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Environmental Test Report

EUT :

Renson 452 - L.066V

Mesh 2,3x2,3mm, 300x333mm, with gutter

Filename : ENV-057-2016

Release : 01

Date: 22 Dec. 2016

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Approval Sheet

Function title		Name	Signature	Date
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Test Overview and Results

Test	Test Date	Test result
Degrees of protection provided by enclosures for electrical equipment against access to hazardous parts (IPXX code)	14 Dec. 2016	See overall conclusion
Degrees of protection provided by enclosures for electrical equipment against solid foreign objects (IP1/2/3/4X code)	14 Dec. 2016	See overall conclusion
Degrees of protection provided by enclosures for electrical equipment against ingress of water (IPX3, IPX4 code)	20 Dec. 2016	See overall conclusion

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Release overview

Document	Release	Release date	Author	Description
ENV-057-2016	01	22 Dec. 2016	Arne Van Hulle	Initial release

Referenced data items

The table below lists all data items that are used or referenced to in this report (Categories : Customer info, Standards, Other info)

Document name	Release date	Revision	Category
EN 60529:1991 +A1:2000+A2:2013	2013	NA	Standard

Abbreviations and acronyms

Abbreviation	
EUT	Equipment Under Test
RH	Relative Humidity

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1. EUT Description

1.1 EUT Identification

EUT

Name	:	Renson 452 - L.066V
Lab identification	:	ENV-057-2016 (sample 14_12_2016, sample 20_12_2016)
Dimensions	:	300 x 333 mm
Mesh	:	Mesh 2,3mm
Gutter	:	Gutter inside

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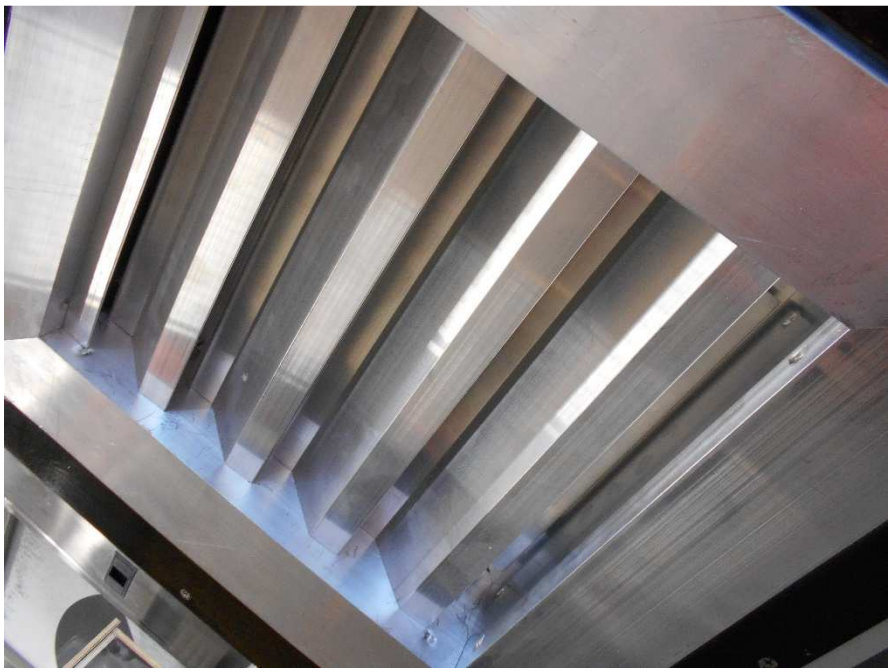

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1.2 Customer Identification

Manufacturer: Renson
Address: Industriezone 2 Vijverdam, Maalbeekstraat 10, 8790 Waregem
Offer Number: BGEMC-16-432

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2. Tests

2.1 Degrees of protection provided by enclosures for electrical equipment against access to hazardous parts indicated by the first characteristic numeral (protection of persons)

2.1.1 Referenced Specification

Test performed according EN 60529:1991 +A1:2000 +A2:2013

1	Protection against hazardous parts with back of a hand	sphere 50 mm
2	Protection against hazardous parts with a finger	jointed test finger
3	Protection against hazardous parts with a tool	2,5 mm probe
4	Protection against hazardous parts with a wire	1,0 mm probe
5	Protection against hazardous parts with a wire	1,0 mm probe
6	Protection against hazardous parts with a wire	1,0 mm probe

2.1.2 Deviations from Test Procedure

Test executed on non-electrical/electronic enclosure (vent grills).

2.1.3 EUT Test Setup

- The EUT (sample 14_12_2016) is mounted and positioned in a test fixture provided by the manufacturer.
- Test equipment: Test wire 1.0 mm / Test wire 2,5 mm / Test Sphere/Jointed test finger

2.1.4 Test Description

- The access probe is pushed against or inserted through any openings of the enclosure with the force specified in the table below:

Degrees of protection against access to hazardous parts indicated by the first characteristic numeral (protection of persons)		
1	Sphere Ø50mm (PEMC 11-026K)	50N
2	Jointed test finger Ø12mm, 80mm length (PEMC 11-003)	10N
3	Test wire 2,5 mm (PEMC 11-004)	3N
4	Test wire 1 mm (PEMC 11-005)	1N
5	Test wire 1 mm (PEMC 11-005)	1N
6	Test wire 1 mm (PEMC 11-005)	1N

- Test with first characteristic numeral 2 (jointed test finger) shall be started from straight position, followed by testing with both joints successively bent trough an angle of up to 90° in every possible positon
- If applicable (not required if it's obvious the access probe is not penetrating at all) for low voltage equipment (<1000VAC/1500VDC) a low voltage supply (40V-50V) in series with a suitable lamp will be connected between the probe and the hazardous parts inside the enclosure: **not applicable since no electrical/electronic parts are present**.

2.1.5 Testing

Atmospheric conditions in test lab:

Ambient Temperature	:	17,5	°C
Ambient Relative Humidity	:	52,4	%RH

2.1.6 Pass-Fail criteria

To comply with the conditions of the first characteristic numeral, adequate clearance shall be kept between the access probe and the hazardous parts (as practical definition of hazardous live parts definition 1.2.8.6 of IEC60950 is applied):

- (IP1) The access probe shall not completely pass through the opening and shall have adequate clearance from hazardous parts. For low voltage equipment (< 1000VAC/1500VDC) this means the access probe shall not touch hazardous live parts. If (IEC 60529 section 12.3.1) adequate clearance is verified by a signal circuit the lamp shall not light.

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- (IP2) The jointed test finger may penetrate to its 80mm length but the stop face shall not pass through the opening, and shall have adequate clearance from hazardous parts. For low voltage equipment (< 1000VAC/1500VDC) this means the access probe shall not touch hazardous live parts. If (IEC 60529 section 12.3.1) adequate clearance is verified by a signal circuit the lamp shall not light.
- (IP3/4/5/6) The protection is satisfactory if adequate clearance is kept between the access probe and hazardous parts. For low voltage equipment (< 1000VAC/1500VDC) this means the access probe shall not touch hazardous live parts. If (IEC 60529 section 12.3.1) adequate clearance is verified by a signal circuit the lamp shall not light.

2.1.7 Test Result

- No hazardous parts can be touched by the test probe for IP1X, IP2X, IP3X and IP4X.
- Remark: via the gutter opening in the front it's not possible – due to internal barrier - to enter the EUT by means of the 2,5mm and 1mm test probes.

2.2 Degrees of protection provided by enclosures for electrical equipment against solid foreign objects by the first characteristic numeral 1/2/3/4 (protection of equipment)

2.2.1 Referenced Specification

Test performed according EN 60529:1991 +A1:2000 +A2:2013

Protection of persons (solid foreign objects)

1	Protection against foreign objects >50 mm	sphere 50 mm
2	Protection against foreign objects >12,5mm	sphere 12,5 mm
3	Protection against foreign objects >2,5 mm	2,5 mm probe
4	Protection against foreign objects >1 mm	1,0 mm probe

2.2.2 Deviations from Test Procedure

Test executed on non-electrical/electronic enclosure (vent grills).

2.2.3 EUT Test Setup

- The EUT (sample 14_12_2106) is mounted and positioned in a test fixture provided by the manufacturer.
- Test equipment: Test wire 1.0 mm / Test wire 2,5 mm / Test Sphere (50/12,5 mm)

2.2.4 Test Description

- The access probe is pushed against any openings of the enclosure with the force specified in the table below:

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Degrees of protection against access to hazardous parts indicated by the first characteristic numeral (protection of persons)		
1	Sphere Ø50mm (PEMC 11-026K)	50N
2	Sphere Ø12,5mm (PEMC 11-027K)	10N
3	Test wire 2,5 mm (PEMC 11-004)	3N
4	Test wire 1 mm (PEMC 11-005)	1N

2.2.5 Testing

Atmospheric conditions in test lab:

Ambient Temperature	:	17,5	°C
Ambient Relative Humidity	:	52,4	%RH

2.2.6 Pass-Fail criteria

The EUT will PASS the test when (penetration is considered a means for entering the area behind the grill) :

- (IP1) The object probe shall not fully penetrate, the protection is satisfactory if the full diameter of the probe does not pass through any opening. The object probe shall have adequate clearance from hazardous parts. For low voltage equipment (< 1000VAC/1500VDC) this means the access probe shall not touch hazardous live parts
- (IP2) The object probe shall not fully penetrate, the protection is satisfactory if the full diameter of the probe does not pass through any opening
- (IP3/4) The object probe shall not penetrate at all

2.2.7 Test Result

- No penetration possible using test spheres for IP1X and IP2X 50 & 12,5mm, nor with test probe for IP3X (2,5mm)* and IP4X (1mm)*
- * remark: via the gutter opening in the front it's not possible – due to internal barrier - to enter the EUT by means of the 2,5mm and 1mm test probes.
- It should be noted the test sphere of 12,5mm can penetrate the grill but cannot further penetrate due to the mesh behind the grill.

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2.3 Degrees of protection provided by enclosures for electrical equipment against ingress of water (IPX4 code)

2.3.1 Referenced Specification

Test performed according EN 60529:1991 +A1:2000 +A2:2013, protection against ingress of water

4	Protection against splashing water	Spray nozzle

2.3.2 Deviations from Test Procedure

Test executed on non-electrical/electronic enclosure (vent grills). Water temperature and EUT temperature just before start of test are within specification, test itself (5 minutes) executed in an outside ambient temperature of 2°C, but not considered a problem for a good interpretation of the test results in view of previous tests done on this EUT.

2.3.3 EUT Test Setup

- The EUT (sample 20_12_2016) is mounted and positioned in a test fixture provided by the manufacturer.
- Test equipment: Spray nozzle with flow meter

2.3.4 Test Description

- The EUT was sprayed in a horizontal plane of 180°, and in vertical planes of 180°.
- Water flow rate: 10 liter /min.
- Duration of test: 1min/m², at least 5 min -> 5 minutes
- Distance from nozzle to EUT: between 30 and 50cm

2.3.5 Testing

Atmospheric conditions in test lab just before start of test:

Ambient Temperature	:	19,2	°C
Ambient Relative Humidity	:	38,4	%RH

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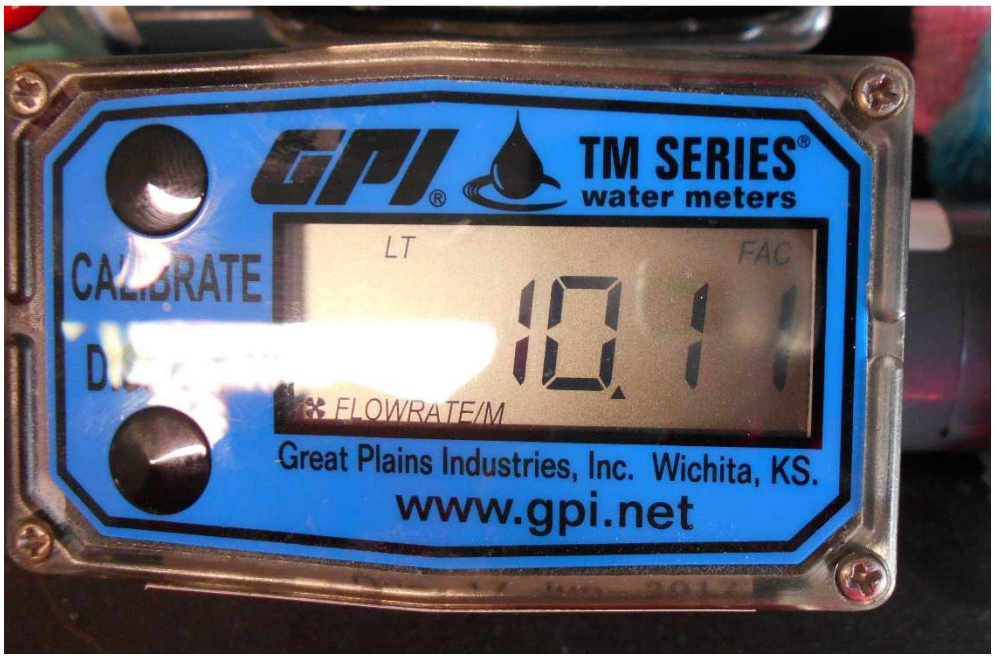

2.3.6 Pass-Fail criteria

The EUT will PASS the test when :

- No ingress of water observed, or should be limited in quantity and location depending on the application
- Limited water “dust” (mist) allowed in the clearance area as prescribed in the installation manual/procedures.

2.3.7 Test Result

- Limited ingress of water observed which however is not the result of water entering through the grill (from outside to inside, as intended by this IP test) but due to water entering via the inner construction of the grill itself.
- Water “dust” (mist) observed in the area behind the grill (20-25cm)
- EUT can be considered IPX4 on condition enough clearance is kept.

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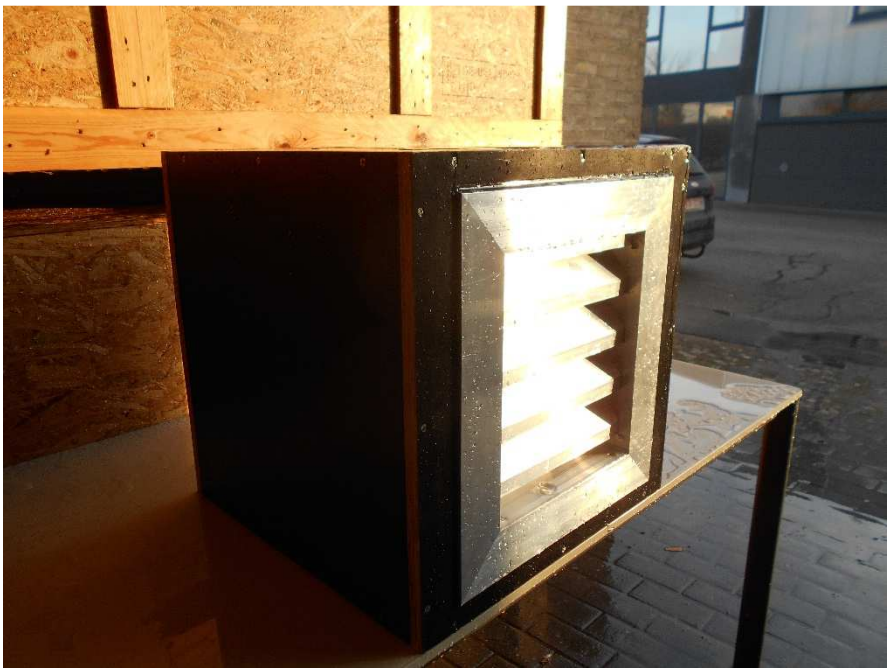

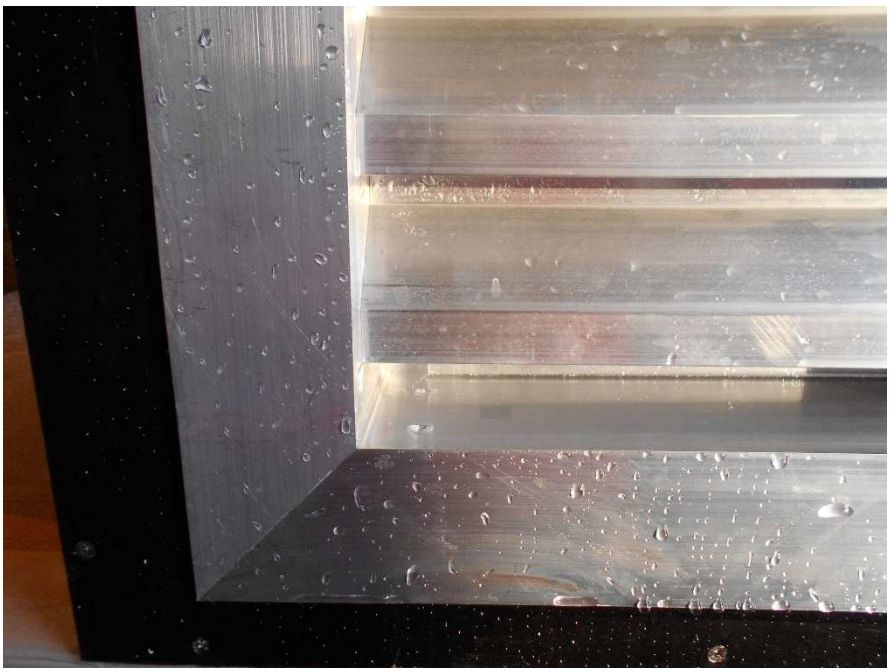

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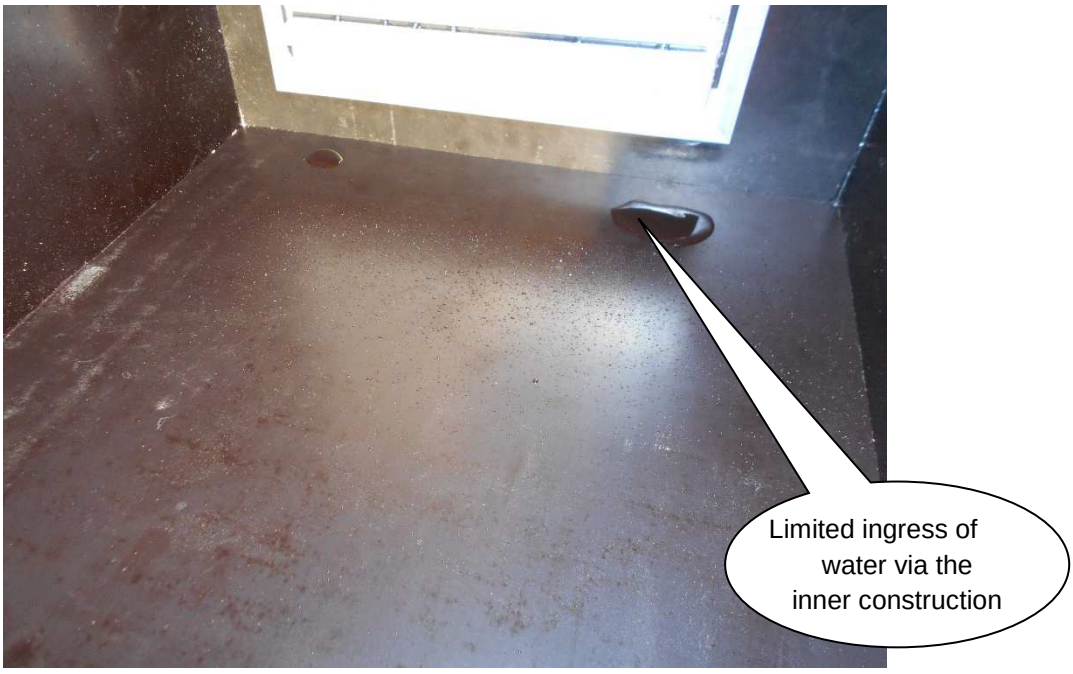

3. General Conclusion

EUT can be considered IP44 on condition enough clearance (see 3.2) is kept to hazardous parts (by mounting/installation instructions).

3.1 Degrees of protection provided by enclosures for electrical equipment indicated by the first characteristic numeral

The EUT can be given the following IP code:

- The actual protection is IP4X
- Remark: depending on the presence (and dimensions) of the mesh and shape/size of the test object it's not excluded objects (0-15mm) might enter. This however is not part of the standardized testing as per EN 60529.

3.2 Degrees of protection provided by enclosures for electrical equipment indicated by the second characteristic numeral

The EUT can be given the following IP code:

- The actual protection is IPX4 on condition enough clearance (250-300mm) is kept to hazardous parts (by mounting/installation instructions), and
- Assuming no water is entering via the inner constriction of the grill itself.

4. Test Equipment

4.1 List of test equipment

Equipment	Brand	Model	Serial number
Test wire 1.0 mm (rigid IEC steel rod with dynamometer 1N) PEMC 11-005	PTL	PTL P10.27	5011557
Test wire 2,5 mm (rigid IEC steel rod with dynamometer 3N) PEMC 11-004	PTL	PTL P10.26	5011556
Sphere 50mm PEMC 11-026K	Shenzen Autostrong Instrument Co, Ltd	AUTO-A	AUTO150211001
Sphere 12,5mm PEMC 11-027K	Shenzen Autostrong Instrument Co, Ltd	AUTO-Q-12,5mm	AUTO150211002
Jointed IEC test finger PEMC 11-003	PTL	PTL P10.14	5011555
Dust chamber BGEMC 01-055	Shenzen Autostrong Instrument Co, Ltd	U13-SS0J08	U13-20140804
Spray nozzle IPX3/4	Shenzen Autostrong	AUTO_IPX3/4	AUTO131023005

BGEMC 01-041	Instrument Co, Ltd		
Flow meter (7,6-76l/min) BGEMC-01-063K	Great Plans Industries	TM75	01/063
Manometer 0-1,6 bar BGEMC 01-089K	Afriso	RF40 R1/8 AX 0+1,6	A0020991
Timer 99 min BGEMC 01-065K	TFA Dostmann	38.2013	BGEMC 01-065K
Temperature midi logger BGEMC 01-082K	Graphtec Cooperation	GL240	C 50730301
Temperature/humidity meter BGEMC 01-086K	Testo	608-H1	601 0130 0660 6081 45066326
Temp/HUM logger BGEMC 01-44K	Testo	645	00582415/109

4.2 Calibration dates and certificates

Equipment	**Serial number**	**Calibration date**	**Due date**	**Calibration certificate**
Sphere 50mm	AUTO15021 1002	24 Feb.2015	24 Feb.2020	2015022402.01
Test wire 1.0 mm	5011557	23 Feb.2016	23 Feb.2017	2016022302.01 (BGEMC)
Test wire 2,5 mm	5011556	24 Feb.2016	24 Feb.2017	2016022302.01 (BGEMC)
Jointed IEC test finger PEMC 11-003	5011555	22 Jan. 2013	22 Jan. 2018	20130122 (BGEMC)
Flow meter (7,6-76l/min) BGEMC-01-063K	01/063	17 Jun. 2015	17 Jun. 2017	30595 (TPF control)
Manometer 0-1,6 bar BGEMC 01-089K	A0020991	9 Sep. 2016	9 Sep. 2017	622237 (euro-index)
Timer 99 min	BGEMC 01-065K	17 Aug. 2016	17 Aug. 2017	2016081701.01 (BGEMC)
Temperature midi logger	C 50730301	30 Mar. 2016	30 Mar. 2017	16CAL0330-01
Temperature/humidity meter BGEMC 01-086K	601 0130 0660 6081 45066326			
Temp/HUM logger BGEMC 01-44K	00582415/109	07 Sep. 2016	07 Sep. 2018	584158 (Calimet)