Test report **TL201801008**

Outdoor cabinet

Revision 1.0

DUT type:	Outdoor Modular Cabinet	Test date:	Week 19
DUT p/n:	10149-337	Firmware:	------
DUT s/n:	------	Test also applies to p/n:	------

Test : IP55 test without running fans / Test according to IEC 60529

Results: ☒ PASS ☐ FAIL ☐ MIXED

Document history:

Revision	Date	Author	Description of changes
1.0	2018.05.15	Lehm	Initial release

Information about producer:
Schroff GmbH
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List of contents

1 Test purpose

The Ingress Protection ratings are defined in international standard EN 60529. They are used to define levels of sealing effectiveness of enclosures against intrusion from foreign matter (tools, dirt etc.) and moisture. The ratings are determined by testing.

IPX5 test according to IEC 60529:
Protected against low pressure jets of water from all directions- limited ingress permitted

IP5X test according to IEC 60529:
Protected against dust, limited ingress (no harmful deposit)

2 Description of the test

IPX5 Test according to IEC 60529:

- Jet nozzle Ø 6,3mm
- Distance to enclosure between 2,5 and 3 meters
- Water volume flow 12,5l/min +/-5%
- Test duration 8 minutes (1 minute for each m^2 = cabinet = $8m^2$)

The test is conducted by spraying water at the enclosure from all directions.
Examination on the product after test is done according to IEC 60529, page 21 section 14.3.

IP5X Test according to IEC 60529:

- Dust chamber
- Test-dust with 75µm grain
- Test duration 8 hours

Examination on the product after test is done according to IEC 60529, page 16 section 13.4.

Both tests without running fans!

13 Tests for protection against solid foreign objects indicated by the first characteristic numeral

13.1 Test means

Test means and the main test conditions are given in table 7.

Table 7 – Test means for the tests for protection against solid foreign objects

First characteristic numeral	Test means (object probes and dust chamber)	Test force	Test conditions, see
0	No test required	–	–
1	Rigid sphere without handle or guard $50^{+0,05}_{0}$ mm diameter	50 N ± 10 %	13.2
2	Rigid sphere without handle or guard $12,5^{+0,2}_{0}$ mm diameter	30 N ± 10 %	13.2
3	Rigid steel rod $2,5^{+0,05}_{0}$ mm diameter with edges free from burrs	3 N ± 10 %	13.2
4	Rigid steel rod $1,0^{+0,05}_{0}$ mm diameter with edges free from burrs	1 N ± 10 %	13.2
5	Dust chamber figure 2, with or without underpressure	–	13.4 + 13.5
6	Dust chamber figure 2, with under-pressure	–	13.4 + 13.6

13.2 Test conditions for first characteristic numerals 1, 2, 3, 4

The object probe is pushed against any openings of the enclosure with the force specified in table 7.

13.3 Acceptance conditions for first characteristic numerals 1, 2, 3, 4

The protection is satisfactory if the full diameter of the probe specified in table 7 does not pass through any opening.

NOTE For the first characteristic numerals 3 and 4 the probes specified in table 7 are intended to simulate foreign objects which may be spherical. Where an enclosure has an indirect or tortuous entry path and there is any doubt about ingress of a spherical object capable of motion, it may be necessary to examine drawings or to provide special access for the object probe to be applied with the specified force to the opening(s) where ingress has to be checked.

13.4 Dust test for first characteristic numerals 5 and 6

The test is made using a dust chamber incorporating the basic principles shown in figure 2 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 of a gap between wires 75 µm. The amount of talcum powder to be used is 2 kg per cubic metre of the test chamber volume. It shall not have been used for more than 20 tests.

13.5.2 Acceptance conditions for first characteristic numeral 5

The protection is satisfactory if, on inspection, talcum powder has not accumulated in a quantity or location such that, as with any other kind of dust, it could interfere with the correct operation of the equipment or impair safety. Except for special cases to be clearly specified in the relevant product standard, no dust shall deposit where it could lead to tracking along the creepage distances.

Table 8 – Test means and main test conditions for the tests for protection against water

Second characteristic numeral	Test means	Water flow rate	Duration of test	Test conditions, see
0	No test required	–	–	–
1	Drip box Figure 3 Enclosure on turntable	$1^{+0,5}_{0}$ mm/min	10 min	14.2.1
2	Drip box Figure 3 Enclosure in 4 fixed positions of 15° tilt	$3^{+0,5}_{0}$ mm/min	2,5 min for each position of tilt	14.2.2
3	Oscillating tube Figure 4 Spray ± 60° from vertical, distance max. 200 mm or Spray nozzle Figure 5 Spray ± 60° from vertical	0,07 l/min ± 5 % per hole, multiplied by number of holes 10 l/min ± 5 %	10 min 1 min/m² at least 5 min	14.2.3 a) 14.2.3 b)
4	As for numeral 3 Spray ± 180° from vertical	As for numeral 3		14.2.4
5	Water jet hose nozzle Figure 6 Nozzle 6,3 mm diameter, distance 2,5 m to 3 m	12,5 l/min ± 5 %	1 min/m² at least 3 min	14.2.5
6	Water jet hose nozzle Figure 6 Nozzle 12,5 mm diameter, distance 2,5 m to 3 m	100 l/min ± 5 %	1 min/m² at least 3 min	14.2.6
7	Immersion tank Water-level on enclosure: 0,15 m above top 1 m above bottom	–	30 min	14.2.7
8	Immersion tank Water-level: by agreement	–	by agreement	14.2.8

14.2 Test conditions

Test means and main test conditions are given in table 8.

Details concerning compliance of degrees of protection – in particular for second characteristic numerals 5/6 (water jets) and numerals 7/8 (immersion) – are given in clause 6.

The tests are conducted with fresh water.

During the tests for IPXI to IPX6 the water temperature should not differ by more than 5 K from the temperature of the specimen under test. If the water temperature is more than 5 K below the temperature of the specimen a pressure balance shall be provided for the enclosure. For IPX7 details of the water temperature are given in 14.2.7.

During the test, the moisture contained inside the enclosure may partly condense. The dew which may thus deposit shall not be mistaken for an ingress of water.

For the purpose of the tests, the surface area of the enclosure is calculated with a tolerance of 10 %.

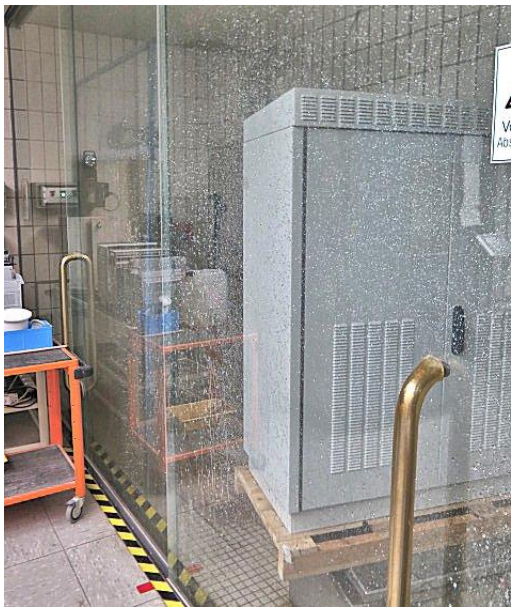
14.2.5 Test for second characteristic numeral 5 with the 6,3 mm nozzle

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 figure 6.

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 metre of enclosure surface area likely to be sprayed: 1 min;
- minimum test duration: 3 min;
- distance from nozzle to enclosure surface: between 2,5 m and 3 m.

3 Test Setup



IPX5 water test

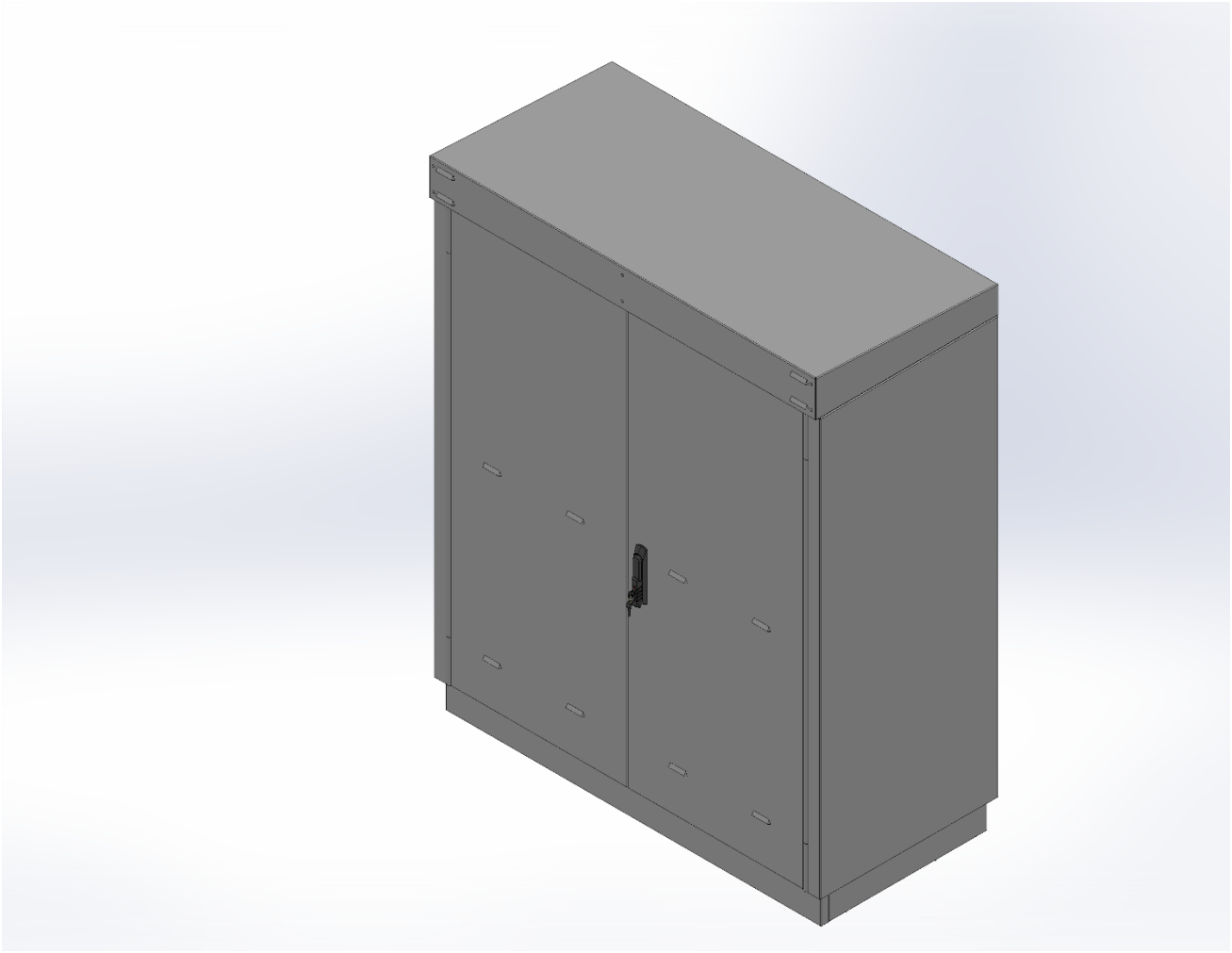
IP5X dust test

3.1 Test resources/equipment

- IP water cabin with standard spray head and shower
- Weiss dust chamber ST 8000 U with test dust according to IEC 60529

3.2 Test object

nVent SCHROFF Outdorr Modular Cabinet
Item number: 10149-337



3D model of nVent SCHROFF Outdoor Modular Cabinet, Item Number 10149-337

3.3 Ambient conditions

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4 Measurement results

IPX5 test according to IEC 60529:
The outdoor cabinet passed the IPX5 test according to IEC 60529:
No water entered the cabinet.

IP5X test according to IEC 60529:
The outdoor cabinet passed the IP5X test according to IEC 60529:
No dust entered the cabinet.

5 Conclusion

The behavior of the nVent SCHROFF Outdoor Modular Cabinet 10149-337 for IP55 testing according to EN 60529 was studied in an IP water cabin and a Weiss dust chamber.

At the end of the tests, the cabinet showed that no water or dust has entered the cabinet.

These results confirm the IP55 sealing effectiveness according to the norm defined above.

Pictures:

IPX5 test:

Cabinet during the IPX5 test

Cabinet after the IPX5 test

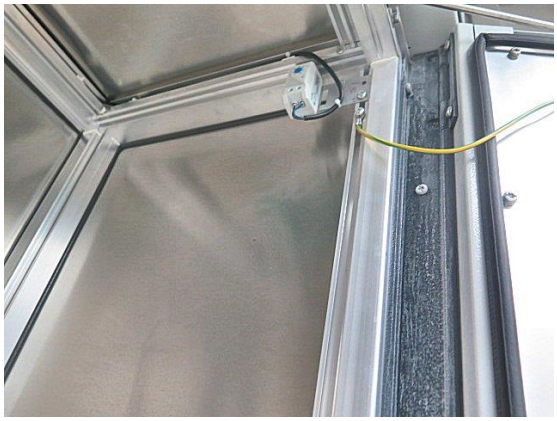
No water inside the cabinet / No pictures available.

IP5X test:

Cabinet after IP5X test

No dust inside the cabinet

No dust inside the cabinet



No dust inside the cabinet