IP Ingress Protection Testing

Related Specification:	BS EN 60529:1992 +A2:2013 IP66 Category 1
Test House:	Particle Technology Ltd, UK
Equipment Supplier:	Drhino Ltd
Customer Reference	Tony Fuller
Test Engineer(s):	Steve Sandland
Report Author:	Greg Spicer
Equipment Under Test (EUT):	Drhino Cabinet Enclosure
Date of Test:	03 - 04 September 2018
Issue	17980/01 Issue 01

Contents

1 Report Summary

1.1 Introduction

The aim of this test is to ascertain the compliance of the equipment supplied by Container Clad. The tests were performed to BS EN 60529:1992 +A2:2013 IP66 Category 1. The test intends to determine the enclosure's protection against ingress from dust and water. There are two parts of the test:

1. IP6X – Protection against solid foreign objects, dust tight

2. IPX6 – Protection against powerful jets of water

1.2 Brief Summary of Results

A brief summary of the tests carried out in accordance with BS EN 60529:1992 +A2:2013 IP66 Category 1 is shown below.

Table 1-1

Specific Clause	Test Description	Result
IP6X	An object probe of 1.0mm ø shall not penetrate at all when applied with a force of 1 N. Dust Tight – Ingress of dust is totally prevented	There were no apertures or openings allowing penetration of a 1mm probe when applied with a force of 1 Newton (applies to all enclosures evaluated). There was no visible dust ingress into the enclosure The Drhino Cabinet Enclosure conformed to the standard required of BS EN 60529:1992 +A2:2013 IP66 Category 1.
IPX6	Protected against powerful water jets.	There was no visible water ingress into the enclosure. The Drhino Cabinet Enclosure conformed to the standard required by BS EN 60529:1992 +A2:2013 IP66 Category 1.

1.3 Deviations from the standard

No deviations from the applicable test standard were made during testing.

1.4 Modification Record

There were no modifications to the unit during or prior to testing

2 Test House Details

Particle Technology Ltd
Station Yard Industrial Estate
Hatton, Derbyshire
DE65 5DU

3 Customer Address

Drhino Ltd
4 Dalton Grove
Bawtry
Doncaster
DN10 6XS

3.1 Test Equipment

Table 3-1 Test Equipment Used

EQUIPMENT USED FOR ALL IP TESTING			
EQUIPMENT	**MODEL/TYPE**	**INVENTORY No**	**CALIBRATION DUE DATE**
Large Chamber	PTL 40m^3	1001	N/A
Probe (1mm)	RG1440	1011	27/10/2020
Digital Thermometer	Digitron 2029T	1029	02/01/2019
Tape Measure	Buildbase / 5m	1036	14/01/2020
IPX6	Customer Built (Topley Fisher)	1044	05/10/2018
Precision Balance	Sartorius/IB34EDE-P/50911236	1049	10/01/2019
Rotronic Hygrolog	HL-NT2-DP60511854	1066	03/10/2018
Stopwatch	RS 440 9805	1069	25/02/2019
Influx Flow Meter	0.6 – 5Ltr/min	1075	06/10/2018
Hand Force Meter	Lutron	1080	21/02/2019
Turbine Flowmeter	Trimec	1096	12/07/2019

3.2 Equipment Under Test

Table 3-2 – Equipment Under Test

Description	**Model Number**	**Serial Number**	**PTL Ref**	**Date Rec**
Drhino Standard Cabinet	D-Type	2301581	25325	03/09/2018

Test Details

3.3 Ingress Protection, Dust (IP6X)

3.3.1 Specification Reference

BS EN 60529:1992 +A2:2013 IP6X Category 1: Dust-Tight

3.3.2 Date of Test

03 September 2018

3.3.3 Test Method

Figure 1 – Arrangement of EUT in IP6X Test Chamber

1) Initially the enclosure was checked for openings that allowed penetration by a 1mm diameter probe when applied with a force of 1 N.

2) The EUT was set up in the dust-testing chamber as per Figure 1

3) 120kg of talcum powder was loaded into the chamber, which represents 2kg/m^3.

4) A vacuum of 19.9mbar was applied during the test period, the airflow was measured at 3.1 litres/min, this equated to 1.6 vol/hour and therefore an 8 hour test was required.

5) Upon completion of the test the EUT was opened for an internal inspection.

Figure 2 – EUT at the start of IP6X testing

Figure 3 – EUT at the start of IP6X

Figure 4 – EUT on completion of IP6X testing

Figure 5 – EUT on completion of IP6X testing

Figure 6 – EUT on completion of IP6X testing

3.3.4 Inspection IP6X

Figure 7 – Enclosure showed no visible dust ingress

Figure 8 – Enclosure showed no visible dust ingress

Figure 9 – Enclosure showed no visible dust ingress

3.3.5 Test Results IP6X

There were no apertures or openings allowing penetration of a 1mm probe when applied with a force of 1 Newton.

No conspicuous damage was noticed on the exterior of the unit. Excess dust was removed to allow inspection; there was no visible dust ingress into the enclosure.

The Drhino Cabinet Enclosure conformed to the standard required of BS EN 60529:1992 +A2:2013 IP6X Category 1

4 Ingress Protection, Water (IPX6)

4.1.1 Specification Reference

BS EN 60529:1992 +A2:2013 IPX6:Protected against powerful jets of water

4.1.2 Date of Test

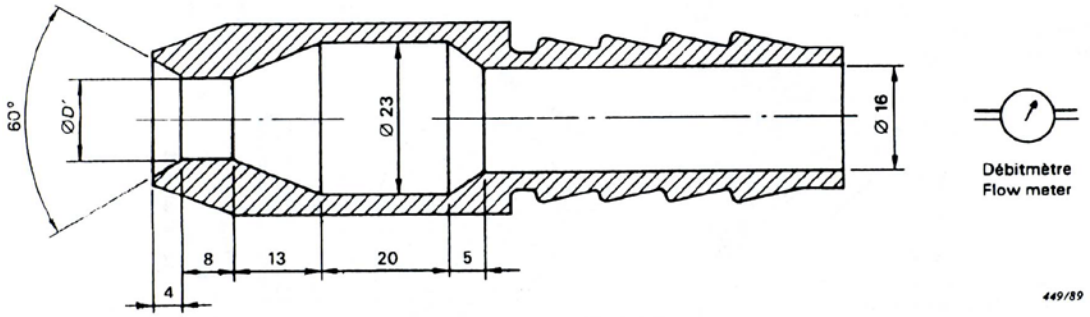
4 September 2018

4.1.3 Test Method

Figure 10 - EUT in water test area

The unit was sprayed with a stream of water from a standard test nozzle as described below:-

Test Duration:	3 min (1 min/m^2)
Nozzle:	As per Figure 11 (D12.5)
Delivery rate:	100 litres/minute
Distance from nozzle to test surface:	2.5 to 3 meters
Water temperature:	17.9°C
Test item temperature:	19.3°C



Dimensions en millimètres *Dimensions in millimetres*

D' = 6,3 pour l'essai de 14.2.5 (deuxième chiffre caractéristique 5)
for the test of 14.2.5 (second characteristic numeral 5)

D' = 12,5 pour l'essai de 14.2.6 (deuxième chiffre caractéristique 6)
for the test of 14.2.6 (second characteristic numeral 6)

Figure 11 - from IEC 60529 Edition 2.2 2013-08, nozzle used for IPX6 testing (D=12.5mm)

Figure 12 – EUT undergoing IPX6 testing

Figure 13 – EUT undergoing IPX6 testing

Figure 14 – EUT undergoing IPX6 testing

Figure 15 – EUT undergoing IPX6 testing

Figure 16 – EUT undergoing IPX6 testing

4.1.4 Inspection IPX6

Figure 17 – Inspection showed no visible water ingress on completion of IPX6 testing

Figure 18 – Inspection showed no visible water ingress on completion of IPX6 testing

Figure 19 – Inspection showed no visible water ingress on completion of IPX6 testing

4.1.5 Test Results IPX6

On completion of testing excess water was removed and the enclosure was opened for inspection.

No conspicuous damage was noticed on the exterior of the enclosure. Upon opening there was no visible water ingress into the enclosure.

The Drhino Cabinet Enclosure conformed to the standard required by BS EN 60529:1992 +A2:2013 IPX6.

5 Approval

The preceding report is an accurate account of the testing performed at Particle Technology Ltd, UK.

Approved by . . . . . .
Greg Spicer, MEng
Managing Director
Date: 19 September 18

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