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Paints and varnishes — Protective coatings for concrete structures —

Part 1: General introduction

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Foreword

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This document was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 15, *Protective coatings: concrete surface preparation and coating application*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Unprotected concrete and cement-based structures exposed to the atmosphere, water and soil are subjected to degradation that can lead to damage, especially calcium leaching, physical damage, carbonatation, and chloride and sulfate attacks of steel reinforcements. To avoid such damage, these structures are protected to withstand the environmental stresses to which they are subjected during their required service life.

There are different ways of protecting concrete structures from damage. The ISO 9607 series[1)] deals with the protection of concrete structures through coating systems and the features that are important in achieving adequate protection against degradation. Additional or other measures are possible but require particular agreement between the parties involved.

In order to ensure the effective protection of concrete, owners of such structures, planners, consultants, companies carrying out protection work, inspectors of protective coatings and manufacturers of coating materials should have at their disposal state-of-the-art information in a concise form on protection using paint systems. It is vital that such information is as complete as possible, unambiguous and easily understandable to avoid difficulties and misunderstandings between the parties concerned with the practical implementation of protection work.

The ISO 9607 series is intended to give this information in the form of a set of instructions for those who have some technical knowledge.

The ISO 9607 series[1)] foresees the following parts:

— Part 1 is a general introduction to the series;

— Part 2 is intended to define the atmospheric-aggressiveness categories and indicates the degradation to be expected;

— Part 3 is expected to cover the basic design criteria for concrete structures for the purpose of improving their resistance to environmental degradation;

— Part 4 is intended to describe different types of surfaces to be protected and define the surface preparation grades and surface profiles;

— Part 5 is expected to describe the generic types of coatings on the basis of their chemical composition and the type of film formation process;

— Part 6 is expected to specify laboratory test methods that are intended to be used when assessing the performance of protective coating systems;

— Part 7 is expected to describe how coating work should be carried out in the workshop or onsite;

— Part 8 is intended to cover the development of specifications for concrete protection work.

1) The other parts of this series are under development.

Paints and varnishes — Protective coatings for concrete structures —

Part 1: General introduction

1 Scope

This document defines the overall scope and provides a general overview of the other parts of the ISO 9607 series. It also includes requirements and guidance on using the ISO 9607 series.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4618, *Paints and varnishes — Vocabulary*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 4618 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
corrosion
electrochemical interaction between a material and its *environment* (3.3) that results in changes in the properties of the material, and which can often lead to impairment of the function of the material, the environment or the technical system of which these form a part

3.2
durability
expected life of a *protective coating system* (3.6) to the first major maintenance painting

Note 1 to entry: Durability is a technical consideration/planning parameter that can help the owner set up a maintenance programme (see 5.5).

3.3
environment
physical surroundings, excluding concrete, including atmosphere, flora, fauna, land, air, soil, water, which can affect the concrete and can influence its degradation or functional properties

3.4
hydrophobic impregnation
treatment of concrete to produce a water-repellent surface

Note 1 to entry: During this process, the pores and capillaries are internally coated, but they are not filled. There is no film on the surface of the concrete and there is little or no change in its appearance.

3.5
impregnation
treatment of concrete to reduce the surface porosity and to strengthen the surface

Note 1 to entry: During this process, the pores and capillaries are partially or totally filled.

3.6
protective coating system
total sum of the coats or related products which are intended to be applied or which have been applied to a *substrate* (3.7) to provide protection

3.7
substrate
surface to which the coating material is applied or is intended to be applied

Note 1 to entry: The substrate is considered to be a concrete or cement-based substrate.

3.8
partial refurbishment
spot repair of coating defects followed by surface preparation and application of a minimum of one top coat over the whole area

3.9
total refurbishment
total removal of a *protective coating system* (3.6) and application of a new one

3.10
sample area
area on which the properties of a newly applied coating are tested

4 General introduction to the ISO 9607 series

4.1 General

The ISO 9607 series is intended to deal with the protection and degradation prevention of concrete and cement-based structures through protective coating or paint systems as an additional barrier to stresses from immersion and the atmosphere.

These coatings or paint systems protect the concrete from degradation, if the fundamental concrete cover of the reinforcing steel is not completely present or if the cover is intended to be supplemented.

4.2 Protective functions covered

The ISO 9607 series is intended to cover only the protective function of coating systems against the aggressiveness of the environment. The following other protective functions are not intended to be covered by the ISO 9607 series, including protection against:

— anti-fouling,

— stored chemicals,

— mechanical impacts,

— fire.

Aesthetic aspects are not intended to be covered by the ISO 9607 series.

4.3 Field of application

4.3.1 Overview

The field of application is characterized by:

— the type of structure,

— the type of surface and surface preparation,

— the type of environment,

— the type of protective coating system,

— the type of work,

— the durability of the protective coating system.

The ISO 9607 series will cover the following concrete structures:

— industrial buildings,

— dwellings and public buildings,

— civil engineering structures,

— buried structures,

— off-shore structures.

The following other applications with specific functions, including water tightness or mechanical resistance, are not intended to be covered by the ISO 9607 series:

— floorings,

— tanks and reservoirs.

The various aspects of the field of application are described in more detail in 4.3.2 to 4.3.7.

4.3.2 Type of structure

The ISO 9607 series is intended to cover structures made of concrete or cement, which can be reinforced by steel.

Steel structures are not intended to be covered by the ISO 9607 series.

4.3.3 Type of surface

The ISO 9607 series is intended to deal with the following types of surface consisting of concrete, which can be reinforced by steel, and their preparation:

— uncoated surfaces,

— other painted surfaces.

NOTE Impregnated or hydrophobically treated surfaces can be coated if the required performance of the coating system is met.

4.3.4 Type of environment

The ISO 9607 series is intended to deal with:

— classes of exposure for atmospheric environments,

— classes for structures immersed in water or buried in soil.

4.3.5 Type of protective coating system

The ISO 9607 series will cover a range of paint and related products which contribute to the complete concrete protection system. The following are not intended to be covered by the ISO 9607 series:

— hydrophobic impregnation as a stand-alone treatment,

— impregnation as a stand-alone treatment,

— protective coating on the inner surface of a tank (linings).

NOTE Although all aspects of the application of hydrophobic treatments and inhibitor impregnations are not part of this document, it is common practice that impregnated or pre-treated concrete surfaces are suitable substrates for a subsequent use of coating systems.

4.3.6 Type of work

The ISO 9607 series will cover both new work and maintenance.

4.3.7 Durability of the protective coating system

The ISO 9607 series will consider four different durability ranges:

— Low (L) up to 7 years,

— Medium (M) 7 years to 15 years,

— High (H) 15 years to 25 years,

— Very high (VH) more than 25 years.

The durability range is not a “guarantee time”. Durability is a technical consideration or planning parameter that can help the owner set up a maintenance programme. A guarantee time is a consideration which 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.

5 General considerations

5.1 The aspects listed in 5.2 to 5.5 should be taken into consideration when applying the ISO 9607 series.

5.2 Since the durability of a protective system is assumed to be shorter than the expected service life of the structure, additional considerations should be given at the planning and design stage to the possibility of their maintenance, or partial or total refurbishment.

Sample areas provide guidance on the type of refurbishment and can also be used for the assessment of the visual appearance.

5.2 Structural components which are exposed to environmental stresses and which are no longer accessible for protection measures after construction, shall be provided with protection that will remain effective, and hence ensure the stability of the structure, for the duration of the service life of the structure. If this cannot be achieved by means of protective coating systems, other measures shall be taken (e.g. different structure design according to the environment aggressiveness).

5.3 The cost-effectiveness and sustainability of a given protection system is generally in direct proportion to the length of time for which effective protection is maintained, since the amount of maintenance or replacement work required during the service life of the structure is reduced to a minimum.

5.4 The type of environmental conditions (4.3.4) and the durability of coatings systems (4.3.7) are the main parameters for selecting the coating systems.

5.5 The level of coating failure before the first major maintenance painting shall be agreed upon by the interested parties.

NOTE Coating defects can be assessed according to ISO 4628-1, ISO 4628-2, ISO 4628-4 and ISO 4628-5, if agreed between the interested parties.

For example, it would normally be expected that the first major maintenance painting be carried out for reasons of protection as decided by the parties involved. This requirement can be applied to the whole structure or to representative sections as agreed upon between involved parties, which can then be classified separately.

6 Health and safety and environmental protection

When applying the ISO 9607 series, health and safety and environmental protection should be taken into account.

Items that require particular attention include the following:

— not specifying or using toxic or carcinogenic substances;

— emissions of volatile organic compounds (VOCs);

— measures against harmful effects of fumes, dust, vapours and noise, as well as fire hazards;

— protection of the body, including the eyes, the skin, the ears and the respiratory system;

— protection of water and soil during corrosion protection work;

— recycling of materials and waste disposal.