



# DYCOMETAL

*Testing Technology*



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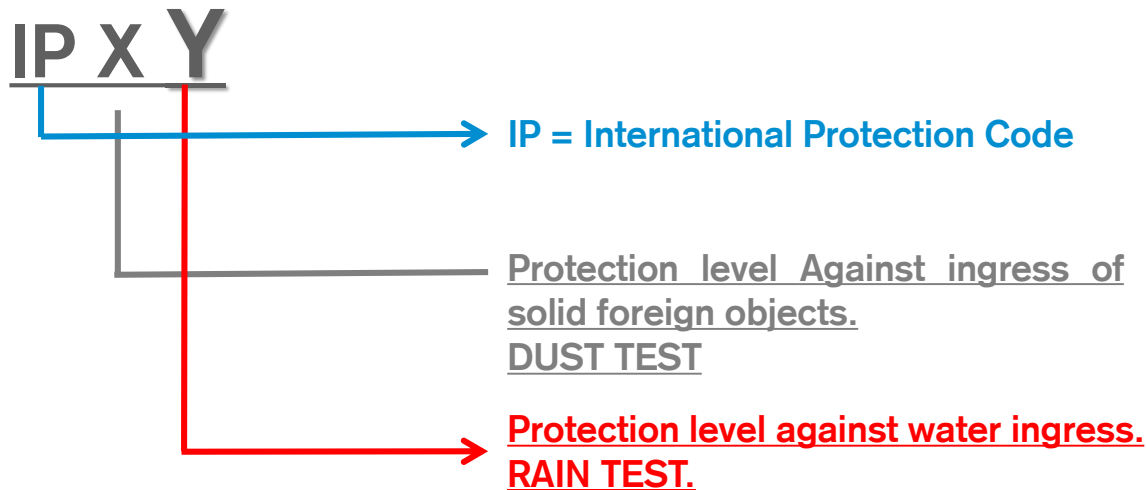
# RAIN TEST CHAMBERS, CLL- SERIES





The IP protection degrees refer to an international regulation, which indicates the level of protection of electrical or electronic equipment against the penetration of external agents: dust (IPX\_) or water (IP\_Y).

We will present in this document the, protection against solid agents ingress. **CLL SERIES –RAIN Test Chambers for IP\_Y tests.**





The rain chambers are primarily designed to comply with the [IEC 60529](#) standard. This standard classifies the different degrees of protection of the components to be tested alpha-numerically according to the level of protection of the materials against the ingress of foreign materials.

The following codes will quickly and easily identify the degree of protection of the specimen to be tested.

| First characteristic numeral | Degree of protection                                                             |                                                                                                                                                                                                                                                     |
|------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | Brief description                                                                | Definition                                                                                                                                                                                                                                          |
| 0                            | Non-protected                                                                    |                                                                                                                                                                                                                                                     |
| 1                            | Protected against vertically falling water drops                                 | Vertically falling drops shall have no harmful effects                                                                                                                                                                                              |
| 2                            | Protected against vertically falling water drops when enclosure tilted up to 15° | Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical                                                                                                           |
| 3                            | Protected against spraying water                                                 | Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects                                                                                                                                                    |
| 4                            | Protected against splashing water                                                | Water splashed against the enclosure from any direction shall have no harmful effects                                                                                                                                                               |
| 5                            | Protected against water jets                                                     | Water projected in jets against the enclosure from any direction shall have no harmful effects                                                                                                                                                      |
| 6                            | Protected against powerful water jets                                            | Water projected in powerful jets against the enclosure from any direction shall have no harmful effects                                                                                                                                             |
| 7                            | Protected against the effects of temporary immersion in water                    | Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time                                                                 |
| 8                            | Protected against the effects of continuous immersion in water                   | Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7 |
| 9                            | Protected against high pressure and temperature water jets.                      | Water protected at high pressure and high temperature against the enclosure from any direction shall not have harmful effects.                                                                                                                      |



But there are many other standards like: SAE J525, ISO 20653, EN 60068-2-18, JIS D203, IEC 60598-1, LV 124, NEMA 250, etc

And the automotive manufacturers themselves have their own particular standards like:

- RENAULT: 31-07-049, 32-10-006, ...
- BMW: GS 95003-4
- VW: TL 825 17,
- etc.

All with similar functions, but with some particular characteristics. That is why it is very important to know the standard that will be used for the manufacture of the chamber.

There is the possibility of being able to combine several standards in a single chamber, consult our technical department.



# How to define a chamber?

In order to define a chamber, it is necessary to know several important points:

1. Size of sample/s to be tested. If the customer has several sample sizes, it will be necessary to know the different sample sizes, since the regulations establish a distance to the spray systems. It will also be important to define the height of the plate.
2. Standards to be tested. It is very important to know the standards that the client wants to use in the chamber, because these standards will indicate if the chamber must have any additional element.
1. IP protection degree. The chambers are normally configured for IPX3 or IPX4 degrees of protection (arc), but it is possible to configure one chamber for several degrees.



DYCOMETAL offers a range of small and large volumes in its standard configuration of rain chambers.

In addition, we have the technical capacity to modify the standard chambers or to make customized chambers, in order to meet different standards according to the customer's needs.

| Model                    | CLL-343                                             | CLL-512 | CLL-729 | CLL-1000 |
|--------------------------|-----------------------------------------------------|---------|---------|----------|
| Internal Dimensions (mm) |                                                     |         |         |          |
| Height                   | 700                                                 | 800     | 800     | 900      |
| Width                    | 700                                                 | 800     | 800     | 900      |
| Depth                    | 700                                                 | 800     | 800     | 900      |
| External Dimensions (mm) |                                                     |         |         |          |
| Height                   | 1.550                                               | 1650    | 1700    | 1800     |
| Width                    | 1.100                                               | 1200    | 1300    | 1400     |
| Depth                    | 800                                                 | 900     | 1000    | 1100     |
| Weight                   | 225                                                 | 275     | 390     | 395      |
| Diameter of the table    | 250                                                 | 250     | 300     | 300      |
| Arc rotation angle       | From 0° to +/-170°                                  |         |         |          |
| Electrical supply        | 400V 3N~PE / 50 Hz (Other frecuencies under demand) |         |         |          |

**CLL – XXXX *e***



**RAIN TEST  
CHAMBER**



**VOLUME**



**SPECIAL**





- Manufactured according [IEC 60529](#).
- Interior made in Stainless steel AISI316.
- Exterior made in stainless steel AISI304.
- Observation window with big dimensions.
- Oscillating test arc made of stainless steel AISI316, for IPX5 and IPX6. Drip box for IPX1 and IPX2 tests like optional.
- Water sprayers spaced according to regulations.
- Rotating test platform with speed adjustment and height adjustment.
- Mechanical pressure seal to ensure the tightness of the door.
- Inner silicone gasket for greater tightness.
- Access port of 50 mm Ø.
- Height adjustable legs (Casters like option).





- Microswitch in door.
- Closed water circuit.
- A digital counter for programmable rain cycles.
- Two timers programmable in time for rain cycles, elapsed time spraying water, elapsed time without spraying.
- A speed tachometer of the rotating test platform, as well as a selector to be able to vary the speed at will.
- A disconnecter or general current switch.
- Start and stop switches for the oscillating arc system.
- Switches for starting and stopping the shower type water spray nozzles (OPTIONAL).
- Push buttons for manual positioning of the rain arc.
- Arc position selector.







## IEC 60529, DRIP BOX (IPX1 & IPX2)

Drip box adapted for IPX1 and IPX2 protection tests.

The dimensions of the drip box will depend on the interior volume of the chamber.

- IPX1: Test duration: 10 min. Drip rate: 1 (+0.5/0) mm/min.
- IPX2: Test duration: 2.5 min. (in each of the 15° positions of the envelope). Dripping flow rate: 3 (+0.5/0) mm/min.





## IEC 60529, JET NOZZLES (IPX5 & IPX6)

It is possible to prepare the chamber for this tests adapting a tunnel on the side, but these tests are performed outside of the chamber, normally.

- IPX5: Test duration: 1 min/m<sup>2</sup> (minimum; 3 min). Water flow: 12,5 l/min (+5 %).
- IPX6: Test duration: 1 min/m<sup>2</sup> (minimum; 3 min). Water flow: 100 l/min (+5 %).



### IEC 60529, IPX6K – MOBILE SYSTEM

Complete mobile system for testing according to IPX6K standard.

The system consists of a tank with a high-pressure pump and a spray system according to standards, supplying a water jet of 75 l/min ( $\pm 5\%$ ), for a minimum of 3 minutes and at a pressure of  $\pm 10000$  kPa.

The distance to the sample should be about 2.5 to 3 meters.

The system includes:

- Stainless steel construction.
- Tank capacity  $\pm 300$  litres.
- High flow and pressure rubber hose, with a maximum of 3 m.
- High pressure and flow pump included.
- Electronic water level: maximum and minimum.
- Water flowmeter.
- Test timer.



## ISO 20653, IPX4K – Splash water with increased pressure

The tests for protection rating 4k are based on a rain arc, but with the modification of a high pressure of approximately 400 kPa in the water spray.

Both the rotational speed of the platen and the arc angles shall be the same as those used for IPX4, except that a pump with higher spray pressure shall be implemented.

The water flow rate shall be 0.6 l/min ( $\pm 5\%$ ).

The test time is 10 minutes.





## IEC 60529, IPX9K

The chambers can be modified to meet the IPX9K degree of protection by placing 4 high-pressure nozzles on the wall of the chamber, positioned at angles of 0°, 30°, 60° and 90° on the turntable.

The sample positioned on a rotating plate moving at a speed of  $5 \pm 1$  r/min, shall be subjected to jets of water at a temperature of  $80^{\circ}\text{C} \pm 5^{\circ}\text{C}$  for a time of 30 seconds for each sprinkler position and a pressure between 8000 to 10000 kPa. The water flow shall be between 14 and 16 l/min.

If the sample to be tested (envelope) is large, the test shall be carried out outside the chamber using a manual system, always ensuring that the surface of the sample is sprayed from practically all directions.



### JIS D0203 (R1, R2, S1 & S2)

The chambers can be manufactured for both IEC 60529 and JIS D0203 or even for both standards in one chamber.

The accessory for the JIS test consists of a motorised system of dual use for the sections of the standard: R1-R2 (Shower test) or for section S1-S2 (Rain test).

The chamber shall have a boom with both spraying systems with a rotation of 23 RPM on the 45° axis.

- Water flow rate for R1: 1.9 l/min, test duration: 10 min.
- Water flow rate for R2: 3,2 l/min, test duration: 10 min.
- Water flow rate for S1-: 24,5 l/min, test duration: 30 min.
- Water flow rate for S2: 39,2 l/min, test duration: 60 min.



### SAE J575

For this test, the chamber shall be equipped with one or more shower-type water sprays, with sufficient angle to cover the sample. The spray angle shall be  $45^{\circ}\text{C} \pm 5$  with respect to the vertical axis of the rotating test platform.

The precipitation rate of the water sprayed on the device must be 2.25 (+1.6/-0) mm/min, measured with a vertical cylindrical collector (NOT INCLUDED IN SUPPLY) centered on the vertical axis of the turntable.

The height of the manifold shall be 100 mm and the minimum inside diameter 140 mm, according to the standard.

The water spray test must last 12 hours.



## CONTROL OF TEMPERATURES INSIDE OF THE CHAMBER

Some rain tightness tests require environmental temperature control (+40°C, +60°C, etc.), during a stage of the tests.

In order to comply with these environmental temperature control conditions, it will be necessary to modify the chamber so that there are heating elements to increase the temperature inside the chamber, as well as to guarantee the homogeneity and uniformity of this temperature.

There are different temperature control systems, so it will be necessary to know the working temperature required by the regulations in order to be able to configure the chamber correctly.





- The passages from the chamber into the laboratory should be checked, as the dimensions of the chamber may exceed some door or corridor dimensions.
- Water feed. The use of water without too many impurities (decalcified and demineralised) is recommended.
- The equipment drains by gravity. The drain must be close to the chamber and no more than 250 mm above the floor.
- In addition, a differential and a thermal protection device must be provided between the power supply and the chamber.
- Consideration should be given to the chamber space as well as a service area for access to the installation and maintenance area.



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## Turn key Solutions



CP-1000e



CP-2600e



CP-1000e



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## Turn key Solutions



CLLesp



CLL-4500



**CLL-11856Me**



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## Turn key Solutions



CLL-10787Me





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