



CQC Intime Testing Technology Co.,Ltd

TEST REPORT

Report No: 2015040K2286X
Product: copper clad aluminum busbar
Type: 80*10/50*5
Applicant: YanTai Fisend Bimetal Co.,Ltd



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Product Name : copper clad aluminum busbar
Product Type: 80*8/50*5
Quantity: 8 pcs
Applicant: YanTai Fisend Bimetal Co.,Ltd
Address: No.575,Wu Five Road, MuPing District, YanTai City
Manufacturer: -
Test Item: Change of temperature test
Reference Standard: Customer's requirements
Deviation : -
Sample Receive Date: 2015.05.04
Test Date: 2015.05.04~2015.06.15
Test Result: Reference section 1.5
Remark: The performance of samples was checked by customer (reference chapter 2).

Engineer: Wang Kun Signature: *Wang Kun* Date:2015.06.23

Auditor: Tang Yong Signature: *Tang Yong* Date: 2015.06.23

Approver: Zhao Runsheng Signature: *Zhao Runsheng* Date: 2015.06.23



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1 Change of temperature test

1.1 Atmospheric Environment

Ambient Temperature : 15~35℃
Ambient Humidity : 30~75%RH
Air Pressure: 86~106kPa

1.2 Test Equipment

Test Equipment: Temperature and humidity test chamber
Model: KHL-KWGDS62IV
Expiration Date: 2014/07/10~2015/07/09

1.3 Test Conditions

Low temperature: -40℃
High temperature: 140℃
Rate : 6℃/min
Number of cycle 1000

1.4 Reference Standard

Client requirements

1.5 Test result

After test, screws were rusty.

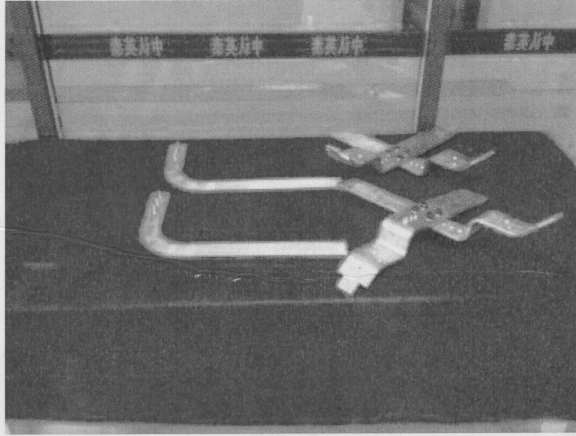


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1.6 Test Pictures



Before test



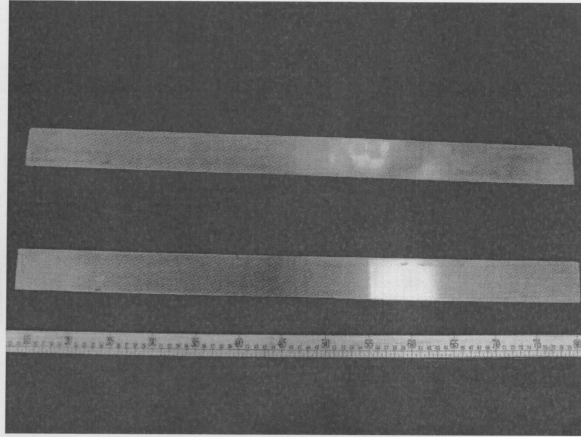
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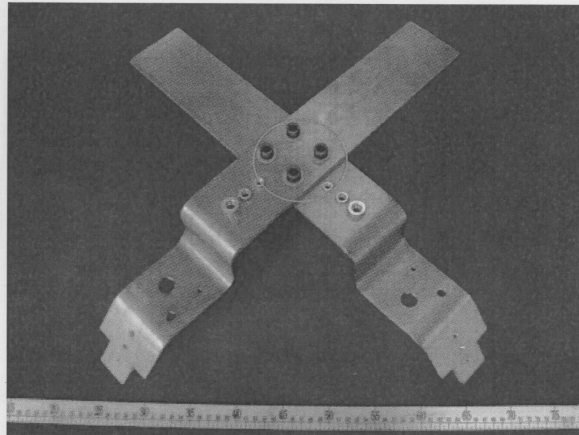
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After test



After test

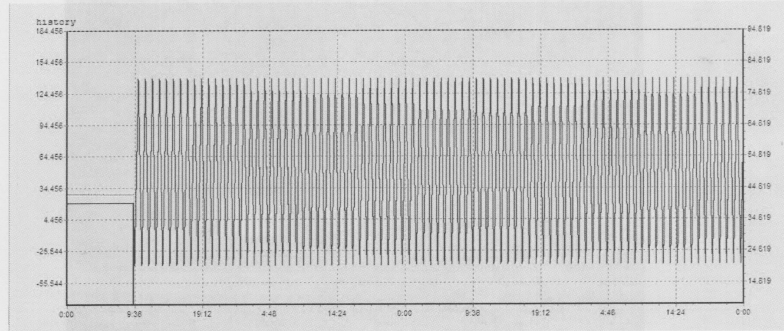


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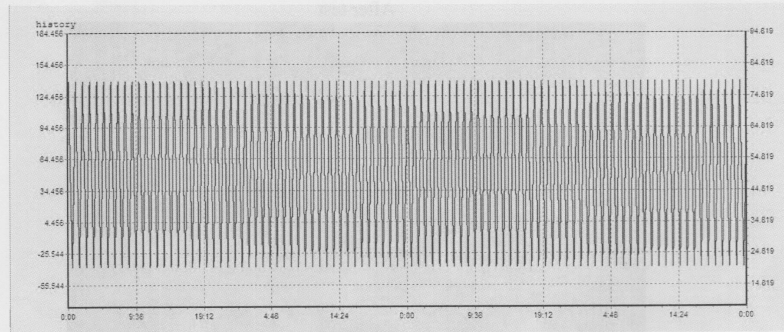
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1.7 Test Profile Curve



Profile 1



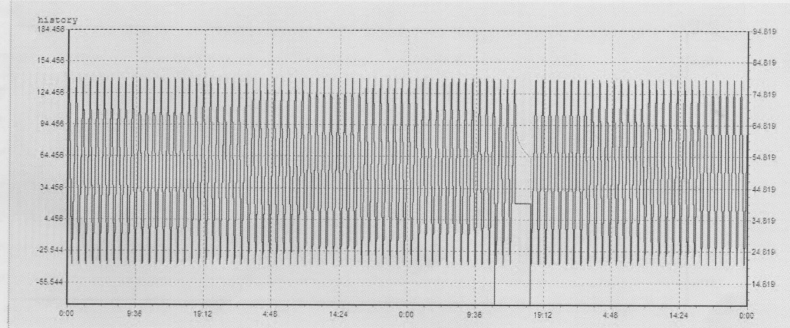
Profile 2



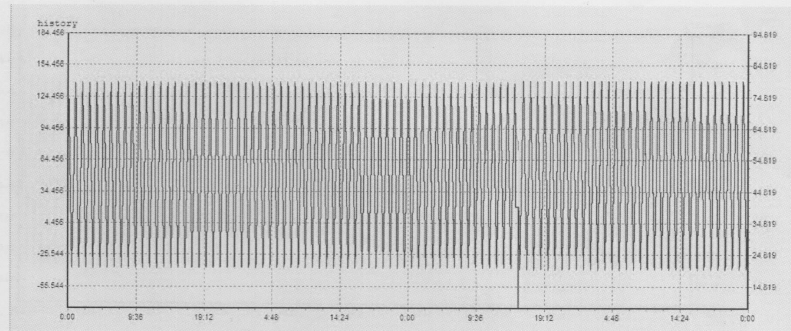
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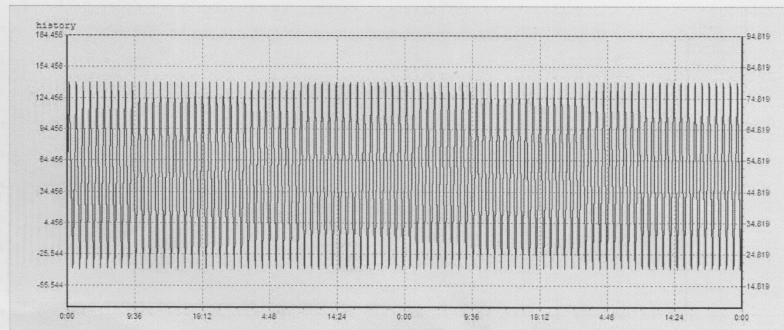
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Profile 3



Profile 4



Profile 5

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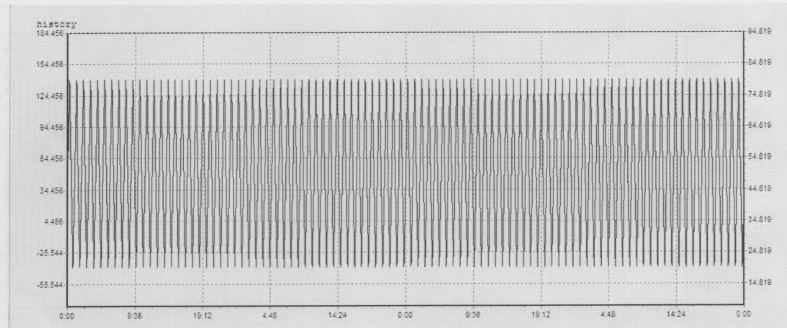
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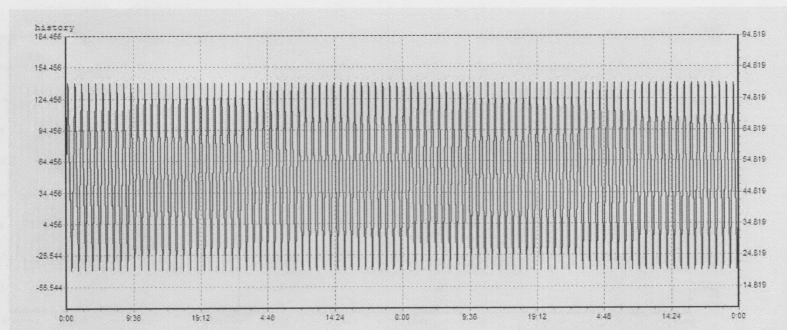
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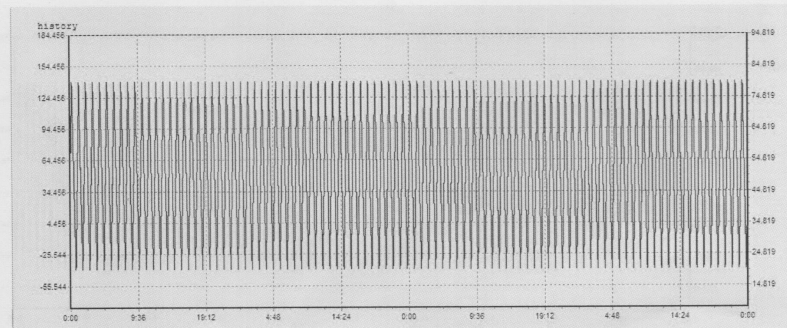
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Profile 6



Profile 7



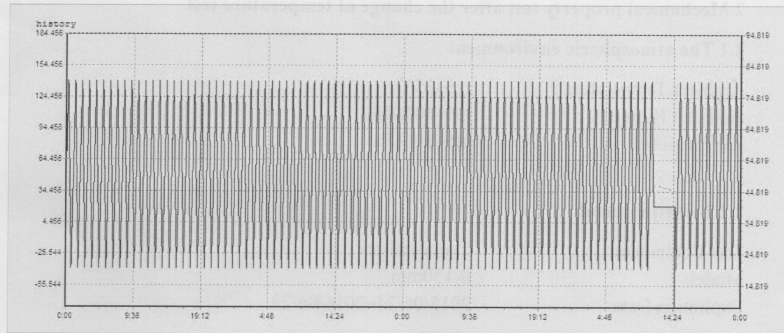
Profile 8



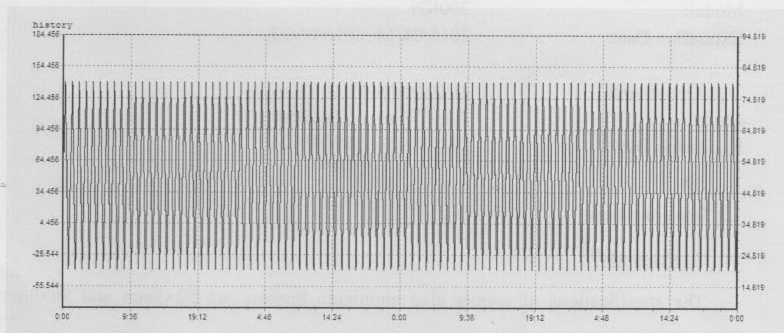
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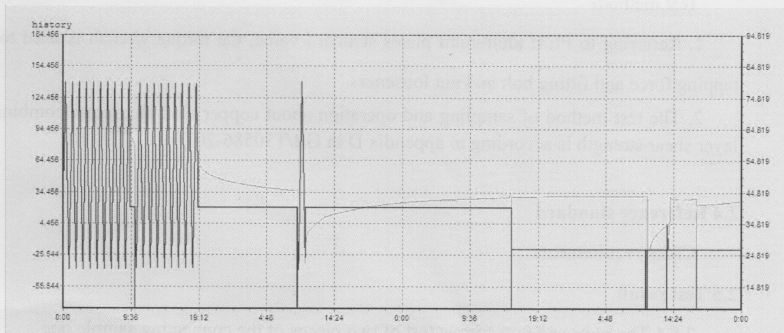
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Profile 9



Profile 10



Profile 11

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2 Mechanical property test after the change of temperature test

2.1 The atmospheric environment

Ambient Temperature : 15~35°C
Ambient Humidity : 30~60%RH
Air Pressure: 86~106kPa

2.2 Test equipment

Test Equipment: digital caliper
Model: 0-150mm
Expiration Date: 2015/06/24~2016/06/23

Test Equipment: tensile testing machine
Model: 200KN
Expiration Date: 2015/04/14~2016/04/13

Test Equipment: torque wrench
Model: 2.5-12N·m; 10-60N·m
Expiration Date: 2015/05/25~2016/05/24

2.3 Test condition

Test sample:

The specifications of copper clad aluminum busbars are 50×5mm and 80×8mm, processed according to the customer's requirements.

Test method:

1. Referring to PEM aluminum plates standard value, the torque wrench is used to test torque, tapping force and fitting bolt and nut looseness.
2. The test method of sampling and operation about copper clad aluminum combination layer shear strength is according to appendix D in GB/T30586-2014 .

2.4 Reference standard

Client requirements

2.5 Test result

2.5.1 The bolts and nuts torque test of two pieces of the connecting sample one

Turn the torque value to 20N.m (refer to CPS FAI standard of 200kgf.cm, that is

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19.6N·m), there is no looseness phenomenon when twisted. Eg fig 1 .

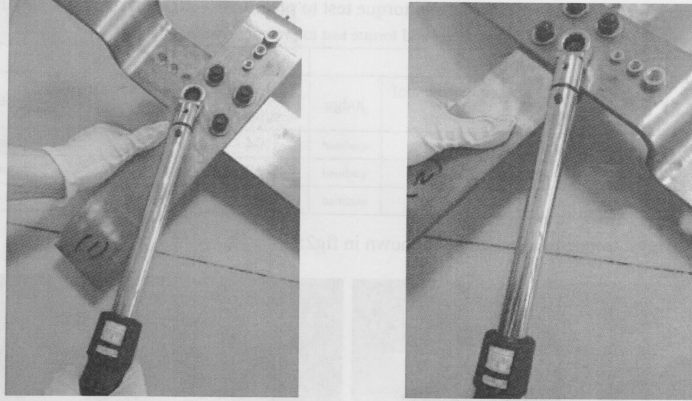


Fig 1: the torque test of bolts and nuts

2.5.2 Thrust, torque and tapping force test to pressure riveting piece of sample one

The table one shows the thrust and torque test to pressure riveting piece of sample one

Table 1: thrust and torque test to pressure riveting piece

Testing item nut	torque/N·m			thrust/KN		
	Measured value	PEM reference value of aluminum plate	judge	Measured value	PEM reference value of aluminum plate	judge
M10	35.5	32.7	qualified	1.94	1.76	qualified
M8	20	18.1	qualified	1.63	1.57	qualified
M6	15	14.1	qualified	1.62	1.5	qualified

The nuts' torque test procedure is shown in fig2:

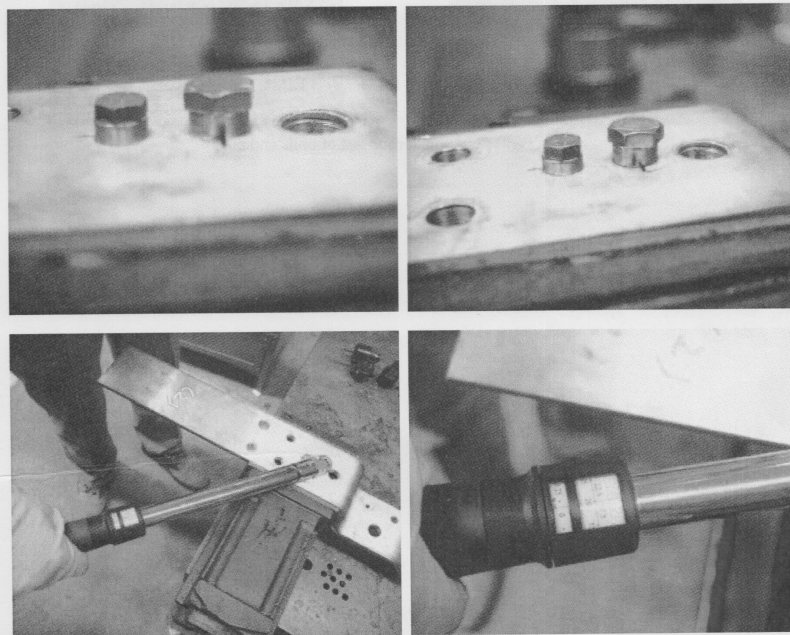


Fig 2 : the torque test of nuts

The nuts' thrust test procedure is shown in fig 3:

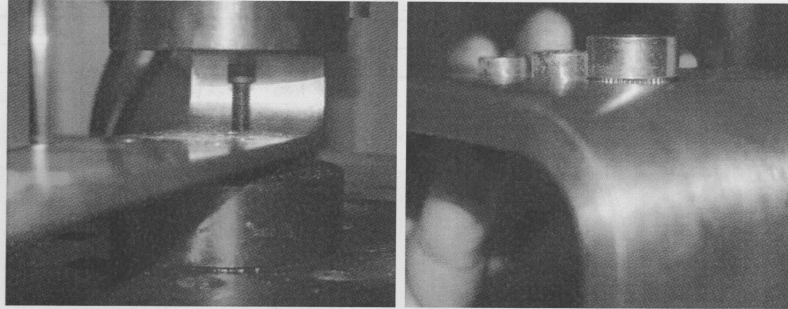


Fig 3: the thrust test of nuts

The table 2 shows the results of tapping force test for sample one

Table 2: the test results of tapping force

Testing item nuts	Collapsing force/N·m		
	Measured value	reference value (CPS FAI offer)	judge
M8	-	-	-
M6	7	6.37	qualified
M4	3	1.764	qualified

The tapping force test procedure is shown in fig4:

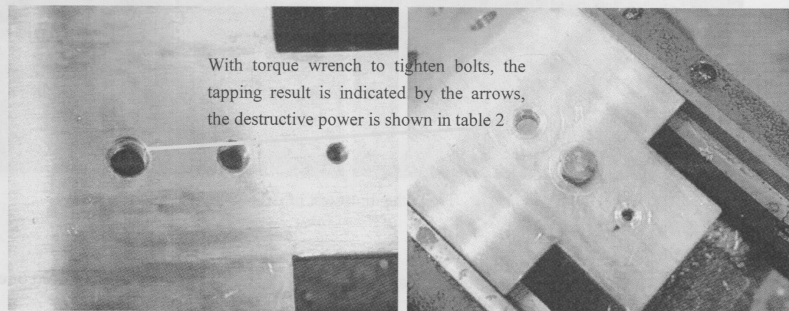


Fig 4: tapping force test

2.5.3 Thrust test to rivet of sample 2

The table 3 shows the thrust results of rivet:

Table 3: the thrust results of rivet

Testing item nut	thrust/KN		
	Measured value	PEM reference value of aluminum plate	judge
M10	2.52	2.448	qualified
M8	2.06	1.91	qualified
M6	1.76	1.66	qualified

The thrust test procedure of rivet is shown in fig5:

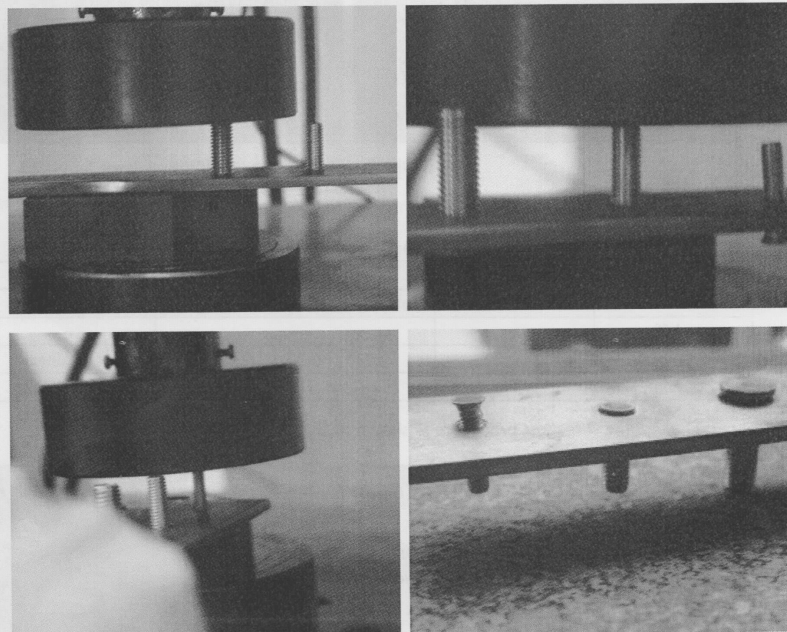


Fig 5: the thrust test of rivet

2.5.4 The interface shear strength test of copper clad aluminum busbar in sample one and sample two.

Table 4 shows the interface shear strength results of 50×5mm and 80×8mm samples, the operation procedure refers to appendix D in GB/T30586-2014.



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Table 4: interface shear strength value

Test item sample	Interface shear strength value/Mpa			Reference value/Mpa Refer to GB/T30586-2014	judge
	combining layer above	combining layer below	Average value		
50×5	49	51	50	40	qualified
	49	57	53		qualified
80×8	43	42	42.5		qualified
	45	43	44		qualified

2.5.5 The results of torque, thrust, tapping force and interface shear strength after 1000 times high-low temperature cycle

Machined as sample one and sample two after 1000 times high-low temperature cycle, the operation procedure of torque, thrust, tapping force and interface shear strength refers to chapter 2.5.1~2.5.4. The results achieve to standard requirement and are shown in table 5 and table 6, they are all judged qualified.

Table 5: the torque, thrust and tapping force results of bolts and nuts

Test item nut/bolt	Nut torque/N·m Measured value	Nut thrust/KN Measured value	Bolt thrust/KN Measured value	Tapping force/N Measured value
M10	34.8	1.82	2.48	-
M8	19.2	1.61	1.99	-
M6	14.8	1.55	1.72	-
(tapping) M8	-	-	-	-
(tapping) M6	-	-	-	7.12
(tapping) M4	-	-	-	2.96

Table 6: interface shear strength value

Test item sample	Interface shear strength value/Mpa		
	combining layer above	combining layer below	Average value
50×5	48	50	49
	47	49	48
80×8	46	44	45
	48	42	45



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2.6 Conclusion

1. Visual inspection after testing, there is amount of red rust on screw, it may be caused by copper oxide after high-low temperature cycle and doesn't affect the using performance of copper clad aluminum busbar.

2. After environmental testing, there is no looseness under 20 N.m on nuts and bolts which connect two pieces of sample one. It achieves to standard requirement provided by CPS FAI, so it's judged qualified.

3. After environmental testing, nuts torque and bolts thrust achieve to standard requirement provided by PEM, so it's judged qualified.

4. After environmental testing, tapping force achieves to standard requirement provided by CPS FAI, so it's judged qualified.

5. After environmental testing, interface shear strength of copper clad aluminum busbar achieves to standard requirement provided by GB/T30586-2014, so it's judged qualified.

6. After environmental testing, machined as sample one and sample two, all the testing results of torque, thrust, tapping force and interface shear strength could achieve to standard requirement provided by CPS FAI and GB/T30586-2014, so they are all judged qualified.

To sum up, after environmental testing, the performance of copper clad aluminum busbar satisfy all the requirements.



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Statement of Report

1. The test report shall not be copied except in full, without written approval of the laboratory.
2. The test results are only effective for test samples.
3. If there is any objection to test results, please submit a written complaint to the company in 10 days since you receive the report.
4. The test samples must be taken back in 60 days since you receive the report, or the company reserves the right to dispose of samples.
5. This report can only be a reference for client, not providing a basis for litigation and arbitration.

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