Environmental and material tests (ENV) SECTOR

Product description:	CleanRoom and GMP gripping system
Tested Models:	MPPM1606-KIT-GMP

Test specification:	EN 60529:1991 / A1:2000 / A2:2013
Application:	Verification of degree of protection IP65
Remarks:	None

Applicant:	**GIMATIC S.p.A.** Via Enzo Ferrari, 2/4 – 25030 Roncadelle (BS) Tel. +39 0302584655 Fax +39 0302583886		
Customer:	Same as Applicant		
Manufacturer:	Same as Applicant		
Purchase Order:	ODA-T02839	**dated:**	2015-07-09
Order Confirmation:	CO 2015-0243-00	**dated:**	2015-07-10

Samples receiving date:	2015-07-08			
Tests date:	**from:**	2015-07-08	**to:**	2015-07-09

Test Laboratory	**Test site**
INTEK S.p.A. - Test and Measurement Division Via Mazzini, 75 - 25086 Rezzato (BS) - Italy Tel. +39 030 2591857 Fax +39 030 2594351 url: http://www.intek.it e-mail: info@intek.it	**INTEK S.p.A. - Test and Measurement Division** Via Breve - 25086 Rezzato (BS) - Italy

Written by	Verified by	Approved by
Marco Camodeca Test Engineer	*Flavio Floriani* ENV Sector Manager	*Ivo Meroni* Test and Measurement Division Manager

Rev.	*Date*	*Description*
00	2015-07-13	Formal issue

INDEX

1. PURPOSE

Purpose of this document is to contain results of the tests performed to verify correspondence of test samples, as identified and described in paragraph 3, to requirements of standards listed in paragraph 2.

2. APPLICABLE DOCUMENTS

On customer request, the tests have been performed in compliance with the standards listed below:

Standard	Title
EN 60529:1991 /A1:2000 /EC:1993 /A2:2013	Degree of protection provided by enclosures (IP Code)

Afterwards, the “applicable documents”, will be indicated without date and/or edition number and/or amendments.

2.1 OTHERS DOCUMENTS

Document	Date	Rev.	Title
05 04 PP 041 PRE	2015-03	05	Intek procedure for test IP first characteristic number
05 04 PP 043 PRE	2014-09	01	Intek procedure for test IP second characteristic number

3. TEST SAMPLE IDENTIFICATION

Unless otherwise specified, the technical data stated in this paragraph are declared by the manufacturer or obtained from the product technical documentation.

3.1 DESCRIPTION

Identification data of test samples are reported in the first page of this document.

Sample identification
Not available
Marking plate / markings

Manufacturing plant address:	**GIMATIC S.p.A.** Via Enzo Ferrari, 2/4 – 25030 Roncadelle (BS)
Type of unit:	☐ Prototype / Pre-series ☒ Series
Serial number:	Not present
HW revision:	Not declared
SW/FW revision:	Not applicable

3.1.1 TECHNICAL DATA

Power supply nominal voltage:	/
Rated frequency:	/
Rated power / current:	/
Extreme environmental ranges:	/
Dimensions:	/
Other:	/

3.1.2 CLASSIFICATION

Degree of enclosure protection:	IP65
Other:	The sample is classified in Category 1

3.1.3 ADDITIONAL INFORMATION

None

3.2 SAMPLES ORIGIN

The test samples are supplied by:			
☒ **Manufacturer**	☐ **Customer**	☐ **Applicant**	☐ _____
The beginning sampling is carried out by:			
☒ **Manufacturer**	☐ **Customer**	☐ **Applicant**	☐ _____

Received samples:	1	**Tested samples:**	1
Selection method of the laboratory:	☐ **Random taking**	☒ **N/A**	

4. TEST INFORMATIONS

4.1 CONDITIONS DURING THE TESTS

4.1.1 PERSONNEL PRESENT TO THE TESTS

Test performed by: ***Marco Camodeca (Intek S.p.A.)***

Other people present: **/**

4.1.2 MODIFICATIONS TO SAMPLES

Test sample was not modified during the tests.

4.1.3 ENVIRONMENTAL CONDITIONS

Test site environmental conditions are recorded during tests and they are shown on relevant paragraphs.
The measurement uncertainties are given with expanded uncertainty with a level of confidence of 95 % (k = 2).

4.1.4 CONVENTIONS

If applicable, on the right of each chapter or paragraph is written the number of the chapter or paragraph of reference Standard in the form: § number.

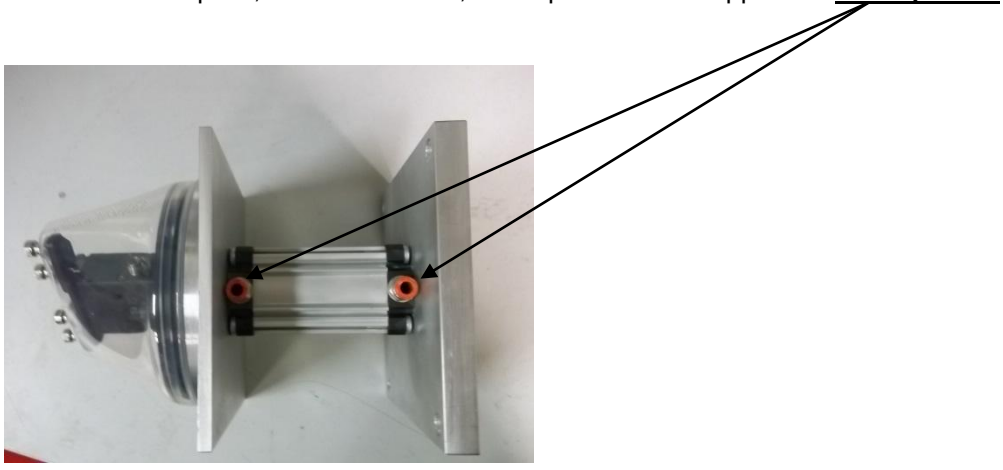
4.1.5 ABBREVIATIONS

N/A = Not Applicable
N/D = Not Declared
N/R = Not Required by the customer
F = Fail
P = Pass
TR = Test Report
EUT = Equipment Under Test
NCR = No Calibration Required

4.2 CONFIGURATION

During the tests the sample was configured following the methods and the procedures specified in the reference documents.

On customer request, for the IP6X test, the depression was applied at **these points.**



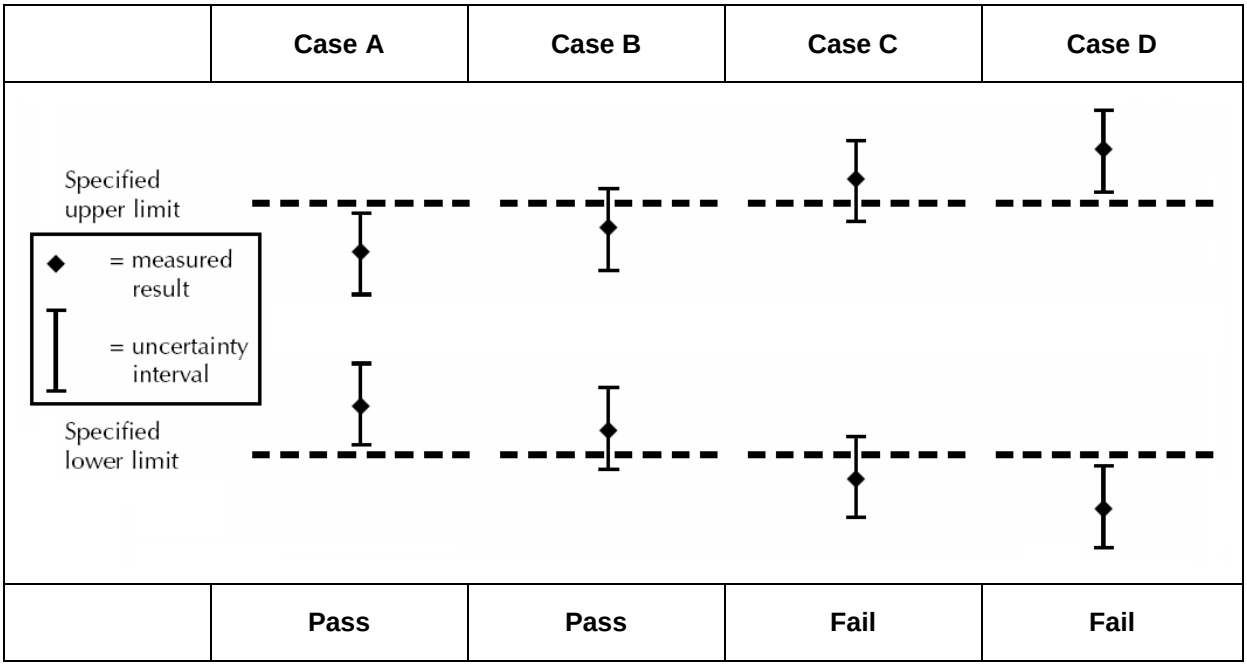
4.3 CRITERIA ADOPTED FOR COMPLIANCE EVALUATION

If applicable for compliance evaluation of test results, the Laboratory adopts the following criteria:

- Reference standard specifies uncertainty for measurements:
  - measurements uncertainty permitted;
  - instruments accuracy;
  - application of measurements uncertainty to the measured values;

  in this case the measurement complies with the requirement if the measured value is within the limits, or with the correction due to the Laboratory uncertainty.

- Reference standard doesn't specify uncertainty for measurements:
  Calculate uncertainty for measurement and compare the measured result with uncertainty band to defined acceptable limit. The measurement complies with the requirement if the probability it being within the limit is at least 50 % (see following figure):



5. TEST RESULTS

Ref. § TR	Test / Verification	§ Standard EN 60529	Result (ref. § 4.3)	Notes
6.1	Verification of degree of protection IP6x	§ 13.4	***Pass***	***/***
6.2	Verification of degree of protection IPx5	§ 14.2.5	***Pass***	***/***

Notes: /

5.1 SAMPLES CORRELATION / TEST SEQUENCE

The sample was sequentially subjected to the tests described in the following paragraphs.

5.2 TEST METHOD DEVIATIONS

Test methods described in the reference document were adopted without any deviation.

6. TESTS PERFORMED

6.1 VERIFICATION OF DEGREE OF PROTECTION IP6x - EN 60529 § 13.4 - 13.6

6.1.1 DESCRIPTION

The test was performed in conformity to § 13.4 of the EN 60529 standard reference.
The test is made using a dust chamber incorporating the basic principles shown in Fig. 2 of EN 60529 whereby the powder circulation pump may be replaced by other means suitable to maintain the talcum powder in suspension in a closed test chamber. The talcum powder used shall be able to pass through a square-meshed sieve the nominal wire diameter of which is 50 µm and the nominal width between wires 75 µm. The amount of talcum powder to be used is 2 kg per cubic meter of the test chamber volume. It shall not have been used for more than 20 tests.

Enclosures are of necessity in one of two categories:

Category 1: Enclosures where the normal working cycle of the equipment causes reductions in air pressure within the enclosure below that of the surrounding air, e.g., due to thermal cycling effects.
Category 2: Enclosures where no pressure difference relative to the surrounding air is present.

For IP6x test, the enclosure is always considered in Category 1.

The enclosure under test is supported inside the test chamber and the pressure inside the enclosure is maintained below the surrounding atmospheric pressure by a vacuum pump. The suction connection shall be made to a hole specially provided for this test. If not otherwise specified in the relevant product standard, this hole shall be in the vicinity of the vulnerable parts.
If it is impracticable to make a special hole, the suction connection shall be made to the cable inlet hole. If there are other holes (e.g., more cable inlet holes or drain holes) these shall be treated as intended for normal use on site.
The object of the test is to draw into the enclosure, by means a depression, a volume of air 80 times the volume of the sample enclosure tested without exceeding the extraction rate of 60 volumes per hour. In no event shall the depression exceed 2 kPa (20 mbar) on the manometer shown in Fig.2 of the EN 60529.
If an extraction rate of 40 to 60 volumes per hour is obtained the duration of the test is 2 h.
If, with a maximum depression of 2 kPa (20 mbar), the extraction rate is less than 40 volumes per hour, the test is continued until 80 volumes have been drawn through, or a period of 8 h has elapsed.

Test parameters:

Enclosure Category:	1
Measured depression	20 mbar
Extraction rate	0
Test duration	8 h

Acceptance criteria:
The protection is satisfactory if no deposit of dust is observable inside the enclosure at the end of the test.

6.1.2 ENVIRONMENTAL CONDITIONS OF THE TEST SITE

Temperature: 23 °C ± 5 °C Relative Humidity: 50 % ± 25 % Atm. pressure.: 960 mbar ± 100 mbar

6.1.3 SUMMARY OF RESULTS

Annex N.	Fig. N.	Sample N.	Description	Result	Notes
01	1,3,4	1	At the end of the test no traces of dust are visible inside the enclosure.	***Pass***	***/***

Notes: ***/***

6.1.4 TEST / MEASUREMENT UNCERTAINTY

Measurements uncertainties:

Measure	Uncertainty U
Pressure	1.6 % of full range (-40 mbar)
Time	1 %

Values of expanded uncertainty are given with a level of confidence of 95 % (k = 2).

6.2 VERIFICATION OF DEGREE OF PROTECTION IPx5 - EN 60529 § 14.2.5

6.2.1 DESCRIPTION

The test was performed in conformity to § 14.2.5 of the EN 60529 standard reference.
The test is made by spraying the enclosure from all practicable directions with a stream of water from a standard test nozzle as shown in fig. 6 of the EN 60529.
The conditions to be observed are as follows:

- internal diameter of the nozzle: 6,3 mm;
- delivery rate: 12,5 l/min ± 5 %;
- water pressure: to be adjusted to achieve the specified delivery rate;
- core of the substantial stream: circle of approximately 40 mm diameter at 2,5 m distance from nozzle;
- test duration per square meter of enclosure surface area likely to be sprayed: 1 min;
- minimum test duration: 3 min;
- distance from nozzle to enclosure surface: between 2,5 and 3 m.

Test parameters:

Delivery rate	12,5 l/min
Test duration	3 min
Distance from nozzle to enclosure surface	2,7 m

Acceptance criteria:
At the end of the test, if any water has entered, it shall not:

- *be sufficient to interfere with the correct operation of the equipment or impair safety;*
- *deposit on insulation parts where it could lead to tracking along the creepage distances;*
- *reach live parts or windings not designed to operate when wet;*
- *accumulate near the cable end or enter the cable if any.*

6.2.2 ENVIRONMENTAL CONDITIONS OF THE TEST SITE

Temperature: 23 °C ± 5 °C Relative Humidity: 50 % ± 25 % Atm. pressure.: 960 mbar ± 100 mbar

6.2.3 SUMMARY OF RESULTS

Annex N.	Fig. N.	Sample N.	Description	Result	Notes
01	2,3,4	1	At the end of the test no traces of water are visible inside the enclosure.	***Pass***	***/***

Notes: ***/***

6.2.4 TEST / MEASUREMENT UNCERTAINTY

Measurements uncertainties:

Measure	Uncertainty U
Delivery rate	5 %
Time	1 %
Distance	100 mm

Values of expanded uncertainty are given with a level of confidence of 95 % (k = 2).

7. TEST INSTRUMENTATION

Ref. § TR	Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
6.1	Dust chamber	ATS di Galbusera	03.01	0049 F	NCR	NCR
6.1	Talcum	/	/	0945 U	NCR	NCR
6.1	Test sieve for dust chamber	Endecotts	75 Mic.	0835 P	2015-05	2015-11
6.1	Manometer	F.lli Magni	-40 mbar	0956 P	2014-07	2015-07
6.1-6.2	Chronometer	RS	278698	0853 P	2015-02	2016-02
6.1	Thermo/hygrometer	Deltaohm	HD35E DL1NT VI	1048 P	2015-03	2016-03
6.2	Water flowmeter 0,5-16,5 l/min	CVC	D4	0026 P	2015-02	2016-02
6.2	Water jet hose nozzle Ø6,3 mm	ATS di Galbusera	03,22	0024 P	2014-09	2017-09
6.2	Measuring tape	BMI Radius	20 m	0695 P	2013-12	2017-12
6.2	Thermo/hygrometer	Deltaohm	HD35E DL1NT VI	1047 P	2015-03	2016-03
6.1-6.2	Barometer	Fischer	/	0054 P	2015-01	2019-01

7.1 INSTRUMENTATION ACCURACY

If reference standard doesn't specify otherwise, accuracy of used instrumentation for the tests is in accordance to the limits indicated in the IEC document - CTL Decision Sheet DSH251B 2009 Developed by WG4-WG1 "Measurements accuracy".

8. EUT DOCUMENTATION

Not available.

If the complete product documentation isn't available, there is no guarantee about reproducibility in future of the results of the tests performed.

9. ANNEXES LIST

Annex N.	Description
01	Photographs.

End of test report.

Fig. 1. - Test set-up for IP6x

Fig. 2. - Test set-up for IPx5

Fig. 3. - Result IP65

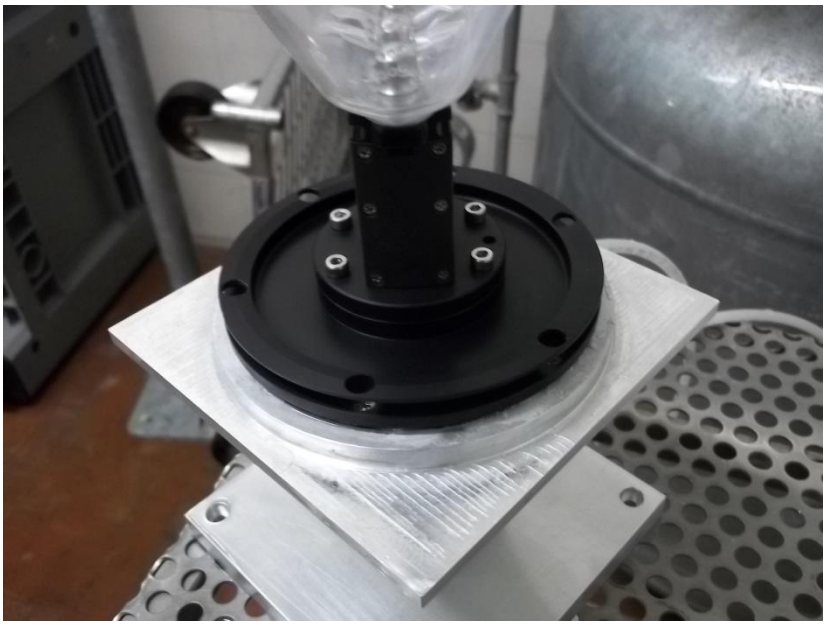


Fig. 4. - Result IP65