JBC/PG, INSULATION PIERCING CONNECTOR

JBC/PG

JBC/PG insulation piercing connectors are applicable for all types of LV ABC conductors as well as connections in service line system, building electrical system and street lighting system. Installation of JBC/PG can be easily done by tightening bolts to force teeth penetrate insulation of main line and tap line simultaneously. Stripping of insulation is avoided to reduce time.

- Used for parallel groove connection or branch connection
- Main line: insulated aluminium cable
- Tap line: insulated aluminium cable or insulated copper cable
- Body is moulded from high strong,flame,weather resistant material
- special designed shear head bolt allows different installation with specific shear off torque. Constant force ensures teeth penetrate cable without damaging mechanical strength of conductor.
- Elastic sealant and silicone grease are applied to guarantee excellent waterproof and corrosion resistant performance.
- End cap is attached to body.No loose parts could fall off during installation.
- easy and safe installation
- Tested by cyclic electric voltage of 6kV for 1 minute under water.
- Standards: EN 50483-4, NF C 33-020, NF Electric

Type	Main Conductor Size(mm²)	Tap Conductor Size(mm²)	Number of Bolts	Shear-off Torque (Nm)	Pack (pcs)
JBC6-35/6-35/PG	6-35	6-35	1	12	40x4
JBC16-70/6-35/PG	16-70	6-35	1	12	30x4
JBC16-95/6-35/PG	16-95	6-35	1	13	30x4
JBC25-95/25-95/PG	25-95	25-95	1	19	20x4
JBC25-95/25-95/2/PG	25-95	25-95	2	13	10x4
JBC25-120/25-120/PG	25-120	25-120	1	20	15x4
JBC35-150/6-35/PG	35-150	6-35	1	18	25x4
JBC95-185/6-35/PG	95-185	6-35	1	17	20x4
JBC120-240/25-120/PG	120-240	25-120	1	25	12x4
JBC35-185/35-185/2/PG	35-185	35-185	2	25	6x4
JBC95-240/95-240/2/PG	95-240	95-240	2	25	6x4
JBC35-150/35-150/PG/A	35-150	35-150	1	25	15x4

MELEC

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To Whom It May Concern,

We, JIANGSU JIAMENG ELECTRICAL EQUIPMENT CO., LTD.

has confirmed that all the Type Test below :

Item	Model	JBC16-95/ 2.5-35/PG (1 bolt)	JBC25-95/ 25-95/PG (1 bolt)	JBC25-95/ 25-95/2/PG (2 bolts)	JBC35-150/ 35-150 (1 bolt)	JBC35-150/ 35-150 (2 bolts)	JBC35-150/ 6-35 (1 bolt)
1	Type Test Report No.	2018FA0669	2018FA0667	2018FA0670	2018FA0665	2018FA0666	2018FA0672
2	Number of pages	40	40	40	40	40	40
3	Applicant	JIANGSU JIAMENG					
4	Trade Mark	MELEC	MELEC	MELEC	MELEC	MELEC	MELEC
5	Manufacturer	JIANGSU JIAMENG					
6	Factory	No. 5, Zhongli Road Binhai Industrial Zone, Qidong City, Jiangsu Province 226236, China					
7	Standard of Testing / Test Method	NFC 330202013 BS EN 50483-4:2009					
8	Issued by:	SIRIM QAS International Sdn. Bhd.					
9	CB Testing Laboratory:	SIRIM QAS International Sdn. Bhd.					
10	Testing location/ address	No. 1, Persiaran Dato' Menteri, P.O.BOX 7035, Section 2, 4070 Shah Alam, Selangor Darul Ehsan, Malaysia					
11	Date of issue:	09 JUL. 2018	26 JUN. 2018	09 JUL. 2018	26 JUN. 2018	26 JUN. 2018	19 JUL. 2018

Are scanned from the Original one of the Factory.

Due to all the informations in these Type Test included secret technology,

so we can not upload all these type test widely on internet.

With this writing, we commit the authentication of the Stamped Type Test Report's Copy of our Factory.

.....

Chongjie Zhang - General Manager
On behalf of MELEC

SIRIM QAS International Sdn.Bhd. (410334-X)
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TEST REPORT

REPORT NO.: 2018EA0670	PAGE : 1 OF 40

Applicant	:	JIANGSU JIAMENG ELECTRICAL EQUIPMENT CO., LTD. NO. 5, ZHONGLI ROAD BINHAI INDUSTRIAL ZONE, QIDONG CITY JIANGSU PROVINCE 226236, CHINA
Manufacturer	:	JIANGSU JIAMENG ELECTRICAL EQUIPMENT CO., LTD. NO. 5, ZHONGLI ROAD BINHAI INDUSTRIAL ZONE, QIDONG CITY JIANGSU PROVINCE 226236, CHINA
Product	:	IPC (Insulation Piercing Connectors)
Reference Standard / Test Method	:	NFC 33 020:2013 BS EN 50483-4: 2009
Description of sample	:	Brand : MELEC Model : JBC25-95/25-95/2/PG Rating : Main : 25mm²-95mm² Tap : 25mm²-95mm²
Date received	:	13 OCT. 2017
Job No./Ref. No	:	J20171420991
Overall test result	:	**COMPLIED(See page 2 & 3 for details)**
Issue date	:	09 JUL. 2018

Approved Signatories:

(MOHAMAD ASNAN BIN AHMAD)
Testing Executive

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

(M.ZAMRI BIN MUSTAFFA)
Head
Electrical & Electronic 1 Section
Testing Services Department

SUMMARY OF TESTS:

1. This is a type test report as requested by the applicant.
2. The tests were carried out based on the requirement of NFC 33 020:2013 and BS EN 50483-4: 2009.
3. All the tests were conducted on the samples as submitted by the applicant.

Test		Correspondence with NF EN 50483-4	No. of samples tested	
6.3	Mechanical tests			Seq.
6.3.1	Shear Head function test and bolt tightening test	8.1.2.4	6+6	A
		8.1.2.3	2+2+2	B
6.3.2	Test for mechanical damage to the main conductor	8.1.2.1	2+2+2	C
6.3.3	Branch cable pull-out test	8.1.2.2	2+2	D
6.3.4	Low temperature impact test	8.1.2.5	2+2	E
6.4	Dielectric test and water tightness test			
6.4.1	Voltage test	8.1.3.1	2+2	F_1
6.4.2	Water tightness test	8.1.3.2	-	-
6.5	Low temperature assembly test	8.1.4	2+2+2	G
6.6	Climatic ageing test	8.1.5.2	2+2	F_2
		8.1.3.1.3.2.1	2+2	F_3
		8.1.3.1.3.1	2+2	F_4
		8.1.3.2	-	-
6.7	Corrosion test	8.1.5.1	2	H
6.8	Electrical ageing test	8.1.6	6+6	I
6.9	Temperature rise and overcurrent test	Appendix A	-	-
7.2	Test for permanent marking	9.2 NF EN 50483-1	2	

4. The abbreviation used in this test report denotes as follows:-

   Pass – Complied with the requirement
   NA – Not applicable with requirement
   Fail – Fail to complied with the requirement

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

SUMMARY OF RESULTS:

1. The tested samples deemed to comply to the tests that were conducted.

ADDITIONAL INFORMATION:

1. Tested by : Mr. Mohd Ishar Bin Abdul Hamed
   Mr. Hasbar Rafeq Bin Abd Rahim
2. Checked by: Mr. Mohamad Asnan bin Ahmad
3. Date of test sample(s) received;
   a) 1st submission : 13 OCT 2017
   b) 2nd submission : __NIL__

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
6.3	**Mechanical tests**		
	For minimal breaking loads (MBL) of the cables, refer to the existing standards.		Pass
	In the absence of normative value, take for:		
	- The aluminum phases a minimal stress value equal to 120 N/mm^2 applied to the nominal cross section area		Pass
	- The copper conductors a minimal stress value equal to 300 N/mm^2 applied to the nominal cross section area		NA
	The tolerance range to consider is that of paragraph 9.1.3 of the standard NF EN 50483-1 with for the weak stresses the higher of the following two values: ± 5 % or ± 10 N.		Pass
6.3.1	Shear head function's test and connector bolt tightening test		Pass
	For the shear head function test, the test of paragraph 8.1.2.4 of the standard NF EN 50483-4 applies with the following specification:		Pass
	- The six samples test for each of the temperatures, are spread over the two combinations of cross-sections.	Refer Table 1	Pass
	For the connector bolt tightening test, the test of paragraph 8.1.2.3 of the standard NF EN 50483-4 applies.	Refer Table 2	Pass
6.3.2	Test for mechanical damage to the main conductor		Pass
	For the test for mechanical damage to the main conductor, the test of paragraph 8.1.2.1 of the standard NF EN 50483-4 applies with the following specifications:		Pass
	- In the case of a connection of a insulation main conductor (CU and Aluminum) towards an insulated tap conductor, the values of loads applied are equal to :	Aluminum	Pass
	- 15 % to 20 % of MBL for the pre-loading of the main conductor;	Refer Table 3	Pass
	- 60 % of the MBL for the tensile load applied on the main conductor for 1 min;	Refer Table 3	Pass
	For connectors of type CMCC/CTy [connectors for measuring and short circuiting, editor's note], only		NA

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
	the maximum and minimum combinations of the main conductor apply.		
6.3.3	Branch cable pull-out test		Pass
	For the branch cable pull-out test, the test of paragraph 8.1.2.2 of the standard NF EN 50483-4 applies.	Refer Table 4	Pass
6.3.4	Low temperature impact test		
	For the low temperature impact test, the test of paragraph 8.1.2.5 of the standard NF EN 50483-4 applies with the following specifications.	Refer Table 5	Pass
	-The connectors are mounted at ambient temperature at the breaking torque of torque limiters;		Pass
	- For connectors of type CMCC/CTy [connectors for measuring and short circuiting, editor's note], the shocks are applied on the connector part, not on the connecting pin.		NA
6.4	**Dielectric voltage test and watertightness test**		
6.4.1	Dielectric voltage test		Pass
	For dielectric voltage test, the test of paragraph 8.1.3.1 of the standard NF EN 50483-4 applies with the following specifications:		Pass
	- The connectors belong to Class 1 ; test in water, 60s	60 s	Pass
	- The value of alternate voltage to be applied is 6kV.	6kV	Pass
	This test is applied neither to connectors of type CDR/CNk [network connectors for bare main lines, editor's note] for which test defined in paragraph 6.4.2 is applied nor to PMCC plugs [plugs used for measuring and short circuiting, editor's note] alone.		NA
	The PMCC plugs are associated to CB [branching connector, editor's note] connector.		NA
	For connectors of type CMCC [CMCC = CB + PMCC, editor's note] and PMCC plugs associated to a CB connector, the protective covers of the pin are closed according to the requirements of the constructor.		NA
6.4.2	Watertightness test		NA
	For the watertightness test, the test of paragraph 8.1.3.2 of the standard NF EN 50483-1 applies.		NA

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
	This test applies only to connectors of type CDR/CNk [network connectors for bare main lines, editor's note].		NA
6.5	**Low temperature assembly test**		
	For low temperature assembly test, the test of paragraph 8.1.4 of the standard NF EN 50483-4 applies.	Refer table 7	Pass
	For connectors of type CMCC/CTy [connectors for measuring and short circuiting, editor's note], only the maximum and minimum combinations of the main apply.		NA
6.6	**Climatic ageing Test**		
	This test is done on samples that have been subjected to the voltage test and watertightness test of paragraph 6.4.		Pass
	For the climatic ageing test, the test Method 1 of paragraph 8.1.5.2 of the standard NF EN 50483-4 applies.		Pass
	After the climatic ageing for the insulation piercing connectors, the voltage test in the metallic balls is done according to.Method 1 and under an alternate voltage of 6kV.	Refer table 8	Pass
6.7	**Corrosion test**		
	This test does not apply to PMCC plugs [plugs used for measuring and short circuiting, editor's note].		-
	For the corrosion test, the test of paragraph 8.1.5.1 of the standard NF EN 50483-4 applies upon doing the test in gaseous atmosphere Method 1 of paragraph 8.1.5.1.3.2 with the following specification:		Pass
	- The definition of significant red rust is under study, and therefore, the criterion of the presence of red rust must be subject of agreement between the manufacturer and the client.	No red rust	Pass
	For the connector of type CMCC [connectors for measuring and short circuiting, editor's note], the protective cover of the pin is closed according to the requirements of the constructor.		NA
	For a connector designed with a shear-head it shall be able to be removed with a torque below or	Refer table 9	Pass

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
	equal to, the manufacturer's specified maximum torque.		
6.8	**Electrical ageing test**		
	This test does not apply to connectors of type CMCC/CTy and PMCC [resp. connectors and plugs used for measuring and short circuiting, editor's note] for which the temperature rise and overcurrent test in paragraph 6.9 is applied.		-
	For electrical ageing, the test of paragraph 8.1.6 of the standard NF EN 50483-4 applies with the following specifications:		Pass
	- Classes of connectors:		
	- Class A for connectors of type CDR [network connectors, editor's note].		NA
	- Class B for connectors of types CB and CE [resp. branching and street lighting connectors, editor's note].	Class B	Pass
	- Configuration of test loops :		
	- 1st loop: maxi/maxi cross sections on phase conductors.	See Annex B	Pass
	- 2nd loop: mini/mini cross sections on neutral conductors.	See Annex C	Pass
	- In the case of connectors of type CDR/CN [network connectors for bare main lines, editor's note], the temperature ΘN of the main bare conductor is fixed at 105°C		NA
	- In the case of connector of type CB, only the cable conforming to the standard NF C 33-209 is used as tap.		NA
6.9	**Temperature rise and overcurrent test**		NA
	This test applies only to connectors of type CMCC/CTy and PMCC [resp. connectors and plugs used for measuring and short circuiting, editor's note] associated to a CB connector [branching connector, editor's note] in accordance with the current document.		NA
	For the temperature rise and overcurrent tests, the tests in Appendix A of the standard NF EN 50483-4 apply with the following specifications:		NA
	- The connectors (CMCC/CTy or PMCC / CB) are connected in pairs according to the illustrative setup		NA

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
	in Appendix A of the standard NF EN 50483-4 using a copper braid of rated cross-section 25 mm2 carrying in one of the extremes a connecting socket compatible with the connector pin as described in Figure A.1 of the standard NF EN 50483-4 and of jig in conformity with the one indicated in Appendix B.		
	As a preliminary measure, it is ensured that the resistance of the contacts is below 630 µΩ. This measure is done by using in the assembly two identical sockets connected to the braid of 25 mm2 on one hand and on the other, connected to one another by a test pin described in Appendix B. This measure is done in continuous current with an intensity which must not exceed 10 Amps. The potential measuring points are placed on the 25 mm2 braid at a distance of 100 mm from the extreme end of the socket.		NA
	- Value of current of previous and final temperature rise : (100 •) 2) Amps ;		NA
	Value of current for overcurrent test: 4kA respecting the relation I2t = Cte = 16.106 J.		NA
7	**Markings and indications**		
7.1	All products mentioned above shall permanently bear:		
	- The trade mark or the logo of the manufacturer, the batch reference and the code of the manufacturing plant;	MELEC	Pass
	- The designation as per this standard and the commercial reference, if any;		Pass
	- The maximum and minimum cross-section for which this connector is intended.	Main=25-95mm² Tap= 25-95mm²	Pass
	Each conditioning unit shall bear:		
	- The designation as per this standard and the commercial reference, if any;	JBC25-95/25-95/2/PG	Pass
	- The trade mark or the logo of the manufacturer and the batch reference;		NA
	- The number of connectors;		NA
	- The nominal torque for the tap of reusable connectors (if necessary);	13 Nm	Pass
	- The reference to this standard.		NA

NFC 33 020:2013			
Clause	**Requirement**	**Remark**	**Result**
7.2	**Check for permanent marking**		Pass
	For the check for permanent marking, the test defined in paragraph 9.2 of standard NF EN 50483-1 applies		Pass

BS EN 50483-1& -5: 2009			
Clause	**Requirement**	**Remark**	**Result**
5	Type test		
5.1	Connectors shall be subjected to 1,000 cycles of heating and cooling.		Pass
	Heat cycle and short circuit tests shall be made with alternating current		Pass
5.2	Test arrangement		
	Test loop shall be as shown in fig. 5, 6, 7 or 8	Figure 5 (Main and Tap equal cross section conductor)	Pass
5.2.1	Optional immersion test		NA
5.2.2	Disconnection devices		
	The test circuit may include sectioning joints so that can it can be dismantled easily for short circuit test and for resistance measurement		NA
5.2.3	Conductors		
	Phase and neutral conductors used in the test loop shall remain insulated.	Stranded aluminum with XLPE type insulation	Pass
5.2.4	Ambient temperature shall be measured in the middle of the test loop.		Pass
	The thermocouple shall be placed in a metal foil cylinder of 100mm height and 40mm diameter.		Pass
5.2.5	Ambient conditions		Pass
	The ambient temperature of the test location shall be between 15 °C and 30° C	20° C to 26° C	Pass
	During resistance measurement the ambient temperature shall remain between 20°C to 26°C	20° C to 26° C	Pass
5.2.6	Equalizers		Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

BS EN 50483-1& -5: 2009			
Clause	**Requirement**	**Remark**	**Result**
	For stranded conductors welded or soldered equalizers shall be used to obtain reliable measurement.	As prepared by mfg.	Pass
	Other methods can be used provided that they give comparable results.	Crimped with ferrules as equalizers	
5.2.7	Lengths and configurations of conducting paths		
	The distance of the equallzers points		Pass
	- 150mm for conductors with cross sections up to 50mm.sq	Refer to Annex C diagram 1	Pass
	- 200mm for conductors with cross sections from 50 - 120mm.sq	Refer to Annex B diagram 1	Pass
	- 250mm for conductors with cross sections from 120 - 240mm.sq		NA
5.3	Test samples		
5.3.1	Setting up of the test loop		Pass
	Figure 5 for main and tap conductors of the same cross sectional area.	25-95mm² & 25-95mm²	Pass
	Figure 6 for main and tap conductors of different cross sectional area.		NA
5.3.2	Preparation of cable and cores before the tests		Pass
	Insulated core shall be conditioned before the test		Pass
	- Normal operating temperature of the type of conductor insulation and + 30°C	90°C + 30°C	Pass
5.3.3	The connectors shall be installed as per mfg's instructions.	Test loop as prepared by mfg.	Pass
5.4	Measurement		
	Thermocouple of accuracy ± 2°C shall be used a small hole is drilled on the connector to insert the thermocouple.		Pass
	For the reference conductor the thermocouple shall be inserted between the strand and under the cable insulation		Pass
5.4.2	Electrical resistance measurement		
	DC current shall be used for the resistance measurement	25mm²:13.9A DC 95mm²:35A DC	Pass
	Voltage measurement shall have an accuracy within ± 0.5% or ± 10μV		Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

BS EN 50483-1& -5: 2009			
Clause	**Requirement**	**Remark**	**Result**
	Current measurement shall have an accuracy within ± 0.5% or ± 0.1A	Resistance test bench	Pass
5.5	Heat cycle test The heat cycling test shall be made at power frequency	Refer to diagram II	Pass
	Figure 3 diagrammatically represent the heat cycle curve		Pass
	First thermal cycle		
	The object of the first cycle is to determine the current to heat up the reference conductor and the connectors, to be used for subsequent cycles.	Refer Annex B & Annex C	Pass
	Description of test		
	Alternating current at power frequency of 50Hz, is circulated in the test loop bringing the reference conductor temperature to normal operating temperature	Refer to diagram II	Pass
	At equilibrium the reference conductor temperature shall be maintained within minimum + 5k and maximum +15k		Pass
	At equilibrium the tap reference conductor temperature shall be maintained within minimum + 5k and maximum +10k		Pass
	The median connector temperature shall be stable within 2 k for a minimum of 10 minutes.		Pass
	The equilibrium current in the main conductor and tap conductor shall be recorded.	Refer Annex B & Annex C	Pass
	After the equilibrium period the reference and connectors shall be cooled to ambient temperature +5k in 10 or more minutes	Refer Annex B & Annex C	Pass
	If forced cooling is used it shall act on the whole test loop and use air within ambient temperature limits.	Two Fan was used	Pass
5.5.2	Subsequent heat cycles		
	A total of 1000 heat cycles shall be made.		Pass
	The maximum temperature prior to the resistance measurement shall be recorded.	Refer to Table I(a)	Pass
5.5.3	Short circuit tests (for class A connectors only)		NA
	Six short circuits shall be applied after the 200th cycle		NA
	The short circuit level shall be such that it raises the temperature of the reference conductor from ambient temperature to not less than the short		NA

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

BS EN 50483-1& -5: 2009			
Clause	**Requirement**	**Remark**	**Result**
	circuit temperature given in Annex C of part 1 of this standard		
Note 4	It is permissible for the short circuit current and duration of current to be calculated if it is difficult to measure the temperature of the reference conductor.		NA
	For unequal cross section, the lowest current based on the cross section of the tap conductor shall be used.		NA
5.5.4	Assessment of results		
	An individual connection resistance (Rj) enables a common method of connector assessment to be made over the six connectors		Pass
	a. The connector resistance Rj shall be calculated at all the intervals stated	Refer to Table II & III	Pass
	b. The initial scatter between the six initial values of (Rj) prior to heat cycling, shall be calculated.	Refer to Table III	Pass
	c. The mean scatter between the six values of (Rj) averaged over the last 11 measurement. shall be calculated	Refer to Table III	Pass
	d ,The assessment of resistance stability, the larger relative change of each connector resistance, shall be calculated over the last 11 measurement	Refer to Table III	Pass
	e. the resistance factor ratio shall be calculated	Refer to Table IV	Pass
	f. the stability of the connector's temperature shall be calculated	Refer to Table I(d)	Pass
	g. The maximum temperature on each connector shall be recorded	Refer to Table I(a)	Pass
5.6	Requirements		
5.6.1	General requirements		
	The six connectors shall satisfy the requirements shown in table 4.		Pass
	If more than one connector out of the six dos not satisfy one or more requirements, no re-test shall be permitted and does not confirm to this standard		NA
5.6.2	Resistances		Pass
5.6.2.1	Initial scatter	Refer to Table III	
	Maximum value shall be less than 0.3	< 0.3	Pass
5.6.2.2	Mean scatter	Refer to Table III	

BS EN 50483-1& -5: 2009			
Clause	**Requirement**	**Remark**	**Result**
	Maximum value shall be less than 0.3	< 0.3	Pass
5.6.2.3	Assessment of resistance stability for each connector		
	Maximum value shall be less than 15%	Refer to Table V	Pass
5.6.2.4	Resistance factor ratio		
	Shall be less than 2.0	Refer to Table IV	Pass
5.6.3	Temperature		
5.6.3.1	Temperature stability		
	the difference in temperature between connector and reference conductor shall not differ by ± 10°C	Refer to Table I(c)	Pass
5.6.3.2	Connector temperature, θj shall be lower than or equal to the warmest reference	Refer to Table I(b)	Pass

Annex A

Table 1:

Shear head Function test and bold tightening test (sub clause 8.1.2.4 BS EN 50483-4)

Sample No.	Conductor Size (mm^2)		Torque range (Nm)	Break of Shearhead (Nm)			
	Main	Tap		Min. temperature (-10±3) °C		Max. temperature (50±3) °C	
A1	25	25	12 – 15	12.90	13.18	13.00	12.60
A2	25	25	12 – 15	12.48	12.60	12.96	12.96
A3	25	25	12 – 15	12.68	12.70	12.54	12.66
A4	95	95	12 – 15	13.08	13.08	12.64	12.66
A5	95	95	12 – 15	12.66	12.78	12.80	12.70
A6	95	95	12 – 15	12.88	13.28	12.74	12.80

Table 2:

Shear head Function test and bold tightening test (sub clause 8.1.2.3 BS EN 50483-4)
Maximum torque (15Nm) + 20% = 18 Nm

Sample No.	Conductor Size (mm^2)		Tensile Strength (kN)	Max. Torque (Nm)		Connector shall be undamaged
	Main	Tap				
B1	95	95	2.28	18.06	18.02	Pass
B2	95	95	2.28	18.12	18.08	Pass
B3	25	25	0.6	18.00	18.02	Pass
B4	25	25	0.6	18.12	18.04	Pass
B5	25	95	0.6	18.08	18.06	Pass
B6	25	95	0.6	18.02	18.00	Pass

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Annex A (Cont...1)

Table 3:

Test for mechanical damages to main conductor (sub clause 8.1.2.1 BS EN 50483-4)
Maximum torque = 15Nm

Sample No.	Conductor Size (mm^2)		Pre-loading 15%-20% (kN)	Tensile Strength 60%, 1min (kN)	Tightening with max. torque (Nm)		No breaking or no damaged
	Main	Tap					
C1	95	95	1.7 – 2.28	6.84	15.00	15.08	Pass
C2	95	95	1.7 – 2.28	6.84	15.10	15.06	Pass
C3	25	25	0.45 – 0.60	1.80	15.10	15.00	Pass
C3	25	25	0.45 – 0.60	1.80	15.08	15.10	Pass
C4	25	95	0.45 – 0.60	1.80	15.08	15.04	Pass
C6	25	95	0.45 – 0.60	1.80	15.02	15.04	Pass

Table 4:

Branch cable pull out test (sub clause 8.1.2.2 BS EN 50483-4)
Maximum torque = 15Nm

Sample No.	Conductor Size (mm^2)		Pre-loading 10% (kN)	Tightening with max. torque (Nm)		Slippage not exceed 3mm	No breaking or no damaged
	Main	Tap					
D1	25	25	0.3	15.02	15.32	0	Pass
D2	25	25	0.3	15.10	15.04	0	Pass
D3	95	25	0.3	15.14	15.52	0	Pass
D4	95	25	0.3	15.08	15.08	0	Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex A (Cont...2)

Table 5:

Low temperature impact test (sub clause 8.1.2.5 BS EN 50483-4)
Torque range (Nm) = 12 – 15

Sample No.	Conductor Size (mm^2)		Tightening with max. torque (Nm))		Impact test at (-10±3) °C	
	Main	Tap			Acting from top	Acting on side
E1	95	25	14.60	14.66	No damages	No damages
E2	95	25	14.66	14.38	No damages	No damages
E3	95	95	14.12	14.00	No damages	No damages
E4	95	95	14.50	14.20	No damages	No damages

Table 6:

Dielectric voltage test (sub clause 8.1.3.1 BS EN 50483-4)
Minimum torque : 12Nm

Sample No.	Conductor Size (mm^2)		Tightening with min. torque (Nm)		6kV Voltage test, 60 s	
	Main	Tap			Voltage applied(kV)	Result
F1.1	25	25	12.02	12.10	6.01	No breakdown
F1.2	25	25	12.02	12.16	6.01	No breakdown
F1.3	95	25	12.04	12.22	6.01	No breakdown
F1.4	95	25	12.08	12.02	6.01	No breakdown

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex A (Cont...3)

Table 7:
Low temperature assembly test (sub clause 8.1.4 BS EN 50483-4)
Minimum torque : 12Nm x 0.7 = 8.4 Nm

Sample No.	Conductor Size (mm^2)		Tightening with 0.7 x min. torque (Nm)at (-10±3) °C	Continuity
	Main	Tap		
G1	95	95	4.10	Pass
G2	95	95	3.90	Pass
G3	25	95	3.80	Pass
G4	25	95	2.78	Pass
G5	95	25	3.98	Pass
G6	95	25	4.20	Pass

Table 8:
Voltage test after climatic ageing test (sub clause 8.1.3.1.3.2.1 & 8.1.3.1.3.1, BS EN 50483-4)

Sample No.	Conductor Size (mm^2)		Test Voltage Applied (kV) - metallic ball	Test Voltage Applied (kV) - water	Result
	Main	Tap			
F1	25	25	6.0	1.0	No breakdown
F2	25	25	6.0	1.0	No breakdown
F3	95	25	6.0	1.0	No breakdown
F4	95	25	6.0	1.0	No breakdown

Table 9:
Disassembly torque after corrosion test (sub clause 8.1.5.1.4 BS EN 50483-4)

Sample No.	Conductor Size (mm^2)		Disassembly Torque Value (Nm)	Torque Range (Nm)	Result
	Main	Tap			
H1	25	25	6.02	≤ 15	Pass
H2	25	25	6.96	≤ 15	Pass

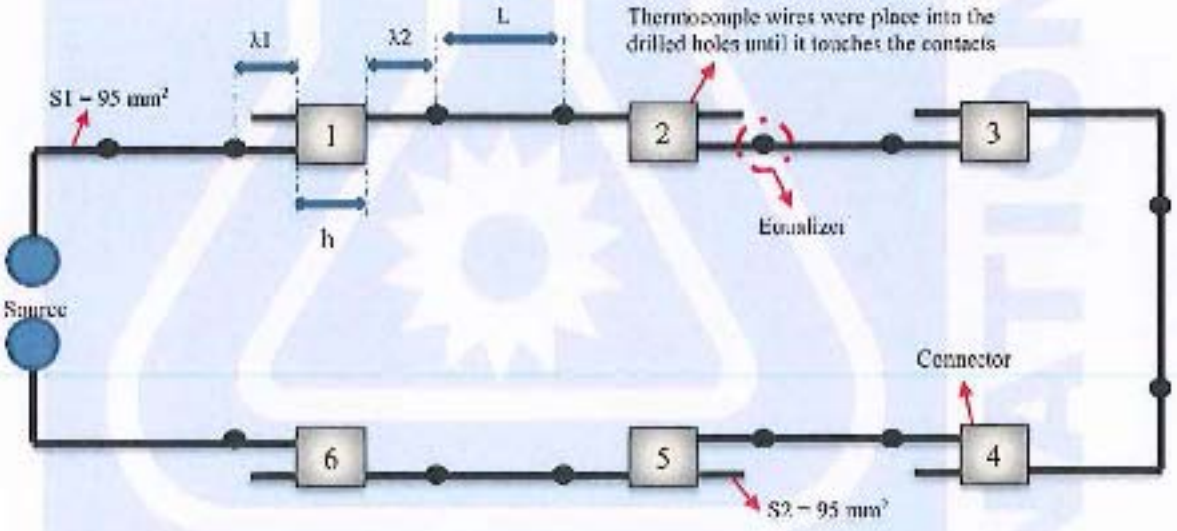
SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex B

Test configuration (main conductor/tap conductor: 95/95 mm²)

Diagram I

An A.C. heating current of 440 ± 10Amp, at power frequency of 50Hz is circulated in the loop.



Parameters of the loop are dimensioned in (mm) as follows:-

λ1	λ2	h	L
200	200	-	400

Torque applied on the bolt of the IPC in (Nm.). G1- G6 are the connector numbers.

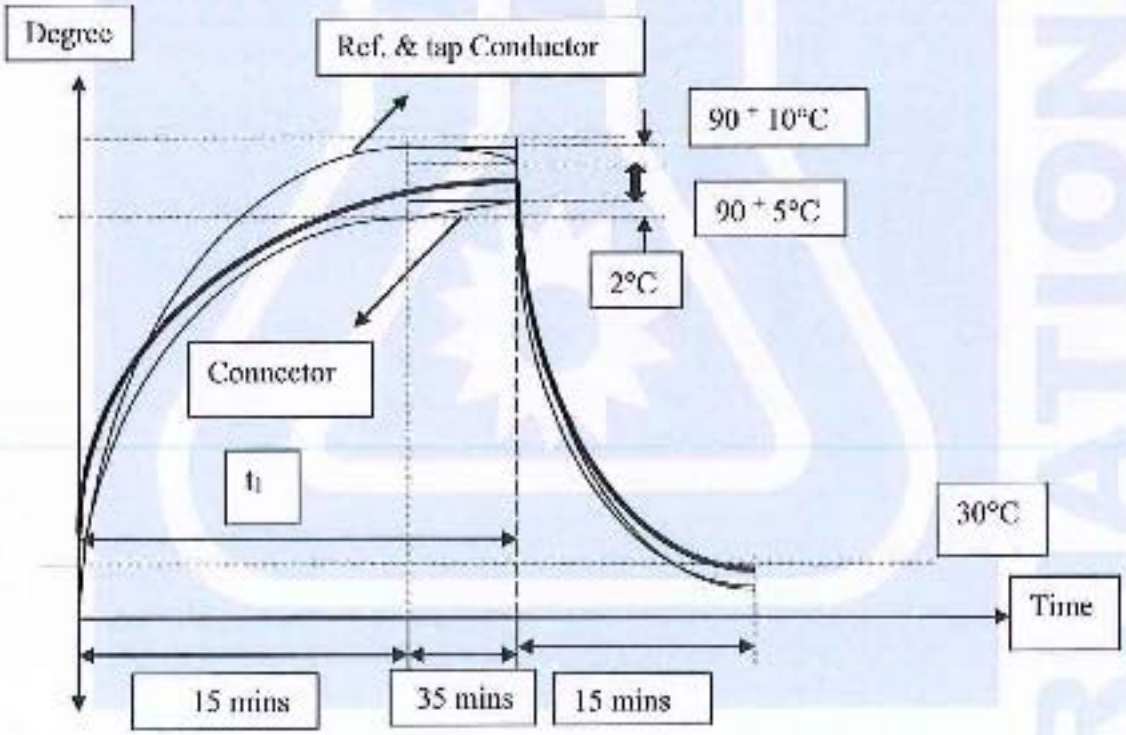
G1=	G2=	G3=	G4=	G5=	G6=
12.38/12.02	12.12/12.28	12.10/12.06	12.28/12.20	12.00/12.18	12.10/12.10

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION I

Annex B (Cont...1)

Set A: Test configuration (Main: 95 mm²- Tee: 95 mm²)
Diagram II

To determine the heat cycle duration.



Process of cycle:

Heating current	Average Current in the all three tab conductor	-
	Current in the main conductor	440+10A
Heating of main ref. Cond to temperature of 90°C ⁺5°C ~ 90°C ⁺10°C and tap cond. 90°C ⁺5°C ~ 90°C ⁺10°C.	Duration	15 minutes
Stabilise period	Duration	35 minutes
Cooling period	Duration	15 minutes
Temperature and resistance measurement every 75 cycles		
Total duration of a cycle	Duration	85 minutes

Annex B (Cont...2)

Test configuration (IPC: 95/95 mm²)

Table I(a)

Highest temperature recorded prior to the resistance measurement. (°C)

Cycle. No.	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6	Ambient.	AL95
1	63.8	63.8	62.7	64.9	65.4	66.7	21.0	98.0
250	65.3	63.3	65.1	63.8	66.4	69.3	19.8	97.0
325	66.2	65.5	65.4	64.6	67.6	70.5	20.6	98.5
400	66.4	65.7	65.4	65.8	69.3	70.3	21.0	98.0
475	65.2	65.5	64.9	65.0	68.5	69.5	20.8	96.3
550	67.8	67.3	65.7	66.4	69.3	71.2	22.0	98.6
625	65.5	67.1	66.4	65.7	68.4	69.4	21.8	96.5
700	65.9	66.7	65.3	65.2	68.6	69.1	20.5	96.5
775	66.8	67.6	66.9	66.6	69.8	70.4	21.9	98.2
850	68.7	69.5	69.0	68.7	71.9	72.0	24.8	99.4
925	67.7	67.8	67.9	67.4	70.5	71.0	24.6	97.6
1000	65.3	66.2	65.3	65.1	67.7	68.6	22.0	95.1
Maximum	68.7	69.5	69.0	68.7	71.9	72.0	24.8	99.4

Table I(b)

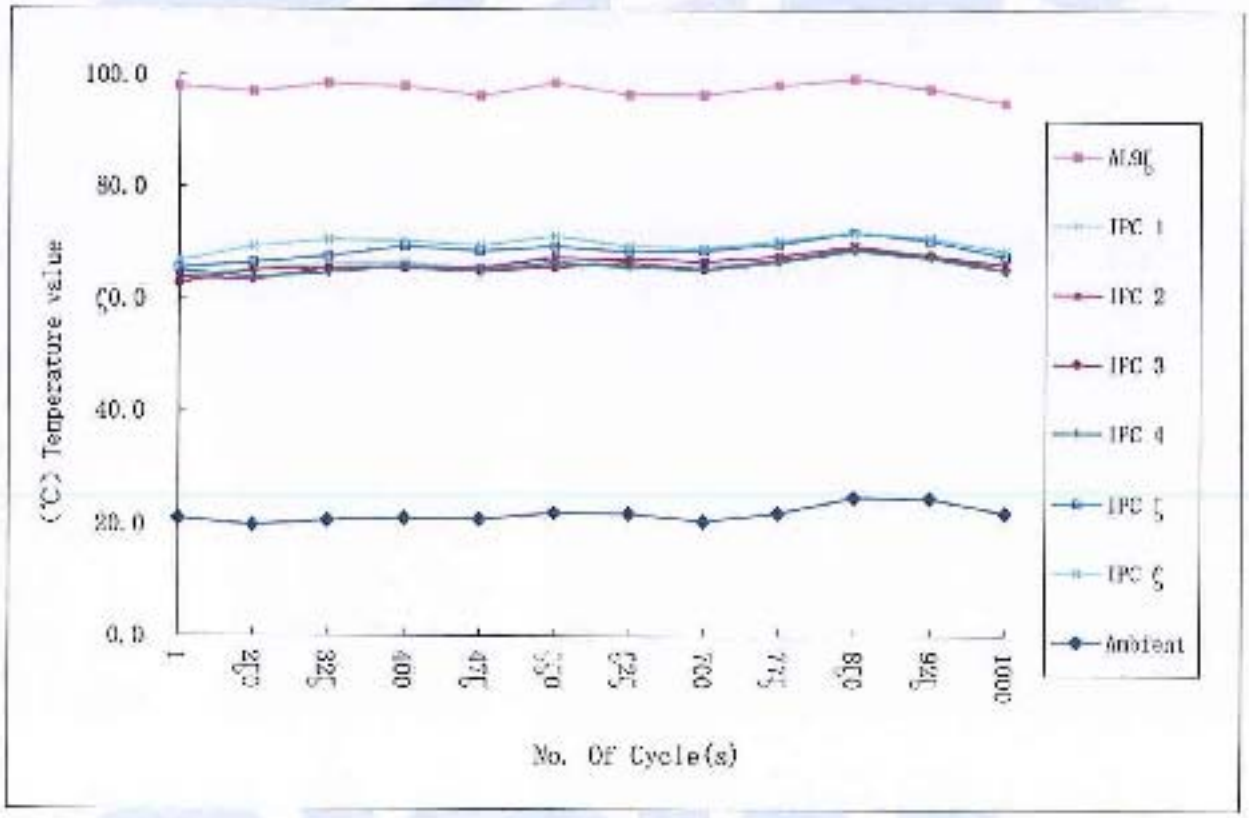
Maximum temperature of each connector (clause 5.6.3.2) shall be lower or equal to the warmest reference conductor.

	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6	Ref. Cond.
$\Theta_i \leq \Theta_R$	68.7	69.5	69.0	68.7	71.9	72.0	99.4
Result	Pass	Pass	Pass	Pass	Pass	Pass	Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex B (Cont...3)

Temperature in graphical representation



Annex B (Cont...4)

Table I(c)
Table for temperature stability

Temperature difference between reference cable and connector ($\Delta\Theta_j$)						
Cycle No.	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6
250	31.7	33.7	31.9	33.2	30.6	27.7
325	32.3	33.0	33.1	33.9	30.9	28.0
400	31.6	32.3	32.6	32.2	28.7	27.7
475	31.1	30.8	31.4	31.3	27.8	26.8
550	30.8	31.3	32.9	32.2	29.3	27.4
625	31.0	29.4	30.1	30.8	28.1	27.1
700	30.6	29.8	31.2	31.3	27.9	27.4
775	31.4	30.6	31.3	31.6	28.4	27.8
850	30.7	29.9	30.4	30.7	27.5	27.4
925	29.9	29.8	29.7	30.2	27.1	26.6
1000	29.8	28.9	29.8	30.0	27.4	26.5
Sum	340.90	339.50	344.40	347.40	313.70	300.40
$\Delta\Theta_j$	30.99	30.86	31.31	31.58	28.52	27.31
Min	29.80	28.90	29.70	30.00	27.10	26.50
Max	32.30	33.70	33.10	33.90	30.90	28.00

Table I(d)
Test requirement (clause 5.6.3.1), Temperature stability.

IPC no.	$\Delta\Theta_j$ - 10	min	max	$\Delta\Theta_j$ + 10	$\Delta\Theta_j$ -10 ≤ $\Delta\Theta_j \leq \Delta\Theta_j$+ 10
1	20.99	29.80	32.30	40.99	Pass
2	20.86	28.90	33.70	40.86	Pass
3	21.31	29.70	33.10	41.31	Pass
4	21.58	30.00	33.90	41.58	Pass
5	18.52	27.10	30.90	38.52	Pass
6	17.31	26.50	28.00	37.31	Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex B (Cont...5)

Table II

Test configuration (Size of IPC: 95/95 mm^2)
Millivolt drop measurement at 0 cycle, 250 cycle and followed by every 75 cycles. By passing a d.c. current of 35A in the loop.

Cycle no.	IPC (1)				IPC (2)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	174.7	171.764	24.2	52.399	173.9	171.247	23.8	51.882
250	175.2	173.534	22.4	53.909	174.7	172.902	22.6	53.277
325	174.7	174.212	20.7	54.761	174.1	173.495	20.8	54.044
400	174.7	174.282	20.6	54.745	174.0	173.514	20.7	53.977
475	174.7	174.351	20.5	54.762	174.0	173.583	20.6	53.994
550	174.9	174.501	20.5	54.871	174.0	173.653	20.5	54.023
625	175.2	174.940	20.3	55.461	174.0	173.742	20.3	54.263
700	175.8	174.891	21.3	55.539	174.5	173.548	21.3	54.196
775	175.1	175.030	20.1	55.705	173.8	173.681	20.1	54.356
850	177.0	175.059	22.7	55.580	175.5	173.694	22.6	54.214
925	177.1	175.089	22.8	55.657	175.5	173.694	22.6	54.261
1000	176.3	175.179	21.6	55.962	174.8	173.757	21.5	54.540

Annex B (Cont...6)

Table II (Cont.)

Cycle no.	IPC (3)				IPC (4)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	175.8	172.914	24.1	53.549	176.2	173.308	24.1	53.943
250	177.3	174.803	23.5	55.178	179.5	177.322	23.0	57.697
325	176.6	175.686	21.3	56.235	179.1	178.124	21.3	58.673
400	176.6	175.707	21.2	56.169	179.2	178.294	21.2	58.757
475	176.6	175.637	21.3	56.048	179.3	178.372	21.3	58.784
550	176.6	175.756	21.2	56.126	179.5	178.571	21.3	58.941
625	176.6	175.987	20.8	56.508	179.5	178.856	20.9	59.377
700	177.2	175.884	21.8	56.532	180.3	179.082	21.7	59.730
775	176.5	175.887	20.8	56.562	179.8	179.155	20.9	59.830
850	178.2	175.968	23.1	56.489	181.5	179.206	23.2	59.727
925	178.2	175.948	23.2	56.515	181.6	179.234	23.3	59.802
1000	177.6	176.001	22.2	56.784	181.0	179.443	22.1	60.226

Cycle no.	IPC (5)				IPC (6)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	R0 (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	174.2	170.468	25.4	51.103	177.3	173.415	25.6	54.051
250	176.2	173.376	24.0	53.751	179.6	176.514	24.3	56.889
325	175.7	173.911	22.5	54.460	178.9	177.059	22.6	57.608
400	175.6	174.088	22.1	54.551	178.7	177.162	22.1	57.625
475	175.7	174.187	22.1	54.598	178.8	177.191	22.2	57.602
550	175.6	174.137	22.1	54.507	178.8	177.311	22.1	57.681
625	175.6	174.276	21.9	54.797	179.0	177.600	21.9	58.122
700	175.9	174.021	22.7	54.669	179.5	177.582	22.7	58.230
775	175.5	174.384	21.6	55.059	179.1	177.890	21.7	58.565
850	177.2	174.341	24.1	54.861	180.9	177.981	24.1	58.502
925	177.3	174.321	24.2	54.869	181.0	178.009	24.2	58.577
1000	176.7	174.555	23.0	55.338	180.4	178.141	23.1	58.924

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Annex B (Cont...7)

Table II (Cont.)

Cycle no.	AL 95		
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)
0	121.8	119.365	25.1
250	121.3	119.625	23.5
325	120.6	119.451	22.3
400	120.4	119.537	21.7
475	120.5	119.589	21.8
550	120.3	119.630	21.4
625	120.1	119.479	21.3
700	120.5	119.352	22.3
775	119.9	119.325	21.1
850	121.2	119.479	23.6
925	121.2	119.432	23.7
1000	120.6	119.217	22.9

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex B (Cont...8)

Table III

Connector resistance, initial scatter and mean scatter (clause 5.6.2.1 to 5.6.2.3)

	μΩ						Results		
Cycle .No	Rj1	Rj2	Rj3	Rj4	Rj5	Rj6	Ave.	Stdev	Mean scatter
0	52.40	51.88	53.55	53.94	51.10	54.05			
250	53.91	53.28	55.18	57.70	53.75	56.89			
325	54.76	54.04	56.24	58.67	54.46	57.61			
400	54.74	53.98	56.17	58.76	54.55	57.62			
475	54.76	53.99	56.05	58.78	54.60	57.60			
550	54.87	54.02	56.13	58.94	54.51	57.68			
625	55.46	54.26	56.51	59.38	54.80	58.12			
700	55.54	54.20	56.53	59.73	54.67	58.23			
775	55.71	54.36	56.56	59.83	55.06	58.57			
850	55.58	54.21	56.49	59.73	54.86	58.50			
925	55.66	54.26	56.52	59.80	54.89	58.58			
1000	55.96	54.54	56.78	60.23	55.34	58.92			
Mean resistance	55.177	54.104	56.286	59.231	54.680	58.029	56.251	2.014	0.059
requirement									≤ 0.3

Wire resistance deducted μΩ	Rra	59.682	59.682	59.682	59.682	59.682	59.682
	Rrb	59.682	59.682	59.682	59.682	59.682	59.682
Product resistance Rj μΩ	/	52.399	51.882	53.549	53.943	51.103	54.051
Mean resistance	$\overline{R_0}$ /	52.821	52.821	52.821	52.821	52.821	52.821
$Rj - \overline{R_0}$	/	-0.422	-0.939	0.728	1.122	-1.718	1.229
$(Rj - \overline{R_0})^2$	/	0.178	0.882	0.530	1.258	2.952	1.511
Standard scatter S0	/	1.209					
Initial scatter δ	/	0.038					

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

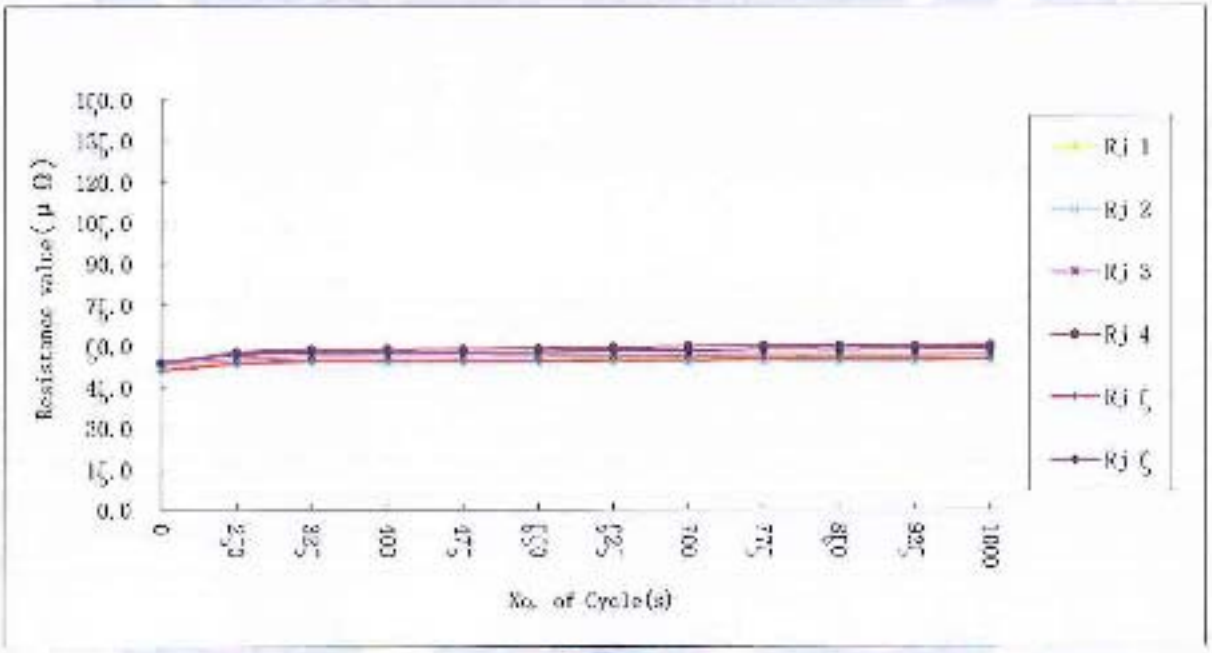
Annex B (Cont...9)

Table IV

Resistance ratio factor (clause 5.6.2.4) the maximum value shall be less than 2.0

Parameter	Resistance coefficient ratio, λ					
	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6
Max resistance of each connector during the last 11 measuring cycles Rj(max)	55.962	54.540	56.784	60.226	55.338	58.924
Resistance of each test sample in 0 cycle Rj0	52.399	51.882	53.549	53.943	51.103	54.051
Resistance coefficient ratio, λ	1.068	1.051	1.060	1.116	1.083	1.090
Requirement = < 2	Pass	Pass	Pass	Pass	Pass	Pass

Graphical presentation of measured resistance.



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Annex B (Cont...10)

Table V (assessment of resistance stability (maximum value 15%)

	Cycle No.	Rj1	Rj2	Rj3	Rj4	Rj5	Rj6
-5	250	53.909	53.277	55.178	57.697	53.751	56.889
-4	325	54.761	54.044	56.235	58.673	54.460	57.608
-3	400	54.745	53.977	56.169	58.757	54.551	57.625
-2	475	54.762	53.994	56.048	58.784	54.598	57.602
-1	550	54.871	54.023	56.126	58.941	54.507	57.681
0	625	55.461	54.263	56.508	59.377	54.797	58.122
1	700	55.539	54.196	56.532	59.730	54.669	58.230
2	775	55.705	54.356	56.562	59.830	55.059	58.565
3	850	55.580	54.214	56.489	59.727	54.861	58.502
4	925	55.657	54.261	56.515	59.802	54.889	58.577
5	1000	55.962	54.540	56.784	60.226	55.338	58.924
	Mean Value, Rj	55.177	54.104	56.286	59.231	54.680	58.030
	Minimum	53.909	53.277	55.178	57.697	53.751	56.889
	Maximum	55.962	54.540	56.784	60.226	55.338	58.924
	Max-Min, ΔRj	2.05	1.26	1.61	2.53	1.59	2.04
	Resistance stability	3.72%	2.33%	2.85%	4.27%	2.90%	3.51%
	Requirement, <15 %	Pass	Pass	Pass	Pass	Pass	Pass

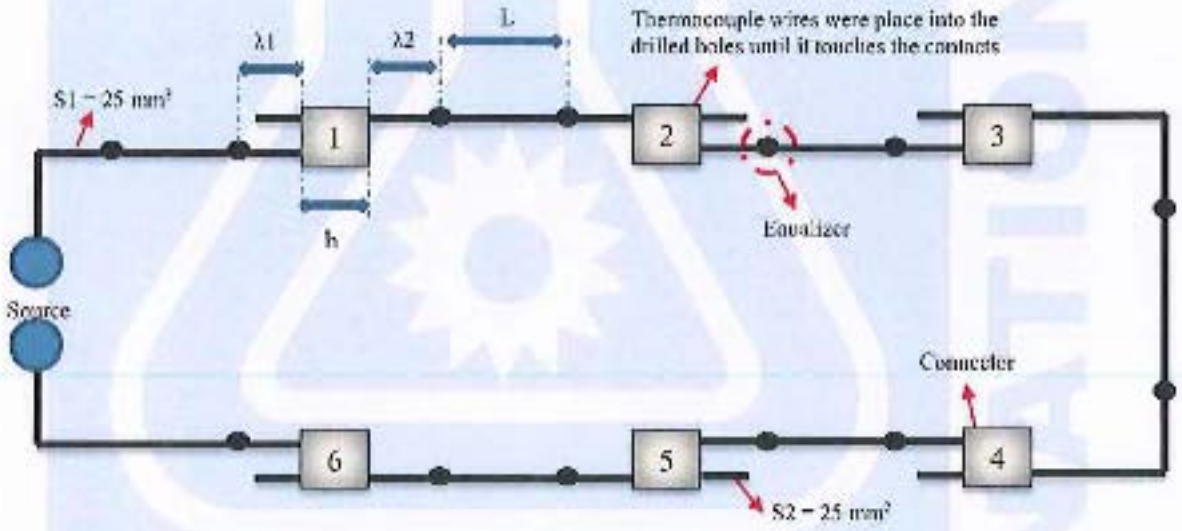
SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex C

Test configuration (main conductor/tap conductor: 25/25 mm²)

Diagram I

An A.C. heating current of 13.9 ± 10Amp, at power frequency of 50Hz is circulated in the loop.



Parameters of the loop are dimensioned in (mm) as follows:-

λ1	λ2	h	L
150	150	-	300

Torque applied on the bolt of the IPC in (Nm.). G1- G6 are the connector numbers.

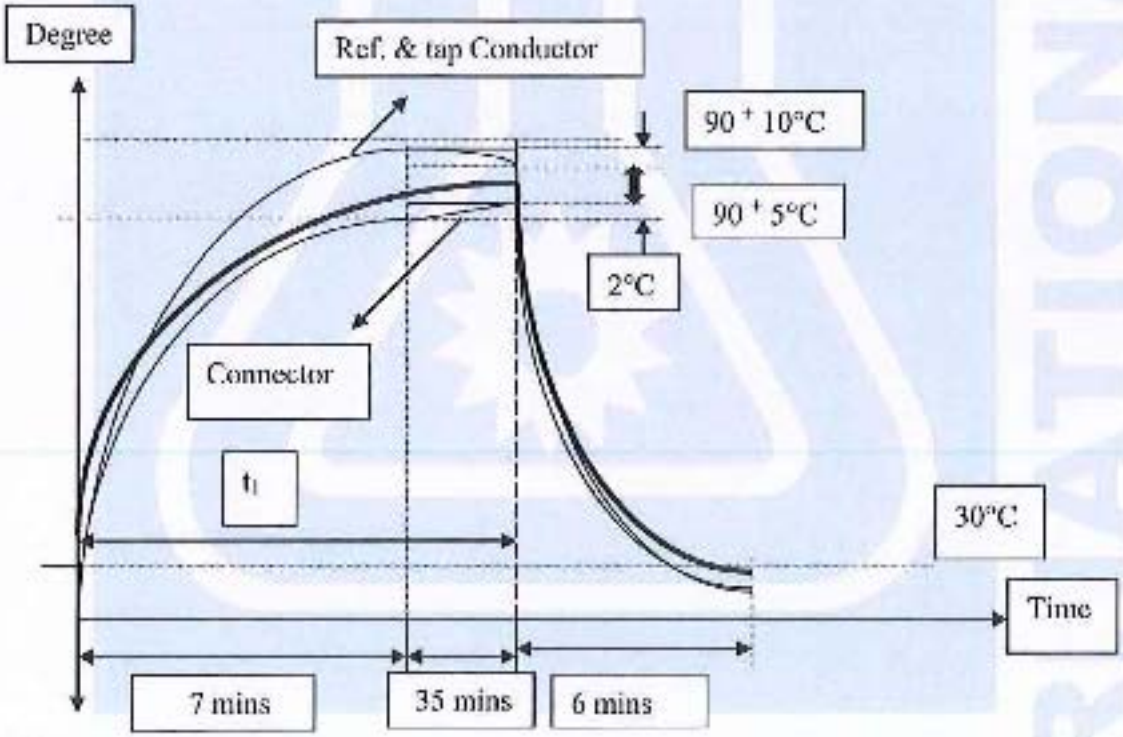
G1=	G2=	G3=	G4=	G5=	G6=
12.04/12.16	12.30/12.00	12.18/12.26	12.20/12.36	12.16/12.06	12.06/12.20

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex C (Cont...1)

Set B: Test configuration (Main: 25 mm²- Tee: 25 mm²)
Diagram II

To determine the heat cycle duration.



Process of cycle:

Heating current	Average Current in the all three tab conductor	-
	Current in the main conductor	49 ±10A
Heating of main ref. Cond to temperature of 90°C +5°C ~ 90°C +10°C and tap cond. 90°C +5°C ~ 90°C +10°C.	Duration	7 minutes
Stabilise period	Duration	35 minutes
Cooling period	Duration	6 minutes
Temperature and resistance measurement every 75 cycles		
Total duration of a cycle	Duration	48 minutes

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Annex C (Cont...2)

Test configuration (IPC: 25/25mm²)

Table I(a)

Highest temperature recorded prior to the resistance measurement. (°C)

Cycle. No.	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6	Ambient.	AL25
1	52.4	51.2	50.4	51.0	47.8	49.5	19.7	98.2
250	51.2	53.1	49.9	50.2	48.2	49.6	20.3	95.7
325	51.6	53.6	50.3	50.7	48.5	50.1	20.5	96.6
400	52.8	54.6	51.4	51.9	49.3	50.8	21.7	98.6
475	51.6	52.8	49.8	50.5	48.5	49.6	20.9	96.6
550	53.3	55.2	51.7	52.7	50.0	51.3	22.2	99.0
625	52.1	53.9	50.6	51.5	49.4	50.4	21.3	97.8
700	52.1	53.8	50.7	51.4	49.2	50.2	21.6	97.5
775	52.3	53.8	50.6	51.7	49.3	50.1	22.1	97.6
850	52.4	54.1	51.1	52.0	49.6	50.6	22.4	98.1
925	51.2	53.3	49.8	50.9	48.2	49.3	21.1	97.1
1000	53.3	55.0	51.7	52.9	50.5	51.8	22.2	98.9
Maximum	53.3	55.2	51.7	52.9	50.5	51.8	22.4	99.0

Table I(b)

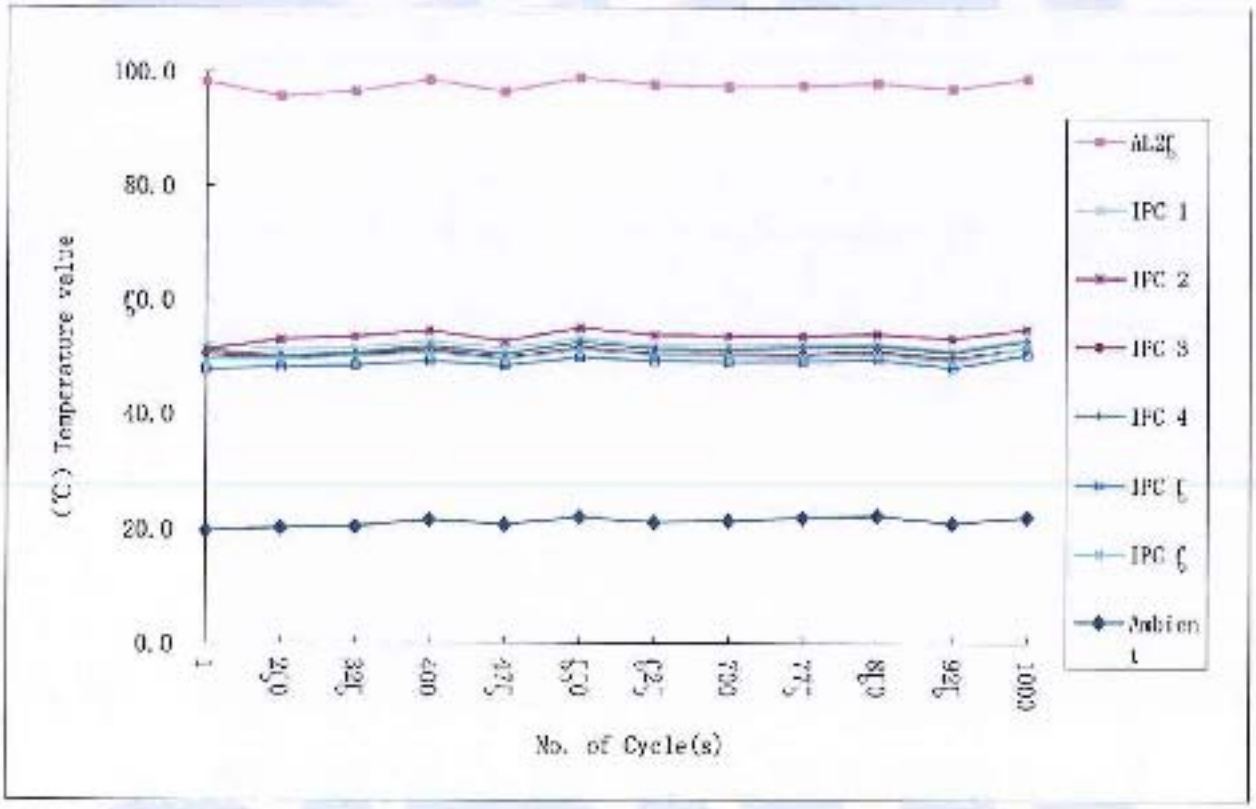
Maximum temperature of each connector (clause 5.6.3.2) shall be lower or equal to the warmest reference conductor.

	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6	Ref. Cond.
$\Theta_S \leq \Theta_R$	53.3	55.2	51.7	52.9	50.5	51.8	99.0
Result	Pass	Pass	Pass	Pass	Pass	Pass	Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION

Annex C (Cont...3)

Temperature in graphical representation



Annex C (Cont...4)

Table I(c)
Teble for temperature stability

Temperature difference between reference cable and connector ($\Delta\Theta_j$)						
Cycle No.	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6
250	44.5	42.6	45.8	45.5	47.5	46.1
325	45.0	43.0	46.3	45.9	48.1	46.5
400	45.8	44.0	47.2	46.7	49.3	47.8
475	45.0	43.8	46.8	46.1	48.1	47.0
550	45.7	43.8	47.3	46.3	49.0	47.7
625	45.7	43.9	47.2	46.3	48.4	47.4
700	45.4	43.7	46.8	46.1	48.3	47.3
775	45.3	43.8	47.0	45.9	48.3	47.5
850	45.7	44.0	47.0	46.1	48.5	47.5
925	45.9	43.8	47.3	46.2	48.9	47.8
1000	45.6	43.9	47.2	46.0	48.4	47.1
Sum	499.6	480.3	515.9	507.1	532.8	519.7
$\Delta\Theta_j$	45.42	43.66	46.90	46.10	48.44	47.25
Min	44.50	42.60	45.80	45.50	47.50	46.10
Max	45.90	44.00	47.30	46.70	49.30	47.80

Table I(d)
Test requirement (clause 5.6.3.1), Temperature stability.

IPC no.	$\Delta\Theta j$ - 10	min	max	$\Delta\Theta j$ + 10	$\Delta\Theta_j$ -10 $\leq \Delta\Theta \leq \Delta\Theta_j$+ 10
1	35.42	44.50	45.90	55.42	Pass
2	33.66	42.60	44.00	53.66	Pass
3	36.90	45.80	47.30	56.90	Pass
4	36.10	45.50	46.70	56.10	Pass
5	38.44	47.50	49.30	58.44	Pass
6	37.25	46.10	47.80	57.25	Pass

SIRIM QAS International Sdn. Bhd. ELECTRICAL & ELECTRONIC SECTION I

Annex C (Cont...5)

Table II

Test configuration (Size of IPC: 25/25 mm^2)
Millivolt drop measurement at 0 cycle, 250 cycle and followed by every 75 cycles. By passing a d.c. current of 13.9 A in the loop.

Cycle no.	IPC (1)				IPC (2)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	420.3	418.625	21.0	72.232	424.1	422.579	20.9	76.185
250	420.5	418.992	20.9	72.221	423.4	422.555	20.5	75.784
325	420.8	419.124	21.0	72.346	424.0	422.311	21.0	75.533
400	421.6	418.919	21.6	71.680	424.4	422.541	21.1	75.302
475	422.8	419.278	22.1	72.072	425.8	422.421	22.0	75.215
550	421.7	419.185	21.5	72.214	424.5	422.472	21.2	75.501
625	422.1	419.249	21.7	71.775	425.0	422.970	21.2	75.495
700	421.9	419.551	21.4	72.170	424.7	423.008	21.0	75.627
775	423.4	419.873	22.1	72.634	425.9	423.023	21.7	75.785
850	422.0	419.316	21.6	72.683	424.4	422.709	21.0	76.075
925	421.9	419.384	21.5	74.028	423.3	421.278	21.2	75.922
1000	422.3	420.618	21.0	74.387	424.1	422.747	20.8	76.517

Annex C (Cont...6)

Table II (Cont.)

Cycle no.	IPC (3)				IPC (4)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	423.8	421.775	21.2	75.382	423.1	421.197	21.1	74.803
250	423.9	422.043	21.1	75.272	428.3	427.445	20.5	80.674
325	424.9	422.534	21.4	75.756	427.8	426.946	20.5	80.169
400	424.9	422.366	21.5	75.127	429.0	427.632	20.8	80.393
475	426.5	422.612	22.3	75.406	429.9	426.488	22.0	79.282
550	425.5	422.962	21.5	75.991	429.2	426.471	21.6	79.500
625	425.7	423.161	21.5	75.687	429.0	427.461	20.9	79.987
700	425.5	423.636	21.1	76.255	429.1	427.902	20.7	80.521
775	426.2	422.817	22.0	75.579	430.6	427.692	21.7	80.453
850	424.8	422.602	21.3	75.969	429.0	427.461	20.9	80.827
925	424.3	422.105	21.3	76.749	428.5	426.963	20.9	81.607
1000	424.8	423.108	21.0	76.877	429.1	427.731	20.8	81.501

Cycle no.	IPC (5)				IPC (6)			
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)	Rj (μΩ)
0	422.8	420.229	21.5	73.835	424.6	421.683	21.7	75.289
250	421.9	421.058	20.5	74.287	426.6	424.224	21.4	77.453
325	421.8	420.622	20.7	73.845	426.6	424.056	21.5	77.278
400	421.9	420.890	20.6	73.651	426.1	424.064	21.2	76.826
475	423.0	420.143	21.7	72.937	427.2	423.978	21.9	76.772
550	422.5	419.980	21.5	73.009	427.0	423.898	21.8	76.927
625	422.3	421.121	20.7	73.647	426.3	424.264	21.2	76.789
700	422.1	421.089	20.6	73.709	426.5	424.970	20.9	77.589
775	423.4	420.875	21.5	73.636	427.0	423.779	21.9	76.541
850	421.9	420.387	20.9	73.753	426.7	424.662	21.2	78.028
925	420.8	419.124	21.0	73.768	426.0	423.798	21.3	78.441
1000	421.2	420.024	20.7	73.794	426.9	425.369	20.9	79.139

Annex C (Cont...7)

Table II (Cont.)

Cycle no.	AL 25		
	Rθ (μΩ)	R20 (μΩ)	Temp.(°C)
0	350.6	346.393	23.0
250	350.1	346.771	22.4
325	350.8	346.777	22.9
400	352.0	347.140	23.5
475	352.9	347.206	24.1
550	352.8	346.971	24.2
625	352.2	347.474	23.4
700	352.8	347.381	23.9
775	352.1	347.239	23.5
850	350.1	346.634	22.5
925	349.5	345.356	23.0
1000	349.0	346.230	22.0

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Annex C (Cont...8)

Table III

Connector resistance, initial scatter and mean scatter (clause 5.6.2.1 to 5.6.2.3)

	μΩ						Results		
Cyc.No	Rj1	Rj2	Rj3	Rj4	Rj5	Rj6	Ave.	Stdev	Mean scatter
0	72.23	76.19	75.38	74.80	73.84	75.29			
250	72.22	75.78	75.27	80.67	74.29	77.45			
325	72.35	75.53	75.76	80.17	73.84	77.28			
400	71.68	75.30	75.13	80.39	73.65	76.83			
475	72.07	75.21	75.41	79.28	72.94	76.77			
550	72.21	75.50	75.99	79.50	73.01	76.93			
625	71.77	75.50	75.69	79.99	73.65	76.79			
700	72.17	75.63	76.26	80.52	73.71	77.59			
775	72.63	75.78	75.58	80.45	73.64	76.54			
850	72.68	76.08	75.97	80.83	73.75	78.03			
925	74.03	75.92	76.75	81.61	73.77	78.44			
1000	74.39	76.52	76.88	81.50	73.79	79.14			
Mean Resistance	72.565	75.705	75.879	80.447	73.640	77.435	75.945	2.803	0.061
requirement									≤ 0.3

Wire resistance deducted μΩ	Rra	173.197	173.197	173.197	173.197	173.197	173.197
	Rrb	173.197	173.197	173.197	173.197	173.197	173.197
Product resistance Rj μΩ	/	71.899	76.185	75.382	74.803	73.835	75.289
Mean resistance	$\overline{Rj}$	74.566	74.566	74.566	74.566	74.566	74.566
$Rj - \overline{Ro}$	/	-2.667	1.620	0.816	0.238	-0.730	0.724
$(Rj - Ro)^2$	/	7.112	2.623	0.667	0.056	0.534	0.523
Standard scatter S0	/	1.518					
Initial scatter δ	/	0.034					

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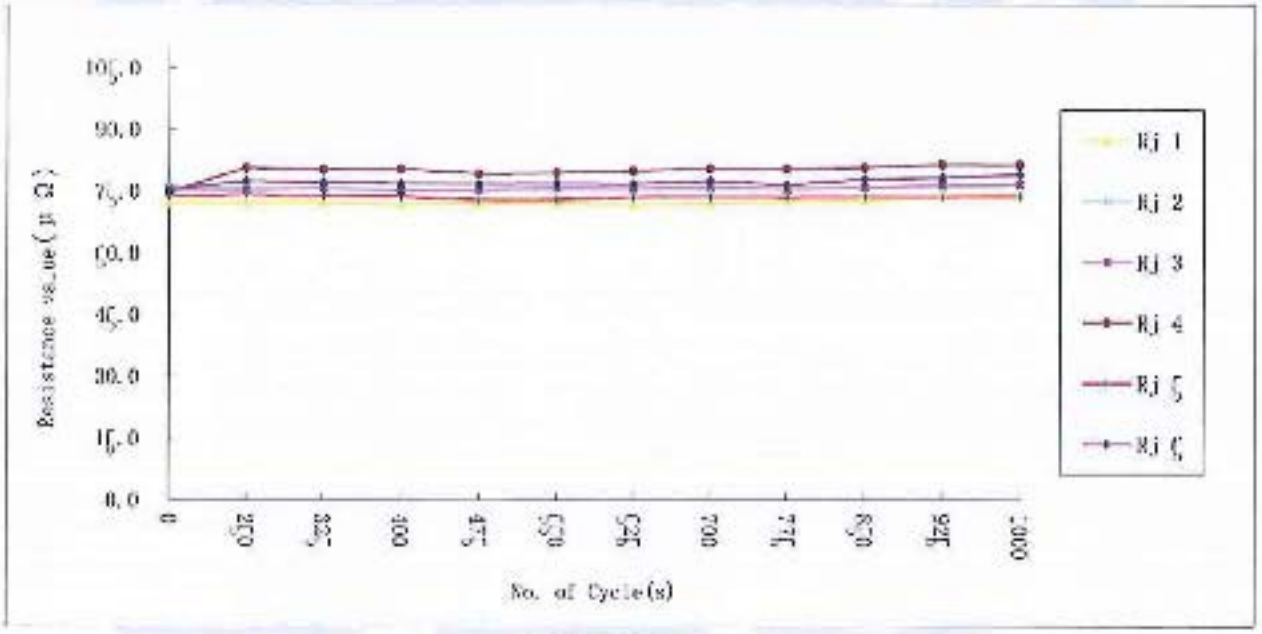
Annex C (Cont...9)

Table IV

Resistance ratio factor (clause 5.6.2.4) the maximum value shall be less than 2.0

Parameter	Resistance coefficient ratio, λ					
	IPC 1	IPC 2	IPC 3	IPC 4	IPC 5	IPC 6
Max resistance of each connector during the last 11 measuring cycles Rj(max)	74.387	76.517	76.877	81.607	74.287	79.139
Resistance of each test sample in 0 cycle Rj0	72.232	76.185	75.382	74.803	73.835	75.289
Resistance coefficient ratio, λ	1.030	1.004	1.020	1.091	1.006	1.051
Requirement = < 2	Pass	Pass	Pass	Pass	Pass	Pass

Graphical presentation of measured resistance.



Annex C (Cont...10)

Table V (assessment of resistance stability (maximum value 15%)

	Cycle No.	Rj1	Rj2	Rj3	Rj4	Rj5	Rj6
-5	250	72.221	75.784	75.272	80.674	74.287	77.453
-4	325	72.346	75.533	75.756	80.169	73.845	77.278
-3	400	71.680	75.302	75.127	80.393	73.651	76.826
-2	475	72.072	75.215	75.408	79.282	72.937	76.772
-1	550	72.214	75.501	75.991	79.500	73.009	76.927
0	625	71.775	75.495	75.687	79.987	73.647	76.789
1	700	72.170	75.627	76.255	80.521	73.709	77.589
2	775	72.634	75.785	75.579	80.453	73.636	76.541
3	850	72.683	76.075	75.989	80.827	73.753	78.028
4	925	74.028	75.922	76.749	81.607	73.768	78.441
5	1000	74.387	76.517	76.877	81.501	73.794	79.139
	Mean Value, Rj	72.56	75.71	75.88	80.45	73.64	77.43
	Minimum	71.68	75.22	75.13	79.28	72.94	76.54
	Maximum	74.39	76.52	76.88	81.61	74.29	79.14
	Max-Min, ΔRj	2.71	1.30	1.75	2.33	1.35	2.60
	Resistance stability	3.73%	1.72%	2.31%	2.89%	1.83%	3.36%
	Requirement, <15 %	Pass	Pass	Pass	Pass	Pass	Pass

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PHOTOGRAPHS OF TEST SAMPLES

SIRIM QAS International Sdn. Bhd.
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    b) Obtaining an injunction from Court (cost on a solicitor-client basis to be borne by the Applicant);
    c) Refusing to accept any further Product for Testing Services from the Applicant or whosoever related to the Applicant, whether subsidiary or otherwise;
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    e) Informing or lodging a report pertaining the Applicant's Test Report with the relevant authorities.

10. Certified true copies of the Test Report may be issued upon request by the Applicant upon payment of the relevant fee.

11. Corrections to test report shall only be allowed within 6 months from issuance date of the test report and shall be limited to maximum 3 times, after either case whichever occurs earlier, a new test report shall be issued and replace the previous one (having error(s) or lack of information). Issuance of Supplementary Report to the original Test Report shall be for the followings;

    a) Misprints and typo errors
    b) Missing technical information
    c) Test data not reported
    d) Mistake in reporting of test data