Basic Tests for Cap Lamp Certification

ROOBUCK

IECEx or ANZEx certification is compulsory for miner's cap lamps for all underground coal mines, some underground hard rock mines with explosive gas and some areas on the surface. However, more and more mines that do not have regulatory certification requirements are considering certification for cap lamps for a peace of mind. Certification benefits go beyond explosion-proof. They include assessments and tests, strict safety designs, design information control, quality management surveillance and clear and accessible accountability. The critical reasons for choosing certified cap lamps are the comprehensive tests. This article briefly introduces major tests. The cap lamp is assumed to be certified to intrinsic safety in IECEx standard. Corresponding standards are IEC 60079-0, IEC 60079-11 and IEC 60079-28.

1. Battery Safety Test

Cap lamps contain rechargeable batteries, which are classified as dangerous explosive goods. Since cap lamps are worn on the head, this causes a major concern for safety.

Ten samples are submitted for testing. Any internal short circuit protection in testing samples, such as Positive Temperature Coefficient (PTC) devices, must be removed to create a fault condition. Power is applied to such as unprotected sample directly for various tests.

Acceptance criteria: No explosion and no liquid leaking. Surface temperature is measured and spark ignition is assessed to decide Ex marking.

2. Ingress Protection Test to Enclosure

Minimal IP rating is IP54 for IECEx Group I products and is IP55 in Queensland. However, most cap lamps are designed to IP66 or IP67.

The sample is tested accordance with IEC 60529. Testing details are decided by IP rating. The applicant needs to specify the IP rating in the certificate application. The testing sample is placed in a dust and water environment in the facility or equipment, then the enclosure is opened to check dust and water ingress.

Acceptance criteria: No water or dust within the enclosure.

3. Drop Test

The sample is firstly conditioned in -20˚C environment (normally -27.5˚C for safety margin), unless different ambient temperature is specified by the applicant. The testing sample is dropped from 2m height to concrete ground for 4 times. The point of the sample touching the ground must be the most unfavorable position.

Poor plastic material may become fragile in a low temperature. If you see a certified cap lamp specifying ambient temperature as 0 ~ 40°C, it could be because of enclosure failure in -20°C drop test. Even if you never use the cap lamp in minus degrees, you need to take caution as this is an indication of the mechanical strength of the cap lamp.

Acceptance criteria: No significant damage, such as large cracks or deformation.

4. Electrostatic Charge Test on Plastic Enclosure

Electrostatic charge can build up on the plastic surface. The enclosure must be made from an antistatic discharge material unless it meets surface area conditions.

A special material sample in a certain shape is submitted. The specially designed IECEx test facility measures surface resistance at 50% humidity.

Acceptance criteria: Surface resistance < 1GΩ.

5. Light Radiation Test

When a light is projected on an object, the light energy could be strong, especially for focused light beams. This test ensures the peak point of the light is within the safe energy level.

10 LED samples are tested. Samples are powered in an available voltage or current at fault condition. Power is applied to the LED sample directly step by step, until the LED is burn-out, so the light is off.

Acceptance criteria: less than 5 mW/mm^2.

These fives tests are conducted on every cap lamp. Certification tests are comprehensive. What tests are conducted is dependent on the product and the requested Ex marking. Other common cap lamp tests include spark ignition test, thermal test, thermal endurance test to heat and to cold, chemical resistance test and electronic component test.