TROUBLE WITH GEL

This article takes a look at a couple of unique field problems faced due to poor quality gel.

Indian climatic conditions present an acid test for any equipment installed outdoors. The high temperature combined with high humidity and ofcourse our heavy monsoons can rapidly deteriorate CATV coaxial cable mounted outdoors.

CATV coaxial cable basically consists of 2 concentric conductors. The outer conductor, the braid is equi-distant at all points, from the center conductor. Ideally, a vacuum should separate the braid and center conductor. This is impractical, hence dry air is the next best alternative. Water or moisture in any form is probably the worst possible dielectric. Moisture also corrodes the braid and aluminum dielectric. Hence any ingress of water or moisture rapidly increases the cable loss and makes the cable length unusable.

Manufacturers therefore pay particular attention to ensure that there is no ingress of moisture into the cable. The outer PVC sheet is made tough so that it doesn't crack when exposed to sunlight or hostile climatic conditions.

As a further safe guard against moisture, manufacturers provide a "Flooding Compound" on top of the braid, under the PVC sheet. The flooding compound is basically a water-repellent jelly - also referred to as a "Gel".

The use of petroleum jelly as a flooding compound, in telecom cables is very wide spread. However, petroleum jelly has low viscosity i.e. it flows easily. Hence it oozes out when the cable is cut.

International manufacturers such as Commscope and Times-Fiber have introduced a viscous gel, under their own brand name. Commscope refers to their gel as "APD". The exact composition is a closely guarded trade secret and Commscope offers little information other than stating that APD is an Amorphous Silicon compound.

APD has a very low viscosity, even at elevated temperatures such as when the cable is exposed to sunlight during the day. It also has excellent water repellent properties. Commscope's APD has been very well received in the Indian market. Given the market success of APD, several Indian coaxial cable manufacturers have tried to provide some water-resistant gel on their cables. Lack of true RND and availability of suitable products, several Indian manufacturers have used a high temperature grease, as the flooding compound. Some Chinese cables too have used similar flooding compounds.

FIELD PROBLEMS

Unfortunately, high temperature grease has not proved very successful. Infact some products used, loose their viscosity at 70 degrees C to 80 degrees C. As a result, the gel starts to flow when the cable is installed outdoors. Even though ambient temperature never exceeds 50 degrees C, cable installed outdoors absorbs heat from the sun due to its black colour. As any car owner will appreciate, the temperature of the black plastic dashboard in the car, when left standing in the sun is significantly hotter than the ambient temperature.

POWER PASS PROBLEMS

Recent reports indicated a unique problem faced by a cable operator in Goa. The cable operator

had used inferior quality RG-11 cable with a local gel. The symptom of a dark horizontal bar rolling from the top to the bottom of the screen is a classic symptom of hum modulation. This will happen most frequently when the power supply of an amplifier is defective. The AC ripple is not effectively filtered out by the amplifier power supply causing the problem.

The same symptoms can also occur when an amplifier receives less than the minimum required power pass voltage. As a first line of action, amplifiers on the line were replaced but the problem persisted. That indicated the possibility of poor line voltage. When checked on a meter, the line voltages appeared normal, well above the minimum 30 VAC required.

The problem was finally diagnosed to be caused due to the poor quality of the gel / flooding compound. The gel used in the cable lost its viscosity during the day due to elevated temperatures. The gel then floored over the cable braid. The electrical contact between the cable braid and the connector body was deteriorated due to the flowing gel. This was more pronounced where cheap ring type crimp connectors were used to hold the braid and F connector together, on the RG-11 cable. Screw type F connectors or imported crimp connectors were not affected.

REVERSE CABLE LOSS

A section of the cable network experienced dark bars rolling from the top to bottom of the screen. Other sections experienced poor signal strength for Band I channels in the night. If the amplifiers were optimised for proper signal delivery in the night, the signal strength increased dramatically in the day causing amplifier overload. This phenomena is exactly opposite to what is normally observed that is cable loss should rise during the day, due to elevated temperatures and fall during the night. This perplexing problem was finally traced to, again, the poor quality of gel used, in the RG-11 cable.

In this case, due to elevated temperatures, the gel flowed down the cable, into the RG11 F connector's center contact and coated it. During the day, due to the low viscosity of the heated gel, the spring contacts in the female F connector maintained good electrical contact with the center conductor. However, in the night, due to the lower ambient temperature, the gel viscosity increased. The gel covering the center conductor became viscous and parted the spring contacts in the F connector on the amplifier. This effectively either broke the electrical contact or significantly deteriorated the quality of the contact.

Due to the thin gel film separating the center conductor and the spring contacts in the female F connector, Band I signals were not transmitted well. Due to "skin effect" Band III and higher frequency signals "jumped" across the gel barrier. Signal reception at these higher frequencies was less affected than that at low frequencies.

Analyzing and identifying both the above problems was time consuming and extremely frustrating. The cable network owner replaced the entire stretch of cable that he had bought, which used this poor quality gel.

CONCLUSION

Even in a mature market, where cable network owners have years of experience, they often stumble over new and unique problems that are caused due to unforeseen factors. The general belief has been that while poor quality gel may not protect well against moisture, it surely cannot cause any harm. This myth has been proven wrong with the above example. The only trusted advice that always holds is "Let The Buyer Beware!"

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