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Over-Polarization and possible effects on buried pipelines

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ABSTRACT

Over-polarization on buried pipelines may occur when CP Currents are too high. The effect of over-polarization on the metal of the pipelines depends on their coating, soil conditions and relevant characteristics. The most known effect of over-polarization is “coating disbonding”. Another phenomenon often referred to is the “hydrogen embrittlement” of the steel. Recently some theoretical scientists are trying to consider the phenomenon of “over-polarization” as the main responsible of very catastrophic effects on buried pipelines. Our experience on gas and oil transport pipelines buried since more than 50 years in the real field, on the contrary, demonstrates that the effect of “over-polarization”, while is in practice sometimes unavoidable, on the contrary, it has never been a real concern for pipeline safety/integrity. In countries where the Railways are fed by DC, the interference in the negative section can increase the pipeline On-Potential up to -30 Volt. The Drainages which are installed in the positive position of the section of the interfered pipeline, deliver currents up to more than 30 A, which is the maximum drained value admitted by law, according to the Italian Ministerial Decree edited in 2014.

Only in some specific oil pipelines laid in the 50-60^{ies}, containing some spots of hardened steel (factory defects) in correspondence of some coating fault, some cracks occurred having as a consequence catastrophic oil pollution. Nevertheless, this has been a rare phenomenon. In order to reduce D.C. Interferences on Pipelines, it is technically necessary to install insulating joints thus shortening the parallel routing between Pipelines and Railways. Where the transported fluid is conductive (e.g. Oil or Water Pipelines), particular attention must be paid as the internal part of the pipe may be subject to corrosion due to electrical interference between the sides of the insulating joint.