

TEST REPORT No. 15-7081B Revision 1

Test Specimen: Case - Guardian -

Client: bwh Spezialkoffer GmbH
Saltenwiese 54
D-48477 Hörstel

Involved Persons: Björn Schindler (bwh Spezialkoffer GmbH)
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Purpose:

By a laboratory test a case - type guardian - is to be tested to its protection against: a) access to dangerous parts inside the enclosure; b) ingress of solid foreign objects and c) ingress of water. The test profile was given by the client (DIN EN 60529). IP 54 test should be executed.

Summary:


The tests were performed successfully. The inspection after IP X4 showed no ingress of water. The visual inspection after the dust test (IP 5X) showed traces of dust inside the case. The Case fulfils the requirement of IP 54 protection class.


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Written: Verena Sarach  14th of October, 2015
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(Managing Director) Signature

List of Revision:

Revision	Date	Reason
0	2015-09-22	Original Document
1	2015-10-14	delate IP X7 test

With this revision, all previous releases are no longer valid.

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3. Specimen

For the qualification test a case was provided by the client. Table 1 describes the unit in detail. In the following designation the specimen is shortened by UUT (Unit Under Test).

Table 1: Specimen

No.	Serial No.	Description	Type	Manufacturer
1	unknown	Case	Guardian	bwh Spezialkoffer

Illustration 1 shows the specimen.



Illustration 1: UUT

4. Test and Equipment

On the basis of the conducted tests the tightness of an enclosure was supposed to be tested. The test specifications were given by the client and are described in the DIN EN 60529 standard.

Table 2 shows an overview of the international protection tests and the test sequences.

Table 2: International Protection Tests

International Protection Tests						
Sequence	Not e	Descript ion	Reference	Test Level	Acc. Lab.	
International Protection Tests	IP-Tests					Yes PACosult
	1	IP 5X	DIN EN 60529	Protection against access to dangerous parts inside the enclosure Test Wire: Ø 1 mm Test Force: 1 N ± 10% (Test wire must not ingress and needs to have enough distance to endangering parts)		
				Protection against ingress of solid foreign objects (dust-proof) Dust: Talcum Amount of Dust: 2 kg Duration: 8 h		
2		IP X4	DIN EN 60529	Protection against Splash Water (Sprinkler Head) Water ± 180° from the vertical Flow Rate: 10 l/min Duration: 5 min		

4.1. Test Conditions

All tests were performed, if not otherwise stated in the test report, under the following conditions (table 3).

Table 3: Environmental Conditions

Temperature	15°C-35°C
Relative Humidity	<85 %
Air Pressure	860 hPa – 1060 hPa

4.2. Equipment used for Test

The test equipment used in the laboratory of PAConsult is listed in the following table.

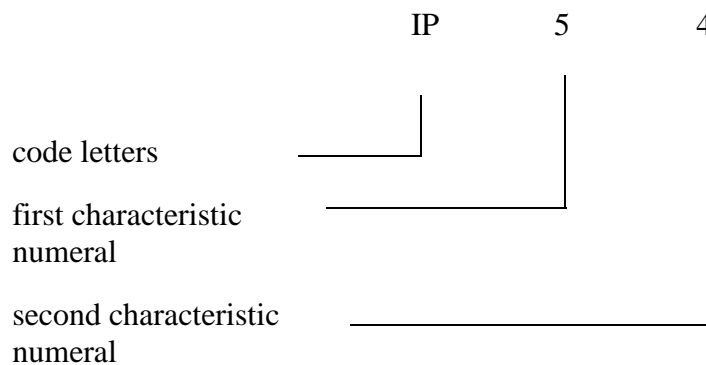
Table 4: Test Equipment

Devices	Manufacturer	Type	Serial number / Version	Date of last calibration
Dust Chamber	Weiss Umwelttechnik	ST 1000	22606022	n/a
External Manometer (Dust Chamber)	Kobold	MAN-KF24E7Y	411055.1	2015/02
Flow Rate Sensor	Endress+Hauser	Proline Promass 80	A1146902000	2014/12
Sprinkler Head IPX3/X4	PTL Dr. Grabenhorst	P 05.24	5100202	2010/08
Testing Probe (Ø 1 mm)	PTL Dr. Grabenhorst	P 10.27	5090083	2014/03
The calibration of the laboratory test equipment is performed annually.				

5. Test Procedures

IP (International Protection) - Degrees of Protection provided by Enclosures

The degree of protection provided by an enclosure is indicated by the IP Code in the following way:



Protection classes which are not demanded to be tested are replaced by the letter “X”.

The purpose of the standard DIN EN 60529 is to define a degree of protection provided by an enclosure of electrical equipment as regards:

- Protection of persons against access to endangering parts inside the enclosure (1st numeral),
- Protection of equipment inside the enclosure against ingress of solid objects (1st numeral) and
- Protection of equipment inside the enclosure against harmful effects due to ingress of water (2nd numeral).

5.1. IP 5X - Protection against Ingress of Dust (Dustproof)

First of all the protection against contact to dangerous parts is to be tested. Therefore the test probe is not allowed to reach dangerous parts inside the enclosure. Each opening is to be penetrated with a test force of 1 N.

Protection against ingress of dust is to be tested in a dust chamber. About 8 hours 2 kilogram of talcum powder is to be initiated. After the test a visual inspection is to be performed.

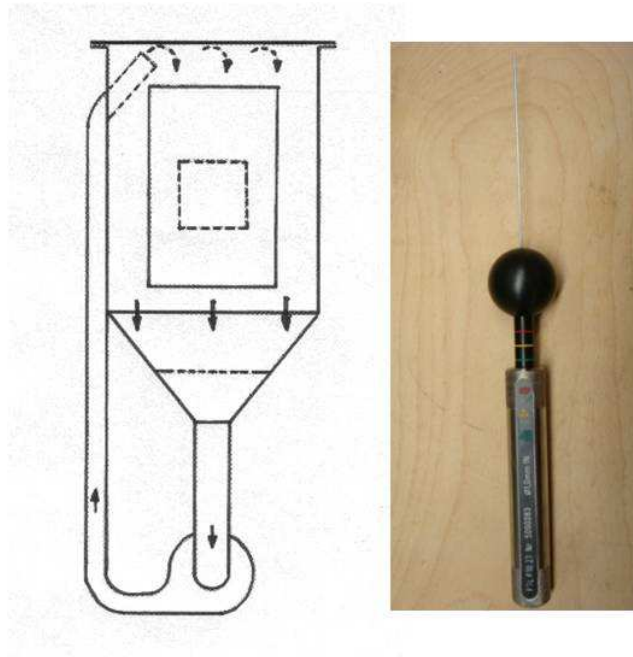


Illustration 2: Dust Chamber and testing Probe

5.2. IP X4 - Protection against Ingress of Splash Water

The UUT is to be placed in the wet chamber and is to be sprayed with a sprinkler head from any direction. The water flow rate is 10 l/min. The test period is a minimum 5 minutes. After the test a visual inspection is to be performed. In illustration 3 the sprinkler head is shown.



Illustration 3: Sprinkler Head

6. Test and Results

The IP-Tests were performed with the parameters from table 2.

6.1. IP 5X - Protection against Ingress of Dust (Dustproof)

At first the sealing was penetrated with the testing probe. Illustration 4 shows the test setup in the dust-chamber and the specimen after the test. Illustration 5 documents the visual inspection after the test.



Illustration 4: Test Setup Dust Chamber; Specimen after Test



Illustration 5: Visual Inspection

Result:

The IP 5X Test was performed successfully. The testing probe could not penetrate the enclosure to any opening.

The visual inspection after the dust test showed traces of dust inside.

6.2. IP X4 - Protection against Ingress of Splash Water

Illustration 6 shows the setup in the wet-chamber and illustration 7 the test proceeding during the IP X4 test.



Illustration 6: Test Setup Wet-Chamber



Illustration 7: Test Proceeding IP X4

The visual inspection after the test is documented in illustration 8.



Illustration 8: Visual Inspection

Result:

The IP X4 test was performed successfully. The visual inspection after the test showed no ingress of water inside the enclosure.

7. Evaluation

The IP 54-tests were performed successfully. In Table 5 the test results are summarized. The tightness of the case was checked.

Table 5: Overview Test Results

International Protection Tests according to DIN EN 60529/ DIN...				
Sequence	Description	UUT	Result	
International Protection Tests	IP Tests			
	1	IP 5X dust proof	Guardian Case	Passed
	2	IP X4 water proof		Passed

The Guardian Case fulfils the requirements of IP 54 protection class.


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Note:

This test report may be passed on as a complete version and unchanged only. Extracts require permission of the test laboratory. Test results refer to the test object specified above. Test reports without signature are invalid.