



Electromagnetic Compatibility Test Report

Test results of Floww equipment

Reference number : 10C00357RPT01.doc
Status test report : Final
Brand : Floww
Model number : mobileFloww
screenFloww
pocketFloww (Small)
pocketFloww (medium)
heatingFloww
electroFloww
aquaFloww
bioFloww (Home)
geoFloww (Home)
bioFloww (Office)
geoFloww (Office)
Serial number : production series
Date of receipt : 2010 June, 18
Date of test : 2010 June, 18
Date of test report : 2010 July, 15

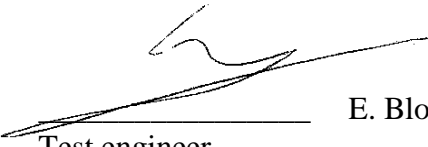
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Manufacturer : The Floww Company
Peperstraat 17
5211 KM DEN BOSCH
The Netherlands

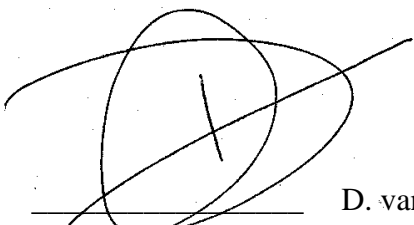
Tests carried out on behalf of : The Floww Company
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1 Introduction

D.A.R.E!! Consultancy has been asked by The Floww Company to carry out EMC emission and immunity tests on the Floww equipment. This report is only to be used for this purpose.

At the request of The Floww Company, the EMC tests are carried out in order to find out whether the product complies with the emission limits and immunity test levels as described in chapter 6 of this report.

The tests are carried out at our facilities located in Woerden, The Netherlands.

The test results presented in this report relate only to the product tested.

In this report, the product tested will be referred to as Equipment Under Test (EUT).

This report is in conformity with ISO 17025.

Opinions or interpretations mentioned in this report are excluded from accreditation.

All tests as described in the applied standard(s) are carried out, unless otherwise specified in this report.

The reported expanded uncertainty of measurement is based on a standard uncertainty of measurement multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%, but excluding the contribution of the EUT. The expanded uncertainty of measurement has been determined in accordance with UKAS publication LAB34.

2 EUT details

The details for the Floww equipment supplied for test were as follows.

EUT details

| | |
|-------------------------------------|--|
| Name: | Floww equipment |
| Description: | The EUT is a complete closed stainless steel tube. In the tube are electrical components placed like coils, resistors and capacitors. The EUT contains also a reservoir with a liquid. In one module is a EPROM place. The electronic and electrical parts are placed in several different size tubes. |
| Brand: | Floww |
| Model number: | mobileFloww screenFloww pocketFloww (Small) pocketFloww (medium) heatingFloww electroFloww aquaFloww bioFloww (Home) geoFloww (Home) bioFloww (Office) geoFloww (Office) |
| Serial number: | production series |
| Power supply: | No power supply |
| Rated Power: | -- |
| Dimensions (L*W*H [m]): | mobileFloww 10mm screenFloww 110 mm pocketFloww (Small) 70mm(L) pocketFloww (medium) 70mm (L) heatingFloww 108mm electroFloww 165 mm aquaFloww 225 mm bioFloww (Home) 495mm geoFloww (Home) 580mm bioFloww (Office) 495mm geoFloww (Office) 580mm |
| Software release: | -- |
| Hardware release: | Production type |
| Environment to be used: | Buildings like office and domestic |
| System description (if applicable): | -- |

Cable connections to EUT and peripheral equipment

None

The condition of the EUT during reception was undamaged and fully functional.

3 Operating conditions during test

3.1 Test considerations

The EUT is not a piece of electronics with a measureable output. So no performance can be checked. Therefore are no immunity tests applicable.

3.2 Mode(s) of operation

The test mode(s) during testing were defined as:

| | |
|---------|--|
| Mode 1: | The EUT tries to receive Electro Magnetic Fields and absorbs the energy and converts it to thermo energy |
| Mode 2: | -- |
| Mode 3: | -- |
| Mode 4: | -- |

3.3 Acceptance criteria

The criteria for recording a malfunction of operating during the immunity tests are shown in the table below.

| | |
|------------------------------|----------------|
| Acceptance criterion Mode 1: | Not applicable |
| Acceptance criterion Mode 2: | Not applicable |
| Acceptance criterion Mode 3: | Not applicable |
| Acceptance criterion Mode 4: | Not applicable |

The applicant's representative was present to witness the testing.

3.4 Test configuration

The EUT is tested as Table top equipment. The Appendixes of this report show pictures of the test configuration during the tests.

4 Possible test case verdicts

- NA or not applicable : test does not apply to the EUT
- P(ass) : EUT does meet the requirement

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- F(ail) : EUT does not meet the requirement
- U(ndetermined) : Pass or Fail could not be established
- NR or not requested : test is not requested by customer

Pass or fail statements exclude the measurement uncertainty.

5 Explanation Status Report

- Final : Formally signed report, with a final conclusion. Changes in the report will lead to a new report with a new report number.
- Preliminary : Intermediate unsigned report, with a temporary conclusion. Changes in the report will lead to a new report with a new report number.

6 Standards and test plan

The EUT is assessed against the following requirements:

- Emission : EN 61000-6-3 (2007)
- Immunity : EN 61000-6-1 (2007)

If available, a test plan is used as a supplement.

6.1 Test plan deviations

There was no test plan available.

7 Test results

7.1 Emission tests

According the information of the customer, the class of emission is B.

7.1.1 Radiated emission

The radiated emission tests are carried out in a Semi Anechoic Room (SAR).

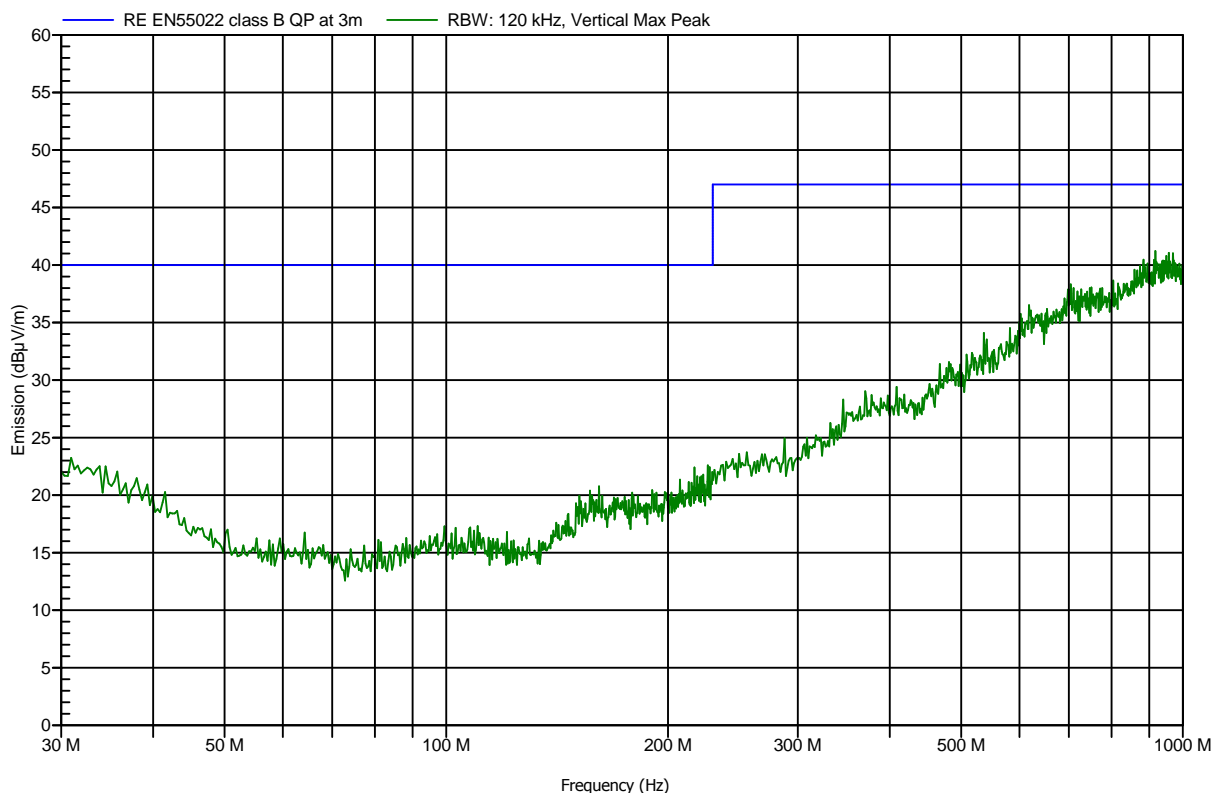
First, pre-tests are carried out in the SAR. Finally, quasi peak tests are carried out at the highest peak values. The test results are recorded with a Spectrum Analyser / Measuring Receiver. The tests are carried out in accordance with the standard EN 61000-6-3 (2007) and the basic standard EN 55022 (2006) + A1 (2007), where the first standard takes precedence.

Measurement uncertainty SAR

| | |
|--------------------|--------------|
| 30 MHz – 1000 MHz: | ± 5.4 dB |
|--------------------|--------------|

Result Radiated Emission SAR 30.000 MHz to 1000.000 MHz Vertical

| | |
|--------------|--|
| PIN number: | 10C00357 |
| Description: | 7) RE SAR (ID1494) EN 55022 (2006) vert. 30 - 1000 MHz Pre-scan SA 3m No turn table, Antenna Tower |



Test environment

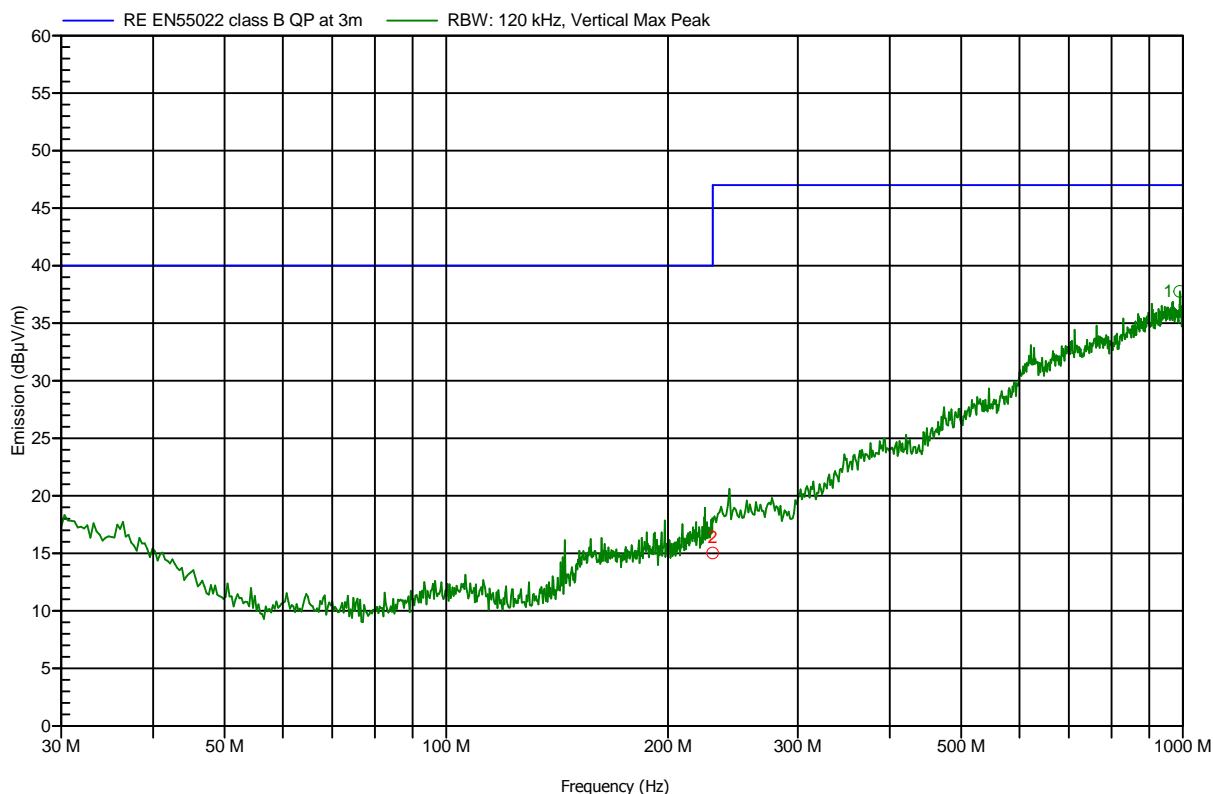
| | |
|--------------------|---------------------------|
| Mode of operation: | All products on the table |
| Remarks: | Pre scan |

Settings

| | | | |
|-------------------|---------|------|----------|
| RBW: | 120 kHz | VBW: | 1000 kHz |
| Antenna distance: | 3 m | | |

Result Radiated Emission SAR 30.000 MHz to 1000.000 MHz Vertical

| | |
|--------------|--|
| PIN number: | 10C00357 |
| Description: | 8) RE SAR (ID1494) EN 55022 (2006) vert. 30 - 1000 MHz class B SA 3m |



Detected Peaks

| Nr | Frequency | Peak | Angle | Height |
|----|-------------|---------------|------------|--------|
| 1 | 990.393 MHz | 37.754 dBµV/m | 182 Degree | 4 m |
| 2 | 230.000 MHz | 15.015 dBµV/m | 181 Degree | 3 m |

Test environment

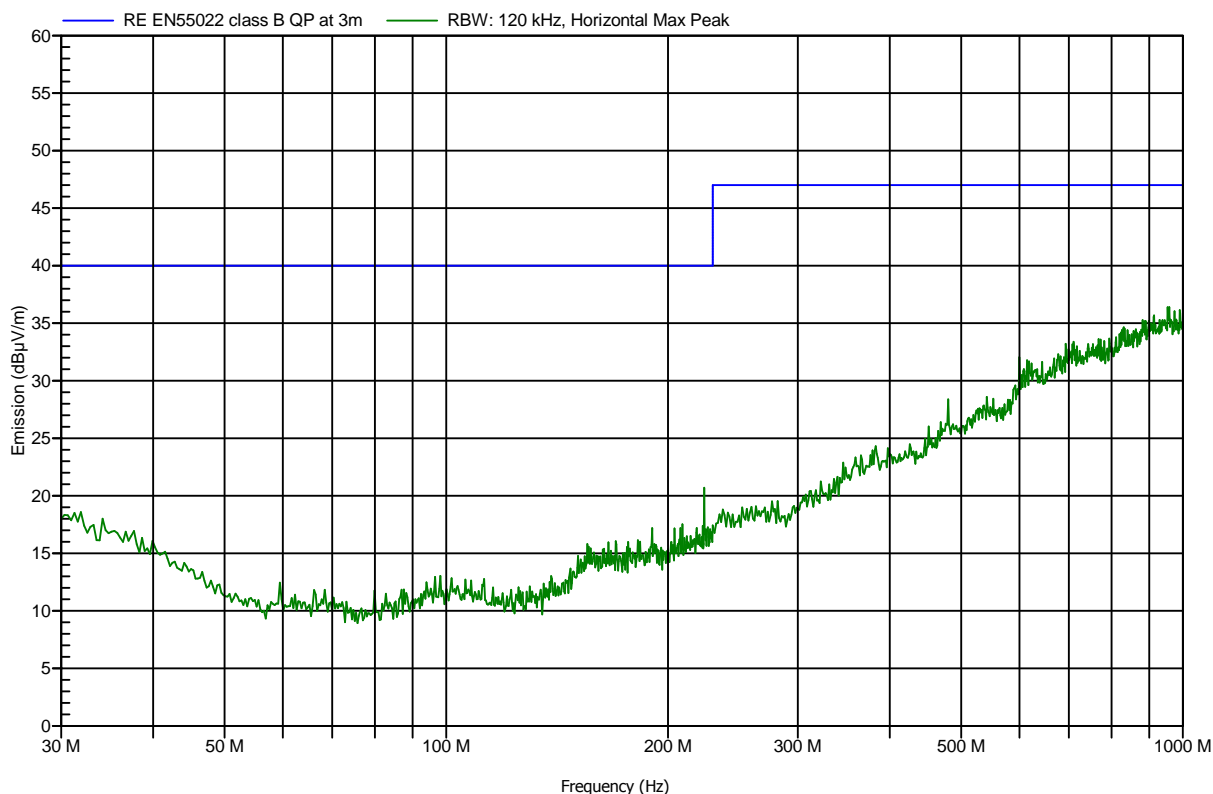
| | |
|--------------------|---------------------------|
| Mode of operation: | All products on the table |
| Remarks: | Pass |

Settings

| | | | |
|-------------------|---------|------|----------|
| RBW: | 120 kHz | VBW: | 1000 kHz |
| Antenna distance: | 3 m | | |

Result Radiated Emission SAR 30.000 MHz to 1000.000 MHz Horizontal

| | |
|--------------|--|
| PIN number: | 10C00357 |
| Description: | 9) RE SAR (ID1494) EN 55022 (2006) hor. 30 - 1000 MHz Pre-scan SA 3m |



Test environment

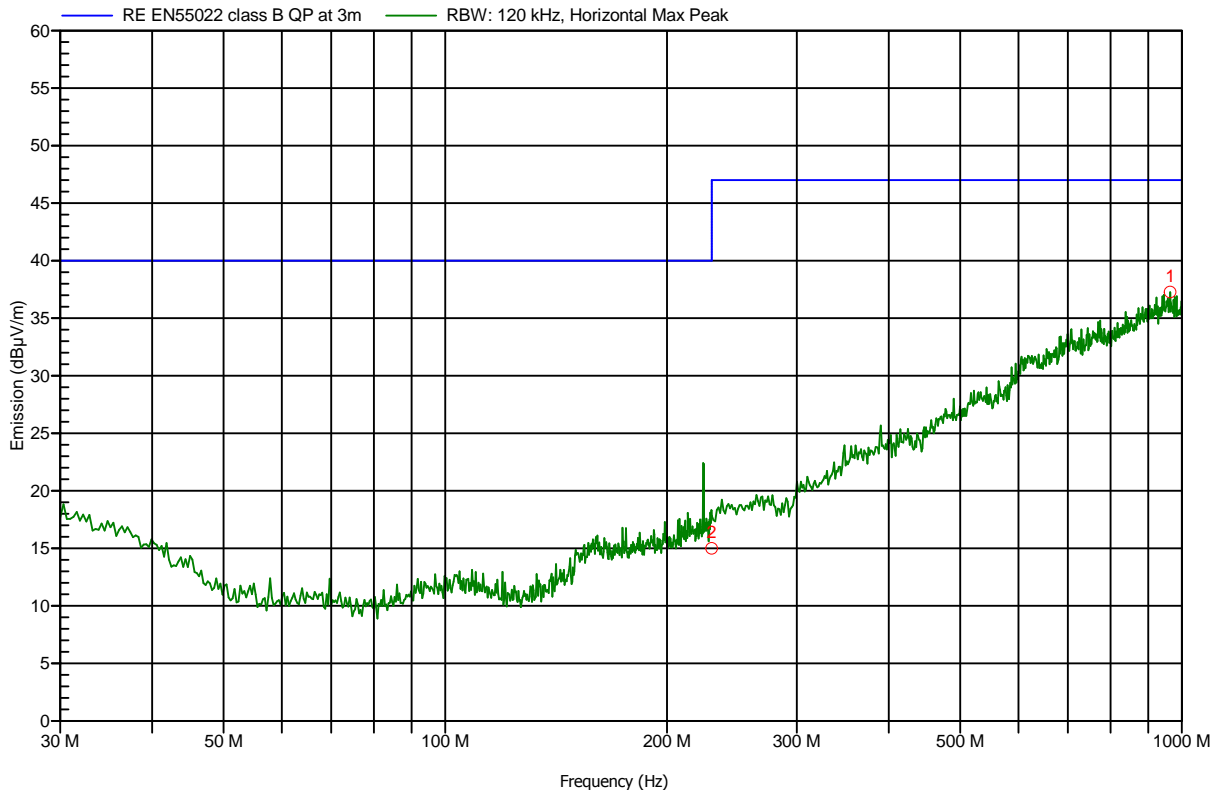
| | |
|--------------------|---------------------------|
| Mode of operation: | All products on the table |
| Remarks: | Pre scan |

Settings

| | | | |
|-------------------|---------|------|----------|
| RBW: | 120 kHz | VBW: | 1000 kHz |
| Antenna distance: | 3 m | | |

Result Radiated Emission SAR 30.000 MHz to 1000.000 MHz Horizontal

| | |
|--------------|--|
| PIN number: | 10C00357 |
| Description: | 10) RE SAR (ID1494) EN 55022 (2006) hor. 30 - 1000 MHz class B SA 3m |



Detected Peaks

| Nr | Frequency | Peak | Angle | Height |
|----|-------------|---------------|------------|--------|
| 1 | 964.036 MHz | 37.262 dBµV/m | 0 Degree | 4 m |
| 2 | 230.000 MHz | 14.985 dBµV/m | 179 Degree | 3 m |

Test environment

| | |
|--------------------|---------------------------|
| Mode of operation: | All products on the table |
| Remarks: | Pass |

Settings

| | | | |
|-------------------|---------|------|----------|
| RBW: | 120 kHz | VBW: | 1000 kHz |
| Antenna distance: | 3 m | | |



Equipment List 30 MHz to 1000 MHz

| Device Type | Brand | Type | ID |
|-------------------------|-----------------------|----------------|------|
| Antenna | EMCO | 3142 | 1168 |
| Cable antenna -> preamp | D.A.R.E!! Development | Sucoflex | 1478 |
| Turn table | D.A.R.E!! Development | RadiTurn | 1367 |
| Spectrum analyzer | Rohde & Schwarz | ESU 26 Input 2 | 1465 |
| Antenna tower | D.A.R.E!! Instruments | RTW1004B | 1496 |

8 Evaluation

The following table displays the results of the tests, which are carried out to the EUT.

Test results summary

| Test sequence | Phenomenon | Basic standard | EUT Modified during test | Result |
|---------------|---|---|--------------------------|----------------|
| -- | Conducted emission, test with a LISN | EN 55016-2-1 (2009) & EN 55022 (2006) + A1 (2007) | -- | Not applicable |
| -- | Conducted emission, test with a Voltage Probe | EN 55016-2-1 (2009) & EN 55022 (2006) + A1 (2007) | -- | Not applicable |
| 1 | Radiated emission, | EN 55016-2-3 (2007) | No | Pass |
| -- | Harmonics | EN 61000-3-2 (2006) | -- | Not applicable |
| -- | Flicker | EN 61000-3-3 (1995) + A1 (2001) + A2 (2005) | -- | Not applicable |
| -- | ESD | EN 61000-4-2 (1995) + A1 (1998) + A2 (2001) | -- | Not applicable |
| -- | Radiated Immunity (limited to 1 GHz) | EN 61000-4-3 (2006) + A1 (2008) | -- | Not applicable |
| -- | EFT | EN 61000-4-4 (2004) | -- | Not applicable |
| -- | Surge | EN 61000-4-5 (2007) | -- | Not applicable |
| -- | Conducted Immunity | EN 61000-4-6 (2009) | -- | Not applicable |
| -- | Power Frequency Magnetic Field ¹ | EN 61000-4-8 (1993) + A1 (2001) | -- | Not applicable |
| -- | Voltage Dips and Interruptions ¹ | EN 61000-4-11 (1994) + A1 (2001) | -- | Not applicable |

¹ Tests are excluded from accreditation.

Pass or fail statements exclude the measurement uncertainty.

Explanation if test is not applicable

| Phenomenon | Comment |
|---|---|
| Conducted emission, mains terminals, continue (LISN) | The EUT is not AC supplied. |
| Conducted emission, telecommunications/network port (Current Probe) | The EUT doesn't have multi-user telecommunications / network ports such as ISDN or Ethernet. |
| Conducted emission, load and additional terminals, continue (VP) | EUT doesn't have load or additional terminals. |
| Radiated emission above 1 GHz (FAR) | The highest frequency of the internal sources of the EUT is less than 108MHz. |
| Radiated emission (Absorber clamp) | The EUT doesn't have cables connected. |
| Harmonics | The EUT is not AC supplied. |
| Flicker | The EUT is not AC supplied. |
| ESD | No performance check possible |
| Radiated Immunity | The EUT does not contain electronic control circuitry. |
| EFT | The EUT is not AC supplied. The EUT doesn't have I/O cables longer than 3 m. |
| Surge | The EUT is not AC supplied. The EUT doesn't have I/O cables longer than 30 m. |
| Conducted Immunity | The EUT doesn't have I/O cables longer than 3 m. The EUT does not contain electronic control circuitry. |
| Power Frequency Magnetic Field | The EUT doesn't contain components which are sensitive to magnetic fields (e. g. Hall sensors). |
| Voltage Dips and Voltage Variations | The EUT is not AC supplied. |

9 Conclusion

The Floww equipment meets the class B emission levels as described in EN 61000-6-3 (2007).

Thus the Floww equipment is in compliance with the harmonised standards under the EMC directive 2004/108/EC, as mentioned above.

9.1 Remarks

It is the responsibility of the manufacturer to make certain all subsequent products are identical to the measured sample and as such ensure all manufactured Floww equipments are in compliance with the harmonised standards under the EMC directive 2004/108/EC, as mentioned above.

Furthermore, in order to fulfill the European CE-legislation it is the responsibility of the manufacturer of the equipment to draw up a declaration of conformity and to have technical file documentation containing information to demonstrate the conformity of the product to the applicable requirements. At the same time every unit brought to the market or put into service has to be marked with the CE-mark.

10 Appendix A: General performance criteria

Performance criterion A:

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B:

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C:

Temporary loss of function is allowed, provided the loss of function is self-recoverable or can be restored by the operation of the controls.

11 Appendix B: Pictures of EUT

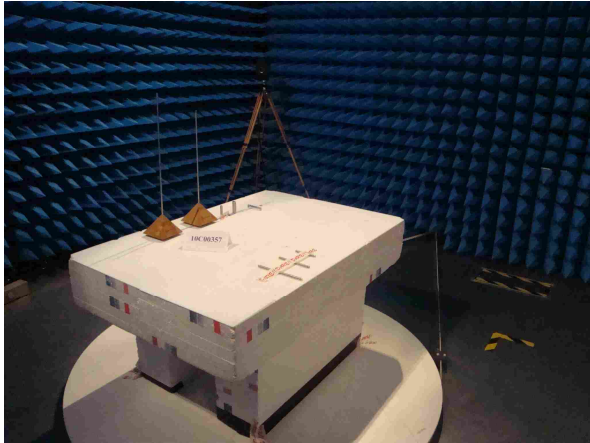


Photo 1: Radiated emission 30 – 1000 MHz

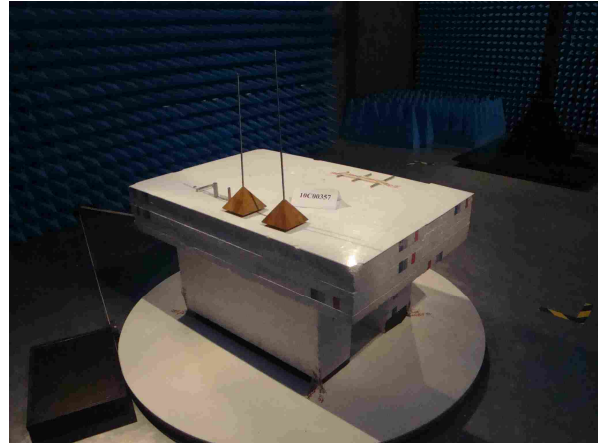


Photo 2: radiated emission 30 – 1000 MHz