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Q & A on power cable faults

Power cable faults are the bane of every network operator's life, as they are costly to remedy and they often lead to major service disruptions. Faults on recently installed cables are particularly exasperating, as a reasonable expectation is that new cables will operate reliably. Sheath testing is an effective way of guarding against these premature cable failures, and it's a regular topic for questions to our technical support team.

These are a few of the most common.

Q: Surely a new cable will be reliable, so what's the point of carrying out a sheath test?

A: If every new cable was installed without damage, it's true that the need for sheath testing would be much reduced. But damage during installation is far from rare, and statistics show that one of the most common problems is damage to the cable sheath. Typically, this doesn't initially affect the performance of the cable, which will usually show normal values of insulation resistance between conductors as well as between the conductors and the outer metallic shield. A damaged sheath, however, will allow the ingress of moisture and as a result of this, the condition of the cable will rapidly deteriorate, leading to early failure. Sheath tests, which are fast, easy and inexpensive to perform, allow sheath damage to be detected and corrected before cable deterioration sets in. For this reason, it is strongly recommended that sheath testing is included in the portfolio of tests that are carried out when commissioning a new cable.

Q: Is it possible to pre-locate a sheath fault?

A: Indeed it is. One approach is to use the voltage drop method, in which the current, voltage and resistance before and after the fault location are measured and evaluated in relation to the cable length. If a MFM10 test set is used, the measurement and calculation steps are carried out automatically and, after a few seconds, the distance to the fault is displayed.

This test set uses bipolar measurement, which allows thermoelectric and galvanic influences to be detected and mathematically eliminated. Pre-location can alternatively be carried out using the bridge method, which relies on resistance rather than voltage measurements.

Q: How can sheath faults be pinpointed?

A: The basic approach is to investigate the voltage gradient in the area around the fault using two earth rods and a galvanometer. This is most conveniently done an EGS NT and an A-frame, which is a standalone instrument with two earth probes and a dedicated voltage gradient detector. When the A-frame probes are inserted into the earth in the proximity of the sheath fault, the EGS NT shows the voltage gradient in the form of a bargraph, and also displays the direction to the fault by means of the bar graph. The probes are inserted into the earth at successive locations along the cable route until the bar graph reverses, which indicates that the fault location has been passed. By using this direction indication in conjunction with the bargraph voltage gradient display, it is possible to pinpoint the fault location with great accuracy.

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