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FURSE EARTHING
www.cablejoints.co.uk

Thorne and Derrick UK
Tel 0044 191 490 1547 Fax 0044 191 477 5371
Tel 0044 117 977 4647 Fax 0044 117 9775582

3M COLD SHRINK CABLE JOINTS & CABLE TERMINATIONS, 11KV 33KV. Best practice makes the difference

How to keep quality standards high when working on underground cabling system by 3M's Allan Russell

An essential part of any power system is the vast network of underground cabling systems, including hundreds of cable joints and cable terminations. The quality of these makes all the difference to the performance of the network. However, installation quality can be affected by insufficient knowledge, time pressures and installers being tempted to compromise. While this is understandable, it can lead to power outages in the future, caused by cable joint failures, which can require thousands of pounds to correct.

Using best practices

There is much that can be done to ensure that installation of cables joints and cable terminations runs smoothly, reducing time and therefore cost, as well as minimising the chances of failed cable joints in the future. There are a range of 'best practices' that can be adopted and while some may be obvious, their use is far from universal.

Cable Jointer Training

Cable jointer training is a good example of something that should be taken for granted, but is not necessarily the case. Investing in training can make all the difference between a high quality cable network and one that is prone to joint failures.

Here are a couple of examples of what can - and does - happen when training has not been thorough. A cable jointer may be trained in one kind of cable joint, such as a single core polymeric joint. During the course of his work, he comes across a three core cable joint and despite not having any training for this very specific situation, will decide to try anyway. As a result, the cable joint fails, requiring additional time and cost to repair.

Similarly, the cable jointer may be trained on one manufacturer's accessories, but not any other. He uses a new brand for the first time and assumes that it will be pretty much the same. Unfortunately, this is not the case, meaning that the work has to be repeated.

While utilities and larger contractors will tend to have formal training programmes, smaller contractors, installers and owners of private networks are unlikely to have these resources. Instead, they can attend third party courses, particularly those run by manufacturers of cable accessories, such as 3M. Unfortunately, take-up of these courses is by no means standard in the industry, so bad techniques are not always corrected.

Although problems are less frequent in power utilities and larger contractors, when workloads are high, they may sub-contract to much smaller organisations. This is when problems can arise. On industrial sites, resident electricians may try to carry out low or medium voltage network cable joints. Given that they install these vary rarely, they are often reliant on guesswork and this can lead to problems. Naturally, these groups may argue that training is difficult to justify when it is not chargeable time, but conversely, it can be argued that training can help a smaller contractor or installer to be more competitive, by establishing a reputation for high quality work.

It is also important to invest in refresher training and to carry out re-assessment of skills at regular intervals, ideally at regular planned intervals, and to read the installation instructions thoroughly. This is because inevitably there is a gap between training and putting the lesson into practice. A cable jointer may be trained on a particular kind of cable joint, but does not come across that particular situation for a couple of years, by which time there may well be changes or revisions to the joint or installation. This will be addressed in the jointing instructions accompanying the joint kit, but sadly, these details may not always be picked up by the installer.

The consequences of this can be significant. Take for instance 3M 11kV cable transition joints, instructions for which have been amended because a build-up kit is now required. This is due to cable manufacturers having reduced the thickness of the insulation layer used in the polymeric cable, so although the cable may still be 95mm² cross sectional area it is in fact several millimetres smaller in diameter than cables manufactured five to ten years ago. Unless instructions are followed properly, problems may arise when installing the cable joint.

It also makes sense to explain to installers more fully exactly why a particular installation procedure needs to be conducted in a particular way. Without this context, it is not surprising that installers may be tempted to cut corners.

Using the right cable jointing tools

Installation jobs should only be given to installers who have a proper set of jointers tools. Sounds pedantic? Not at all, considering that it is impossible to guarantee the correct completion of many joints unless the right tools are used.

So what is needed? There are six or seven tools that between them, in addition to standard hand tools, will enable the installer to tackle just about everything he might have to do. The total cost of the kit is about £1500. The very minimum for working on polymeric cables is: a tool to remove the cable jacket or sheath; one tool for bonded screen polymeric cable, one for peel-able screen polymeric; and a further tool to remove the primary insulation, costing about £350 on its own.

£1500 may seem a lot for an installer to find, especially if the average job pays considerably less than this amount. However, using a knife - still a common practice - is just not sufficient to guarantee that the work is carried out to the correct, often very precise level, and can create problems. If installers intend to be carrying out power joint work for years to come, then it pays to invest.

The right techniques save time

In addition, there are installation techniques that actively reduce equipment needed onsite, as well as simplifying cable jointing and terminating as a whole. In medium voltage environments, cold-shrink techniques - which are used to 'shrink' joint splice bodies and cable terminations on to the cable in a water and air-tight fit - are now the preferred method for creating cable joints and terminations. Since heat is not required, there is no need for gas bottles to be carried on site. Pioneered by 3M, ranges such as 3M Cold Shrink give the installer an all-in-one unit, with everything required to complete the cable joint or termination.

This means that cable joints and terminations are installed to a consistent and high quality level, with less room for human error. In turn, this reduces fewer joint failures and power outages in the future. Furthermore, joints and terminations can be carried out far more rapidly, for example a medium voltage transition joint can be completed in just two hours, as opposed to half a day with other methods.

So, while there is a raft of challenges that today's power utility, contractor and installer have to face when carrying out cable jointing and termination, all the answers are there. It is simply a case of investing the time and resources in the first place, in order to see a return in terms of improved network reliability and reduced maintenance and repair costs in the future.