

COMPRESSION FORCES ALLOWABLE ON BURIED CABLES

There is much uncertainty about the permissible mechanical loads that cables can withstand where they pass under a road or other load bearing surface. To quantify the risk we offer the following information

Numerous international representatives (FR, IE, NL, BE) reported that the practice (In France it is a legal requirement) in their countries is to bury cables a minimum of 1m below the surface. They all reported no problems where cables showed mechanical damage due to the surface compressive forces. There has thus been no motivation to establish a working group (e.g. Cigre) to quantify the limits of loading. If one does a basic calculation (with certain assumptions) it is clear that the risk is minimal.

Assumptions:

- Backfill is uniformly compacted and void of large objects
- Depth of burial is large compared to diameter of cable (e.g. 10x)
- Surface loading does not disturb the backfill (subsidence)
- Soil is a linearly elastic medium (compressible)
- Cable sheath acts as a pipe (CSA + PE)

The above assumptions are to ensure that the average surface loading is the same pressure that the cable will experience. A block of concrete for example will potentially transfer the whole load to a single point. In fact the pressure experienced by the cable will be a lot less than the surface load since the load is applied to a much bigger footprint at cable depth.

A load of 100 Ton per m² on the surface equates to a pressure of 0,1kg/mm². This is small compared to the recommended 3000psi (21Mpa) compressive stress as quoted in an ADS Technical note 2.130 on "Structural Performance of Corrugated PE Pipe Using the Burns and Richard Solution" (www.ads-pipe.com). This equates to a Factor of Safety of 20x the design stress (not the buckling stress).

While larger loadings are possible, surface loading of up to 200 Tons/m² can be safely applied without concern for the buried cables (CSA + PE) if they have been installed with at least 1m of compacted backfill above them.

electric
african cables