



Pushing Performance

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## **The perfect solution – whatever the weather Outdoor tests guarantee reliability of plug connection technology**



***In the field of telecommunications, data connectors and energy connectors are finding increasing use in outside applications. Given the long-term nature of these applications, demands are high in terms of reliability, user-friendliness and ease of servicing. The test series conducted by the HARTING Technology Group ensure that all components are designed and configured perfectly for harsh outdoor environments.***

In modern telecommunication applications like WiMAX, LTE or 3G (third-generation) transmission systems, more and more plug connectors are being used in outdoor areas for data and energy connections. The technology employed covers a wide range of connector types – from the more robust power connectors to fiber optic cables which require special handling techniques. For example, plug connectors are used to create a connection between outside units (RRH Remote Radio Head), which are attached to the tip of a mast, and the base station (Node B). In this particular example, this means that – as well as being utilized for mobile and short-term applications – the connections will need to ensure reliable and fault-free transmissions for periods of more than 15 years – despite the increasing challenging conditions under which the technology is deployed.

In addition, plug connectors for outdoor applications must be easy to assemble and disassemble, without any compromises in terms of availability and reliability, also in continuous operation and under extreme weather conditions. Frost, snow, extreme dampness and moisture (for example during continuous rain), dust, continuous sunshine, heat and dry periods all take their toll on materials, finish and manageability and must be taken into account at the design stage. Operational reliability and ease of servicing define a requirement profile that places the highest demands on the development and design of the plug connectors – particularly because these goals sometimes lead to conflicting sets of requirements. For the development engineers at HARTING, the challenge is to resolve all of these conflicts. It is then up to the HARTING Outdoor Testing department to put the solutions through their paces and make sure that they are both fit for the challenges they are designed for and easy enough to service – before they are used in the field.

The resilient and reliable outdoor solutions are based on the HARTING connector housings with protection ratings IP 65 and IP 67, both of which have been successfully tried and tested in the field. The product family for outdoor telecommunication applications builds on this technology and offers solutions for:

- energy transmission with wire cross-sections of up to 3 x 10 mm<sup>2</sup>;
- data transmission cables based on copper wire, e.g. RJ 45;
- data transmission with fiber optic cables using the standardized LC duplex connector layout;
- hybrid transmission for power and data (based on copper or fiber optic solutions).

Efficient and systematic testing procedures are employed to ensure that all outdoor solutions deliver excellent performance. HARTING solutions are not only developed with a carefully tailored specification, but they also pass through comprehensive and complex test series in which they must demonstrate their suitability for outdoor applications under simulated application conditions.

Here, the Central Laboratory of the HARTING Technology Group (CTS Corporate Technology Service) not only conducts the test series, but also draws up the complex and – at the same time – extreme test requirements. This extensive work to define the tests is necessary because international standardization bodies have so far shied away from defining binding test specifications for plug connectors for outdoor applications. For obvious reasons, a wide range of – at times – very extreme and occasionally conflicting environmental influences need to be taken into account for all the different climate regions on earth. However, the industry cannot just sit back and accept the status quo. The real demands of customers are clear and unambiguous: outdoor applications are needed and must be offered by the industry. This is why HARTING has taken a step ahead and drawn up outdoor tests that realistically integrate all conceivable variables and influencing factors.



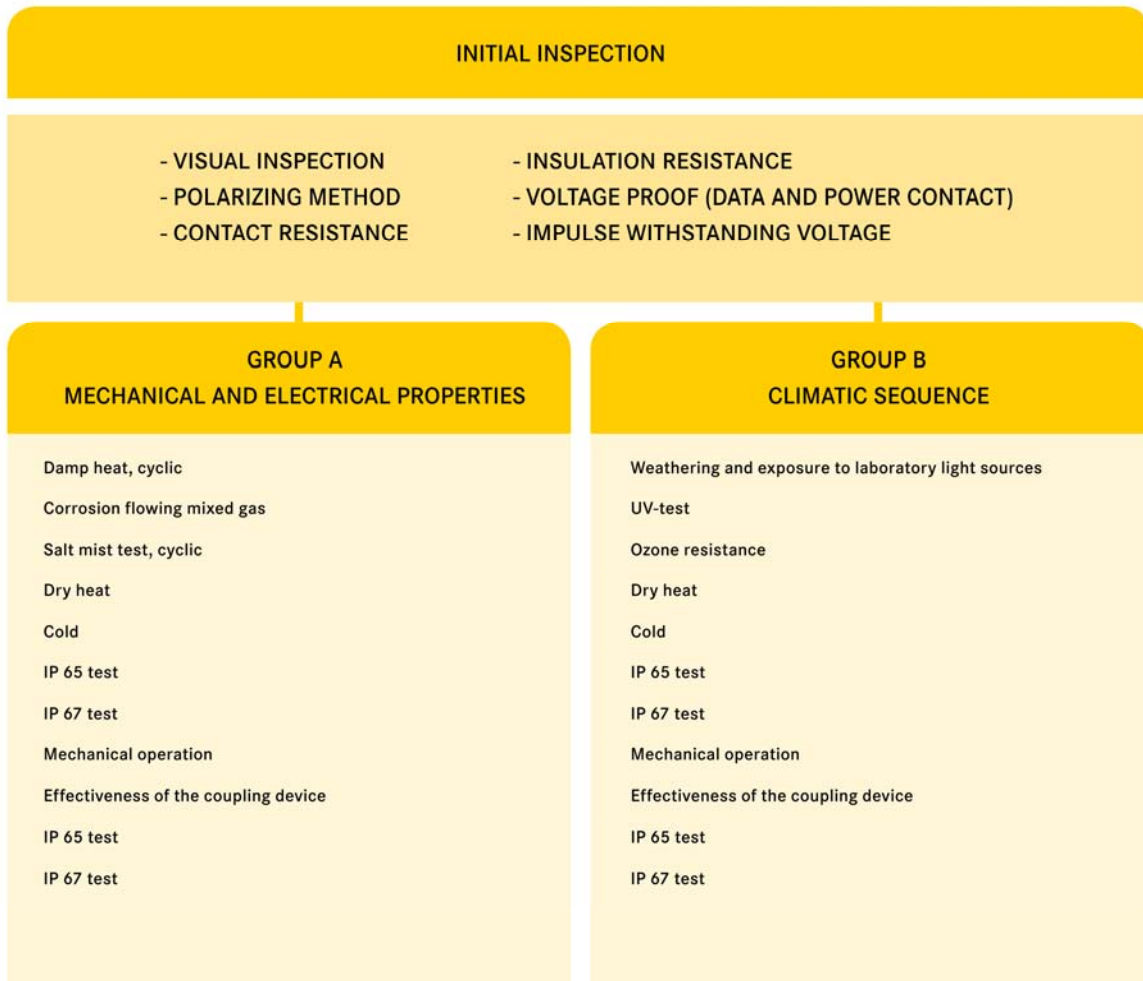
Standard seal – porous after the ozone/UV tests



Special outdoor seal – still in perfect condition after the ozone/UV tests

## The test series in the special laboratory at HARTING

The HARTING test series are made up of mechanical, electrical and climatic tests which are arranged in two test groups.



Overview of HARTING outdoor tests

- In group A – mechanical and electrical testing – series of tests are carried out to examine the influence of cold, heat, corrosion, salt and steam under different load/exposure levels. Here, the functional integrity of the plug connectors must not be affected even under extreme loads.
- The tests carried out in group B examine how the connectors respond to climatic loads, including the effects of weather and resistance to ozone and UV loads. Here again, the key requirement for the test objects is that they do not lose any of their functionality. In addition, the satisfaction of demands derived from the clear definitions of the protection ratings IP 65 and IP 67 is also assured. The picture shows a systematic overview of the outdoor test series. The choice of material for the connector housings plays a key role in ensuring long-term durability in outdoor environments. Depending on the particular application, HARTING housings are available either as plastic (PA polyamide or PC polycarbonate) or metal (coated die-cast zinc or stainless steel) versions. Special attention is also paid to the materials used for the seals and cable glands. Ozone and UV radiation can significantly impair the elastic properties of the sealing materials. For example, numerous materials become so brittle under the effects of extreme exposure to sunlight or other weather influences that they can no longer offer a reliable sealing function. In order to prevent this from happening, suitable materials have to be trialed in extensive test series. The results of these tests have been rigorously applied to the HARTING product portfolio, where they have been used to develop high-performing outdoor solutions.