is the most effective means of improving the quality and reliability of transmissions. Cabling is usually carried out as a result of modernisation of railway installations - e.g. installation of automatic block - particularly the electrification of lines.

(1) Recommendatory paragraphs are preceded by the letter "R".

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When compared with the cost of investment for the supply of the equipment, the operations connected with the laying of underground cables represent a large proportion of the total expenditure. It is therefore advisable to seek the most economic methods and conditions of laying, by resorting as far as possible to mechanised appliances. It is necessary, however, to provide effective protection for the underground cables against risk of damage resulting from the proximity of the railways ; for this purpose, it is essential for the depths and positioning of the cables to take into account modern methods of track maintenance.

The purpose of this leaflet is to give general information on the laying conditions and on the precautions to be taken to guarantee the good condition of the cables in the course of time, and finally, to bring to notice certain methods for increasing the output of the laying work by using various types of machines.

When laying shunt cables which terminate in installations situated in the track, it is not necessary, in specific cases, to comply with the recommendations in this leaflet.

II - GENERAL CONDITIONS OF LAYING

2.1. - Position of the cables in relation to the tracks and railway installations.

Cables are generally less prone to risks of mechanical deterioration when they are laid along boundaries - i.e. usually 3 to 10 metres in relation to the centre of the nearest track.

In this way they are protected from track maintenance or electrification work, and are of easy access for repairs.

To facilitate laying or when the site is too steep, it may be advisable to place the cables near the tracks, e.g. between the line of pylons supporting catenaries and the track.

Laying between tracks should only be permitted in station areas. The laying of cables beneath tracks and in the ballast immediately adjacent to stretches of rails should be prohibited.

Certain economies can be achieved by laying telecommunications and signalling cables in the same trench.

When signalling cables include wires carrying electrical energy, such cables may only be laid in the same trench with other signalling cables provided steps have been taken to prevent direct contact of the two cables - suitable spacing of the cables, parpen walls, mechanical protection -, or if the telecommunications cables are of special construction - provided with a special screen, etc., or still more, if each cable has been very clearly marked to indicate its destination - signalling cable, telecommunications cable, to avoid any confusion of the cables during maintenance work. Any such confusion could constitute a serious danger to maintenance teams.

With this kind of marking, parpen walls separating the two types of cables may be dispensed with.

These recommendations should be complied with unless the regulations in force in each country provide otherwise.

When considering the path for the laying of cables, it is desirable to obtain the views of the Departments responsible for the maintenance of the track bed and the permanent way, which will be in a position to appreciate certain important factors : slopes to be modified, foreseeable extensions, etc.

R. 2.2. - Effect of the mechanisation of track maintenance on the siting of cables.

When cables are laid in the immediate proximity of a railway line or when they cross it, it is essential for them to be outside the range of any machines or appliances likely to be used for the maintenance of the track.

Railways are recommended to determine the working range of their machines in relation to their conditions of laying, and taking into account the following recommendations :

- a) When the cables are laid parallel to the track, the horizontal distance between the centre of the track and the cables should be at least 3,00m. In special cases - Narrow sites, steep slopes - this distance may be reduced in exceptional cases to 200 m.
- b) When the track has to be traversed, it is recommended that the cables should be laid at a depth of more than 0,80 m in relation to the under surface of the sleepers. In special cases - rocky terrain - this depth may be reduced to 0,60 m, and even to 0,50 m in exceptional circumstances.

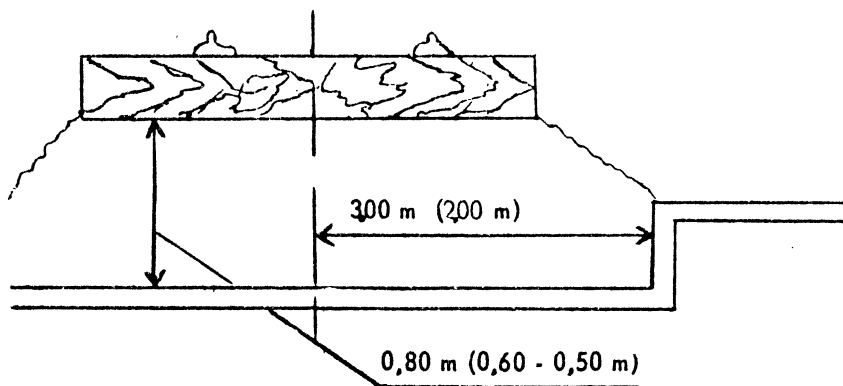


Fig. 1 - Gauge of the area without cables

R 2.3. - Distance between telecommunications and signalling cables and energy equipment.

Generally speaking, telecommunications and signalling cables should be at a distance from energy lines, lightning conductors, lines of trees or metallic masses likely to come into accidental contact with installations capable of carrying a high voltage.