Stay Protected from Electrical Fires

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The BIS authorities, in order to keep pace with the changes in the International specification, applications and usage conditions in India, have been revising the IS 694 Standard from time to time to keep the industry and consumers abreast with these changes. The last (4th) revision of IS 694 took place in the year 2010, and this revision though long overdue, sets norms which are in tune with international specifications. The IS 694: Revision 4: 2010 forms a major basis of our analysis in this article.

The low voltage wires and cables market in India comprises both organized and unorganized players. Recent changes in the governing regulatory and technical standards for insulated electrical cable and cords used in homes and offices are meant to ensure better quality and higher flame withstand parameters of these wires and cables. For the buyer or user, knowledge of these changes and their implications on the quality and safe life of cables, would, make them well informed of the precautions to take while deciding their purchase or use, thereby, mitigating the risks and ensuring their safety from electrical fires which occur due to usage of low quality wires.

Evolving BIS Standards & Effects on Markets

In the Indian electric power distribution segment, where low voltage flexible cables and cords are used, IS 694 is the most prevalent specification. This is applicable for industries, in house wirings as well as in appliances, as cords. The IS 694 standard is in alignment with the IEC and BS (British) standards, in specific IEC 60227 and BS 6500 and was first brought out in the year 1955. The BIS authorities, in order to keep pace with the changes in the International specification, applications and usage conditions in India, have been revising the IS 694 Standard from time to time to keep the industry and consumers abreast with these changes. The last (4th) revision of IS 694 took place in the year 2010, and this revision though long overdue, sets norms which are in tune with international specifications. The IS 694: Revision 4: 2010 forms a major basis of our analysis in this article. This

Table 1: Additional Tests Conducted for FR & FRLS Wires & Cables

Test	Function	Test Method Specification	Specified Values
Acid Gas generation (Only for FRLS)	To ascertain the amount of Hydrochloric acid gas evolved from insulation of wire under fire	IS 10810 Part 59	Less than 20%
Critical Oxygen Index (For FR & FRLS)	To determine percentage of Oxygen required for supporting combustion of insulating material at room temperature.	IS 10810 Part 58	More than 29%
Temperature Index (For FR & FRLS)	To determine at what temperature, normal Oxygen content of 21% in air will support combustion of insulating material.	IS 10810 (Part 64)	More than 250° C

revision, after due deliberations, was implemented with effect from September 2016.

The latest revision of IS 694 specification includes four new categories:

HR PVC (Heat Resistant PVC), FR (Flame Retardant) and FRLS (Flame Retardant Low Smoke and Halogen) cables and lastly, Type 'D' insulation for general use.

Here, we would take up FR & FRLS categories: categories generally referred to as 'House Wires'. In the 2010 revision of IS 694, both Flame Retardant (FR) & Flame Retardant Low Smoke & Halogen categories have been added. This inclusion of FR & FRLS by BIS is highly appreciable, and a step in the right direction. It is in alignment with the practise prevalent in developed countries, as in European and US markets.

In the Indian scenario, data shows that the majority of industrial disasters and commercial or household fires are a result of electrical short circuits. These electrical short circuits cause fires in the electrical appliances or electrical fittings, which rapidly spread through flames via the connecting electrical wires to the surrounding rooms or halls and combustible furniture, etc. Apart from igniting the combustible furniture, other connected electrical equipment, these 'under fire' cables emit thick smoke from the burning insulating compounds in the wires, which cause asphyxia in humans, if exposed to such hazardous environments for prolonged periods lead to their falling into coma or their death if unattended or untreated. The Uphaar Cinema tragedy happened almost two decades back, in that perspective this revision of BIS was long, long overdue! Considering the safety of users and public and a safer environment, it is felt by the author that the FR and FRLS categories' inclusion should have come much earlier. As a matter of fact, FR and FRLS insulated cables had become the compulsory in the Nineteen eighties, in Europe and the US in all LV applications.

In the case of electrical short circuit conditions, wherever good quality and genuine FR and FRLS cables are in use, the cables when exposed to the flames, self-extinguish the flames in a short time and emit much lesser toxic smoke. This is the primary reason why FR and FRLS cables should be the singular specification for LV applications used in densely populated areas like commercial complexes, houses, hospitals, office buildings, theatres, and in industries.

It would be interesting to know the Tests conducted on FR and FRLS cables:

Despite the fact that regulatory standards are in place, it is felt by the author that compliance to the standards should be tightened. Unfair trade practices and lower quality manufacturing of wires by the unorganised cable manufacturers makes the competition unhealthy and the consumers unsafe.

Challenges in Indian Market

In India, the harsh environmental conditions of ambient temperatures (up to 55° C) and high humidity (>90%), which are common in summers and monsoons, mandate unambiguous and strict standards for the conductors and insulation. The basic purpose of the insulation is to provide a safe and non–deteriorating jacket over the conductor for the life of the cables. In addition, the FR and FRLS insulations have flame retardant and reduced smoke emission properties which protect human lives and property in case of fires arising from electrical faults or short circuits. (Refer Table 1 above)

CAVEAT EMPTOR!
(Let Buyer Beware)

For the average Indian consumer or specifier , it is pertinent to know that:

By merely confirming their cables are FR or FRLS compliant is not the assurance that the cables would perform their roles in times of such hazards or calamities!

In the Indian Wire and Cable industry, it is well known that the unorganized sector cable- wire manufacturers use cheap and inferior PVC FR insulation, which would not genuinely pass the Critical Oxygen Index and Temperature Index Tests. In case of FRLS cables, their cables are seen to fail in the Acid Gas Generation tests. Further, an industry knowledge that the unorganised sector manufacturers get their cable samples passed at the threshold limits or at the time of Inspection by BIS or by their customers. The buyers need to understand that the latest BIS revision although mandatory for FR and FRLS cables, is not fully sufficient to ensure that the FR and FRLS cables would maintain their integrity over their lives. There are plenty of avenues available for the manufacturers to thwart the specifications or testing criteria as explained above. Moreover, the additives like antimony are quite expensive, which are absolutely essential to enhance the flame retarding and smoke inhibiting properties of PVC, these are substituted

by cheaper varieties. The life of the FR / FRLS cables and their enhanced Flame Retarding or Smoke Inhibiting properties to remain intact throughout their lives are, thus, severely compromised.

One way the specifier or user can protect himself or herself is by restricting his choice to only the organised sector players. Secondly, they must insist on a valid IS license number (It would be as CM/L number of the manufacturer) along with the FR / FRLS (as the case may be) printed legibly on the cables at every one metre length.

Thirdly, at least the bulk buyers must demand and get an FR or FRLS Test report (recent) from the suppliers.

These measures, will go a long way in educating the buyers or decision makers or specifiers on the recent changes in the BIS standards and the regulations, as well as taking the necessary safeguards while deciding on the purchase or use. They can have the assurance about the cable quality for which they are paying are good value -for-their money. If they follow the guidelines, they can be 100% sure that these cables are y, and valuable GDP.

genuinely going to provide the safety of lives and properties in case of electrical fires under electrical short circuit or other fire hazards in the vicinity of such electrical wires. Otherwise, as has been happening time and again in the Indian scenario, use of sub-standard FR / FRLS wires, which is the norm in the unorganized sector in India, or normal (Non FR / non FRLS) PVC wires, would regularly appear as news headlines , and pose far more losses to lives and propert EI