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Paints and varnishes — Corrosion protection of steel structures by protective paint systems —

Part 5:
Protective paint systems

Peintures et vernis — Anticorrosion des structures en acier par systèmes de peinture —

Partie 5: Systèmes de peinture

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISO 12944-5 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-committee SC 14, *Protective paint systems for steel structures.*

ISO 12944 consists of the following parts under the general title *Paints and varnishes - Corrosion protection of steel structures by protective paint systems:*

- *Part 1: General introduction*
- *Part 2: Classification of environments*
- *Part 3: Design considerations*
- *Part 4: Types of surface and surface preparation*
- *Part 5: Protective paint systems*
- *Part 6: Laboratory performance test methods*
- *Part 7: Execution and supervision of paint work*
- *Part 8: Development of specifications for new work and maintenance*

Annexes A to C of this part of ISO 12944 are for information only.

INTRODUCTION

Unprotected steel in the atmosphere, in water and in soil is subjected to corrosion that may lead to damage. Therefore, to avoid corrosion damage, steel structures are normally protected to withstand the corrosion stresses during the service life required of the structure.

There are different ways of protecting steel structures from corrosion. ISO 12944 deals with protection by paint systems and covers, in the various parts, all features that are important in achieving adequate corrosion protection. Additional or other measures are possible but require particular agreement between the interested parties.

In order to ensure effective corrosion protection of steel structures, it is necessary for owners of such structures, planners, consultants, companies carrying out corrosion protection work, inspectors of protective coatings and manufacturers of coating materials to have at their disposal state-of-the-art information in concise form on corrosion protection by paint systems. Such information has to be as complete as possible, unambiguous and easily understandable to avoid difficulties and misunderstandings between the parties concerned with the practical implementation of protection work.

This International Standard - ISO 12944 - is intended to give this information in the form of a series of instructions. It is written for those who have some technical knowledge. It is also assumed that the user of ISO 12944 is familiar with other relevant International Standards, in particular those dealing with surface preparation, as well as relevant national regulations.

Although ISO 12944 does not deal with financial and contractual questions, attention is drawn to the fact that, because of the considerable implications of inadequate corrosion protection, non-compliance with requirements and recommendations given in this standard may result in serious financial consequences.

ISO 12944-1 defines the overall scope of all parts of ISO 12944. It gives some basic terms and definitions and a general introduction to the other parts of ISO 12944. Furthermore, it includes a general statement on health, safety and environmental protection, and guidelines for using ISO 12944 for a given project.

This part of ISO 12944 gives some terms and definitions related to paint systems in combination with guidance for the selection of different types of protective paint system.

Paints and varnishes — Corrosion protection of steel structures by protective paint systems —

Part 5:
Protective paint systems

1 SCOPE

This part of ISO 12944 describes the types of paint and paint system commonly used for corrosion protection of steel structures. It also provides guidance for the selection of paint systems available for different environments (see ISO 12944-2), surface preparation grades (see ISO 12944-4) and durabilities to be expected (see ISO 12944-1). The durability of paint systems is classified in terms of low, medium and high.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 12944. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 12944 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2808:1997 *Paints and varnishes - Determination of film thickness.*

ISO 3549:1995 *Zinc dust pigments for paints - Specifications and test methods.*

ISO 4628-1:1982 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 1: General principles and rating schemes.*

ISO 4628-2:1982 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 2: Designation of degree of blistering.*

ISO 4628-3:1982 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 3: Designation of degree of rusting.*

ISO 4628-4:1982 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 4: Designation of degree of cracking.*

ISO 4628-5:1982 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 5: Designation of degree of flaking.*

ISO 4628-6:1990 *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 6: Rating of degree of chalking by tape method.*

ISO 8501-1:1988 *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.*

ISO 8503-2:1988 *Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 2: Method for the grading of surface profile of abrasive blast-cleaned steel - Comparator procedure.*

ISO 12944-1:1998 *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 1: General introduction.*

ISO 12944-2:1998 *Paints and varnishes - Corrosion protection of steel structures by protective paints systems - Part 2: Classification of environments.*

ISO 12944-4:1998 *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 4: Types of surface and surface preparation.*

ISO 12944-6:1998 *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods.*

3 DEFINITIONS

This clause covers those expressions which are used in this part of ISO 12944 and not covered by ISO 12944-1.

3.1 High-build

The property of a coating material which permits the application of a coat of greater thickness than usually considered as normal for that type of coating. For the purposes of this part of ISO 12944, this means ≥80 µm dry film thickness.

3.2 High-solid

A term used to describe paint materials with a greater than normal volume of solids.

3.3 Compatibility

(I) of products in a paint system:
The ability of two or more products to be used in a paint system without causing undesirable effects.

(II) of a product with the substrate:
The ability of a product to be applied to a substrate without causing undesirable effects.

3.4 Priming coat(s)

The first coat(s) of a paint system, obtained by application of a primer.

Priming coats provide good adhesion to sufficiently roughened, cleaned metal and/or cleaned old coating, ensuring a sound base for and offering adhesion to the subsequent coats. They normally also provide corrosion protection during the overcoating interval and the whole service life of the paint system.

3.5 Intermediate coat(s)

Coat(s) between priming and top coat(s).

NOTE 1 In the English language, the term "undercoat" is sometimes used synonymously, normally for a coat applied directly before the top coat(s).

3.6 Top coat(s)

The last coat(s) of a paint system, designed to protect the coats beneath from the environment, to contribute to the overall corrosion protection offered by the system and to give the requisite colour.

3.7 Tie coat

A coat designed to improve intercoat adhesion and/or avoid certain defects during application.

3.8 Stripe coat

A supplementary coat applied to ensure adequate protection of critical areas like edges, welds etc.

3.9 Dry film thickness (DFT)

The thickness of a coating remaining on the surface when the coating has hardened.

3.10 Nominal dry film thickness (NDFT)

The dry film thickness specified for each coat or for the whole paint system to achieve the required durability.

3.11 Maximum dry film thickness

The highest acceptable dry film thickness above which the performance of the paint or the paint system may be impaired.

3.12 Primer

A paint that has been formulated for use as a priming coat on prepared surfaces, commonly under subsequent coats.

3.13 Pre-fabrication primer

A fast-drying paint that is applied to the blast-cleaned steel of a structure to protect the steel during fabrication while still allowing the steel to be welded.

NOTE 2 In many languages, the term pre-fabrication primer does not have the same meaning as in English.

3.14 Pot life

The maximum time during which a coating material supplied as separate components should be used after they have been mixed together.

3.15 Shelf life

The time during which a coating material will remain in good condition when stored in its original sealed containers under normal storage conditions.

NOTE 3 The expression "normal storage conditions" is usually understood to mean storage between +3 °C and +30 °C.

3.16 VOC (volatile organic compound)

Fundamentally, any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact.

As to current usage of the term VOC in the field of coating materials see 3.17.

3.17 VOC content (volatile organic compound content/VOCC)

The mass of the volatile organic compounds present in a coating material, as determined under specified conditions.

NOTE 4 The exact interpretation of the word "volatile" will depend on the sphere of application of the coating material and the conditions at the place of application. For each sphere of application, the limiting values of the VOC content and the methods of determination or calculation are stipulated by regulations or by agreements.

4 TYPES OF PAINT

The following generic types of paint are widely used in paint systems for the protection of steel structures against corrosion. Typical binders for these paints are mentioned in the following sub-clauses. Many other modifications or combinations of them will also be possible.

NOTE 5 The information given hereafter concerns only the chemical and physical properties of paints and not the way they are used. The limits given for drying and curing temperatures are indicative only. Variations can be expected for each type of paint depending on its formulation.

4.1 Air drying paints

The film hardens by evaporation of organic solvents or water followed by reaction of the binder with oxygen in the air.

Typical binders are:

– alkyd;
– urethane alkyd;
– epoxy ester.

The drying time will depend, among other things, on the temperature. The reaction with oxygen can take place down to 0 °C, although at low temperatures it is much slower.

4.2 Physically drying paints

Formulations of these paints can be solvent-borne or water-borne.

4.2.1 Solvent-borne paints

The film dries by evaporation of the solvents. The process is reversible, i.e. the dry film remains soluble in its original solvents.

Typical binders are:

– chlorinated rubber;
– vinyl chloride copolymers (also known as PVC);
– acrylic resins;
– bitumen.

The drying time will depend, among other things, on air movement and temperature. Drying can take place down to 0 °C, although at low temperatures it is much slower.

4.2.2 Water-borne paints

In these paints the binder is dispersed in water.

The film hardens by evaporation of water and film-forming (coalescence) of the dispersed binder.

The process is not reversible, i.e. this type of coating is not redispersible in water after drying.

Typical binders are:

– acrylic dispersions;
– vinyl dispersions;
– polyurethane dispersions.

The drying time will depend, among other things, on air movement, relative humidity and temperature. Drying can take place down to +3 °C, although at low temperatures it is much slower.

4.3 Chemically curing paints

In general, this type of paint consists of a base component and a curing agent component.

The paint film cures by evaporation of solvents, if present, and subsequent chemical reaction between the base and the curing agent component.

The types given in 4.3.1, 4.3.2 and 4.3.3 are in use.

4.3.1 Epoxy 2-pack paints

Base component

The binders in the base component are polymers having epoxy groups which react with suitable curing agents.

Typical binders are:

– epoxy;
– epoxy vinyl/epoxy acrylic;
– epoxy combinations (e.g. epoxy hydrocarbon resins or epoxy coal tar).

Formulations can be solvent-borne, water-borne or solvent-free.

Epoxies chalk when exposed to sunlight. If colour or gloss retention is required, the top coat should be an aliphatic polyurethane (4.3.2) or a suitable physically drying type (4.2).

Curing agent component

Polyaminoamines (polyamines), polyaminoamides (polyamides) or adducts of these are most commonly used.

Polyamides are more suitable for primers because of their good wetting properties. Polyamines lead to coatings which are generally more resistant to chemicals.

Curing does not require exposure to air. The drying time will depend amongst other things on air movement and on the temperature. The curing reaction can take place down to +5 °C.

4.3.2 Polyurethane 2-pack paints

Base component

The binders are polymers with free hydroxyl groups which react with suitable curing agents.

Formulations can be solvent-borne or solvent-free.

Typical binders are:

– polyester;
– acrylate;
– epoxy;
– polyether;
– fluoro resin.

Curing agent component

Aromatic or aliphatic polyisocyanates are most commonly used.

Aliphatic-polyisocyanate-cured products have excellent gloss-retention and colour-retention properties if combined with a suitable base component.

Aromatic-polyisocyanate-curing agents give faster drying but are less suitable for exterior exposure, tending to chalk and discolour more rapidly.

Curing does not require exposure to air. However, the drying time will depend, among other things, on air movement and temperature. The curing reaction can take place down to 0 °C, or lower, but the relative humidity should preferably be kept within the paint manufacturer's recommended range to ensure coatings free from bubbling and pinholing.

4.3.3 Moisture curing paints

The film dries by solvent evaporation. It cures chemically by reacting with moisture from the air.

Typical types are:

- polyurethane (1-pack);
- alkyl silicate, e.g.
- ethyl silicate (2-pack);
- ethyl silicate (1-pack).

The drying time will depend, amongst other things, on the temperature, the air movement, the humidity and the film thickness. The curing reaction can take place down to 0 °C, or lower, provided that the air still contains moisture. The lower the relative humidity, the slower the curing.

It is important that manufacturers instructions regarding the limits for moisture, relative humidity and wet and dry film thickness are complied with in order to avoid bubbling, pinholing, detachment etc. in the coating.

4.4 General properties of different generic types of paint

Further information is given in annex C. This informative annex is intended only as an aid to selection, but if it is used it shall be used in combination with the tables in annex A, manufacturers published data and information from previous projects.

5 PAINT SYSTEMS

5.1 Classification of environments and surfaces to be painted

5.1.1 Classification of environments

In accordance with ISO 12944-2 the environment is divided into the following categories:

Six atmospheric corrosivity categories
- C1 very low
- C2 low
- C3 medium
- C4 high
- C5-I very high (industrial)
- C5-M very high (marine)

Three categories for water and soil
- Im1 immersion in fresh water
- Im2 immersion in sea or brackish water
- Im3 buried in soil

5.1.2 Surfaces to be painted

5.1.2.1 New structures

The paint systems listed in annex A are related to surface preparation grades Sa 2½ and St 2. For steel surfaces prepared to St 2, rust grade C as defined in ISO 8501-1 is the reference grade. The roughness of a surface is generally expressed as the height of the major peaks relative to the major valleys. A method for grading the surface profile of abrasive blast-cleaned steel is described in ISO 8503-2.

The paint systems listed in annex A are typical examples of systems used in the environments defined in ISO 12944-2. No corrosion protection is required for items in corrosion category C1. If painting is necessary for aesthetic reasons, the systems in table A.2 (corrosion category C2) may be used.

The mechanical or chemical surface treatment required for hot-dip-galvanized surfaces is described in ISO 12944-4.

5.1.2.2 Maintenance

For maintenance of previously coated surfaces, the condition of the existing coating and the surfaces shall be checked using suitable methods, e.g. ISO 4628, to determine whether partial or complete repainting should be carried out. The type of surface preparation and protective paint system shall then be specified. The paint manufacturer should be consulted for recommendations. Test areas may be prepared to check the manufacturer's recommendations.

5.2 Type of primer

Tables A.1 to A.9 in annex A give information on the type of primer to be used, and indicate whether the primer is zinc-rich or based on other pigments. For zinc-rich primers, the minimum zinc dust pigment content of the non-volatile portion of the paint shall be 80 % by mass (m/m), both for organic and inorganic binders. This figure is the basis for the durabilities given for the paint systems with zinc-rich primers in tables A.1 to A.8. The zinc dust pigment shall comply with the requirements specified in ISO 3549.

NOTE 6 A method for the determination of the zinc dust pigment content of the non-volatile portion of paints is described in ASTM D 2371-85, *Standard Test Method for Pigment Content of Solvent-Reducible Paints*.

NOTE 7 Some countries have national standards with a minimum content higher than 80 % by mass (m/m). A higher zinc dust pigment content generally improves the durability of paint systems.

5.3 Low-VOC paint systems

The examples listed in annex A include paint systems with a low VOC content designed to meet requirements for low emission of solvents.

For each corrosivity category one or two separate tables indicate whether the paints for the paint systems listed are available as water-borne materials, or as a 1-pack or 2-pack. Several of the paint systems listed can include either high-solids or water-borne paints for both the primer and the top coating materials, or a combination of high-solids and water-borne paints.

5.4 Dry film thickness

Definitions of dry film thickness (DFT) and nominal dry film thickness (NDFT) are given in clause 3.

Film thicknesses indicated in the tables in annex A are nominal dry film thicknesses. Dry film thicknesses are generally checked on the complete paint system. Where judged appropriate, the dry film thickness of the priming coat or of other parts of the paint system may be measured separately. Depending on the instrument calibration, measurement method and film thickness, the roughness of the steel surface will have a different degree of influence on the measurement result.

Methods for the measurement of film thickness are described in ISO 2808. The procedure for checking nominal dry film thicknesses (instruments, calibration, and any allowance to be made for the contribution of the surface roughness to the result) shall be agreed between the interested parties.

Unless agreed otherwise, individual dry film thicknesses of less than 80 % of the nominal dry film thickness are not acceptable. Unless agreed otherwise individual values between 80 % and 100 % of the nominal dry film thickness are acceptable provided that the overall average (mean) is equal to or greater than the nominal dry film thickness.

Care shall be taken to achieve the nominal dry film thickness and to avoid areas of excessive thickness. It is recommended that the maximum dry film thickness is not greater than 3 times the nominal film thickness. In the case of excessive maximum dry film thickness, expert agreement shall be found between the parties. For products or systems which have a critical maximum dry film thickness or, in special cases, information given in the paint manufacturer's technical data sheet shall be observed.

The number of coats and the dry film thicknesses quoted in annex A are based on the use of airless spray application. Application by roller, brush or conventional spraying equipment will produce lower film thicknesses, and more coats will be needed to produce the same dry film thickness for the system. Consult the manufacturer for more information.

5.5 Durability

Definitions of both durability and durability ranges are given in ISO 12944-1.

The durability of a protective paint system depends on several parameters, such as:

- the type of paint system;
- the design of the structure;
- the condition of the substrate before preparation;
- the effectiveness of the surface preparation;
- the standard of the application work;
- the conditions during application;
- the exposure conditions after application.

The condition of the paint system applied can be assessed by means of ISO 4628-1 to ISO 4628-6. It has been assumed in compiling the tables in annex A that the first major maintenance painting would normally need to be carried out for reasons of corrosion protection once the coating has reached the level Ri 3 as defined in ISO 4628-3.

Based on this precondition, durability has been indicated in this part of ISO 12944 in terms of three ranges:

low (L)	2 to 5 years
medium (M)	5 to 15 years
high (H)	more than 15 years

The durability range is not a "guarantee time". Durability is a technical consideration that can help the owner set up a maintenance programme. A guarantee time is a consideration that is the legal subject of clauses in the administrative part of the contract. The guarantee time is usually shorter than the durability range. There are no rules that link the two periods of time.

Maintenance is often required at more frequent intervals because of fading, chalking, contamination or wear and tear, or for aesthetic or other reasons.

5.6 Shop and site application

To ensure maximum performance of a paint system, the majority of the coats of the system or, if possible, the complete system, should preferably be applied in the shop. The advantages and disadvantages of shop application are as follows:

Advantages

a) Better control of application
b) Controlled temperature
c) Controlled relative humidity
d) Easier repair of damage
e) Greater output
f) Better waste and pollution control

Disadvantages

a) Possible limitation of the size of the building components
b) Damage due to handling, transport and erection
c) Overcoating time can be exceeded
d) Possible contamination of the last coat

After completion of fabrication on site, any damage shall be touched up and the complete structure can then be coated with the final coat of the paint system.

Site application of the coating system will be strongly influenced by the daily weather conditions which will also have a certain influence on the expected lifetime.

If preloaded bearing type connections are to be painted, paint systems shall be used which do not lead to an unacceptable decrease in the preloading force. The paint systems selected and/or the precautions taken for such connections will depend on the type of structure and on subsequent handling, assembly and transportation.

5.7 Tables for paint systems

The tables given in annex A give examples of paint systems for several environments. The paints used for all these systems shall be suitable for the highest corrosion stress of the given corrosivity or immersion category. The specifier shall have access to documentation, or a statement from the paint manufacturer, confirming the suitability or the durability of a paint system in a given corrosivity or immersion category. If required, the suitability or durability of the paint system shall be demonstrated by experience and/or artificial-ageing tests in accordance with ISO 12944-6 or as otherwise agreed.

For paint systems based on new products or when no experience has been obtained with a particular system, the paint system shall be tested at least in accordance with ISO 12944-6 and meet the requirements given.

The paint systems have been listed in the tables using two different principles:

a) In tables A.1, A.5 and A.9, which list systems for more than one corrosivity category (table A.1 and A.5 are referred to in the following as "summarizing tables"), the systems have been arranged according to the binder used in the top coat. This arrangement is more convenient when the performance properties of the top coat are to be taken as the basis for the system selection, and for comparison of the overall durability of paint systems for more than one corrosivity category when the corrosivity category is not known exactly.

b) In tables A.2, A.3, A.4, A.6, A.7 and A.8, which list systems for one corrosivity category only (referred to in the following as "individual tables"), the systems have been arranged according to the binder used in the priming coat. This arrangement is convenient for users who know exactly the corrosivity category of the environment to which their structure is exposed.

NOTE†8 The paint systems listed have been chosen taking into account systems used as "typical systems" in several countries. This has necessarily led to some systems being listed which are not typical in other countries. It has been concluded, however, that a simple overview cannot be given, nor can all options be covered.

NOTE 9 In several cases, systems have been included with more coats but no increase in expected durability. The application of more coats may be necessary, and will be cost-efficient in particular cases (see also ISO 12944-1, sub-clause 4.3).

If a specifier intends to make use of the paint systems listed in the tables, he should first decide whether he will use paint systems from summarizing tables or from individual tables because the system numbering is different in the two types of table.

All examples of paint systems for corrosivity categories C2, C3 and C4 are given in table A.1. Tables A.2, A.3 and A.4 show separately the same paint systems for each of these corrosivity categories. A paint system is not shown in table A.2 if it is shown as having a durability classification "high" in table A.3. Likewise, a paint system is not shown in table A.2 or A.3 if shown as "high" in table A.4.

5.8 Designation of listed paint systems

A paint system given in tables A.1 to A.9 is designated by its system number given in the left-hand column in each table (S = system). The designation shall be given in the following form (example taken from table A.1 for paint system No. S1.01):

ISO 12944-5/S1.01

In cases where coats with different binders are given under one and the same paint system number, the designation shall include the binders used in the priming and top coats and shall be given in the following form (example taken from table A.2 for paint system No. S2.09):

ISO 12944-5/S2.09 - AK/AY

If a paint system cannot be allocated to one of the systems listed in tables A.1 to A.9, full information regarding surface preparation, generic type, number of coats, nominal dry film thickness etc. shall be given in the same way as indicated in the tables.

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Annex A
(informative)

Paint systems for corrosivity categories and categories for water and soil

Table A.1: Paint systems summarized for corrosivity categories C2, C3 and C4

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability [9] [10] (see 5.5 and ISO 12944-1)									Corresponding paint system number in tables[11]		
												C2			C3			C4			A.2	A.3	A.4
	St 2	Sa 2½	Binder[2]	Type of primer[3]	Number of coats	NDFT [4] µm	Binder[2]	Number of coats	NDFT[4] µm	Number of coats	Tot. NDFT[4] µm	L	M	H	L	M	H	L	M	H			
S1.01		x	AK, AY	Misc.	1-2	100		-	-	1-2	100										S2.08/11		
S1.02		x	EP, PUR	Zn (R)	1-2	80	-	-	-	1-2	80										S2.17	S3.20	
S1.03		x	ESI	Zn (R)	1	80		-	-	1	80										S2.18	S3.25	S4.24
S1.04	x		AK	Misc.	1	40	AK	1	40	2	80										S2.01		
S1.05		x			1	40		1	40	2	80										S2.02		
S1.06	x				2	80		1	40	3	120										S2.03	S3.01	
S1.07		x			1-2	80		1	40	2-3	120										S2.04	S3.02	
S1.08	x				2	80		1-2	80	3-4	160										S2.05	S3.03	
S1.09		x			1-2	80		1-2	80	2-4	160										S2.06	S3.04	
S1.10	x				1-2	80		2-3	120	3-5	200										S2.07	S3.05	
S1.11		x			1-2	80		2-3	120	3-5	200											S3.06	S4.01
S1.12		x	AY	Misc.	1	80	AY	1	40	2	120										S2.12		
S1.13		x	EP		1	160		1	40	2	200											S3.15	S4.10
S1.14	x		AK, AY, CR	Misc.	2	80		1-2	80	3-4	160										S2.09/13	S3.11	
S1.15		x			1-2	80	AY	1-2	80	2-4	160										S2.10/14	S3.12	
S1.16		x	EP, PUR[7]	Zn (R)	1	40		1-2	120	2-3	160											S3.23	S4.16
S1.17		x	ESI[5]		1	80	CR	1-2	80	2-3	160											S3.26	S4.25
S1.18		x	AK, AY, CR	Misc.	1-2	80		2-3	120	3-5	200											S3.07/13	S4.04/08
S1.19		x	ESI[5]	Zn (R)	1	80	PVC[6]	2-3	120	3-4	200											S3.27	S4.26
S1.20		x	EP, PUR[7]		1	40		2-3	160	3-4	200											S3.24	S4.17
S1.21		x	AK, AY, CR	Misc.	1-2	80		2-3	160	3-5	240											S3.08/14	S4.05/09
S1.22		x	ESI[5]	Zn (R)	1	80		2-3	160	3-4	240												S4.27
S1.23		x	EP, PUR[7]		1	40		2-3	200	3-4	240												S4.18
S1.24		x	EP	Misc.	1	160		1	120	2	280												S4.11
S1.25		x	AK, AY, CR	Misc.	1-2	80	BIT [6]	2	160	3-4	240											S3.09/10	S4.02/06
S1.26		x			1-2	80		2-3	200	3-5	280												S4.03/07
S1.27		x	EP	Misc.	1-2	80		1	40	2-3	120										S2.15	S3.16	
S1.28		x			1-2	80		1-2	80	2-4	160										S2.16	S3.17	
S1.29		x	EP, PUR[7]	Zn (R)	1	40		1-2	120	2-3	160											S3.21	S4.19
S1.30		x	ESI [5]		1	80		1-2	80	2-3	160											S3.28	S4.28
S1.31		x	EP	Misc.	1-2	80		2-3	120	3-5	200											S3.18	S4.12
S1.32		x	EP, PUR[7]	Zn (R)	1	40	EP	2-3	160	3-4	200											S3.22	S4.20
S1.33		x	ESI [5]		1	80		2-3	120	3-4	200											S3.29	S4.29
S1.34		x	EP	Misc.	1-2	80	PUR [8]	2-3	160	3-5	240											S3.19	S4.13
S1.35		x	EP, PUR[7]	Zn (R)	1	40		2-3	200	3-4	240												S4.21
S1.36		x	ESI [5]		1	80		2-3	160	3-4	240												S4.30
S1.37		x	EP	Misc.	1-2	80		2-3	200	3-5	280												S4.14
S1.38		x	EP, PUR[7]	Zn (R)	1	40		2-3	240	3-4	280												S4.22
S1.39		x	ESI [5]		1	80		2-3	200	3-4	280												S4.31
S1.40		x	EP	Misc.	1-2	80		3-4	240	4-6	320												S4.15
S1.41		x	EP, PUR[7]	Zn (R)	1	40		3-4	280	4-5	320												S4.23
S1.42		x	ESI [5]		1	80		3-4	240	4-5	320												S4.32

Binders for priming coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x		
AY	=	Acrylic	x		x
PVC	=	Polyvinyl chloride	x		
EP	=	Epoxy		x	x
ESI	=	Ethyl silicate	x	x	
PUR	=	Polyurethane	x		

Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x		
AY	=	Acrylic	x		x
PVC	=	Polyvinyl chloride	x		
EP	=	Epoxy		x	x
PUR	=	Polyurethane	x	x	
BIT	=	Bitumen	x		

Footnotes:

1) For St 2, rust grade C as defined in ISO 8501-1 is the reference grade. For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.

2) For explanation of abbreviations, see foot of table.

3) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.

4) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.

5) It is recommended that one of the intermediate coats is used as a tie coat

6) It is recommended that compatibility is checked with the paint manufacturer.

7) It is also possible to work with an NDFT of 80 µm provided that the chosen EP or PUR zinc rich primer is suitable for such a NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.

8) If colour and gloss retention is required, it is recommended that he last coat should be based on aliphatic PUR.

9) Square with simple hatching ▨ indicates that the paint systems concerned would not normally be used for these corrosivity categories and are therefore not listed in table A.2 and/or A.3.

10) L = low, M = medium, H = high.

11) Abbreviations such as S2.08/11 mean S2.08 and S2.11.

Table A.2: Paint systems for corrosivity category C2

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[6]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[6]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S2.01	x		AK	Misc.	1	40	AK	1	40	2	80			
S2.02		x			1	40		1	40	2	80			
S2.03	x				2	80		1	40	3	120			
S2.04		x			1-2	80		1	40	2-3	120			
S2.05	x				2	80		1-2	80	3-4	160			
S2.06		x			1-2	80		1-2	80	2-4	160			
S2.07	x				1-2	80		2-3	120	3-5	200			
S2.08		x			1-2	100	–	–	–	1-2	100			
S2.09	x				2	80	AY, CR, PVC[4]	1-2	80	3-4	160			
S2.10		x			1-2	80		1-2	80	2-4	160			
S2.11		x	AY		1-2	100	–	–	–	1-2	100			
S2.12		x			1	80	AY	1	40	2	120			
S2.13	x		AY, CR, PVC		2	80	AY, CR, PVC	1-2	80	3-4	160			
S2.14		x			1-2	80		1-2	80	2-4	160			
S2.15		x	EP		1-2	80	EP, PUR[5]	1	40	2-3	120			
S2.16		x			1-2	80		1-2	80	2-4	160			
S2.17		x	EP, PUR	Zn (R)	1-2	80	–	–	–	1-2	80			
S2.18		x	ESI		1	80	–	–	–	1	80			

Binders for priming coat(s)			Paints (liquid)			Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible				No. of components		Water-borne possible
			1-pack	2-pack					1-pack	2-pack	
AK	=	Alkyd	x		x	AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x			CR	=	Chlorinated rubber	x		
AY	=	Acrylic	x		x	AY	=	Acrylic	x		x
PVC	=	Polyvinyl chloride	x			PVC	=	Polyvinyl chloride	x		
EP	=	Epoxy		x	x	EP	=	Epoxy		x	x
ESI	=	Ethyl silicate	x	x		PUR	=	Polyurethane	x	x	
PUR	=	Polyurethane	x								

1) For St 2, rust grade C as defined in ISO 8501-1 is the reference grade. For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) It is recommended that compatibility is checked with the paint manufacturer.
5) If colour and gloss retention is required, it is recommended that the last coat should be based on aliphatic PUR.
6) For explanation of abbreviations, see foot of table.

Table A.3: Paint systems for corrosivity category C3

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[8]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[8]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S3.01	x		AK	Misc.	2	80	AK	1	40	3	120			
S3.02		x			1-2	80		1	40	2-3	120			
S3.03	x				2	80		1-2	80	3-4	160			
S3.04		x			1-2	80		1-2	80	2-4	160			
S3.05	x				1-2	80		2-3	120	3-5	200			
S3.06		x			1-2	80		2-3	120	3-5	200			
S3.07		x			1-2	80	AY,CR,PVC[4]	2-3	120	3-5	200			
S3.08		x			1-2	80		2-3	160	3-5	240			
S3.09		x			1-2	80	BIT[4]	2	160	3-4	240			
S3.10		x	AY, CR, PVC		1-2	80		2	160	3-4	240			
S3.11	x				2	80	AY, CR, PVC	1-2	80	3-4	160			
S3.12		x			1-2	80		1-2	80	2-4	160			
S3.13		x			1-2	80		2-3	120	3-5	200			
S3.14		x			1-2	80		2-3	160	3-5	240			
S3.15		x	EP		1	160	AY	1	40	2	200			
S3.16		x			1-2	80	EP, PUR[5]	1	40	2-3	120			
S3.17		x			1-2	80		1-2	80	2-4	160			
S3.18		x			1-2	80		2-3	120	3-5	200			
S3.19		x			1-2	80		2-3	160	3-5	240			
S3.20		x	EP, PUR	Zn (R)	1-2	80	–	–	–	1-2	80			
S3.21		x	EP, PUR[6]		1	40	EP, PUR[5]	1-2	120	2-3	160			
S3.22		x			1	40		2-3	160	3-4	200			
S3.23		x			1	40	AY, CR, PVC	1-2	120	2-3	160			
S3.24		x			1	40		2-3	160	3-4	200			
S3.25		x	ESI[7]		1	80	–	–	–	1	80			
S3.26		x			1	80	AY, CR, PVC	1-2	80	2-3	160			
S3.27		x			1	80		2-3	120	3-4	200			
S3.28		x			1	80	EP, PUR[5]	1-2	80	2-3	160			
S3.29		x			1	80		2-3	120	3-4	200			

Binders for priming coat(s)			Paints (liquid)			Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible				No. of components		Water-borne possible
			1-pack	2-pack					1-pack	2-pack	
AK	=	Alkyd	x		x	AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x			CR	=	Chlorinated rubber	x		
PVC	=	Polyvinyl chloride	x			PVC	=	Polyvinyl chloride	x		
AY	=	Acrylic	x		x	AY	=	Acrylic	x		x
EP	=	Epoxy		x	x	EP	=	Epoxy		x	x
ESI	=	Ethyl silicate		x		PUR	=	Polyurethane	x	x	
PUR	=	Polyurethane	x			BIT	=	Bitumen	x		

1) For St 2, rust grade C as defined in ISO 8501-1 is the reference grade. For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) It is recommended that compatibility is checked with the paint manufacturerer.
5) If colour and gloss retention is required, it is recommended that the last coat should be based on aliphatic PUR.
6) It is also possible to work with an NDFT of 80 µm provided that the EP or PUR zinc rich primer chosen is suitable for such an NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.
7) It is recommended that one of the intermediate coats is used as a tie coat.
8) For explanation of abbreviations, see foot of table.

Table A.4: Paint systems for corrosivity category C4

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Coating system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[8]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[8]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S4.01		x	AK	Misc.	1-2	80	AK	2-3	120	3-5	200			
S4.02		x			1-2	80	BIT[4]	2	160	3-4	240			
S4.03		x			1-2	80		2-3	200	3-5	280			
S4.04		x			1-2	80	AY, CR, PVC[4]	2-3	120	3-5	200			
S4.05		x			1-2	80		2-3	160	3-5	240			
S4.06		x	AY, CR, PVC		1-2	80	BIT [4]	2	160	3-4	240			
S4.07		x			1-2	80		2-3	200	3-5	280			
S4.08		x			1-2	80	AY, CR, PVC	2-3	120	3-5	200			
S4.09		x			1-2	80		2-3	160	3-5	240			
S4.10		x	EP		1	160		1	40	2	200			
S4.11		x			1	160		1	120	2	280			
S4.12		x			1-2	80	EP, PUR[5]	2-3	120	3-5	200			
S4.13		x			1-2	80		2-3	160	3-5	240			
S4.14		x			1-2	80		2-3	200	3-5	280			
S4.15		x			1-2	80		3-4	240	4-6	320			
S4.16		x	EP, PUR[6]	Zn (R)	1	40	AY, CR, PVC	1-2	120	2-3	160			
S4.17		x			1	40		2-3	160	3-4	200			
S4.18		x			1	40		2-3	200	3-4	240			
S4.19		x			1	40	EP, PUR[5]	1-2	120	2-3	160			
S4.20		x			1	40		2-3	160	3-4	200			
S4.21		x			1	40		2-3	200	3-4	240			
S4.22		x			1	40		2-3	240	3-4	280			
S4.23		x			1	40		3-4	280	4-5	320			
S4.24		x	ESI[7]		1	80	–	–	–	1	80			
S4.25		x			1	80	AY, CR, PVC	1-2	80	2-3	160			
S4.26		x			1	80		2-3	120	3-4	200			
S4.27		x			1	80		2-3	160	3-4	240			
S4.28		x			1	80	EP, PUR[5]	1-2	80	2-3	160			
S4.29		x			1	80		2-3	120	3-4	200			
S4.30		x			1	80		2-3	160	3-4	240			
S4.31		x			1	80		2-3	200	3-4	280			
S4.32		x			1	80		3-4	240	4-5	320			

Binders for priming coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x		
AY	=	Acrylic	x		x
EP	=	Epoxy		x	x
ESI	=	Ethyl silicate	x	x	
PUR	=	Polyurethane	x		

Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
AK	=	Alkyd	x		x
CR	=	Chlorinated rubber	x		
PVC	=	Polyvinyl chloride	x		
AY	=	Acrylic	x		x
BIT	=	Bitumen	x		
EP	=	Epoxy		x	x
PUR	=	Polyurethane	x	x	

1) For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) It is recommended that compatibility is checked with the paint manufacturer.
5) If colour and gloss retention is required, it is recommended that the last coat should be based on aliphatic PUR.
6) It is also possible to work with an NDFT of 80 µm provided that the EP or PUR zinc rich primer chosen is suitable for such an NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.
7) It is recommended that one of the intermediate coats is used as a tie coat.
8) For explanation of abbreviations, see foot of table.

Table A.5: Paint systems summarized for corrosivity categories C5-I and C5-M

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability[11] (see 5.5 and ISO 12944-1)						Corresponding paint system number in tables	
												C5-I			C5-M			A.6	A.7
	St 2	Sa 2½	Binder[2]	Type of primer[3]	Number of coats	NDFT[4] µm	Binder[2]	Number of coats	NDFT[4] µm	Number of coats	Total NDFT[4] µm	L	M	H	L	M	H	[12]	[13]
S5.01		x	CR	Misc.	1-2	80		2	120	3-4	200							S6.01	S7.01
S5.02		x	EP, PUR[5]		2	120	AY, CR, PVC	1-2	80	3-4	200							S6.02	
S5.03		x			1	80		3	200	4	280							S6.07	
S5.04		x	ESI[6]	Zn (R)	1	80		4	240	5	320							S6.11	
S5.05		x			1	40	EP + CR [10]	2	200	3	240								S7.08
S5.06		x	EP, PUR[5]		1	40		3-4	280	4-5	320								S7.09
S5.07		x			1	40		2	120	3	160							S6.05	
S5.08		x	EP, PUR	Misc.	1	80		2	120	3	200								S7.02
S5.09		x	EP, PUR[5]	Zn (R)	1	40		3	200	4	240							S6.06	S7.07
S5.10		x	ESI[6]		1	80	EP, PUR[7]	2-4	160	3-5	240							S6.09	S7.12
S5.11		x	EP, PUR	Misc.	1	80		3	200	4	280							S6.03	
S5.12		x	ESI[6]	Zn (R)	1	80		3	200	4	280							S6.10	
S5.13		x			1	80		2-4	240	3-5	320							S6.08	S7.14
S5.14		x			1	150		1	150	2	300								S7.03
S5.15		x	EP, PUR	Misc.	1-2	80		3-4	240	4-6	320							S6.04	S7.04
S5.16		x			1	250		1	250	2	500								S7.06
S5.17		x	ESI[6]	Zn (R)	1	80	EP+CTE[9][10]	2	200	3	280								S7.13
S5.18		x	CTV[9]	Al[8]	1	100	CTV[9]	2	200	3	300								S7.15
S5.19		x	EP, PUR	Misc.	1	400	–	–	–	1	400								S7.05
S5.20		x	EP, PUR[5]	Zn (R)	1	40	CTV[9]	3	360	4	400								S7.10
S5.21		x	CTE[9]	Misc.	1	100	CTE[9]	2	200	3	300								S7.16
S5.22		x	EP, PUR[5]	Zn (R)	1	40		3	360	4	400								S7.11

Binders for priming coat(s)			Paints (liquid)		
			No. of components		Water-borne
			1-pack	2-pack	possible
CR	=	Chlorinated rubber	x		
EP	=	Epoxy		x	x
PUR	=	Polyurethane	x		
ESI	=	Ethyl silicate	x	x	
CTV	=	Coal tar vinyl	x		
CTE	=	Coal tar epoxy		x	

Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne
			1-pack	2-pack	possible
AY	=	Acrylic	x		x
CR	=	Chlorinated rubber	x		
EP	=	Epoxy		x	x
PUR	=	Polyurethane	x	x	
PVC	=	Polyvinyl chloride	x		
CTV	=	Coal tar vinyl	x		
CTE	=	Coal tar epoxy		x	

1) For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) For explanation of abbreviations, see foot of table.
3) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigment.
4) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
5) It is also possible to work with an NDFT of 80 µm provided that the EP or PUR zinc rich primer chosen is suitable for such an NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.
6) It is recommended that one of the intermediate coats is used as a tie coat.
7) If colour and gloss retention is required, it is recommended that the last coat should be based on aliphatic PUR.
8) Al = Aluminium pigmented primer.
9) Alternatives to coal tar are available.
10) The first of the abbreviations relates to the intermediate coat and the latter to the top coat.
11) L = low, M = medium, H = high.
12) Systems for C5-I can often be used for C5-M but with a reduced durability.
13) Systems for C5-M can often be used for C5-I but with an increased durability.

Table A.6: Paint systems for corrosivity category C5-I

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[7]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[7]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S6.01		x	CR	Misc.	1-2	80	AY, CR, PVC	2	120	3-4	200			
S6.02		x	EP, PUR		2	120		1-2	80	3-4	200			
S6.03		x			1	80	EP, PUR[4]	3	200	4	280			
S6.04		x			1-2	80		3-4	240	4-6	320			
S6.05		x	EP, PUR[5]	Zn (R)	1	40		2	120	3	160			
S6.06		x			1	40		3	200	4	240			
S6.07		x	ESI[6]		1	80	AY, CR, PVC	3	200	4	280			
S6.08		x			1	80	EP, PUR[4]	2-4	240	3-5	320			
S6.09		x			1	80		2-4	160	3-5	240			
S6.10		x			1	80		3	200	4	280			
S6.11		x			1	80	AY, CR, PVC	4	240	5	320			

Binders for priming coat(s)			Paints (liquid)			Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible				No. of components		Water-borne possible
			1-pack	2-pack					1-pack	2-pack	
CR	=	Chlorinated rubber	x			CR	=	Chlorinated rubber	x		
EP	=	Epoxy		x	x	AY	=	Acrylic	x		x
ESI	=	Ethyl silicate	x	x		PVC	=	Polyvinyl chloride	x		
PUR	=	Polyurethane	x			EP	=	Epoxy		x	x
						PUR	=	Polyurethane	x	x	

1) For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) If colour and gloss retention is required, it is recommended that the last coat should be based on aliphatic PUR.
5) It is also possible to work with an NDFT of 80 µm provided that the EP or PUR zinc rich primer chosen is suitable for such an NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.
6) It is recommended that one of the intermediate coats is used as a tie coat.
7) For explanation of abbreviations, see foot of table.

Table A.7: Paint systems for corrosivity category C5-M

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[10]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[10]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S7.01		x	CR	Misc.	1-2	80	AY, CR, PVC	2	120	3-4	200			
S7.02		x	EP, PUR		1	80	EP, PUR[4]	2	120	3	200			
S7.03		x			1	150		1	150	2	300			
S7.04		x			1-2	80		3-4	240	4-6	320			
S7.05		x			1	400	–	–	–	1	400			
S7.06		x			1	250	EP, PUR[4]	1	250	2	500			
S7.07		x	EP, PUR[5]	Zn (R)	1	40		3	200	4	240			
S7.08		x			1	40	EP + CR[9]	2	200	3	240			
S7.09		x			1	40	EP, PUR[4]	3-4	280	4-5	320			
S7.10		x			1	40	CTV[8]	3	360	4	400			
S7.11		x			1	40	CTE[8]	3	360	4	400			
S7.12		x	ESI[6]		1	80	EP, PUR[4]	2-4	160	3-5	240			
S7.13		x			1	80	EP + CTE[8] [9]	2	200	3	280			
S7.14		x			1	80	EP, PUR[4]	2-4	240	3-5	320			
S7.15		x	CTV[8]	Al[7]	1	100	CTV[8]	2	200	3	300			
S7.16		x	CTE[8]	Misc.	1	100	CTE[8]	2	200	3	300			

Binders for priming coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
CR	=	Chlorinated rubber	x		
EP	=	Epoxy		x	x
ESI	=	Ethyl silicate	x	x	
PUR	=	Polyurethane	x		
CTV	=	Coal tar vinyl	x		
CTE	=	Coal tar epoxy		x	

Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible
			1-pack	2-pack	
CR	=	Chlorinated rubber	x		
PVC	=	Polyvinyl chloride	x		
EP	=	Epoxy		x	x
PUR	=	Polyurethane	x	x	
CTV	=	Coal tar vinyl	x		
CTE	=	Coal tar epoxy		x	
AY	=	Acrylic	x		x

1) For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) If colour and gloss retention is required it is recommended that the last coat should be based on aliphatic PUR.
5) It is also possible to work with an NDFT of 80 µm provided that the EP or PUR zinc rich primer chosen is suitable for such an NDFT. In this case, the NDFT of the complete paint system can be adjusted by subsequent coats.
6) It is recommended that one of the intermediate coats is used as a tie coat.
7) Al = Aluminium pigmented primer.
8) Alternatives to coal tar are available.
9) The first of the abbreviations relates to the intermediate coat and the latter to the top coat.
10) For explanation of abbreviations, see foot of table.

Table A.8: Paint systems for immersion categories Im1, Im2, Im3

The paint systems given in the following table are only examples. Other paint systems having the same performance are possible.
If these examples are used, it shall be ensured that the paint systems chosen comply with the indicated durability when execution of the paint work takes place as specified. See also 5.7.

Paint System No.	Surface preparation grade[1]		Priming coat(s)				Top coat(s) including intermediate coat(s)			Paint system		Expected durability (see 5.5 and ISO 12944-1)		
	St 2	Sa 2½	Binder[6]	Type of primer[2]	Number of coats	NDFT[3] µm	Binder[6]	Number of coats	NDFT[3] µm	Number of coats	Total NDFT[3] µm	Low	Medium	High
S8.01		x	EP, PUR	Zn (R)	1	40	EP, PUR	2-4	320	3-5	360			
S8.02		x			1	40	CTPUR[5]	4	500	5	540			
S8.03		x	EP	Misc.	1	40	CTE[5]	3	400	4	440			
S8.04		x			1	80	EP, PUR	2	300	3	380			
S8.05		x			1	80	EP[4]	1	400	2	480			
S8.06		x	EP[4]		1	800	–	–	–	1	800			
S8.07		x	CTE[5]		1	120	CTE[5]	2	240	3	360			
S8.08		x			1	120		3	380	4	500			
S8.09		x			1	500	–	–	–	1	500			
S8.10		x	CTE[4] [5]		1	1000	–	–	–	1	1000			
S8.11		x	CTPUR[5]		1	200	CTPUR[5]	1	200	2	400			

Binders for priming coat(s)			Paints (liquid)			Binders for top coat(s)			Paints (liquid)		
			No. of components		Water-borne possible				No. of components		Water-borne possible
			1-pack	2-pack					1-pack	2-pack	
EP	=	Epoxy		x		EP	=	Epoxy		x	
PUR	=	Polyurethane	x			PUR	=	Polyurethane	x	x	
CTE	=	Coal tar epoxy		x		CTE	=	Coal tar epoxy		x	
CTPUR	=	Coal tar polyurethane	x	x		CTPUR	=	Coal tar polyurethane	x	x	

1) For Sa 2½ rust grade A, B or C as defined in ISO 8501-1 is the reference grade.
2) Zn (R) = Zinc rich primer, see 5.2, Misc. = Miscellaneous types of anticorrosive pigments.
3) NDFT = Nominal Dry Film Thickness. See 5.4 for further details.
4) Solvent-free type.
5) Alternatives to coal tar are available.
6) For explanation of abbreviations, see foot of table.