

Group Standard

**PV 1210**

Issue 2010-02

Class. No.: 50211

Descriptors: corrosion, body, add-on part

## Body and Add-On Parts

### Corrosion Test

#### Previous issues

PV 1210: 1981-08, 2001-05, 2004-09

#### Changes

The following changes have been made as compared to PV 1210: 2004-09:

- Sections 3.1, 3.4 and 3.5 expanded
- Referenced standards updated

## 1 Scope

This Test Specification (PV) is used for corrosion testing in sample and series-production tests conducted on completely painted bodies, body panels, assemblies and components with differing anti-corrosion coatings.

It serves to monitor and evaluate corrosion behavior or corrosion protection measures of these parts when exposed to static load.

## 2 Description

### Corrosion resistance according to PV 1210

Check standard for current issue prior to usage.

This electronically generated standard is authentic and valid without signature.

The English translation is believed to be accurate. In case of discrepancies the German version shall govern.

Numerical notation acc. to ISO practice.

Page 1 of 5

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VWNDRM-2008-121

### 3 Test method

#### 3.1 Principle

The test is conducted using cyclically changing combinations of various climatic and/or corrosive loads.

One test cycle comprises

- 4 h salt spray testing, NSS test procedure according to DIN EN ISO 9227,
- 4 h aging in standard atmosphere ISO 554-23/50,
- 16 h humid aging at elevated temperature, constant humidity (CH) testing atmosphere according to DIN EN ISO 6270-2.

Changing the testing program is entirely impermissible.

After every 5 cycles, a 2-day resting period in standard atmosphere ISO 554-23/50 follows. A test of 15 cycles takes a total of 3 weeks.

This testing method is used to evaluate corrosion behavior under static load resulting from salt, humidity and temperature.

Corrosion creepage on a scribing line can be examined in order to evaluate the adhesion of coatings. The scribe must penetrate through to the metallic base material and must be loaded in vertical position (see DIN EN ISO 17872). The scribe line must be evaluated with regard to loss of adhesion and corrosion according to DIN EN ISO 4628-8.

Under these defined corrosion conditions, different anti-corrosion coatings can be comparatively assessed.

A correlation with the corrosion mechanism in actual driving operation is not necessarily possible, as the types of damage and corrosion curves are complex and are not completely covered and reflected by the static corrosion load.

A brief interruption of the test for inspection purposes and/or to remove devices under test is permissible.

NOTE 1 In particular cases, the 2-day rest periods after every 5 cycles may be omitted. In this case, a test comprising 15 cycles takes 15 days. However, to shorten the test period in this way is only permissible if it is proven that the test result will not be influenced; it is imperative to record this, e.g. "15 cycles according to PV 1210 without rest periods".

#### 3.2 Test equipment

Assemblies, components and test panels can also be tested in stable or alternating atmosphere chambers. These chambers must comply with the specifications of DIN EN ISO 6270-2, DIN EN ISO 9227 and ISO 554.

#### 3.3 Body test

Testing is carried out according to Section 3.1. Examples are given in Section 3.6.

The body may be turned in order to carry out a specific evaluation of cavities.

Before being brought into the salt spray test chamber for the first time, the body, mounted on the pivoting frame, is preconditioned in the ISO 554-23/50 standard atmosphere; it is then moved into the test chamber which is kept at a constant temperature.

### 3.3.1 Salt spray phase

During the test sequence with rotation, the body is turned about its longitudinal axis so that it is in a different position before each salt spray cycle, according to the following sequence: 0°, 45°, 135°, 225° and 315°.

### 3.3.2 Aging in standard atmosphere/humid aging at elevated temperature

During the cooling-off phase and during humid aging at elevated temperature, the body is positioned horizontally.

### 3.3.3 Repeating the test cycles

After humid aging at elevated temperature is completed according to Section 3.1, the body is immediately placed in the salt spray test chamber; it is then turned 90° in a clockwise direction to 45°, 135°, 225° or 315°, according to the test cycle.

### 3.3.4 Storing during the weekend

The rest phase entails storing in ISO 554-23/50 standard atmosphere, with the body in horizontal position and placed either in a suitable garage/hall or in the test chamber.

## 3.4 Component testing

At least 5 parts are required for complete testing.

Cavities are to be made accessible to the salt spray by separating/opening or by altering the as-installed position.

Unprotected trim edges are to be covered before testing.

## 3.5 Evaluation

After 5, 15, 30, 60 and 90 cycles, the DUTs are evaluated with regard to

- Type of corrosion (coating and/or base metal corrosion)
- Form of corrosion (surface or edge corrosion)
- Time of appearance and development of corrosion

as well as with regard to additional changes in the anti-corrosion coatings such as loss of adhesion or blisters.

Organic coatings can be evaluated according to DIN EN ISO 4628-1, Table 3.

The scribing line is evaluated regarding loss of adhesion and corrosion according to DIN EN ISO 4628-8 and regarding filiform corrosion according to DIN EN ISO 4628-10.

Signs of rust creep on painted panels can be examined using a non-destructive thermographic method for quantitative evaluation of the development and spread of defects.

The test is concluded when corrosion grade Ri 5 according to DIN EN ISO 4628-3 or corrosion perforations occur.

The following must be specified in the test report:

- Parts examined: e.g., painted panels
- Corrosion protection measures: e.g., paint finish (coating thickness: 96 µm, measured at the panel center)

- Test: Start/End
- Evaluation:
- Start of base metal corrosion: e.g., after 15 cycles: surface corrosion Ri 2
- Blistering: e.g., after 18 cycles: blistering grade 2 (S4)
- Adhesion loss: e.g., d = 3 mm
- End of testing: e.g., after 30 cycles
- References/notes:

### 3.6 Examples of weekly cycle

#### 3.6.1 Example 1:

In manufacturing operations from 5:30 a.m. to 10:30 p.m., for one salt spray test chamber and four chambers for humid aging at elevated temperature (Table 1), change-over times max. 2 × 15 minutes per test cycle, throughput: eight passenger car bodies.

**Table 1**

Bodies	Salt spray test	Cooling phase	Humid aging at elevated temperature	Weekend aging
A/B	06:00 a.m.-10:00 a.m., Mon-Fri	10:15 a.m.-2:15 p.m., Mon-Fri	2:30 p.m.-5:45 a.m., Mon-Sat	6:00 a.m.-5:45 a.m., Sat-Mon
C/D	10:00 a.m.-2:00 p.m., Mon-Fri	2:15 p.m.-6:15 p.m., Mon-Fri	6:30 p.m.-9:45 a.m., Mon-Sat	10:00 a.m.-9:45 a.m., Sat-Mon
E/F	2:00 p.m.-6:00 p.m., Mon-Fri	6:15 p.m.-10:15 p.m., Mon-Fri	10:30 p.m.-1:45 p.m., Mon-Sat	2:00 p.m.-1:45 p.m., Sat-Mon
G/H	6:00 p.m.-10:00 p.m., Mon-Fri	10:15 p.m.-2:15 a.m., Mon-Fri	2:30 a.m.-5:45 p.m., Mon-Sat	6:00 p.m.-5:45 p.m., Sat-Mon

#### 3.6.2 Example 2:

In normal shift, for one salt spray test chamber and two chambers for humid aging at elevated temperature, throughput: four passenger-car bodies (Table 2)

**Table 2**

Bodies	Salt spray test	Cooling phase	Humid aging at elevated temperature	Weekend aging
A/B	08:00 a.m.-12:00 p.m., Mon-Fri	12:15 p.m.-4:15 p.m., Mon-Fri	4:30 p.m.-7:45 a.m., Mon-Sat	8:00 a.m.-7:45 a.m., Sat-Mon
C/D	12:30 p.m.-4:30 p.m., Mon-Fri	4:30 p.m.-8:30 p.m., Mon-Fri	8:30 p.m.-11:45 a.m., Mon-Sat	12:00 p.m.-11:45 a.m., Sat-Mon

## 4 Referenced documents

The following documents cited in this standard are necessary for application.

In this Section terminological inconsistencies may occur as the original titles are used.

Standards with the titles given in German are either only available in German or may be procured in other languages from the institution issuing the standard.

DIN EN ISO 17872	Paints and varnishes - Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing
DIN EN ISO 4628-1	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system
DIN EN ISO 4628-10	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 10: Assessment of degree of filiform corrosion
DIN EN ISO 4628-3	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting
DIN EN ISO 4628-8	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 8: Assessment of degree of delamination and corrosion around a scribe
DIN EN ISO 6270-2	Paints and varnishes - Determination of resistance to humidity - Part 2: Procedure for exposing test specimens in condensation-water atmospheres
DIN EN ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests
ISO 554	Standard atmospheres for conditioning and/or testing; Specifications