

KorroPad - Procedure description

Mode of action

The corrosion protection of stainless steels is based on the formation of a thin, only a few atomic layers thick chromium oxide layer, the so-called passive layer, which protects the metal against further corrosion. Areas with disturbed or incompletely formed passive layer are prone to unwanted corrosion reactions. During such corrosion processes iron ions are dissolved. The KorroPad indicator test enables the iron ions leaving the metal to be detected. KorroPad consists of a test pad with indicator solution containing an activator and by means of a binding agent it is kept in a gel-like condition. The KorroPad simulates a moisture film at the surface of the test object and maintains a defined corrosion system. At areas with disturbed passive layer the passage of iron ions is indicated by a colour change to blue (Fig. 1).

Attention: Also tramp iron impurities - as long as they are not completely oxidized - lead to a colour change.

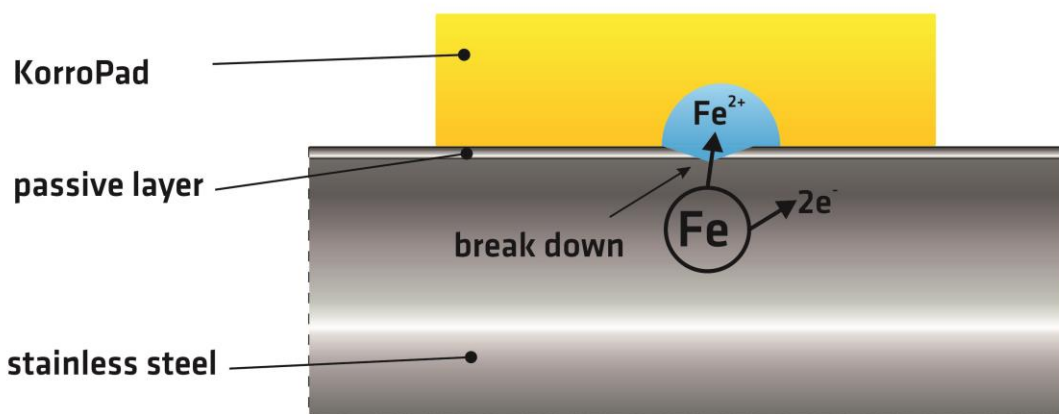


Fig. 1: Schematic diagram of KorroPad; signal with disturbed passive layer

Application

The KorroPad method is suitable for comparative examination of the corrosion resistance of surfaces made of stainless steel. The test method mainly acts surface-specific and is thus suitable for common stainless steels. For lower-alloyed steels (e.g. 1.4003) an adaption of the KorroPad composition is necessary.

The KorroPad method can be used in the temperature range +5 to +50 °C. Best comparable results are achieved at temperature +20 °C ±5.

Testing times are normally 15 minutes but can be adapted if necessary. For comparative tests, the test period should be kept constant.

The test method can be employed for optimization of surface treatment processes as well as for incoming and outgoing goods inspection.

Test instruction

The surface to be tested must be free of grease and oil, metallicly bright and without contaminations. Before the test the surfaces must be cleaned and degreased properly.

After mechanical surface treatment a moist storage of the test surface is necessary before the KorroPad test. The moist storage promotes the formation of a stable passive layer at the stainless steel surface.

A test consists of at least 3 individual tests. **Before testing the KorroPads has to be pretempered to ambient temperature.** The following cycle is recommended:

1. Carefully remove KorroPad packaging unit from the package and remove the carrier foil. Keep carrier foil
2. Lift KorroPads individually with a plastic spatula
3. Apply KorroPad onto the test surface and slightly press down
4. Carefully squeeze air bubbles out
5. Observe KorroPad and lift it with a plastic spatula after 15 minutes
6. Put back the KorroPad between the carrier foils to protect against external influences
7. Scanning of the KorroPad's test side with high-resolution for documentation purposes
8. Cleaning of the test surface with water and detergent after the KorroPad test

Documentation of the following parameters is recommended:

1. Time period between surface treatment and test (if applicable duration of moist storage)
2. Air temperature
3. Temperature of test surface
4. Test time
5. Time of first corrosion indication
6. Digital picture of the KorroPads

Evaluation of results

The KorroPad is configured in that way that it does not indicate a colour change on stainless steel surfaces with a well-formed passive layer. For test results without corrosion indication it can certainly be assumed that the passive layer has been optimally formed.

Single, especially small indications do not necessarily denote general corrosion susceptibility but could occur statistically at technical surfaces. In this case a closer look at all 3 comparative pads is recommended and if necessary further 3 pads have to be applied elsewhere of the test object and assessed.

Numerous, especially larger indications denote local disturbances of the passive layer. In this case specific actions for surface improvement should be performed.

The KorroPad test method is a comparative test. Based on the KorroPad indications surface requirements can be derived for practical use. A guideline is given in Fig. 2. If necessary, the basis, i.e. the criterion for a good/bad evaluation, has to be adapted for different problems.

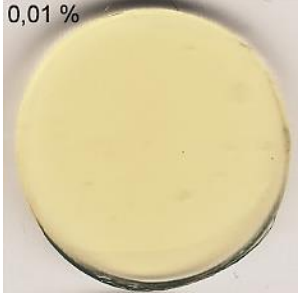

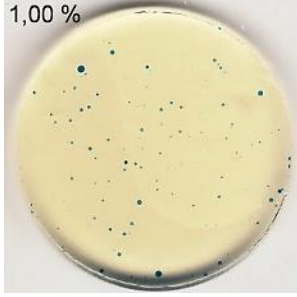

Surface requirements			
High requirements	Medium requirements	Low/without requirements	Proceeding pitting corrosion is possible
0,01 % 	0,10 % 	1,00 % 	10,00 % 

Fig. 2: Exemplary indications after KorroPad testing and resulting requirements on the corrosion resistance of surfaces

Durability

The binding agent used for KorroPads is a culture medium and in case of contamination or improper use it can lead to colonization with fungi and bacteria. It is important to ensure that the KorroPads are permanently stored at temperatures between +5 and +8 °C. The KorroPads are packed in packaging units of 10 items. Opened packages should be used in the short term to prevent colonization.

A “best use before” date is printed on the packaging box until which the KorroPads keep their usability with adequate storage and handling. Should the KorroPads exhibit the normal consistency after that date testing is also possible.