

# Malevarer Træbeskyttelsesmidler og malingsystemer til udendørs træ

## Del 1: Klassifikation og udvælgelse

Paints and varnishes – Coating materials and  
coating systems for exterior wood – Part 1:  
Classification and selection

---

# DS/EN 927-1

København 1997

DS projekt: 18199

Sideantal: 9

ICS 87.040

## Deskriptorer:

maling, lakker, beskyttende overfladebehandlinger, malerarbejde, træ, udvendig, klassifikation, kategorier

## Nationalt forord

Denne publikation har status som dansk standard. Den er identisk med Europæisk Standard EN 927-1:1996.

## National foreword

This publication is approved as a Danish standard. It is identical with European Standard EN 927-1:1996.

---

ICS 71.100.50; 87.040

Descriptors: Paints, varnishes, protective coatings, decorating, wood, exterior, classification, categories

English version

Paints and varnishes — Coating materials and coating systems for  
exterior wood  
Part 1: Classification and selection

Peintures et vernis — Produits de peinture et  
systèmes de peinture pour le bois en extérieur —  
Partie 1: Classification et sélection

Lacke und Anstrichstoffe — Beschichtungsstoffe  
und Beschichtungssysteme für Holz im  
Außenbereich —  
Teil 1: Einteilung und Auswahl

This European Standard was approved by CEN on 1996-08-04. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

## Foreword

This European Standard has been prepared by CEN/TC 139, Paints and varnishes, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 1997, and conflicting national standards shall be withdrawn at the latest by March 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

## Contents

	Page
Foreword	2
Introduction	3
<b>1</b> Scope	3
<b>2</b> Normative references	3
<b>3</b> Definitions	3
<b>4</b> Classification	4
<b>4.1</b> Classification by end use	4
<b>4.2</b> Classification by appearance	4
<b>4.3</b> Classification by exposure conditions	5
<b>5</b> Manufacturer's product information	5
<b>Annex</b>	
<b>A</b> (informative) Guidance on selection criteria	6
<b>A.1</b> General	6
<b>A.2</b> End use	6
<b>A.3</b> Appearance	6
<b>A.3.1</b> Hiding power	6
<b>A.3.2</b> Build	6
<b>A.3.3</b> Gloss	6
<b>A.4</b> Exposure conditions	6
<b>A.5</b> Substrate condition	7

## Introduction

This is one of a number of Parts of EN 927. The present intention is to develop further Parts relating to test methods and performance requirements.

The names used today to describe coating materials and coating systems pay little regard to technical, functional and end use categories. This makes it difficult to devise an unequivocal, simple terminology applicable to all product types. This Part of EN 927 attempts to address this problem by separately defining categories of appearance and end use, but with no assumptions as to whether or not a given product, by its appearance alone, will be suitable for a particular use. The objective is to avoid misuse of coating systems by the misunderstanding or over-statement of performance claims. Current experience of characteristic coating behaviour is explained in annex A so that users may be forewarned of situations requiring specific assurances.

The treatment of exterior wood surfaces has aesthetic and protective functions. The result of such treatments may include the following:

- protection against aesthetic deterioration;
- protection against deterioration due to weathering influences;
- control of dimensional change;
- protection against blue stain attack;
- maintaining the function of wood components (including the possibility of renovation).

This Part of EN 927 identifies criteria that need to be considered when assessing the suitability of a coating system for a particular end use and provides a framework for communicating this information between manufacturer and user. This should assist in the removal of technical barriers to trade. It is the responsibility of the manufacturer of a coating system to designate the appropriate categories for end use and appearance.

## 1 Scope

This European Standard specifies a system for the classification of coating materials and coating systems for exterior wood surfaces by categories of end use, appearance and exposure conditions.

It is applicable to all coating materials and coating systems intended for decoration and protection of exterior wood surfaces including those which contain biologically protective ingredients for the protection of coatings and their interface with the wood surface (film preservation). The coating materials may include biologically active ingredients for the protection of the liquid coating material, for example during storage (in-can preservation). This European Standard is not applicable to wood preservatives.

Guidance on selection criteria and the procedures for users' selection are given for information in annex A.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 971-1 : 1996 *Paints and varnishes – Terms and definitions for coating materials Part 1. General terms*
- ISO 2808 : 1991 *Paints and varnishes – Determination of film thickness*
- ISO 2813 : 1994 *Paints and varnishes – Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°*

## 3 Definitions

For the purposes of this standard, the following definitions apply.

**3.1 ageing:** Irreversible changes in the properties of a film which occur with the passage of time.

**3.2 blocking:** Unwanted adhesion between two painted surfaces when they are left in contact under load after their specified drying period.

**3.3 blue stain in service:** Surface staining of timber in service by fungi causing blue to black discoloration, often causing disruption of surface finishes.

**3.4 build:** The visual impression of the thickness of a dried film.

NOTE. For the purpose of 4.2.1 the measured film thickness is used for classifying build.

**3.5 coating material:** A product, in liquid or in paste or powder form, that, when applied to a substrate, forms a film possessing protective, decorative and/or other specific properties.

NOTE. The German term 'Beschichtungsstoff' as defined in this standard is the general term for 'Lacke', 'Anstrichstoffe' and similar products. (EN 971-1 : 1996).

**3.6 coating system:** The sum total of the coats of coating materials which are to be applied or which have been applied to a substrate.

NOTE. The German term 'Beschichtung' as defined in this standard is the general term for 'Lackierungen', 'Anstriche', 'Kunstharzputze' (organic binder renderings) etc. (EN 971-1 : 1996).

**3.7 exterior wood stain (lasure):** A liquid product producing a transparent or semi-transparent film, for the decoration and protection against weathering which enables maintenance to be carried out easily. Such products may contain biocide(s) to protect the film and/or wood interface against blue stain or mould.

NOTE. In some countries the term 'opaque wood stain' is also used for a paint applied such that the wood surface structure remains visible.

**3.8 finishing coat; top coat:** The final coat of a coating system. (EN 971-1 : 1996).

**3.9 flexibility:** The ability of a dried film to follow without damage the deformations of the substrate to which it is applied.

NOTE. The use of the term 'elasticity' to describe the flexibility of a film is incorrect. (EN 971-1 : 1996)

**3.10 gloss:** The optical property of a surface, characterized by its ability to reflect light specularly. (EN 971-1 : 1996)

**3.11 hiding power:** The ability of a coating material to obliterate the colour or the colour differences of a substrate. (EN 971-1 : 1996)

**3.12 paint:** A pigmented coating material, in liquid or in paste or powder form, which when applied to a substrate forms an opaque film having protective, decorative or specific technical properties.

NOTE. The German terms 'Lack' and 'Anstrichstoff' are used for pigmented and unpigmented coating materials. An unpigmented 'Lack' should be designated 'Klarlack'. (EN 971-1 : 1996)

**3.13 priming coat:** The first coat of a coating system, applied to a substrate. (EN 971-1 : 1996)

**3.14 rot:** Decomposition of timber by fungi resulting in softening, progressive loss of strength and mass and often a change of texture and colour.

**3.15 undercoat; intermediate coat:** Any coat between the priming coat and the finishing coat. (EN 971-1 : 1996)

**3.16 varnish; clear coating material:** A coating material which when applied to a substrate forms a solid transparent film having protective, decorative or specific technical properties.

NOTE. A clear coating material drying exclusively by oxidation is known as a varnish. (EN 971-1 : 1996)

**3.17 water absorption:** The ability of a coated surface area to absorb water from liquid or vapour.

**3.18 water permeability:** The ability of a coating system to allow the transmission of water as liquid or vapour.

**3.19 wood preservative:** A product, containing a biocide, which is intended to inhibit the development of wood-destroying and/or wood-staining organisms in the wood to which it is applied.

## 4 Classification

Coating materials and coating systems for exterior wood shall be classified as specified in 4.1, 4.2 and 4.3.

### 4.1 Classification by end use

Classification of coating materials and coating systems shall be by end use in categories related to the stability of the substrate on which they are suitable for use, as given in table 1.

NOTE. The suitability of a coating material for a given end use is determined by the extent to which dimensional movement of the wood in response to absorption or loss of water must be controlled. For softwood such as pine and spruce three broad end use categories are given. For those hardwoods not subject to high water absorption (e.g. meranti, mahogany) two or more of these categories can be combined provided the relevant performance requirements are met.

### 4.2 Classification by appearance

Classification by appearance shall be by the following properties:

- build;
- hiding power;
- specular gloss.

#### 4.2.1 Build (film thickness)

Classification by build shall be based on the measurement of the dry film thickness according to method 5A of ISO 2808 : 1991 by the following categories:

- minimal: mean thickness less than 5  $\mu\text{m}$ ;
- low: mean thickness 5  $\mu\text{m}$  up to 20  $\mu\text{m}$ ;
- medium: mean thickness greater than 20  $\mu\text{m}$  up to 60  $\mu\text{m}$ ;
- high: mean thickness greater than 60  $\mu\text{m}$ .

Table 1. Classification by end use

End use category	Permitted dimensional movement of wood	Typical examples of end use categories
Non-stable	Free movement permitted	Overlapping cladding, fencing, garden sheds
Semi-stable	Some movement permitted	Tongue and groove cladding, wooden houses and chalets, garden furniture
Stable	Minimum movement permitted	Joinery, including windows and doors

#### 4.2.2 Hiding power

Classification by hiding power shall be by the following categories:

- a) opaque: coating systems that obliterate all substrate colour and pattern but may not hide all surface profile;
- b) semi-transparent: coating systems that do not totally obscure the wood surface;
- c) transparent: coating systems that allow the wood surface to remain clearly visible.

#### 4.2.3 Gloss

Classification by specular gloss shall be based on specular reflectance values when tested at 60° by the method described in ISO 2813 by the following categories:

- a) matt: reflectance up to 10;
- b) semi-matt: reflectance greater than 10 up to 35;
- c) semi-gloss: reflectance greater than 35 up to 60;
- d) gloss: reflectance greater than 60 up to 80;
- e) high gloss: reflectance greater than 80.

NOTE. In practice, the gloss level achieved will depend on the state and nature of the substrate, the type of system and method of application. See annex A for further information.

#### 4.3 Classification by exposure conditions

Classification of coating materials and coating systems shall be based on exposure conditions that take into account constructional factors and climatic conditions. The categories shall be:

- a) mild;
- b) medium;
- c) severe;

as given in table 2.

Construction	Climate		
	Moderate	Hard	Extreme
Sheltered	Mild	Mild	Medium
Partly sheltered	Mild	Medium	Severe
Not sheltered	Medium	Severe	Severe

#### 5 Manufacturer's product information

A manufacturer shall provide product information using the classification system specified in this European Standard.

NOTE. An example of how this information may be presented is shown in table 3. This table summarizes only the most basic information about the appearance and intended application of a given product. Normally additional information will be available in the form of the manufacturer's product data sheets.

Trade name	Appearance	Build (category .....) Hiding power (category .....) Gloss (category .....)	
Product description	System recommendation		
Colour or colour range	System recommendations assume bare unweathered wood to be the substrate.		
Exposure	End use categories		
	Non-stable	Semi-stable	Stable
Mild			
Medium			
Severe			
The information is based on the classification system specified in EN 927-1.			
<b>Substrate recommendations</b>			
The manufacturer should indicate here any special recommendations relating to the substrate, e.g. applicability of the coating system to previously painted or degraded wood, or to wood-based panel products.			
+ is the product recommended.			
0 is the product not recommended.			
NOTE. In order to indicate specific advice the manufacturer may use the footnote sign (*).			

## Annex A (informative)

### Guidance on selection criteria

#### A.1 General

This annex makes some qualitative observations on typical behaviour characteristics of coatings and the factors which influence them. As an aid to initial selection, consideration is given to end use (see A.2), appearance (see A.3) and exposure conditions (see A.4). It is emphasized that the performance of a coating system cannot be predicted from the classification system and it is therefore important that the classification is used in conjunction with appropriate test methods, which will be detailed in other Parts of EN 927. Only performance tests provide the ultimate basis for selection.

#### A.2 End use

An important function of any wood coating is to control entry of water and consequent dimensional movement. Different end use categories have different requirements. For fencing and some types of cladding, dimensional control is less important than for joinery, and higher permeability can be beneficial. Protection against water absorption from direct rain is still desirable.

These considerations are reflected in table 1 by three broad end use categories: non-stable, semi-stable and stable, which should determine the selection of a surface coating. The suitability of a coating material for a given end use situation should be confirmed by the appropriate performance tests.

#### A.3 Appearance

Appearance has been described in terms of build, hiding power and gloss level (4.2). The degree to which categories are split is restricted such that a total of 60 combinations of categories of appearance is possible. This classification provides a description for currently available coatings and has the provision to describe new categories. The following list illustrates how some typical coating systems might be classified. The terms are descriptions and not precise definitions.

- Alkyd gloss paint system: high build; opaque; high gloss.
- Latex gloss system: medium build; opaque; gloss.
- Alkyd varnish (3 coats): high build; transparent; high gloss.
- Joinery woodstain: medium build; semi-transparent; semi-gloss.
- Fence surface treatment: minimal build; semi-transparent; matt.

#### A.3.1 Hiding power

As noted in 4.2.2, hiding power ranges from opaque, through semi-transparent to transparent. There is thus a direct influence on the ability to absorb or reflect potentially harmful solar radiation. In general, maintenance intervals for transparent coatings are shorter than for an opaque system, and this should be assumed unless performance tests demonstrate otherwise.

The influence of hiding power on durability will be further modified by the colour of the coating system. Dark colours will show a much higher absorption of solar radiation than light ones. For example the surface temperature of a black or dark coloured coating system in direct sunlight can reach 80 °C, whereas an equivalent white coating system may only reach 40 °C. Factors affected include wood splitting, resin exudation, rate of deterioration of the coating system, moisture content and fungal growth, though actual performance will be specific to the system.

NOTE. Opacity and colour are related and there may be practical differences in opacity within a product range. For example, a range of semi-transparent wood stains may include dark shades which are effectively opaque.

#### A.3.2 Build (film thickness)

For the purposes of this standard, build is regarded as equivalent to the thickness of the dry coating system and is thus directly related to barrier properties. For a given composition, the water permeability will be controlled by build, and lower build systems will have a higher transmission rate.

#### A.3.3 Gloss

The direct influence of gloss on durability is small. Glossy surfaces may pick up less dirt through soiling than matt surfaces, and are generally easier to clean. The gloss of a coating normally decreases upon ageing. In practice, terms such as 'high gloss' are not applicable to minimal or low-build coating systems where absorption of the coating material by the wood surface modifies appearance.

#### A.4 Exposure conditions

It is important that in selecting a coating system the following factors are considered.

- a) Direction of exposure. In Europe, exposures to the west and south are generally more severe for film breakdown than other directions; the risks of mould and algae growth will generally be higher on north-facing walls.
- b) Inclination. Decreasing the angle of exposure from vertical towards horizontal greatly increases the intensity of weathering.
- c) Local climate. The levels of solar radiation, humidity, temperature and precipitation vary considerably and will greatly influence the performance of a wood coating system.

In practice, exposure conditions will depend not only on climate but also on the degree of shelter offered by the construction. For convenience, exposure conditions are divided into three classes of mild, medium and severe which combine climatic and constructional factors, and which have important practical implications. Coating systems will last longest in a mild situation and require less maintenance. For more exposed situations, a shorter period between maintenance has to be accepted and coating systems with greater durability may therefore be preferred.

It is desirable that any evidence of exterior weathering performance has been obtained in a similar climate to that in which the product is to be used.

#### **A.5 Substrate condition**

Wood species vary considerably in their receptivity to coating materials and in their influence on performance during service. Most softwoods receive coating materials readily, although occasional problems may be experienced where the wood is abnormally resinous. In general, resistance to water absorption and dimensional movement are wood characteristics that are favourable to the performance of the coating system; over-porous wood caused by wet storage adversely affects the appearance and performance of coating systems. Tropical hardwoods often demonstrate very good paint-holding properties, though they can vary considerably in their receptivity. A few hardwoods, for example oak, iroko and teak, require special attention.

Coating system performance is influenced by the surface finish of the wood; durability is generally higher on sawn surfaces than on planed surfaces.

In practice a wide range of substrate influences may be encountered, including:

- wood species;
- new uncoated wood;
- wood degraded by prolonged exposure;
- preservative treated wood;
- factory primed wood;
- weathered coating in need of redecoration.

For specification purposes, information concerning the condition of the substrate must be supplied. It is essential that flaking or poorly adhering coatings and deteriorated wood are removed prior to maintenance.

Compatibility between an existing coating system and a maintenance coating system of a different type should not be assumed without consultation and, where necessary, appropriate tests.

