



**Report on**  
**Smoke in Electrical Panel**  
**At**  
**XXXX, Pune**

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## 1.0 Introduction

XXXX has recently fitted out its premise in YYYYY, Pune.

The installation has been tested and commissioned and XXXX plans to start move in shortly.

The main electrical panel receives power from 2 rising mains on N+N. The power from the main electrical panel is then distributed to lighting and power panel, AC panel. UPS power for the floor is fed from the existing UPS in phase II.

On 7<sup>th</sup> morning, smoke was noticed in the main incoming electrical panel situated in the electrical room. It was observed that source A was powered up at that time and the smoke was emanating from the R phase lead on the upstream of the main breaker at the panel. The power was switched off immediately, terminations were removed, and physical inspections were carried out by the project team. The load on the panel at that time was around 70 A. The incoming breaker capacity is 400 A. It was noted that a torque test was conducted on all the terminations prior to charging the panel as part of testing and commissioning exercise.

It was found that the R phase lug had got discoloured due to heat and the cable insulation on the upstream of the lug had got melted. The bolt connecting the lug to the bus bar was also found to be damaged. (See pictures)

After inspections, it was decided to re-terminate the cable with a new lug after carrying out a megger test of the cable. It was also decided to use a higher size bolt (12 mm instead of existing 10mm) for the termination.

The said rectifications were carried out and the panel was charged back with power.

The undersigned had visited the site to understand the problem and identify the probable cause for it.

Analysis:



The following were the observations:

1. There was no visual marks/ damage on the bus bar .
2. The hole in the bus bar was 12 mm dia which is correct for a 10 mm bolt.
3. A portion of the bolt had melted .
4. The lug was a 240 mm lug with a 15 mm hole and the hole had got oblongated on the side of the bolt.
5. The cable entry is from the top.

Reconstruction of the event:

1. There has been a possible heat generation in the crimped portion of the lug. This could have been due to a material defect or improper crimping. It must however be noted that a hydraulic crimping tool was used for crimping and the press marks on the lug suggest that sufficient pressure has been applied during the crimping.



2. Since the bolt hole in the lug was bigger than the bolt size, the lug hole was probably not centred to bolt but was touching the bolt at the time of termination.
3. The heat generated in the lug had got transmitted to the bolt directly due to a direct contact and the bolt had expanded in heat.
4. On expansion of the bolt longitudinally, the joint had become loose and the cable lug, on account of the weight of the cable and the gravitational force had further settled on the bolt. Both the contact surface of the bolt and the lug had got melted in that location.
5. The flat washer which was a part of the assembly was lost and could not be inspected.
6. The removed bolts from other termination joints along with washers were inspected and there was no sign of any localised heating.

Action taken on 10<sup>th</sup> April 2014:

1. The incoming terminations of both sources in the main panel has been re terminated using a 12 mm bolt.
2. All the termination were removed, inspected and re terminated with the lug hole properly centred to the bolt.
3. The termination of the cable on the tap off side at the downstream of the breaker was also redone using a 12 mm bolt and lug properly centred.
4. All the terminations were torque tested and marked.
5. The cable feeding to the AC panel was also re terminated the same way on either ends.
6. The power was switched on and observed to be stable.
7. It was suggested to conduct a thermography test once the premise is loaded.

Lesson Learnt:

The crimping of the lugs on the cable conductors is done at site manually. The vendor uses a Hand crimping tool or Hydraulic crimping tool depending on the lug size. However, the crimping quality is not tested for the contact between the lug and the conductor.

To overcome this, it is suggested that a contact resistance test be conducted on all cable termination before the panel is charged. This will ensure that there is no weak link in the cable termination.

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