

Evaluation of the Corrosion Protection of Coating Systems According to DIN EN ISO 12944 Part 6 : 1998

Many corrosion protection standards and regulations refer to DIN EN ISO 12944, which is why this standard is now also used for industrial goods made from steel with a thickness of <3 mm. In short, this means that not all parts of the standard can be used. In general, only the classification of atmospheric environments into 6 corrosivity categories (DIN EN ISO 12944 Part 2) and laboratory tests established for each corrosivity category (DIN EN ISO 12944 Part 6) are applicable. The other parts of DIN EN ISO 12944 should be taken into account as far as is reasonable.

The information below refers to the DIN EN ISO 12944 : 1998

Industrial steel goods are usually fully automatically manufactured and mass-produced, which is why it is both possible and necessary to define and implement a standardised pre-treatment and coating process. Most pre-treatment methods and coating systems that are used are not described in DIN EN ISO 12944, but have excellent corrosion protection properties. The various coating structures which were tested and evaluated in accordance with DIN EN ISO 12944-6 : (1998) can be viewed in the corrosion protection database <https://portal.freilacke.de/de/corrosionprotection>.

FreiLacke has therefore tested the coating systems of various product groups with standard pretreatments according to the established laboratory tests of DIN EN ISO 12944 Part 6. The coating systems were then classified into corrosivity categories for atmospheric environments according to their protective effect pursuant to DIN EN ISO 12944 Part 2.

It should be noted that the specified corrosion protection category was devised using test sheets that were produced under laboratory conditions, so results may differ from practice as a result. This factor is influenced by the quality and continuity of pre-treatment, the application and curing conditions and the substrate itself, which means that it must therefore be checked again when customer enquiries are made.

The classification of layered structures as belonging to the corrosion protection category is only a consultation aid, as different industrial goods meet different corrosion protection requirements and other requirements usually must be taken into account as well.

We would be happy to arrange a personal consultation.

You can find your contact partner at <http://www.freilacke.com/kontakt/international/>.

Test criteria

The duration of the respective test is given in the following tables.

Test methods for coating systems on steel¹

Category acc. to ISO 12944-2	Durability	ISO 2812-1 Exposure to chemicals h	ISO 2812-2 Immersion in water h	ISO 6270 Condensation of water vapour h	ISO 9227 NSS Exposure to neutral salt spray h
C2	short	-	-	48	-
	medium	-	-	48	-
	long	-	-	120	-
C3	short	-	-	48	120
	medium	-	-	120	240
	long	-	-	240	480
C4	short	-	-	120	240
	medium	-	-	240	480
	long	-	-	480	720
C5-I	short	168	-	240	480
	medium	168	-	480	720
	long	168	-	720	1440
C5-M	short	-	-	240	480
	medium	-	-	480	720
	long	-	-	720	1440
Im1	short	-	-	-	-
	medium	-	2000	720	-
	long	-	3000	1440	-
Im2	short	-	-	-	-
	medium	-	2000	-	720
	long	-	3000	-	1440
Im3	short	-	-	-	-
	medium	-	2000	-	720
	long	-	3000	-	1440

Test of the adhesive strength of coating systems on galvanised steel¹

Corrosivity category acc. to ISO 12944-2	Durability	ISO 6270 Condensation of water vapour h
C2	short	240
	medium	240
	long	240
C3	short	240
	medium	240
	long	240
C4	short	240
	medium	240
	long	480
C5-I	short	240
	medium	480
	long	720
C5-M	short	240
	medium	480
	long	720

All tests are carried out in triplicate. Two of the three samples must comply with the requirements.

¹ DIN EN ISO 12944 Teil 6

Before each test, the adhesion of the samples must be evaluated as follows:

Adhesion test before the start of corrosion protection tests¹

Standard and type of test		Class	Evaluation time point after the test	Comment
DIN EN ISO 2409 or DIN EN ISO 4624	Cross-cut test or Pull-off test	Gt 1 or >5 MPa	After conditioning in a standard climate	For DCT >250 µm, the adhesion is evaluated using a pull-off test

The general evaluation criteria after the corrosion protection tests are as follows:

General evaluation criteria after the corrosion protection tests¹

Standard and type of test		Class	Evaluation time point after the test	Comment
DIN EN ISO 4628-2	Degree of blistering	0(S0)	immediately	
DIN EN ISO 4628-3	Degree of rusting	Ri 0	immediately	
DIN EN ISO 4628-4	Degree of cracking	0(S0)	immediately	
DIN EN ISO 4628-5	Degree of flaking	0(S0)	immediately	
DIN EN ISO 2409 or DIN EN ISO 4624	Cross-cut test or Pull-off test	Gt 1 or >5 MPa	conditioning for 24 h in a standard climate	For DCT >250 µm, the adhesion is evaluated using a pull-off test

In addition, before the neutral salt spray test (DIN EN ISO 9227 NSS) is carried out, the coating is artificially damaged by scratching it with a scribe stylus so that it penetrates to the substrate. This can be positioned horizontally, vertically or diagonally and must be at least 50 mm long and at least 20 mm away from any edge.

The standard DIN EN ISO 12944 specifies the invalid standard ISO 7253 to evaluate corrosion at the scribe. Therefore, FreiLacke evaluates corrosion at the scribe using DIN EN ISO 4628 Part 8. This standard also includes an evaluation of coating delamination. The result must be given in the test report. Because DIN EN ISO 12944 Part 6 does not specify a value for delamination, FreiLacke has specified a maximum value of 10 mm for the permissible delamination.

Evaluation of corrosion and delamination at the scribe after the tests²

Standard and type of test		Class	Evaluation time point after the test	Comment
DIN EN ISO 4628 Part 8	Corrosion at the scribe and Delamination at the scribe	max. 1 mm and max. 10 mm	immediately and 1 h (see ISO 9227)	

¹ DIN EN ISO 12944 Teil 6

² DIN EN ISO 4628

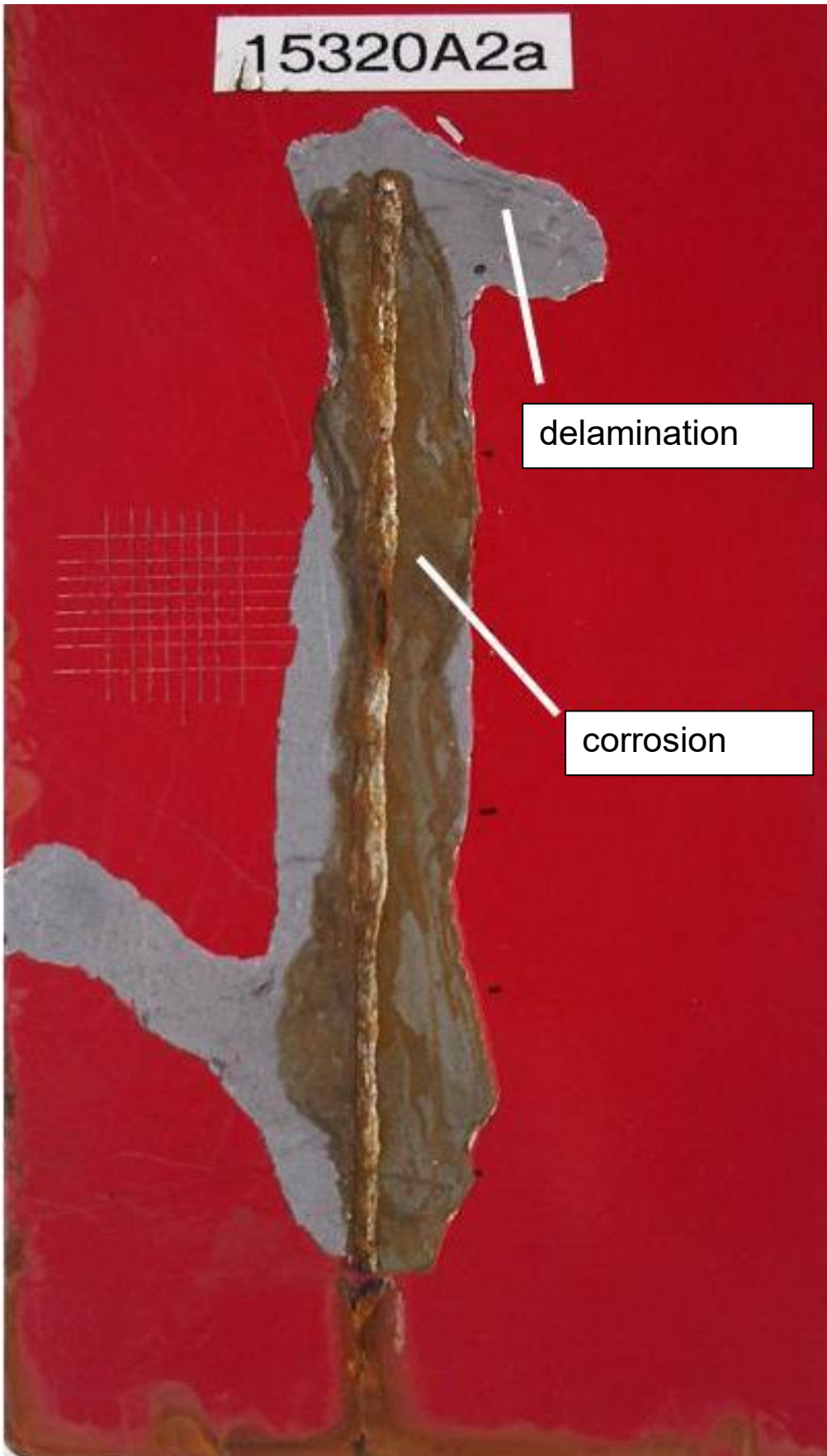


Figure 13: Example of corrosion and delamination