GetCurrent ENERGY
CSL
CUTHBERT STEWART LIMITED
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NEW TECHNOLOGY USED BY DELTA //

In recent trials with Delta in Queenstown; the first set of Slip-on type Terminations from Euromold have been installed in conjunction with cold shrink trifurcation.

The AIN (Indoor) and AFN (Outdoor) Terminations

Termination type	Voltage Um (kV)	Conductor Sizes (mm^2)	
		min	max
AIN 10	12	25	1000
AIN 20	24	35	1000
AIN 30	36	50	800
AIN 36	42	150	800

Termination type	Voltage Um (kV)	Conductor Sizes (mm^2)	
		min	max
AFN 10	12	25	1000
AFN 20	24	35	1000
AFN 30	36	50	800
AFN 36	42	150	800

This compact product is seen as the ideal solution as equipment cable boxes become smaller. The unit pictured shows the AIN10-1, suitable for installation on 25mm^2 to 95mm^2 11kV cable with the actual termination length (green section) only being 150mm long. With the cold applied cable trifurcation this totally removes the need for any heat to be applied near any heat sensitive items such as CT's that may be placed within the cable box.

The major advantages of this range are; the voltage range from 12kV – 42kV and the fact that this cold applied product has no shelf life.

Terminations from Euromold with cold shrink trifurcation.

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FLUKE INSULATION TEST INSTRUMENTS, FOR HV APPLICATIONS //

Electrical insulation degrades over a period of time because of various stresses imposed during its normal working life. Designed to withstand these stresses for a number of years, this often runs into decades. Electrical equipment subject to high voltage testing includes cables, switchgear, transformers and rotating equipment. Abnormal stresses cause an increase in the natural aging process and severely shorten the working life of the insulation. It is good practice to perform testing at regular, prescribed intervals to identify whether increased aging is taking place and have a plan of action to replace or repair before the plant breaks down.

What is insulation?

Every electric wire in a facility is covered with some form of electrical insulation.

What causes insulation to degrade?

Electrical stress – Cracking or delaminating of the insulation can be caused by abnormally high voltages.

Mechanical stress – Hitting a cable while digging a trench is not untypical but mechanical stresses also may occur from running a machine out of balance or frequent stops and starts. The resulting vibration from machine operation may cause defects within the insulation.

Chemical attack – Corrosive vapours, dirt and oil are examples of chemical ingress.

Thermal Stress – Running a piece of machinery in excessively hot or cold conditions will over time cause expansion or contraction of the insulation, which might result in cracks or failures. Thermal stresses also occur every time a machine is started or stopped; every start-and-stop will adversely affect the aging process of the insulation.

Environmental contamination – Agents include lightning, moisture, humidity and rodents. Insulation begins to degrade as soon as it is put into service but is designed to last for many years under normal operating conditions. Pinholes or cracks can develop as a result of any of the above stresses allowing moisture or foreign matter to penetrate the surface(s). Perfect insulation has a high resistance, typically thousands or millions of ohms. Damaged insulation has low resistance.

How can regular testing reduce outages?

A drop in insulation resistance can be sudden, such as equipment being flooded, or reduced gradually, giving plenty of warning if tested periodically. Regular checks permit planned reconditioning prior to surface failure or a shock condition. Large sites such as dairy factories usually have high numbers of motors, in some cases as many as two thousand. The surprise failure of a single motor may have a dramatic effect upon production due to unplanned downtime.

If advanced insulation degradation goes undetected there is an increase in the possibility of electrical shock or even death for personnel and the possibility of electrically induced fires and expensive downtime. Electrical utilities specify insulation tests, on high voltage equipment such as 11kV cables and switchgear, as a matter of course. Notable brands of insulation test equipment can provide, within a single instrument, DC test voltages from 50V to 5,000 or 10,000V.

The selection of the appropriate voltage depends upon the item being tested. A cable rated for use on a 230V circuit is deemed to be tested at 500V whilst an 11kV polyethylene cable at 5kV. New high voltage cables are generally tested by the contractor prior to installation to verify the manufacturers specification and to establish also a benchmark for future tests, that is, an insulation resistance test result for new apparatus rated at 11kV should be tested to the full extent of the test instruments measuring capability – usually hundreds of thousands of ohms, or to infinity.

FLUKE-1550B

FLUKE-1555

Frequency and types of insulation tests for HV plant

1) Prior to and following repair. For example, a damaged 11kV cable is likely to exhibit a very low ohms reading, perhaps hundreds of ohms, whilst as a result of repair – removal of the faulty section and professionally rejoined – a very high resistance should be expected.

2) Step Voltage (SV). On occasion an electrical authority will specify, for 11kV cable and switchgear, a step voltage test. The test instrument is programmed to provide an automated series of tests at succeeding higher voltages over a specified period; starting perhaps at 500V for one minute and then ramping up variously to 1000V, 2,500 and concluding with a 5000V test. The results for all voltages are stored in memory and may be recalled for immediate review or sent to a PC for further analysis, including graphing and report writing. The rationale of SV testing is that good quality plant will exhibit high resistance at all test voltages

3) Polarisation Index (PI). A time resistance test, comprising a one minute test at a specified voltage followed immediately by a ten minute test at the same voltage. For a meaningful result the one minute reading is divided by the ten minute reading to provide a ratio. A result of two is regarded as satisfactory.

FLUKE INSULATION TEST INSTRUMENTS, FOR HV APPLICATIONS // continued

The importance of temperature and humidity during insulation tests

The affect of temperature and humidity when testing should not be underestimated. As a result of damp conditions a cable, for example, may be affected to some degree by moisture ingress whilst the same cable tested during a period of warm, dry weather would show better results. For repeat testing it is vital that environmental conditions are noted.

Fluke 1550B and 1555 Insulation testers

The above meet all requirements of the IEEE specifications for high voltage DC testing.

The instruments have selectable insulation test voltage options from 50V steps to 5kV and 10kV (1555) and the following essential features:

- Time resistance, step voltage, polarisation index (automatic calculation) and the supplementary dielectric absorption ratio (DAR)
- CATIV safety rating
- Resistance measurements up to 2T ohms
- Timer settings up to 99 mins for timed tests
- Capacitance & leakage current measurements
- Guard system to eliminate the effects of surface on leakage current on high resistance measurements
- Battery life of over 750 tests between charges
- Measurements can be stored in up to 99 memory locations
- Gives AC/DC voltage reading up to 600V for increased user safety
- Three year warranty
- Accessories supplied include software, communications lead, HV test leads and clips, and a rugged carry case

The Fluke 1550B and 1555 are rugged instruments and ideally suited for robust handling in the field.

WARKWORTH 33KV 800MM^2 COLD SHRINK STRAIGHT JOINTS WITH SHEARBOLT CONNECTORS //

Recently Andrew Wooles along with Bart Foord from Electrix completed nine Nexans cold shrink joints for a new feeder in Warkworth.

The project went extremely smoothly as the use of this product not only eliminates human error in the shrinking process but also overcomes any issues such as chill factors created by cool winds.

Although the purchase price is slightly more expensive than traditional joints, this is well outweighed by the time saved when fitted by competent jointers.

Fitting the 630-1000mm^2 Shearbolt link

Application of the cold shrink bundle

Reconnection of the screen wires before outer sheath restoration is completed

Job done

JOINTERS CORNER //

Screen terminations on polymeric cables

One of the main factors in termination and joint failure is the poor removal of the semi-conductive screen on XLPE cables.

There are different options for removing the screen, some better than others.

One option is to use a round file, which will give you a nice chamfered edge on your screen termination. You then need to tram line the conductor so that the screen can be removed.

When tram lining the screen you only need to go partially through the screen. Otherwise the primary insulation underneath will get damaged which will cause discharge and then ultimate failure of the joint or termination.

To ensure that you do not mark the primary insulation you should use a tool which is preset so that it does not penetrate right through the semi-conductive screen and into the insulation below.

Using the TT2532-1 and 2 will ensure that you do not damage the primary insulation. The two depths are 0.4mm which is suitable for 11KV and 0.6mm for 33KV.

Depth guarded tram line tool.

NEW LOOK AND NEW TEAM MEMBER FOR THE CSL ENERGY TEAM //

Graeme Hill and the new CSL Ute.

Cuthbert Stewart Limited is pleased to introduce Graeme Hill in the new position of Technical Sales – Line Construction.

Graeme has been involved in the electrical industrial trade all his working life, firstly with the Royal New Zealand Navy where he served his apprenticeship in the Distribution Industry.

Working with Valley Power, in Comms, SCADA and substation work, Graeme became an all-rounder gaining competencies in substation switching, emergency overhead switching and earthing.

Next Graeme moved into project management with Energex New Zealand on the WEL Networks assets, and later became the Hamilton depot operations manager.

At the conclusion of the Energex contract he took the substation managers roll within WEL, then design team coordinator.

Always keen to know more, Cuthbert Stewart is the perfect place for Graeme to learn new skills. His goal is to make a difference to the networks across New Zealand by offering sound technical advice and high quality products.

Graeme keeps busy and gets actively involved in surfing, kite surfing, motor racing and sailing.

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