

Subject: Stray Thoughts on Aluminum Bus Bar Joining

Introduction

Is bus bar joining an art or science? A little of both. Whatever it may be but it is a source of problems - Heating, Mechanical Failure, maybe a flash. Let's take a look at it.

Overlap

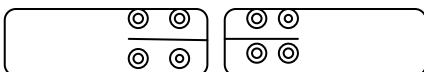
A subject of debate, as there are no guidelines on transfer current density.. Generally the bus bar joints are lap joints and an overlap equal to the width of the bus is sufficient. However there is a school of thought that more than 100 mm is not necessary.

Preparation of Surface.

Aluminum gets oxidized very fast. Aluminum oxide offers good resistance to corrosion by atmospheric pollution, however is a very poor conductor of electricity. Hence the surface to be mated should be cleaned by a wire brush and a coat of anti oxidant gel or petroleum jelly should be applied immediately to prevent reoxidation. This can be done very easily at the board manufacturers' works but poses problems at site while erecting and joining of several of the sections.

Alignment

The bus bar alignment should always be true. Bolts should not do the function of forcing the bus bars to mate. This becomes difficult when the boards are not erected plumb. However the problem can be mitigated if bus bars are spliced.



This is effective when the width of bus bar is 100mm or more. Further two fish plates should be used. Each fish plate having half the width of the main bus bar.

Hardware

This is the most important element in getting a good joint. The function of the

hardware is to give proper contact pressure at the joint

Bolts

For systems where the fault level is below 50 kA MS bolts with zinc passivation are good enough. However when the fault level is 50 kA or above it is advisable to use high tensile bolts. While using high tensile bolt care should be taken that they are not over tightened as aluminum is a soft material Suggested torque values maybe ;

| Bolt size | Hole Dia | Torque Kg F - M |
|-----------|----------|--------------------|
| M6 | 7 mm | 0.38 |
| M8 | 9 mm | 0.85 |
| M10 | 11 mm | 1.88 |
| M 12 | 13 mm | 3.20 |

Washers

It is essential that the washers are selected correctly. The minimum OD should be 25 mm and thickness of 2 mm. To increase the contact surface over sized washers are preferred but one has to ensure, that washers do not touch each other. For bus bars of 100mm and above, nut plates are better option instead of nut and washer on one side.

Spring Washers

These are one of the important members of the bolting system. The material and heat treatment is very critical. The material of spring washers should be spring steel. Spring washers should not be plated but passivate.

Conclusion

To make good bus bar joint the design and workmanship becomes more important than the components. It is easy to make a good joint at the factory, however to replicate this at site is skill.

Prepared by

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