The Prevalence of Sub-standard Installation Cables in the UK

The quality of installed cables has come under a good deal of scrutiny from the Approved Cable Initiative. The results of the ACI’s tests are alarming. Here we look at what was found, and what can be done to rectify a serious problem.

By Richard Townsend

Over the last couple of years it has come to light that the quality of installed cables has come under scrutiny for a number of reasons. A key player in the compilation of this information has been the Approved Cable Initiative (ACI).

The ACI has openly been campaigning to bring to the attention of the electrical industry to the increase in occurrences of dangerously sub-standard cables used within electrical installations. The organisation has logged several cases on its website at www.aci.org.uk.

It was found in the logged cases that the diameter of conductors used – both live and cpc – was significantly below the minimum requirements of the British Standards. This has a profound effect on the thermal efficiency and current-carrying...
capability of the conductors affected; the increased thermal loading of the insulators – owing to the increased resistance and therefore higher operating temperature – can exceed the design parameters of the cables, which affects the circuit design, resulting in a potential source of combustion.

Independent testing by the ACI has also found the standard of the copper in cable conductors used in some of the logged cases to be of a lower grade. This adversely affects resistivity per metre, resulting in the resistance on a given length of cable being increased. This can increase the Zs value of final circuits which, as a result, could increase to such a level that initial design calculations would be exceeded and would possibly not meet the required disconnection times.

Low copper content and reduced conductor diameters have also been found in stranded cables, in so much as the number of strands in some cables has been reduced, having similar effects to those already described.

In addition to the practice of under-sizing the conductors, steel and aluminium conductors have been found to be copper coated, which can cause similarly catastrophic effects.

ACI independent tests have also found – as well as the reduction of the copper content and diameter in conductors – that the materials used for insulation and the process to cure these materials are substandard to the point at which they could present either a high combustion risk, a high shock risk, or both, depending on the installation method. The effect on the insulation can be seen from the image below. Needless to say, the effect would be very serious of the insulation falling off and coming into contact with an unsuspecting engineer tracing a fault – or indeed in the instance of cables being clipped direct whose conductors come into contact with unsuspecting individuals when the insulation degrades.

Other problems with the improper curing of insulators has seen the green band in green and yellow “earth” cable becoming detached and spiralling away from the main cable – a far from ideal circumstance that leaves a safety conductor incorrectly marked.

One common failing of armoured cables is the greatly

Damaged insulation could have a very serious impact on the unsuspecting engineer. Image courtesy of the ACI
reduced or poorly constructed armour strands, so the protection afforded or expected protection will be seriously compromised. Coupled with all of the other failings mentioned, the stalwart ‘do all’ armoured cable trusted by many suddenly becomes a multiple life threat.

The Logistics
It would be reasonable to expect that such misdemeanours would be isolated and limited, with respect to the volume of produced material in the market place. However, the amount of substandard cable currently in use within our industry is very substantial. The cable from one manufacturer alone represented 14 million metres of affected cable of varying types but predominantly armoured and flat twin products (some HO5vv-F type cables also affected along with fire rated and ‘arctic’ type cables). Given these types of cable, the potential risk to domestic customers could be significant.

What to look for
The ACI will undertake to test for free any samples of cables given to them and will give guidance to installers on the steps that they will need to take if the results are unfavourable. The organisation also produces several flyers to help with what to look for when encountering suspect cables. The ACI currently has industry support and backing from major certification and trade bodies, including ECA, ESC, NAPIT, NICEIC and BASEC.

Identifying sub-standard cables is not easy, as all ‘counterfeit’ products are relatively convincing. Some will have fake approval markings, some will be cleverly worded to intimate that they are built to a British or European standard, when they are not. Some will be legitimately marked as approved – which they could be – however the actual quality is below that required standard.

It was for this reason, and similar practises, that the Turkish manufacturer Atlas Kablo was removed from the BASEC register and its HAR license (European equivalent of BASEC), removed. The HSE is currently evaluating the findings from the cable tests before considering its position and possible further action.

Given the varying degrees of poor-quality manufactured cable and counterfeit products, it is a hard task to eradicate the problem from the industry and we all need to take a role in removing the threat from ourselves and our clients.

When designing either a distribution or final circuit the designer will have a theoretical circuit resistance and in turn design Zs; if installers then test and report vigilantly, during and after, as described by BS 7671, then a great many faulty cables (increased resistance due to reduced diameter conductors, low copper grade or coated steel conductors), can be identified before they are finally energised and put into service, potentially risking the lives of clients and maintenance engineers alike.

Government statistics have shown that 27 per cent of electrical fires are accountable to poor quality cables and wires and of that there have been 15 fatalities in the last five years. This, then, is a very real danger. If the current trend of using low-quality cables, from a cost driven commercial aspect, continues to increase, the fatality rate can only grow.

It is vital that everyone – designer, wholesaler, and installer – involved in the installation process understands the grave implications of admitting sub-standard cables. Every calculation used to design or give disconnection times, etc. is reliant on the resistance and quality of the cables you install; if you install a sub-standard cable, you will not be able to comply with BS 7671 which is fundamental to the industry.