

## Restoring lead alloy solder on cable joints for fluid filled low pressure 145kV with increasing pressure class.

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After 50 years of service some fluid filled low pressure cables has brought in this country small oil leaks in solder joints on the casing and the metal sheaths of those cables. Instead of replacing the cables FFLP the Utilities has decided to restore and increase the pressure class of the plumbing solders. For such, a Research and development project was sponsored by AES ELETROPAULO under ANEEL overview that enabled the develop a model to study and to establish the aging of solder joints of cable housing and creating solution that increases the pressure class of the joints as well.

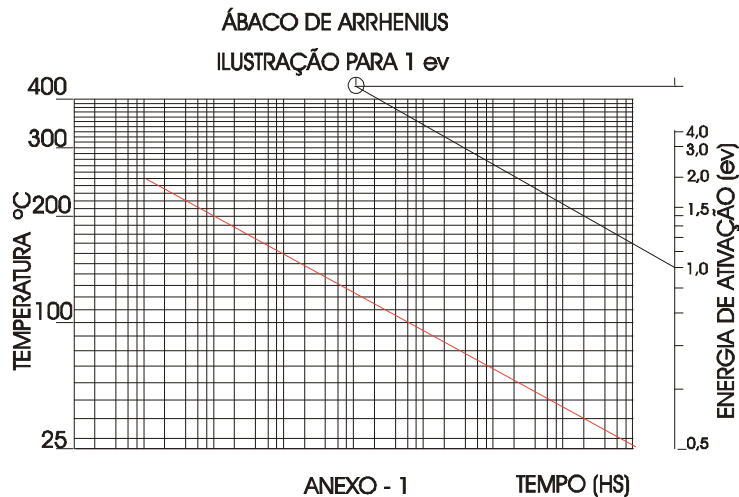


FIG - 1 Abacus of Arrhenius  
(illustrated for 1ev)

The study and development was planned with accelerated experiment using the Arrhenius theory with a simplified physical model, where the soldering and the various possible types of reinforcements were simulated. In the next photo is presented all simplified models and the system pressure control as well. The tests were accelerated with increasing temperature within the closed thermodynamic devices, as shown in the same figure.



FIG - 2a Samples before aging



FIG - 2b Samples inside oven

After the tests between [0, 1000] on [1,10,100 and 1000] stations hours. The data has been treated in Arrhenius abacus and extrapolated to 500,000 hours [50 years] and other values. The same experiment was used to set up reinforcements (next figure).



FIG - 3a Detail of reinforcement



FIG - 3b Overlook of complete joint

The paper covers all development and presents the results achieved in the restoration of FFLP with oil leaks at the cable joints.

Key words

Cables, Underground, Joint, Assembly, Plumbing Solder Reinforcement