



This project has been funded with support from the European Commission. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use, which may be made of the information contained therein.

Learning Resources for the course:

Steel Structure Inspector Course for PED INSPECTOR

This document covers only:

Competence unit no. CU-8 SURFACE PROTECTION

Table of Contents

Objectives.....	2
A. Teacher Guideline.....	3
B. Students Guideline.....	3
C. Learning resources.....	4
D. Students tasks.....	4
E. Evaluation.....	5
F. Appendix.....	6

Introduction

Note. It is assumed that the teacher has in depth knowledge of the industry requirements for the topics discussed in this CU.

**Reference document covering the course structure, see document D2.2
The content of this document covers deliverables for D4.1 and D4.2**

The course consists of a number of CU's. A CU is the smallest element in the education system that specifies Learning Outcomes, Skills and Competence. A CU can be delivered individually or it can be delivered in combinations with other CUs in order to cover a defined range of knowledge and competence.

The course will clarify the inspector's role in manufacturing where it begins well before welding starts, continues during the welding operation, involves action after welding is completed, and is finalized only when the results are properly reported.

The course will be work-based and follows the manufacturing process from the order is received until the welded product is ready for delivery. The inspector is responsible for producing documents that ensure traceability of the components and related manufacturing action throughout this process.

Activities in the course will be both planning activities as well as practical tasks to be carried out in the workshop together with the company mentor, or in a laboratory at the VET school.

The learning material will be distributed through the LMS (Learning Management System) system provided for this course.

CU-8 focus on Surface Protection. For most companies such test will be performed by outside sources and specialized companies. However it is important that the students have knowledge and competence from how to carry out such tests and also what should be prerequisite from the company's point of view.

A document tagged with copyright, has a copyright statement in the document itself. The teacher has to read the statement before using the resource. If only a copyright statement is given, the contact the source for the information in order to clarify the meaning

Objectives.

The objective in this CU is to ensure that the students know the basic principles of surface protection and the alternative surface protection methods. The influence of the surface protection on the different production technologies, like cutting and welding will be emphasized. In addition the students should be aware of the possible pollution arising from surface protection and the health and safety issues.

A. Teacher Guideline.

The activities in CU 8 covers surface protection. The IIW guideline, IAB-041r5-19/SV-00, module 2 item 2.1 and item 2.10 covers the activity in this CU.

Surface protection has been added as a topic. Documents and procedures for surface protection should have been developed in CU 4. If not, then do it here.

Surface protection should be presented and discussed from minimum three points of view:

1. From the long-term protection, maintenance, of the product. How to maintain surface protection over the life span of the product.
2. From a welding point of view. What may an early coating mean for the welding processes and what problems may it cause.
3. From a green environmental point of view, environmental pollution and contamination as well as health and safety

We have must assume that the students have many examples here which they can share.

The practical tasks can be related to surface protection activities of single items or from the structure itself

B. Students Guideline

The activities in CU 8 covers surface protection.

The activity are important topics for the delivery and acceptance of the product.

Surface protection control procedures and test methods is important control and examples of documentation should be shown and used in this CU.

Most products will be surfaced protected before delivery. Most probably you already have examples from your company that you can share and discuss with the other students and the teacher.

Also discuss the health and safety aspect of surface protection.

Of special interest is to discuss the surface protection and its influence on welding. Or how to you ensure that the welding operations are not influenced by the surface protection. Share experience on this thematic.

Time schedule for CU 8: 6 hours (2 hours studying, 2 hours practical work and 2 hours zoom meeting)

The documents developed in CU 4 can be used here.

Through the practical part of this CU you should create some surface protection procedures as well as reports related to the product been produced.

When using the LMS system, you will find the material under the folder with “Resources and activities”. The material is available as pdf-files, word- and excel files, and video material (online at YouTube and as mp4 files stored in the learning management system). Please notice that the written assignments should be answered by using the word-files that are embedded into the description of the tasks. **You shall not use** the Office package installed on your own device.

C. Learning resources

Support resources from selected from the Internet.

Title	Producer	Reference	Language	No of pages	Copy-right
--------------	-----------------	------------------	-----------------	--------------------	-------------------

Learning resources developed in the project.

Title	Producer	Language	No of pages	Copyright
CU-8 Surface Protection	Matrai	English	41	No
CU-8 Surface Protection and Dimensional control Catalog for defects-painting	Matrai	English	40	No

Video resources created for this CU

Title	Producer	Time	Reference	Language	Format	Copy-right
Coating Failures	Frosio	3.15		English	mp4	

D. Students tasks

*Carry out surface protection inspection and create an inspection report

*Verify a dimensional control report

*Deliver a surface protection report.

*Create a dimensional control report

*Create a short video showing how you carried out surface inspection.

*Create a video report how you carried out the dimensional control

1. Create reports from the inspections.

2. Evaluate different tools for carrying out this task

3. Ability to evaluate the methods and tools used for the tasks

1. Justify the need for temporary surface protection.

2. Describe the surface cleaning procedures and their characteristics.

3. Describe the relationship between temporary surface protectors and welding.

4. Explain why it is necessary to remove the paint layer on both sides of the seam line from the surface to be coated with the temporary surface protector as far as possible before welding?

5. What are the tests and characteristics of pressure and size control?

E. Evaluation**1. Did you find this module relevant ?**

* Yes

* No

* I don't know

2. Was it time enough for going through the material ?

* Yes

* No

* I do not know

3. Was the resources relevant for this module ?

* Yes

- * No
- * I do not know

F. Appendix.

Learning resources developed for this CU.

CU-8

Product Inspector PILOT Course -2.2-rev01

Surface protection

Surface protection

Industrial primers

- 1 / definition of surface protection,
- 2 / the purpose and tasks of surface protection,
- 3 / preparation of surface protection,
- 4 / the different coating processes and their purpose, plant primers, hot-dip galvanizing
- 5 / pressure test on pressure vessels and measurement of dimensional accuracy,
- 6 / the result of the pressure test measured on the pressure vessels and the acceptance of the dimensional accuracy test

Industrial primers

1a/ Definition of surface protection:

Surface protection is a process that protects the condition of a metal object from corrosion in the state of a part, semi-finished or finished product until its intended use, or until the final corrosion and / or surface protection of the finished product is completed, and is based on subsequent coatings.

1b/ Industrial primers - definition of temporary surface protection:

One type of corrosion protection is temporary surface protection. The surfactant used provides effective protection for a limited time. The protective material is called a working primer (it is a one or more component paint), it can be welded and / or a corrosion protective primer applied to the cleaned surface.

Industrial primers

1b/ Industrial primers - definition of temporary surface protection: One type of corrosion protection is temporary surface protection. The surfactant used provides effective protection for a limited time. The protective material is called a working primer (it is a one or more component paint), it can be welded and / or a corrosion protective primer applied to the cleaned surface.

Industrial primers

2/ Purpose and tasks of surface protection

a technological process by which the coated surface is resistant to corrosion stress for an average period of production without significant damage, but for at least six months and is also suitable as a primer to support the retention of the quality of the coated structural surface together with the protective / paint system during the service life of the product.

Industrial primers - basic standards

- **ISO 8501:**
- Preparation of steel surfaces prior to application of paints and similar products.
- Visual evaluation of surface cleanliness.
- Part 1: Degrees of rusting and surface preparation of unpainted and completely de-stained steel surfaces.

Industrial primers - basic standards

- **ISO 8502:**
- Preparation of steel surfaces prior to application of paints and similar products. Tests to assess surface cleanliness.
- Part 2: Laboratory determination of chloride on cleaned surfaces

Industrial primers - Basic standards

ISO 8503:

Part 1: Preparation of steel surfaces before application of paints and similar products.

Roughness characteristics of shot blasted steel surfaces

Part 2: Method for the classification of roughness of shot blasted steel surfaces.

Comparative procedure.

Industrial primers and welding - basic standards

ISO 8504:

Preparation of steel surfaces prior to application of paints and similar products.

Surface preparation methods.

Part 1: Principles (ISO 8504-1: 2019),

Part 2: Shot blasting (ISO 8504-2: 2019),

Part 3: Manual and machine tool cleaning (ISO 8504-3: 2018).

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-1:2003](#)
- Welding. Investigation of industrial primer coatings in connection with welding and related processes.
 - Part 1: General requirements (ISO 17652-1: 2003),
- [MSZ EN ISO 17652-2:2003](#)
- Welding. Investigation of industrial primer coatings in connection with welding and related processes.
 - Part 2 Welding properties of industrial primers (ISO 17652-2: 2003)
- [MSZ EN ISO 17652-3:2003](#)
- Welding. Investigation of industrial primer coatings in connection with welding and related processes.
 - Part 3: Thermal cutting (ISO 17652-3: 2003),
- [MSZ EN ISO 17652-4:2003](#)
- Welding. Investigation of industrial primer coatings in connection with welding and related processes
 - Part 4: Smoke and gas emissions (ISO 17652-4: 2003)

Industrial primers and welding - basic standards

[MSZ EN ISO 17652-1:2003](#)

Welding.

Investigation of industrial primer coatings in connection with welding and related processes.

Part 1: General requirements (ISO 17652-1: 2003),

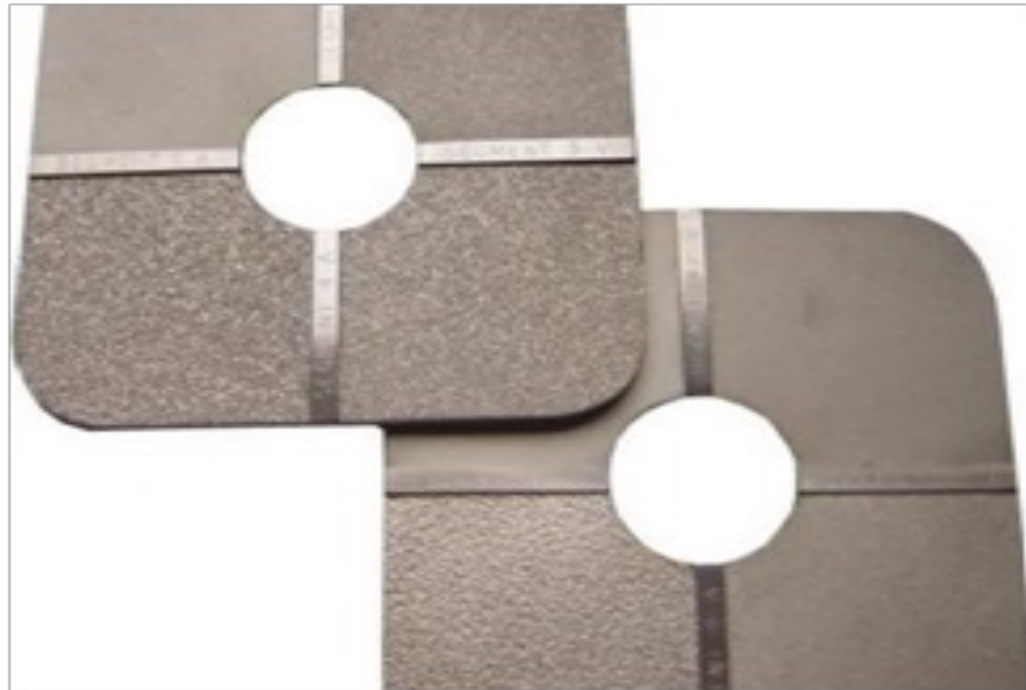
Contains requirements for testing the weldability of steel primers coated with industrial primers.

- The aim can be a uniform test to determine the effect of the applied coating material on the quality of the welded joint (seam), or to develop a new coating material and to compare different coating materials or to verify the authenticity of the manufacturer's / supplier's quality declaration. also for the purpose of control.

Industrial primers and welding - basic standards

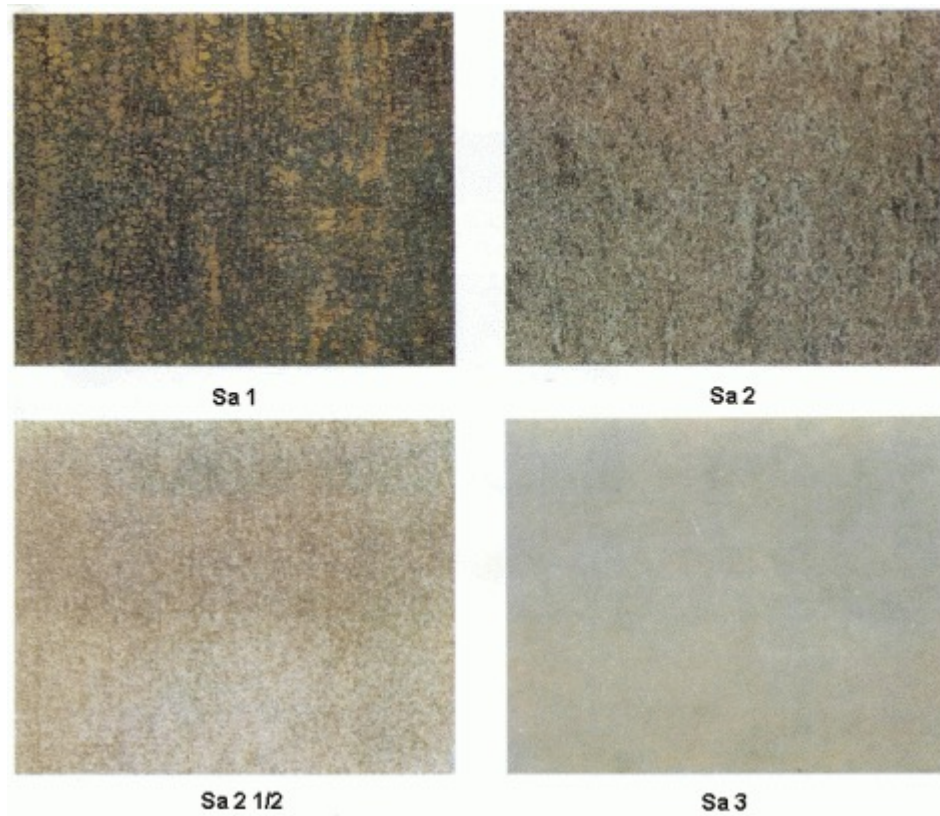
[MSZ EN ISO 17652-1:2003](#)

- one of the tools used for the comparative test:



one of the tools used for the comparative test:

- [MSZ EN ISO 17652-1:2003](#)
- one of the tools used for the comparative test:



Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-2:2003](#)

Welding. Investigation of industrial primer coatings in connection with welding and related processes.

- Part 2 Welding properties of industrial primers (ISO 17652-2:2003).

This standard describes the tests to determine the effect of a plant primer on weldability.

Screening, filter test:

This is a standard method for testing the relative weldability of an operational primer of a specified thickness when making a standard welded joint and also immediately determining the degree of porosity formed.

The screening test is suitable for the supplier to declare his product on the characteristics of the given plant primer and their similar characteristics.

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-2:2003](#)

Welding. Investigation of industrial primer coatings in connection with welding and related processes.

- Part 2 Welding properties of industrial primers (ISO 17652-2:2003).

This standard specifies the effect of a plant primer on weldability.

The following tests are included:

Weldability test:

a procedure that includes an evaluation procedure for the combination of welding consumable and plant primer for different welding processes. To do this, a corner seam of the required size is made, which is suitable for comparison and a false evaluation of the welded joint is performed. For practical reasons, this is the most appropriate test.

Industrial primers and welding - basic standards

[MSZ EN ISO 17652-3:2003](#)

Welding. Investigation of industrial primer coatings in connection with welding and related processes.

Part 3: Thermal cutting(ISO 17652-3: 2003),

This standard specifies the effect of plant primers on the maximum allowable thermal cutting speed.

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-4:2003](#)
- Welding. Investigation of industrial primer coatings in connection with welding and related processes.
 - Part 4: Smoke and gas emissions(ISO 17652-4: 2003)
- This standard specifies the treatment, effect and extent of fumes and gases emitted during welding in the case of industrial primers.

Industrial primers

3/ Preparation of the surface protection

3 / a Quality of the surface chosen for coating:

To achieve this, surface preparation of impeccable quality and the required clean metal surface is required.

The surface cleanliness of steel surfaces and quality control may be carried out in accordance with the relevant ISO 8501 standard before the application of industrial primers and other paints and similar coating products.

Validity of ISO 8501:

Specification of the Pictorial Standards of Cleanlines for unpainted and fully de-stained steel surfaces prior to the application of paints and similar corrosion protection products in the preparation of steel surfaces.

Industrial primers

3/b Quality of the surface chosen for coating:

The working primer coating must not reduce the quality of the welded joint to an extent that differs from or exceeds the permitted level. Surface purity and roughness are usually assessed by comparative visual inspection with a standard (see above). For the qualification and evaluation of the roughness of the surface to be coated with the operational primer, a special test equipment and evaluation procedure is used, which is required by the standard and is suitable for comparing the surface profile. (see also earlier)

Industrial primers

Validity of ISO 8503

This standard specifies visual and tactile methods for the assessment of the characteristic surface profile produced under operating or outdoor conditions when the entire surface of a steel workpiece has been sand-blasted and / or sandblasted and the surface roughness is ISO 8501- 1 according to Sa21 and Sa3 grade. This operation is performed before the plant coating is applied. A comparator is usually used for the ISO-based surface roughness evaluation procedure.

Industrial primers

3/c Cleaning the surface chosen for coating:

Individual metal objects, such as plates, pipes, profiles, etc. they are mainly mechanically cleaned (although manual and chemical processes are possible) and decontaminated.

The surface roughness of the pure metal base metal is approx. It can be 50 - 30 μm .

Prior to welding, check the thickness of the powder-coated paint layer, which should not normally exceed 18 - 20 μm .

The acceptance criteria in EN ISO 8501 must be met in order for the operation to be "accepted".

Industrial primers

3/d Coating the surface selected for coating with a factory primer:

After surface cleaning, surface roughness measurement and quality control, approx. within a maximum of two hours (until the formation of the rust begins) the workpiece is coated and dried with a working primer of the prescribed composition (one or more components) (by manual or mechanical process) in accordance with the permitted layer thickness. The resulting paint layer also serves as a good basis for setting the required “final” protective paint layer against corrosion.

3/e Treatment of industrial primers (welding paints) to protect against temporary corrosion:

Types of paints: single - and multi - component paints are those that can be used within a specified time after mixing in the prescribed proportions before use and under operating atmospheric conditions.

The storage and shelf life of paints are limited, so both the receipt and the use must be recorded, and the so-called It is advisable to use the “FI-FO” method - “first on - first off”.

Industrial primers

- **4/ Supervision, derogation (acceptance), acceptance,**

- **4/a Supervision**

- Before starting the anti-corrosion operation, it is advisable to use inspectors in parallel with the operation to carry out the surface treatment and corrosion protection in operation.
- The preparatory inspection activity: inspection of all surfaces, welded joints and corner edging surfaces with standard visual inspection, documentation of the result.
- Corrosion protection must be carried out in accordance with the applicable regulations and work (technological) instructions.

- **4/b The difference**

the scrap must be treated and, if it can be repaired, the authorized recovery process must be restarted.

Industrial primers

- **4/c The takeover**
- starting point: the plant primer has a special quality characteristic: one is limited in time, the other is subject to the required workshop atmosphere (eg workshop, workpiece, paint temperature, workshop humidity). This plant primer has been developed for specific plant tasks.
- According to the technological operating instructions, the required quality of the welded joint formed by welding the working primer applied to the surface of the test piece must not be reduced - therefore its name may be “welded”.
- The effect of the industrial primer on welding and welding is determined by testing and the ISO 17652 standard can be used for this.

Industrial primers

The effect of the plant primer on the quality of the seam must be determined and verified by an objective and generally accepted method (see above).

Inspection and evaluation of the plant primer:

ISO 17652

Industrial primers

EN ISO 17652

Basic operations of corrosion protection:

- production of a clean metal surface and the required surface roughness,
- application of a one- or two-component working primer coating on this surface with specified, approved work equipment and technology of the required thickness, in the presence of the specified operating temperature and humidity in the work area,
- On steel structures, surface cleaning is effective on preforms, e.g. on plates, pipes, profile sections, etc. basically mechanical, e.g. beer / sandblasting, chemical descaling,

Industrial primers

EN ISO 17652

- **Basic operations of corrosion protection:**
- the cleaning and the application primer are applied to the surface of the workpiece against the rust for approx. It protects for 6 months and serves as a good (bonding) basis for corrosion-resistant paint layers with a higher layer thickness (approx. 200 - 300 μm) and a longer service life during the production of the welded metal structure,
- for welding and thermal cutting, the width to be removed along the line of the seam or flame cut before the start of the operation must be specified if the paint layer has not been shown to be weldable - if this has to be verified in advance, and the conditions of use must be complied with

Industrial primers

Basic operations of corrosion protection:

- after the surface coating certain technological processes of steel structure production follow,
- at this stage of the manufacturing process, the plant primer is on the surface of the workpiece and has already dried,
- the production of the flame-cut surface, corset seams and welded joints begins,
- it is a question of quality assurance that the surface coated and dried with the plant primer is now not "metal clean" and how it behaves when exposed to heat, as only metal-clean surfaces can be welded,

Industrial primers

- the question is whether the plant primer should be removed from the surface to be thermally cut and, if so, how large it should be (approximately 50-70 mm) in terms of the two sides of the cut or seam,
- if it does not need to be removed because it can be welded or flame cut, then the quality of the joint and / or the cut surface will be acceptable,
- the relationship between the factory primer and the weld must be traceably and repeatedly examined for quality assurance reasons,
- standards help to implement the process effectively.

Industrial primers

MSZ EN ISO 17652 – 1 – 4 standard

Basic features of welding and flame cutting tests:

the material of the test piece, (EN 10278: Dimensions and tolerances for bright steel products,

- roughness of the surface after cleaning: max. 50 μ m,
- the thickness (approx. max. 18 - 20 μ m) and technological treatment of the working primer coating layer after drying (powder drying) according to the manufacturer's instructions,
- cleaning the paint on both sides of the seam is approx. 50-50 mm wide or with prior permission without removing the initial primer,

Industrial primers

MSZ EN ISO 17652 – 1 – 4 standard

Basic features of welding and flame cutting tests:

- the humidity content and temperature of the work, test and test environment,
- the technological relationship between the welding process (eg 135), the welding parameters, the lacing and the production of the welded joint,
- the test, the series of tests; and chronology,
- measuring and machining of test pieces, preparation according to specifications, etc.

Industrial primers

- **MSZ EN ISO 17652 – 1 – 4 standard**

- Measurements required by the standard:
 - measurement of smoke emitted (according to EN ISO 15011),
 - to measure and evaluate the effects of smoke and combustion products on humans,
 - the amount of gas pores on the surface and in the bond, measured and evaluated,
 - complete, inspect, approve and traceably archive the inspection and control report in the prescribed format,

Industrial primers

- **MSZ EN ISO 17652 – 1 – 4 standard**
- the humidity content and temperature of the work, test and test environment,,
- technological relationships between the welding process (eg 135), welding parameters, lacing and the production of welded joints,
- the test, the series of tests; and chronology,
- measuring and machining of test pieces, preparation according to specifications, etc.

Hot dip galvanizing

MSZ EN ISO 1461:2009

- “Hot-dip galvanized coatings on finished iron and steel products.
 - Requirements and test methods”

Hot dip galvanizing is a simple, easy-to-understand technology.

The processes of protective layer formation are complex.

The weight of the metal bath should be a multiple of the dipped workpiece. (Following Árpád Antal)

Hot dip galvanizing

- It is defined in ISO 1461 :
- - general characteristics of coatings and test procedures,
- - the conditions of application, e.g. the process is not applicable to the immersion coating of sheets, wires, welded mesh products, pipes and pipelines because they use automatic equipment.

Hot dip galvanizing

TECHNOLOGY :

Immersion: maximum dimensions of the workpiece that can be galvanized with a single immersion: depends on the size of the galvanizing tub

Example: In Dunaújváros - the size of the tub:

- length: 12,0 m,
- width: 1,1 m,
- height: 1,8 m,

Maximum weight that can be immersed : 5 t

In some cases, larger elements can be hot-dip galvanized by rotation.

Hot dip galvanizing

Operating temperature : kb. 450°C

Heat effect :

The residual stress of the welded product decreases at the hot-dip galvanizing temperature and this occurs in deformation - the phenomenon must be taken into account

Védőréteg vastagság: 50 – 150 μm,

Duplex protection: galvanized and its surface painting

Hot dip galvanizing

- **Chemical composition of the seam :**
 - e.g. The content of Si and P is an important factor in the formation, quality and thickness of the protective layer,
 - the increase in layer thickness is generally proportional to the time spent in the bath,
 - but the appearance of the seam also plays an important role.

The galvanized surface :

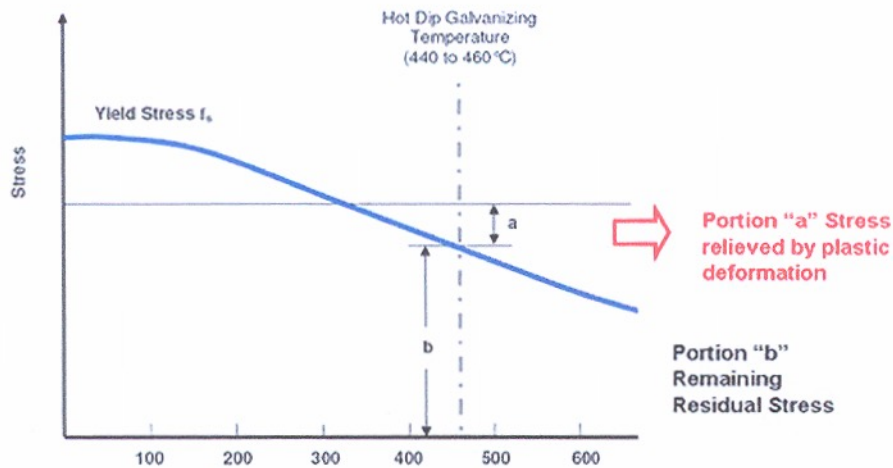
- bright
- silvery and
- it can be zucchini.

Két hegesztési eset van:

- welding of galvanized workpiece,
- galvanizing of non - galvanized workpieces after welding.

Hot dip galvanizing

change of yield point as a function of temperature



Yield limit of the steel changed by the increase in temperature [Ref: Galvanizers Association Southern Africa]

Hot dip galvanizing

- Faulty weld :



END

CU-8

Product Inspector PILOT Course -1.8-rev01

Surface protection

Industrial primers

- 1 / definition of surface protection,
- 2 / the purpose and tasks of surface protection,
- 3 / preparation of surface protection,
- 4 / the different coating processes and their purpose, plant primers, hot-dip galvanizing
- 5 / pressure test on pressure vessels and measurement of dimensional accuracy, 6 / the result of the pressure test measured on the pressure vessels and the acceptance of the dimensional accuracy test

Industrial primers

1a/ Definition of surface protection :

Surface protection is a process that protects the condition of a metal object from corrosion in the state of a part, semi-finished or finished product until the intended use or the final corrosion and / or surface protection of the finished product is completed and is based on the following surface protective layers.

1b/ Industrial primers - Definition of temporary surface protection :

One type of corrosion protection is temporary surface protection. The surfactant used provides effective protection for a limited time. The protective material is called a working primer (it is a one or more component paint), it can be welded and / or a corrosion protective primer applied to the cleaned surface.

Industrial primers

1b/ Industrial primers - Definition of temporary surface protection :

One type of corrosion protection is temporary surface protection. The surfactant used provides effective protection for a limited time. The protective material is called a working primer (it is a one or more component paint), it can be welded and / or a corrosion protective primer applied to the cleaned surface.

Industrial primers

2/ Purpose and tasks of surface protection

a technological process by which the coated surface is resistant to corrosion for an average period of production without significant damage, but for at least six months and is also suitable as a primer to support the retention of the quality of the coated structural surface with the protective coating / paint system; during the service life of the product.

Industrial primers - basic standards

- **ISO 8501:**
- Preparation of steel surfaces before application of paints and similar products.
- Visual evaluation of surface cleanliness.
- Part 1: Degrees of rusting and surface preparation of unpainted and completely de-stained steel surfaces.

Industrial primers - basic standards

- **ISO 8502:**
- Preparation of steel surfaces before application of paints and similar products. Tests to assess surface cleanliness.
- Part 2: Laboratory determination of chloride on cleaned surfaces.

Industrial primers - Basic standards

ISO 8503:

Part 1: Preparation of steel surfaces before application of paints and similar products.

Roughness characteristics of shot blasted steel surfaces.

Part 2: Method for the classification of roughness of shot blasted steel surfaces. Comparative procedure.

Industrial primers and welding - basic standards

ISO 8504:

Preparation of steel surfaces before application of paints and similar products.

Surface preparation methods.

Part 1: Principles (ISO 8504-1:2019),

Part 2: Shot Blasting (ISO 8504-2:2019),

Part 3: Manual and machine tool cleaning (ISO 8504-3:2018).

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-1:2003](#) Angol nyelvű!
Welding. Investigation of industrial primer coatings in connection with welding and related processes.
Part 1: General requirements (ISO 17652-1:2003),
- [MSZ EN ISO 17652-2:2003](#) Angol nyelvű!
Welding. Investigation of industrial primer coatings in connection with welding and related processes.
Part 2 Welding properties of industrial primers (ISO 17652-2:2003),
- [MSZ EN ISO 17652-3:2003](#) Angol nyelvű!
Welding. Investigation of industrial primer coatings in connection with welding and related processes.
Part 3: Thermal cutting (ISO 17652-3:2003),
- [MSZ EN ISO 17652-4:2003](#) Angol nyelvű!
Welding. Investigation of industrial primer coatings in connection with welding and related processes.
Part 4: Smoke and gas emissions (ISO 17652-4:2003)

Industrial primers and welding - basic standards

[MSZ EN ISO 17652-1:2003](#) Angol nyelvű!

Welding.

Investigation of industrial primer coatings in connection with welding and related processes.

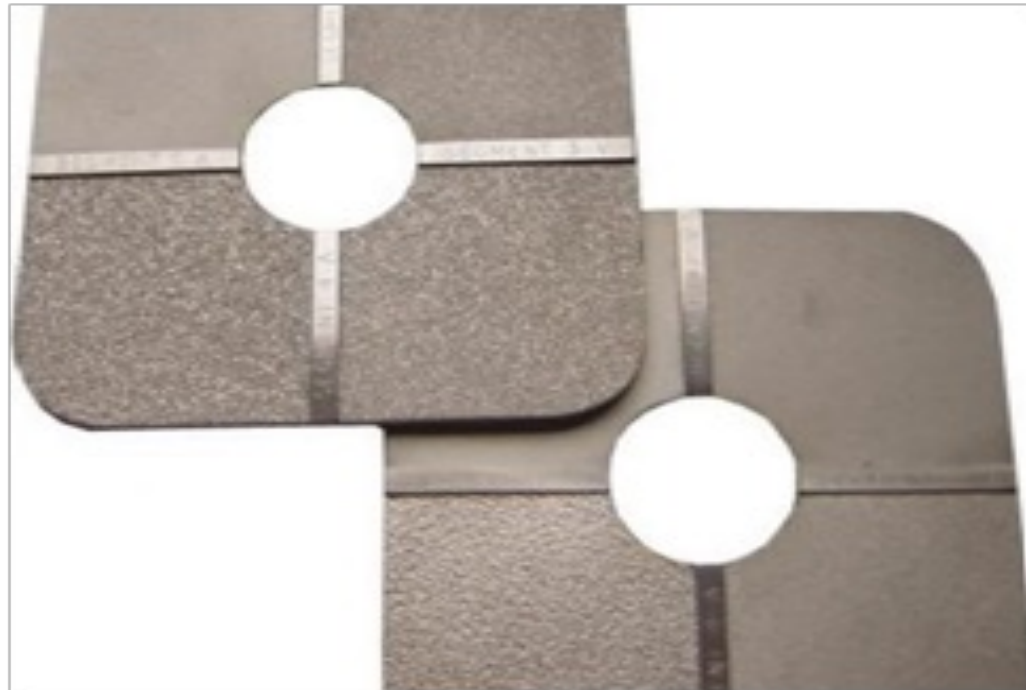
Part. 1.: General requirements(ISO 17652-1:2003),

- Contains requirements for testing the weldability of steel primers coated with industrial primers.
- The aim can be a uniform test to determine the effect of the applied coating material on the quality of the welded joint (seam), or to develop a new coating material and to compare different coating materials or to verify the authenticity of the manufacturer's / supplier's quality declaration. also for the purpose of control.

Industrial primers and welding - basic standards

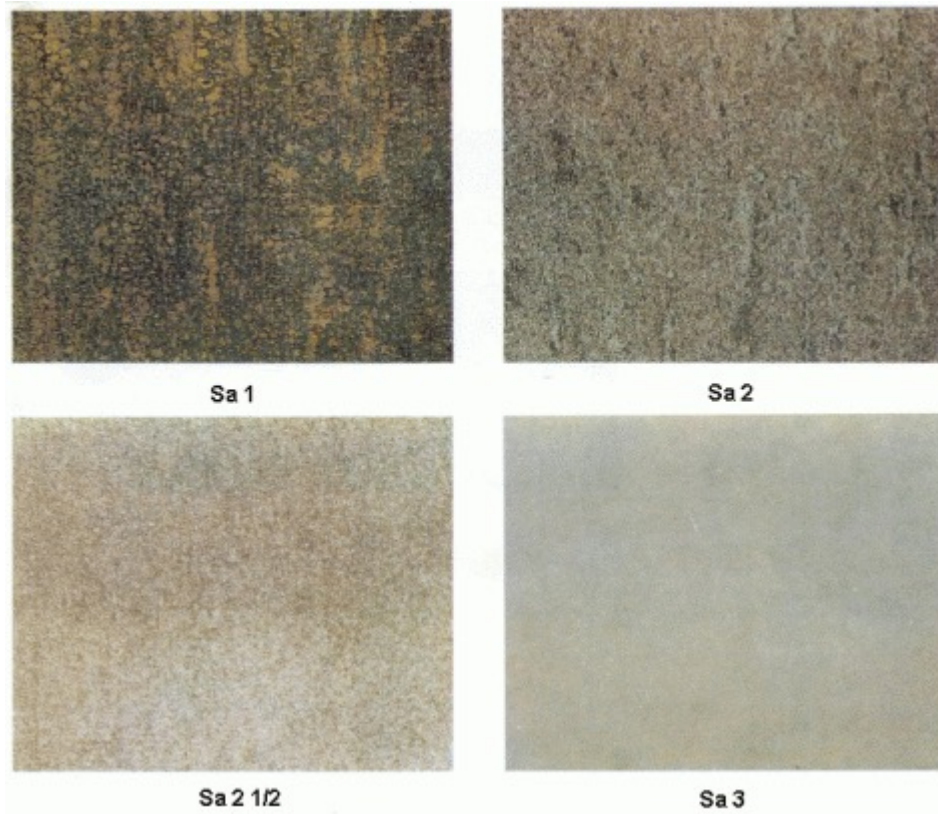
[MSZ EN ISO 17652-1:2003](#)

- one of the tools used for the comparative test:



Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-1:2003](#)
- Surface roughness sample values:



Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-2:2003](#) Angol nyelvű!

Welding. Investigation of industrial primer coatings in connection with welding and related processes.

Part 2 Welding properties of industrial primers
(ISO 17652-2:2003).

This standard describes the tests to determine the effect of a plant primer on weldability.

[The following tests are included:](#)

Screening, filter test:

This is a standard method for testing the relative weldability of an operational primer of a specified thickness when making a standard welded joint and also immediately determining the degree of porosity formed. The screening test is suitable for the supplier to declare his product on the characteristics of the given plant primer and their similar characteristics.

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-2:2003](#) Angol nyelvű!

Welding. Investigation of industrial primer coatings in connection with welding and related processes.

Part 2 Welding properties of industrial primers
(ISO 17652-2:2003).

The following tests are included:

Weldability test:

a procedure that includes an evaluation procedure for the combination of welding consumable and plant primer for different welding processes. To do this, a corner seam of the required size is made, which is suitable for comparison and a false evaluation of the welded joint is performed. For practical reasons, this is the most appropriate test.

Industrial primers and welding - basic standards

[MSZ EN ISO 17652-3:2003](#) Angol nyelvű!

- Welding. Investigation of industrial primer coatings in connection with welding and related processes.
Part 3: Thermal cutting (ISO 17652-3:2003),

This standard specifies the effect of plant primers on the maximum allowable thermal cutting speed.

Industrial primers and welding - basic standards

- [MSZ EN ISO 17652-4:2003](#) Angol nyelvű!
- Welding. Investigation of industrial primer coatings in connection with welding and related processes.

Part 4: Smoke and gas emissions
(ISO 17652-4:2003)

This standard specifies the treatment, effect and extent of fumes and gases emitted during welding in the case of industrial primers.

Industrial primers

3/ Preparation of the surface protection

3/a Quality of the surface chosen for coating:

To achieve this, surface preparation of impeccable quality and the required clean metal surface is required.

The surface cleanliness of steel surfaces and quality control may be carried out in accordance with the relevant ISO 8501 standard before the application of industrial primers and other paints and similar coating products.

Validity of ISO 8501:

Specification of the Pictorial Standards of Cleanliness for unpainted and fully de-stained steel surfaces prior to the application of paints and similar corrosion protection products in the preparation of steel surfaces.

Industrial primers

3/b Quality of the surface chosen for coating :

The service primer coating must not reduce the quality of the welded joint to a greater extent than permitted and to a greater extent.

Surface purity and roughness are usually assessed by comparative visual inspection with a standard (see above). For the qualification and evaluation of the roughness of the surface to be coated with the operational primer, a special test equipment and evaluation procedure is used, which is required by the standard and is suitable for comparing the surface profile. (see also earlier)

Industrial primers

Validity of ISO 8503

This standard specifies visual and tactile methods for the assessment of the characteristic surface profile produced under operating or outdoor conditions when the entire surface of a steel workpiece has been sand-blasted and / or sandblasted and the surface roughness is ISO 8501- 1 has Sa21 and Sa3 grades.

This operation is performed before the plant coating is applied.

A comparator is usually used for the ISO-based surface roughness evaluation procedure.

Industrial primers

3/c Cleaning the surface chosen for coating:

Individual metal objects, such as plates, pipes, profiles, etc. they are mainly mechanically cleaned (although manual and chemical processes are possible) and decontaminated.

The surface roughness of the pure metal base metal is approx. It can be 50 - 30 μm .

Prior to welding, check the thickness of the powder-coated paint layer, which should not normally exceed 18 - 20 μm .

The acceptance criteria in EN ISO 8501 must be met in order for the operation to be "accepted".

Industrial primers

3/d Coating the surface selected for coating with a factory primer :

After surface cleaning, surface roughness measurement and quality control, approx. within a maximum of two hours (until the formation of the rust begins) the workpiece is coated and dried with a working primer of the prescribed composition (one or more components) (by manual or mechanical process) in accordance with the permitted layer thickness.

The resulting paint layer also serves as a good basis for setting the required “final” protective paint layer against corrosion.

3/e Treatment of industrial primers (welding paints) to protect against temporary corrosion :

Types of paint: there are single and multi-component paints that can be used within a specified time after mixing in the prescribed proportions before use and under operating atmospheric conditions.

The storage and shelf life of paints are limited, so both the receipt and the use must be recorded, and the so-called It is advisable to use the “FI-FO” method - “first on - first off”.

Industrial primers

- **4/ Supervision, deviation (acceptance), acceptance,**

4/a Supervision

- Before starting the anti-corrosion operation, it is advisable to use inspectors in parallel with the operation to carry out the surface treatment and corrosion protection in operation.
- Preparatory inspection activity: inspection of all surfaces, welded joints and corner edging surfaces with standard visual inspection, documentation of the result.
- Corrosion protection must be carried out in accordance with the applicable regulations and work (technological) instructions.

4/b The difference

- the scrap must be treated and, if it can be repaired, the authorized recovery process must be restarted.

Industrial primers

- **4/c The takeover**
- starting point: the plant primer has a special quality characteristic: one is limited in time, the other is subject to the required workshop atmosphere (eg workshop, workpiece, paint temperature, workshop humidity). This plant primer has been developed for specific plant tasks.
- According to the technological operating instructions, the required quality of the welded joint formed by welding the working primer applied to the surface of the test piece must not be reduced - therefore its name may be "weldable".
- The effect of the industrial primer on welding and welding is determined by testing and ISO 17652 can be used for this.

Industrial primers

The effect of the plant primer on the quality of the seam must be determined and verified by an objective and generally accepted method (see above).

Examination and evaluation of the plant primer :

ISO 17652

Industrial primers

EN ISO 17652

Basic operations of corrosion protection:

- production of a clean metal surface and the required surface roughness,
- application of a one- or two-component working primer coating to this surface with the specified, approved work equipment, technology, in the presence of the specified operating temperature and humidity in the work area, with a specified layer thickness,
- On steel structures, surface cleaning is effective on preforms, e.g. on plates, pipes, profile sections, etc. basically mechanical, e.g. beer / sandblasting, chemical descaling,

Industrial primers

EN ISO 17652

- **Basic operations of corrosion protection :**
- the cleaning and the application primer are applied to the surface of the workpiece against the rust for approx. It protects for 6 months and serves as a good (bonding) basis for corrosion-resistant paint layers with a higher layer thickness (approx. 200 - 300 μm) and a longer service life during the production of the welded metal structure,
- for welding and thermal cutting, the width to be removed along the line of the seam or flame cut before the start of the operation must be specified if the paint layer has not been shown to be weldable - if this has to be verified in advance, and the conditions of use must be complied with.

Industrial primers

Basic operations of corrosion protection :

- after the surface coating certain technological processes of steel structure production follow,
- at this stage of the manufacturing process, the plant primer is on the surface of the workpiece and has already dried,
- the production of the flame-cut surface, the corset seams and the welded joints begins,
- it is a quality assurance question that the surface coated and dried with the plant primer is now not “metal clean” and how it behaves when exposed to heat, as only metal-clean surfaces can be welded,

Industrial primers

- the question is whether the plant primer should be removed from the surface to be thermally cut and, if so, how large it should be (approximately 50-70 mm) in terms of the cut or seam on both sides,
- if it does not need to be removed because it can be welded or flame cut, then the quality of the joint and / or the cut surface will be acceptable,
- the relationship between the factory primer and the welding must be traceably and repeatedly examined for quality assurance reasons,
- standards help to implement the process effectively.

Industrial primers

MSZ EN ISO 17652 – 1 – 4 standard

Basic features of welding and flame cutting tests:

- the material of the test piece, (EN 10278: Dimensions and tolerances for bright steel products,
- surface roughness after cleaning: approx. max. 50µm,
- the thickness of the working primer coating layer after drying (powder drying) (approx. max. 18 - 20 µm) and its technological treatment according to the manufacturer's instructions,
- cleaning the paint on both sides of the seam is approx. 50-50 mm wide or with prior permission without removing the initial primer,

Industrial primers

MSZ EN ISO 17652 – 1 – 4 standard

Basic features of welding and flame cutting tests :

- humidity and temperature of the work, test and test environment,
- technological relationships between the welding process (eg 135), welding parameters, lacing and the production of welded joints,
- the test, the series of tests; and chronology
- measuring and machining of test pieces, preparation according to specifications, etc.

Industrial primers

- **MSZ EN ISO 17652 – 1 – 4 standard**

- Measurements required by the standard:
 - measurement of emitted smoke (according to EN ISO 15011),
 - to measure and evaluate the effects of smoke and combustion products on humans,
 - the amount of gas pores on the surface and in the bond is measured and evaluated,
 - fill in, inspect, approve and traceably archive the inspection and control report in the prescribed format,

Hot dip galvanizing

MSZ EN ISO 1461:2009

- „Hot-dip galvanized coatings on finished iron and steel products.
 - Requirements and test methods”

Hot dip galvanizing is a simple, easy to understand technology.

The processes of protective layer formation are complex.

The weight of the metal bath should be a multiple of the dipped workpiece. (Following Árpád Antal)

Hot dip galvanizing

- It is defined in ISO 1461 :
- - general characteristics of coatings and test procedures,
- - the conditions of application, e.g. the process is not applicable to the immersion coating of sheets, wires, welded mesh products, pipes and pipelines because they use automatic equipment.

Hot dip galvanizing

TECHNOLOGY :

Immersion: Maximum dimensions of the workpiece that can be galvanized with a single immersion: depends on the size of the galvanizing tank.

Example: In Dunaújváros - the size of the tub :

- length : 12,0 m,
- breadth : 1,1 m,
- height : 1,8 m,

Maximum weight that can be immersed : 5 t

In some cases, larger elements can be hot-dip galvanized by rotation.

Hot dip galvanizing

Operating temperature : kb. 450°C

Heat effect :

The residual stress of the welded product decreases at the hot-dip galvanizing temperature and this results in deformation - this phenomenon must be taken into account.

Protective layer thickness : 50 – 150 µm,

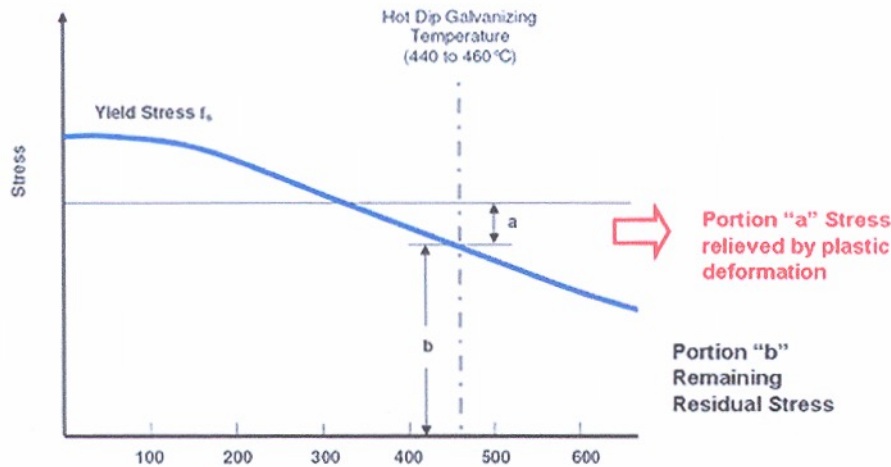
Duplex protection : galvanized and its surface painting

Hot dip galvanizing

- **Chemical composition of the seam :**
 - e.g. The content of Si and P is an important factor in the formation, quality and thickness of the protective layer,
 - the increase in layer thickness is generally proportional to the time spent in the bath,
 - but the appearance of the seam also plays an important role.
- **The galvanized surface :**
 - bright,
 - silvery and
 - **horganyvirágos lehet.**
- **There are two welding cases:**
 - welding of galvanized workpiece,
 - galvanizing of non - galvanized workpieces after welding.

Hot dip galvanizing

change of yield point as a function of temperature



Yield limit of the steel changed by the increase in temperature [Ref: Galvanizers Association Southern Africa]

Hot dip galvanizing

- Defective weld:



END

CATALOG DE DEFECTE LA VOPSIRE

Datele din acest catalog au caracter informativ: acestea au rolul de a ilustra defectele de vopsire cel mai des intilnite si de a sugera cauzele probabile, precum si posibile metode de prevenire si reparare.

Aceste sugestii NU exclud sub nici o forma analiza aprofundata a fiecarui defect de vopsire produs in ateliere si stabilirea – pentru fiecare caz in parte – a cauzelor reale si a metodelor optime de indepartare a neconformitatilor.

Analiza defectelor de vopsire se face impreuna cu specialistii si personalul calificat in domeniu.

Modul de tratare a neconformitatilor se face in conformitate cu procedurile interne “Controlul produsului neconform”, si “Tratarea reclamatilor”.

The data in this catalog are informative: they are intended to illustrate the most frequently encountered painting defects and to suggest probable causes, as well as possible methods of prevention and repair. These suggestions do NOT in any way exclude the in-depth analysis of every painting defect produced in the workshops and the establishment - for each individual case - of the real causes and the optimal methods of removing the non-conformities. The analysis of painting defects is done together with specialists and qualified personnel in the field. Non-conformities are treated in accordance with the internal procedures "Control of non-conforming products" and "Complaints treatment".

Fotografiile prezentate cu titlul de exemplu au fost, in parte, efectuate in timpul desfasurarii proceselor tehnologice din fabrici sau au fost preluate din materiale puse la dispozitie de clienti, colaboratori sau parteneri

Materiale bibliografice utilizate: Fitz Atlas, Painting Inspector Manual.

The photos presented with the example title were, in part, taken during the technological processes in factories, or from materials made available by clients, collaborators or partners. Bibliographic materials used: Fitz Atlas, Painting Inspector Manual.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: Lipsa aderența** (vezi și delaminare, exfoliere, cojire)
- **DESCRIERE:** vopseaua nu adera la substrat sau la stratul de primer / vopseaua se cojeste
- **CAUZE POSIBILE :** suprafața suport contaminată sau cu condens
- **PREVENIRE:** asigurați-vă că suprafața suport este pregătită corect, este curată și uscată, lipsită de orice agenți de contaminare. Utilizați sistemul de vopsire indicat
- **REMEDIERE:** depinde de cât de extins este defectul. Este necesară îndepărtarea vopselei și curățarea totală a suprafeței înainte de revopsire

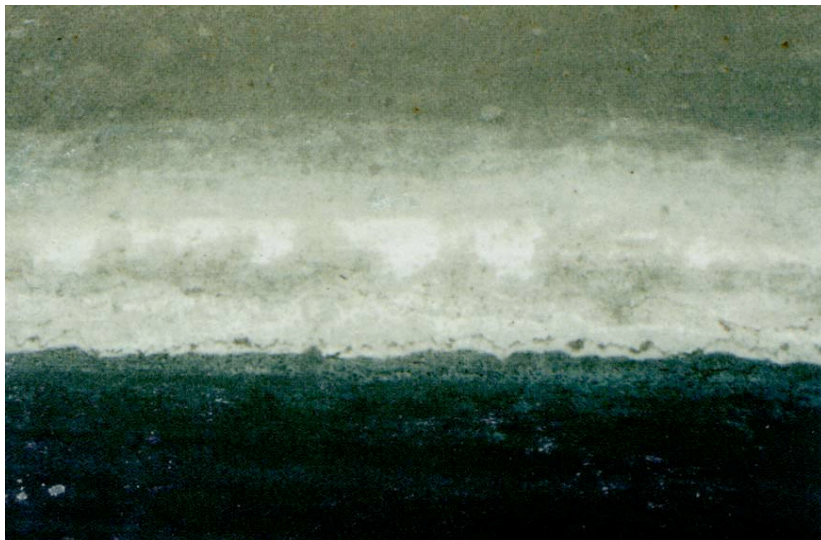


- **DEFECT: exfoliere**
- **DESCRIERE:** o formă particulară de lipsă de aderență în care vopseaua se desprinde efectiv de pe substrat. Apare des la suprafețe galvanizate
- **CAUZE POSIBILE:** sistem de vopsire incorect. Pre-tratarea substratului (ne-feros sau galvanizat) s-a făcut incorect sau nu s-a făcut deloc. Poate fi datorat și contractării diferite între vopsea și substrat (mai ales la lemn)
- **PREVENIRE:** utilizarea unui sistem de vopsire corect și utilizarea pre-tratării.
- **REMEDIERE:** se curată toată vopseaua care se desprinde, se resablează și se aplică sistemul indicat de producătorul de vopsea

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: Delaminare**
- **DESCRIERE:** lipsa aderenței între straturile de vopsea.
- **CAUZE POSIBILE :** pregătirea incorectă a suprafeței; contaminarea stratului intermediar; timp prea mare între acoperiri; aplicarea vopselei pe o suprafață lucioasă
- **PREVENIRE:** se evita contaminarea stratului intermediar; se respecta timpii de aplicare a straturilor de vopsea; curățați și slefuiți ușor (abraziune ușoară) a suprafețelor foarte lucioase.
- **REMEDIERE:** se stabilește în funcție de situație și suprafața contaminată

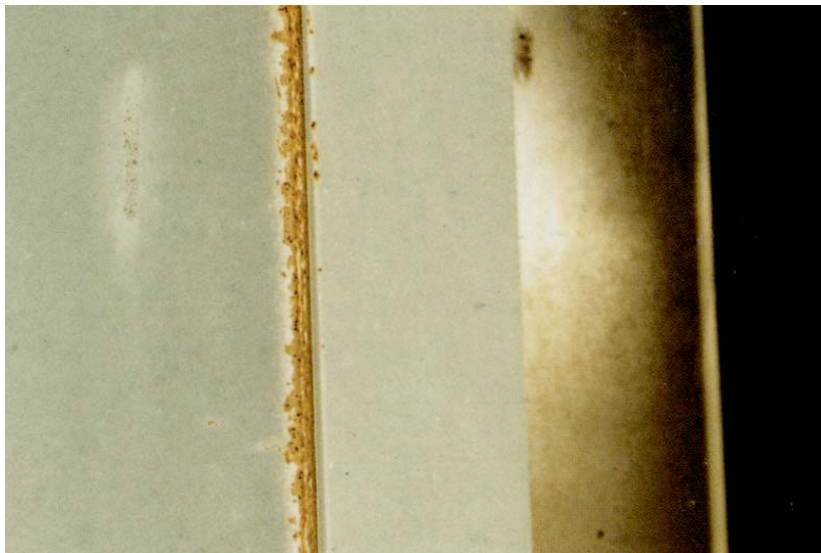


- **DEFECT: Carbonati de zinc**
- **DESCRIERE:** pierderea aderenței pe suprafețe galvanizate. Formare de goluri (în stratul de vopsea) pe suprafețe galvanizate
- **CAUZE POSIBILE:** “rugină albă” (carbonatii) prezenți pe suprafața galvanizată anterior aplicării vopselei; corodarea zincului sub stratul de vopsea
- **PREVENIRE:** protejarea stratului de zinc față de acțiunea mediului; aplicarea unui sistem de vopsire adecvat.
- **REMEDIERE:** se spală suprafața pentru îndepărtarea sărurilor de zinc: se curăță vopseaua prin abraziune și se aplică sistemul de vopsire adecvat

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: cojire**
- **DESCRIERE:** similara cu exfolierea, produce fisii subtiri si elastice care se indeparteaza cu usurinta de pe metal sau de pe stratul intermediar.
- **CAUZE POSIBILE :** fortele de legatura ale stratului de vopsea sunt reduse datorita contaminarii sau a incompatibilitatii intre straturi.
- **PREVENIRE:** respectarea sistemului de vopsire indicat de producator; curatarea corecta a suprafatei metalului.
- **REMEDIERE:** se indeparteaza total vopseaua sau se indeparteaza toata vopseaua care se cojeste pina la un strat ferm. Se curata suprafata metalica si se aplica sistemul prescris.

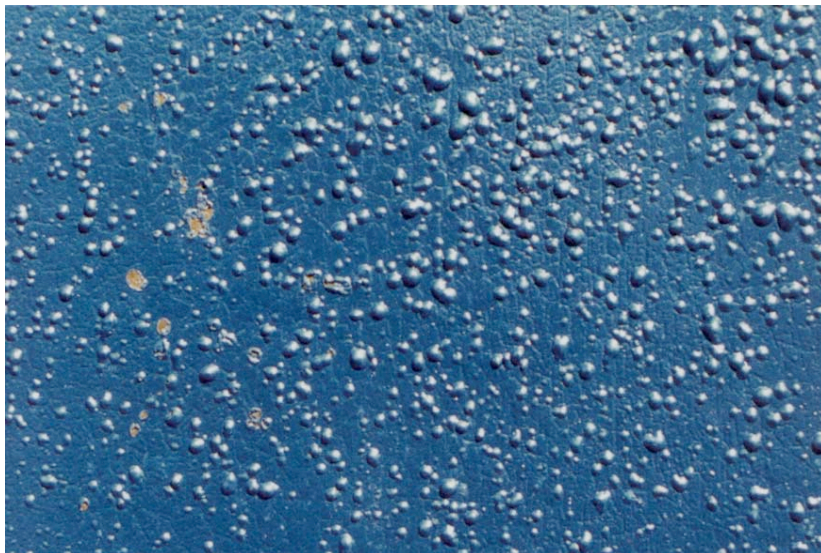


- **DEFECT: eroziune regresiva**
- **DESCRIERE:** coroziunea metalului de baza vizibila la suprafata stratului de vopsea: cazurile severe duc la exfoliere, delaminare, etc.
- **CAUZE POSIBILE :** vopsea aplicata pe suprafata corodata deja; suprafata de baza cu lovituri, ciupituri, etc., nu a fost grunduita.
- **PREVENIRE:** respectarea cerintelor referitoare la starea si pregatirea suprafetei; utilizare sistem de vopsire indicat de producator (utilizarea unui grund adecvat)
- **REMEDIERE:** curatare pina la metal, incl suprafata erodata: aplicarea sistemului de vopsire indicat de producatorul de vopsea.

CATALOG DE DEFECTE LA VOPSIRE

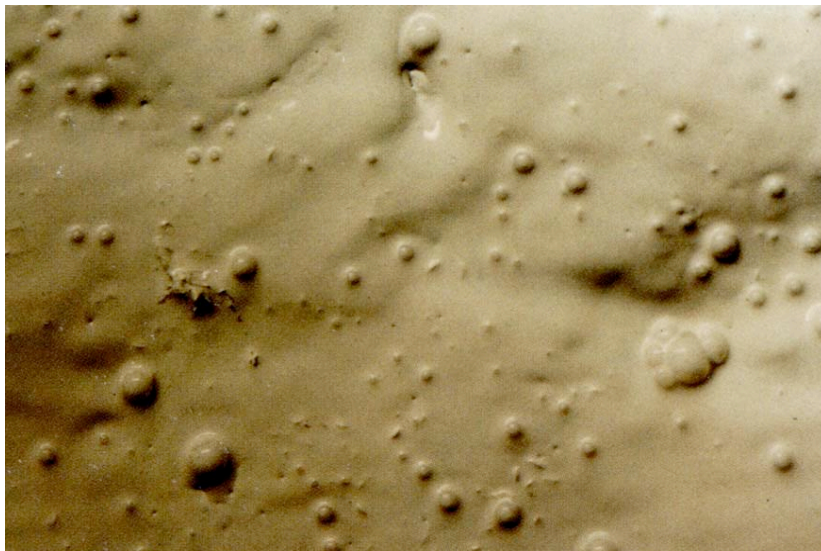


- **DEFECT: aspect zgrumtuos / rugos**
- **DESCRIERE:** filmul este contaminat cu coji de vopsea si particule straine ce dau suprafetei un aspect de rugozitate.
- **CAUZE POSIBILE:** contaminarea in interiorul sau la suprafata a stratului de vopsea (praf, particule de sablare, coji de vopsea, etc)
- **PREVENIRE:** vopsirea cu echipament curat, in mediu curat, fara praf. Cutiile de amestec de vopsire trebuie pastrate inchise: amestecul sa fie ferit de praf si impuritati
- **REMEDIERE:** inlaturarea completa a stratului contaminat inainte de revopsire

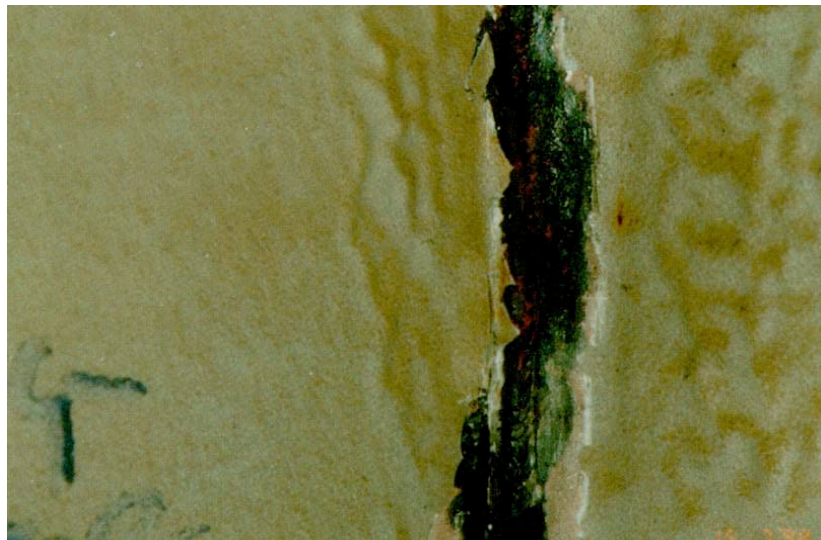


- **DEFECT: basicare**
- **DESCRIERE:** ridicaturi sub forma de basici in filmul uscat de vopsea. Basicile pot contine gaz, lichid sau corpuri solide.
- **CAUZE POSIBILE:** Lipsa punctuala de dereneta datorata contaminarii cu grasimi, uleiuri, saruri, praf sau mizerie fixata pe suprafata metalului sau a stratului intermediar.
- **PREVENIRE:** curatirea si degresarea corecta a stratului de baza; utilizarea sistemului de vopsire indicat.
- **REMEDIERE:** indepartare vopsea pe toata zona afectata, curatire suprafata + reaplicare sistem specificat de producatorul de vopsea

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT:** bule in stratul de vopsea
- **DESCRIERE:** bule de marimi diferite, unele intacte, altele sparte ce lasa un aspect de crater. Apar mai ales in stratul excesiv de gros de vopsea (a nu se confunda cu basicarea – descris anterior)
- **CAUZE POSIBILE :**aer sau solvent in stratul de vopsea, neeliberat prin uscare
- **PREVENIRE:** utilizare echipament de vopsire air-less, ajustarea viscozitatii vopselei (utilizare diluant indicat), sau modificarea temperaturii de aplicare. Utilizati echipament de amestecare potrivit, astfel incit aerul sa nu fie antrenat in timpul amestecarii..
- **REMEDIERE:** indepartare strat afectat, curatare, revopsire



- **DEFECT:** arcuire
- **DESCRIERE:** umflarea stratului de vopsea aplicat la colturi, peste suduri sau crapaturi, fisuri, etc., ce duce ulterior la aparitia unor defecte de genul exfolierii, cojirii, etc.
- **CAUZE POSIBILE:** mod de aplicare deficitar; defecte in stratul de baza
- **PREVENIRE:** aplicare prin pensulare la colturi sau peste anumite cordoane de sudura; repararea defectelor (crapaturi, fisuri) inainte de vopsire.
- **REMEDIERE:** se indeparteaza vopseaua scorojita, se curata (si se repara) stratul de baza, se aplica o fisie de vopsea prin pensulare, apoi se revopseste.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: fisurare la suprafata (retea de fisuri)**
- **DESCRIERE:** o retea de crapaturi minuscule pe suprafata stratului vopsit care nu penetreaza stratul de suprafata si care aproape nu se vad fara lupa.
- **CAUZE POSIBILE :**este o problema de preparare a amestecului de vopsire (vezi si crapare); in stratul vopsit se dezvoltă stresuri astfel incit suprafata filmului devine friabila si crapa.
- **PREVENIRE:** prepararea corecta a sistemului de vopsire
- **REMEDIERE:** indepartare a stratului de vopsea prin abraziune, curatare si revopsire cu sistemul corect preparat si aplicat



- **DEFECT: crapare**
- **DESCRIERE:** stratul de vopsea are crapaturi vizibile care pot ajunge pina la substrat de baza
- **CAUZE POSIBILE:** craparea este un defect generat de stresuri aparute in filmul de vopsea, de imbatrinire, in general de pierderea elasticitatii filmului. Cu cit stratul este mai gros cu atit este mai mare probabilitatea de crapare
- **PREVENIRE:** utilizare sisteme corecte pentru acoperire, tehnici corecte de aplicare si respectare a grosimii stratului uscat
- **REMEDIERE:** indepartare vopsea, curatare si reaplicare a sistemului de vopsire.

CATALOG DE DEFECTE LA VOPSIRE

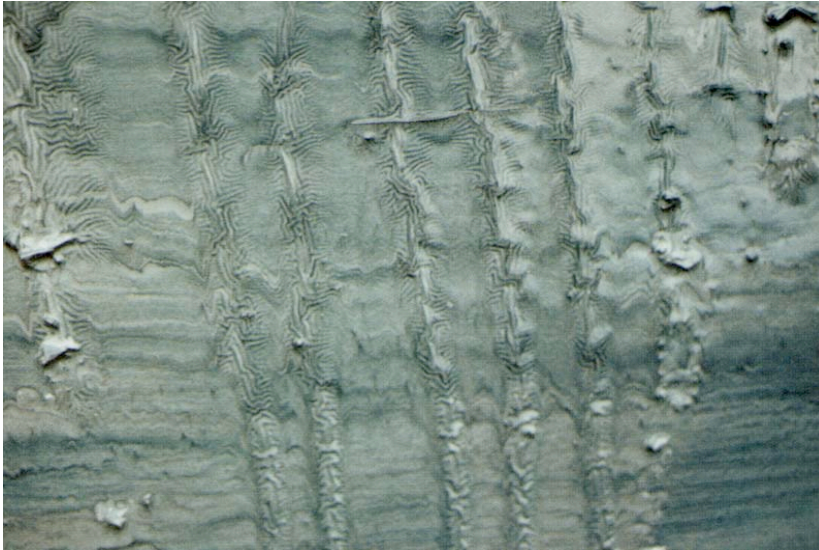


- **DEFECT: “picioar de cioara”**
- **DESCRIERE:** in filmul de vopsea se formeaza increstituri fine asociate in modele ce seamana cu urma lasata de piciorul de cioara.
- **CAUZE POSIBILE:** uscarea rapida a suprafetei filmului, care formeaza o pelicula (piele) care apoi se incresteste, pe masura ce solventul ramas in stratul de dedesupt se evaporata incet. :
- **PREVENIRE:** verificati daca sunt corecte conditiile de aplicare si de uscare pentru sistemul de vopsire utilizat. Aplicati o vopsea mai diluata, sau solventi cu uscare mai lenta
- **REMEDIERE:** dupa uscarea completa curatati suprafata prin abraziune si apoi revopsiti.

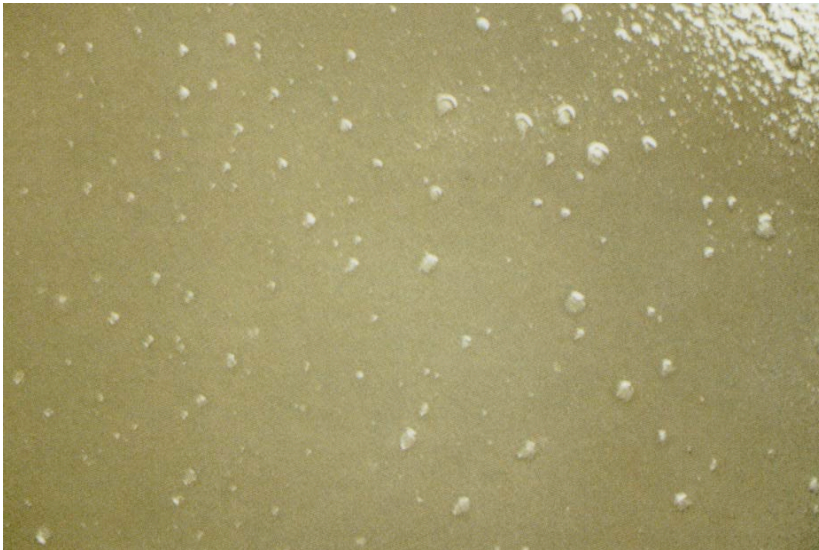


- **DEFECT: ridare**
- **DESCRIERE:** formarea de riduri in stratul de vopsea, pe masura ce acesta se ususca
- **CAUZE POSIBILE:** datorat de obicei formarii unei pelicule (piele) la suprafata stratului de vopsea, la vopselele pe baza de solvent. Alta cauza: inflamarea stratului de vopsea datorita atacului solventului (aplicarea unui strat inainte de intarirea corespunzatoare a celui de dedesupt).
- **PREVENIRE:** utilizati specificatii de vopsire si materiale corecte. Realizati corect amestecul, aplicarea si utilizarea intaritorilor. Respectati timpii de uscare indicati de producatorul de vopsea.
- **REMEDIERE:** îndepartare, curatare si revopsire.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: solvent lifting (eruptie/umflare solvent)**
- **DESCRIERE:** eruptii la suprafata stratului de vopsea: increstiri ce duc la slabirea filmului si ulterior la distrugerea acestuia
- **CAUZE POSIBILE :** utilizare sisteme de vopsire incompatibile: stratul final cu un ameste de solvent puternic poate ataca straturile anterioare care contin un amestec de solvent mai slab. Vopsire a stratului final inainte ca stratul anterior sa se intareasca corespunzator.
- **PREVENIRE:** utilizare sisteme de vopsire prescrise, solventi compatibili, respectare timpilor de uscare intre straturi.
- **REMEDIERE:** indepartare vopsea, revopsire



- **DEFECT: solvent popping (bule de solvent)**
- **DESCRIERE:** la suprafata filmului de vopsea apar, dupa aplicare, bule clare de solvent
- **CAUZE POSIBILE:** amestec incorect de solvent, suprafata poroasa, conditii de mediu inadecvate.
- **PREVENIRE:** utilizare de specificatii corecte pt materiale. Tehnici de aplicare corecte; conditii de mediu conforme
- **REMEDIERE:** curatare suprafata prin abraziune usoara si aplicare sistem de vopsire specificat

CATALOG DE DEFECTE LA VOPSIRE

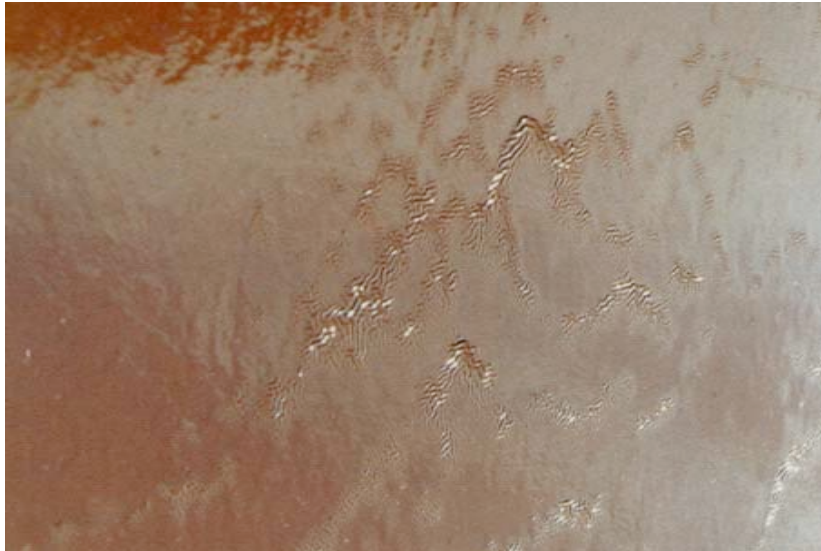


- **DEFECT:** gauri de ac
- **DESCRIERE:** formare a unor gauri ca de ac in filmul umed, in timpul aplicarii si uscarii, datorate bulelor de gaz /aer care explodeaza, formind mici cratera.
- **CAUZE POSIBILE :** solvent sau aer ramas in stratul de acoperire. Aceasta este o problema obisnuita la acoperirea substraturilor poroase, ca cele grunduite cu primer pe baza de zinc, acoperiri metalice,etc. Alte cauze: amestec incorect de solvent, aplicarea incorecta
- **PREVENIRE:** aplicare corecta (distanta corecta pulverizator – suprafata de vopsit); amestec corect de solvent.
- **REMEDIERE:** curatare totala si revopsire

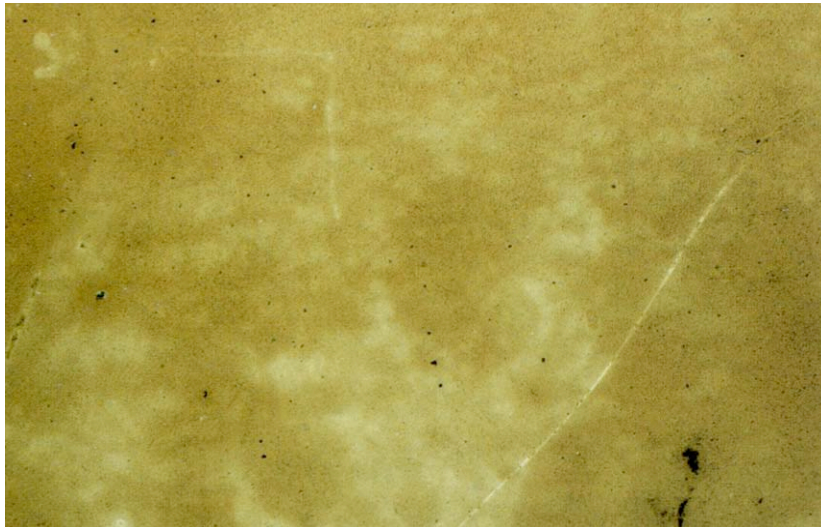


- **DEFECT:** coaja de portocala
- **DESCRIERE:** aspect de piele foarte poroasa si aspra, cu pustule (aspect de coaja de portocala)
- **CAUZE POSIBILE:** tehnici de aplicare incorecte; amestecul de solvent incorect
- **PREVENIRE:** formula amestecului trebuie sa fie cea indicata de producatorul de vopsea; trebuie utilizata o tehnica de aplicare corecta
- **REMEDIERE:** daca produsul vopsit are cerinte ref la estetica, se indeparteaza complet stratul de acoperire si se revopseste corect.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: “perdele”**
- **DESCRIERE:** scurgeri de vopsea ce apar la scurt timp dupa aplicarea vopselei pe suprafete verticale
- **CAUZE POSIBILE :** amestecul de vopsire contine prea mult solvent sau prea putin intaritor. Alta cauza: aplicarea vopselei se face excesiv / in mod incorect.
- **PREVENIRE:**utilizati metode corecte de aplicare (distanta si unghiul de aplicare + sa nu se sprayeze excesiv intr-un loc); amestecul de vopsire se prepara cf indicatiilor producatorului de vopsea.
- **REMEDIERE:** vopseaua uda se pensuleaza usor pina la disparitia perdelelor. Vopseaua uscata se indeparteaza prin abraziune: se revopseste spot.

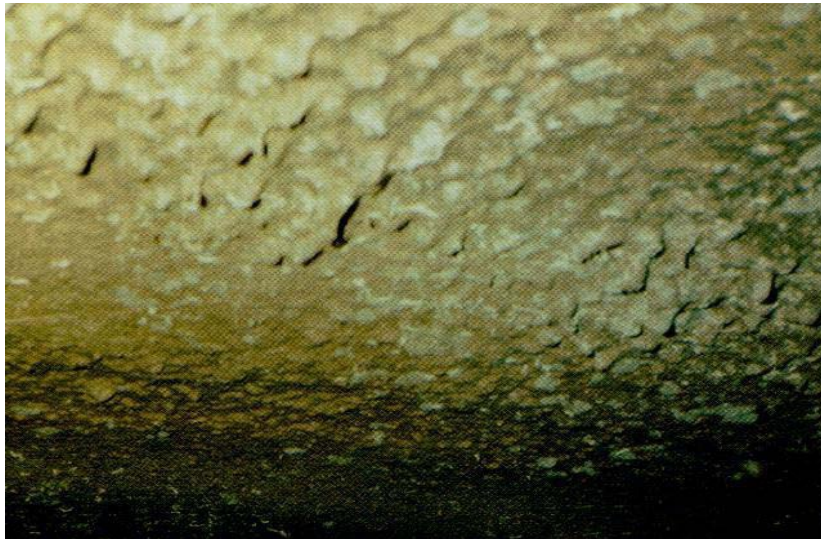


- **DEFECT: decolorare / “inflorire”**
- **DESCRIERE:** o depunere albicioasa pe suprafata filmului de vopsea, care seamana cu bruma de pe struguri, si care duce la decolorarea si matuirea vopselei
- **CAUZE POSIBILE:** filmul de vopsea este expus la condens si umezeala in timpul perioadei de intarire(des intilnit la vopsea epoxy cu intaritor amina).Alte cauze: amestec incorect de solvent contribuie la “inflorire”.
- **PREVENIRE:** sistemul de vopsire trebuie aplicat corect si intarirea trebuie sa se faca in conditii de mediu conforme.
- **REMEDIERE:** se indeparteaza “floarea” cu o cirpa curata si eventual cu solvent compatibil. Se poate reaplica topcoat-ul.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: pete de ploaia (apa)**
- **DESCRIERE:** aspect patat al suprafetei vopsite, cauzate de picaturi de apa: petele ramin si dupa ce apa s-a evaporat
- **CAUZE POSIBILE:** picaturi de apa (ploaie) pe filmul ud lasa urme permanente / picaturi de apa pe filmul uscat si inatarit - pot sa nu fie permanente/pot fi sterse.
- **PREVENIRE:** nu aplicati vopseaua / nu depozitati produsul vopsit acolo unde este pericol sa fie udat (ploaia, picaturi de apa din orice sursa)
- **REMEDIERE:** acolo unde urmele de picaturi nu pot fi sterse (exista pete permanente sau deja cratera formate) se curata si se revopseste.

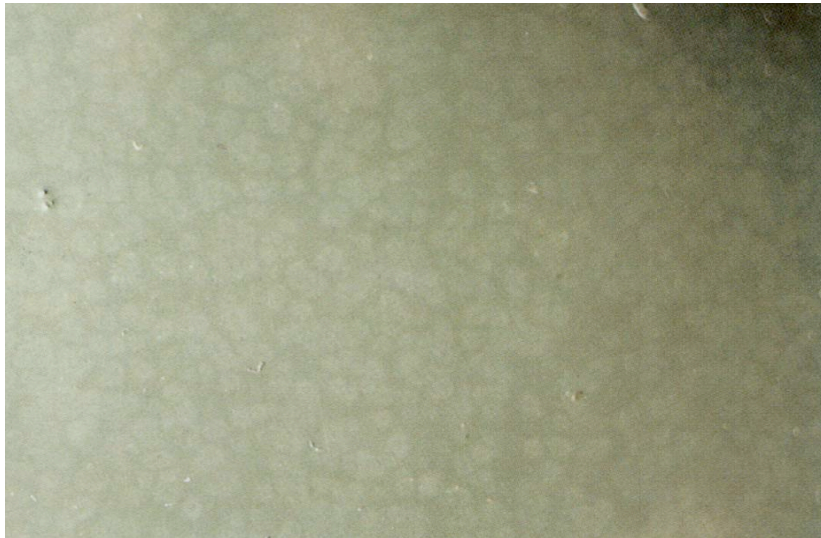


- **DEFECT: "valuri"**
- **DESCRIERE:** filmul de vopsea are pe suprafata un aspect de valurile
- **CAUZE POSIBILE:** curenti de aer in zona de vopsire sau uscare. Alta cauza posibila: mod incorect de aplicare a vopselei.
- **PREVENIRE:** a se evita curentii puternici de aer in timpul vopsirii sau uscarii /ase evita vopsirea in exterior, in aer liber, in conditii de vint. Se recomanda instruirea personalului vopsitor si utilizarea unui echipament si a unei tehnici de vopsire corecte.
- **REMEDIERE:** defectul local se poate remedia prin curatare + revopsire spot. Defectul generalizat duce la indepartarea totala a vopselei, curatare si reaplicare sistem

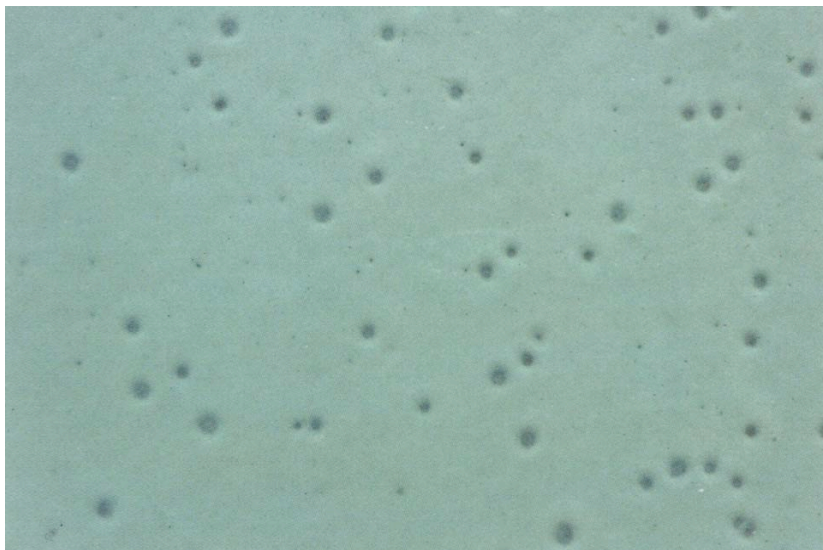
CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: floculare**
- **DESCRIERE:** aglomerari de pigmenti de vopsea in stratul de acoperire
- **CAUZE POSIBILE :** dispersia neuniforma a pigmentilor in vopsea (material neconform). Alte cauze: solventul utilizat nu este compatibil cu vopseaua, sau amestecare incorecta.
- **PREVENIRE:** utilizati materialele indicate de producatorul de vopsea. Nu folositi decit preparate bine amestecate.
- **REMEDIERE:** indepartati stratul de vopsea, acolo unde floculatia este vizibila; slefuiti, curatati si revopsiti.



- **DEFECT: flotatie peliculara**
- **DESCRIERE:** apare in materialele care contin amestec de pigmenti diferiti. Atunci cind se produce separarea pigmentilor apare un efect de marmorare
- **CAUZE POSIBILE:** efectul de marmorare apare atunci cind pigmentii diferiti din amestecul de vopsire se separa. **Alta cauza: utilizarea solventilor in exces**
- **PREVENIRE:** utilizati amestecuri cf specificatiilor producatorului de vopsea: nu folositi solvent in exces.
- **REMEDIERE:** curatere prin abraziune a intregului strat de acoperire: revopsire cu amestec corect .

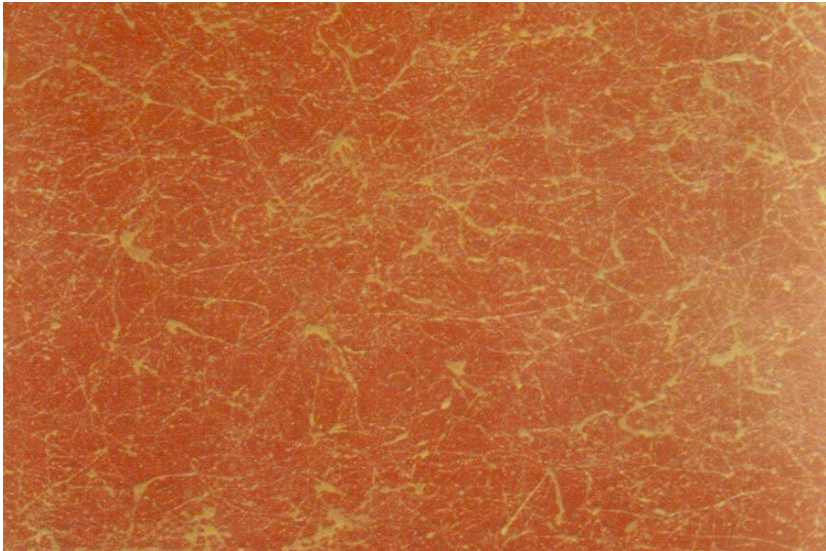


- **DEFECT: Ochi de peste**
- **DESCRIERE:** in suprafata filmului ud se formeaza goluri, care lasa sa se vada substratul (vopseaua nu este "capabila" sa acopere metalul).
- **CAUZE POSIBILE :** suprafata metalului este contaminata cu ulei, unsori, umezeala, silicon, etc. Alte cauze: amestec incorect de solvent
- **PREVENIRE:** asigurati-va ca suprafata este curata (fara grasimi sau alte substante) inainte de a incepe aplicarea vopselei.
- **REMEDIERE:** se curata suprafata si se reaplica sistemul de vopsire in reteta indicata de producatorul de vopsea

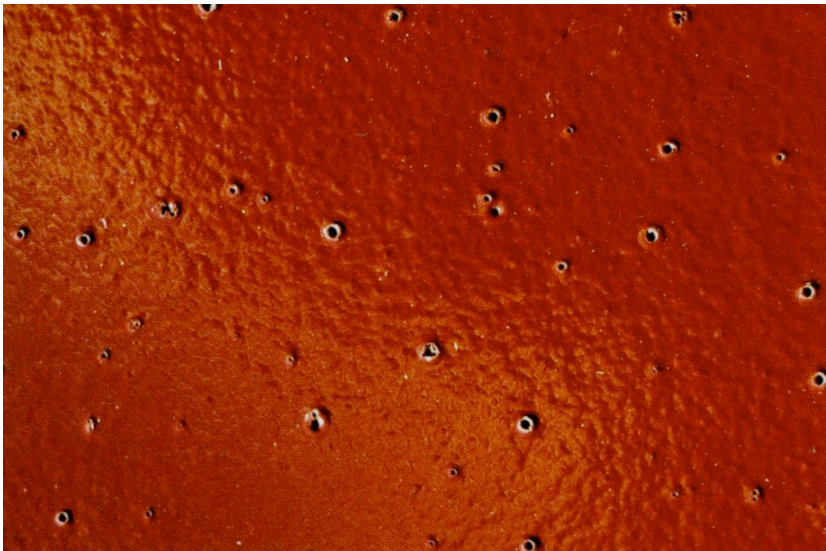


- **DEFECT: Brinzire**
- **DESCRIERE:** stratul de vopsea ramine moale, chiar dupa ce timpul de uscare a trecut.
- **CAUZE POSIBILE:** amestecul de componente pt vopsire este gresit preparat. Temperatura de uscare / intarire este prea scazuta. Solvent in exces retinut in stratul de acoperire.
- **PREVENIRE:** realizati amestecul corect si utilizati doar solventul indicat de producator, in cantitatile indicate. Utilizati intaritorul si realizati tratamentul de uscare / intarire la temperaturile indicate de producatorul de vopsea.
- **REMEDIERE:** indepartati toata vopseaua moale, curatati suprafata si revopsiti.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: Paienjenis**
- **DESCRIERE:** la aplicarea prin pulverizare a anumitor solutii de polimeri, pe suprafata filmului apar filamente (paienjenis).
- **CAUZE POSIBILE :** viscozitate prea mare a amestecului de polimeri.
- **PREVENIRE:** reduceti viscozitatea amestecului pulverizat sau schimbati metoda de pulverizare. Selectati un solvent adecvat.
- **REMEDIERE:** se indeparteaza prin abraziune toata suprafata afectata inainte de curatare si reaplicare a sistemului indicat.



- **DEFECT: formarea de cratere in vopsea**
- **DESCRIERE:** in stratul de vopsea se formeaza niste depresiuni in forma de bol.
- **CAUZE POSIBILE:** bule de aer ramase in vopsea explodeaza lasind in urma niste mici cratere: stratul de vopsea nu are timp sa se uniformizeze pe suport si sa acopere golurile.
- **PREVENIRE:** imbunatatiti tehnologia de pulverizare, astfel incit sa evitati retentia de aer. Adaugati solventii in conformitate cu recomandarea producatorului de vopsea.
- **REMEDIERE:** razuiti vopseaua, curatati suprafata suport si reaplicati sistemul indicat

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: pulverizare "uscata"**
- **DESCRIERE:** suprafata filmului este ruгоasa si cu aspect de nefinisat: particulele de vopsea sunt insuficient de fluide pentru a adera intr-un strat uniform (de obicei si aderenta este foarte scazuta)
- **CAUZE POSIBILE :** tehnica de pulverizare incorecta – nu se mentine o distanta de pulverizare adecvata. Alte cauze: produse cu viteza de uscare mare si o temp. de aplicare prea ridicata.
- **PREVENIRE:** respectati intru totul indicatiile producatorului de vopsea (solvent + temperatura mediului) si utilizati tehnici de aplicare adecvate.
- **REMEDIERE:** razuiti vopseaua, curatati suprafata suport si reaplicati sistemul indicat



- **DEFECT: incluziuni de praf metalic**
- **DESCRIERE:** particule de alice si praf sunt incluse vizibil in stratul de acoperire.
- **CAUZE POSIBILE:** suprafata nu a fost corect curatata, sau stratul de grund a fost contaminat in timp ce era ud.
- **PREVENIRE:** aplicarea vopselei se va face in mediu curat, cu echipament curat. In timpul vopsirii si uscarii intre straturi nu se matura, nu se transporta praf de sablare, si se evita curentii de aer posibil purtatori de praf si resturi de alice.
- **REMEDIERE:** razuiti vopseaua, curatati suprafata suport si reaplicati sistemul indicat

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: Lipsa strat final**
- **DESCRIERE:** s-a omis aplicarea stratului final
- **CAUZE POSIBILE :** metoda de aplicare incorecta, grosimea stratului uscat nerespectata
- **PREVENIRE:** inspectia trebuie facuta corect: verificarea grosimii stratului trebuie facuta intr-un numar suficient de puncte pentru a identifica zonele in care aceasta este sub grosimea specificata.
- **REMEDIERE:** razuiti zonele afectate, curatati si reaplicati vopseaua in unul sau doua straturi, in concordanta cu specificatiile.



- **DEFECT: eruptie de rugina – la acoperiri metalice la cald? (rust rashing)**
- **DESCRIERE:** mici pete de oxid de fier aparute in porii unui strat de acoperire metalica (similar cu cel ce apare uneori la vopsire)
- **CAUZE POSIBILE:** acest fenomen se dezvolta pe suprafatele acoperite metalic (in special cu aluminiu), imediat dupa acoperire: umezeala este absorbita in stratul de acoperire si reactioneaza cu substratul feros.
- **PREVENIRE:** izolati suprafetele acoperite metalic, imediat dupa tratamentul de acoperire.
- **REMEDIERE:** curatati suprafata afectata si reaplicati in conditiile indicate de producator

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT:** Pete de rugina
- **DESCRIERE:** pete de rugina aparute pe stratul de vopsea (apare initial local, dar se extinde cu repede)
- **CAUZE POSIBILE :** grosimea filmului nu este respectata, exista zone nevopsite, defect in suprafata metalului. Profilul vopsit include margini ascutite, nerotunjite, sau metalul de baza este : prea rugos. Suprafata metalului poate fi contaminata cu resturi metalice, pulberi, resturi de alice.
- **PREVENIRE:** Sablarea corecta, rotunjirea muchiiilor, curatarea corecta a suprafetelor.
- **REMEDIERE:** depinde de gradul de extindere a defectului



- **DEFECT: suprafete nevopsite (goluri/insule)**
- **DESCRIERE:** zone nevopsite, zone in care se vede substratul metalic ce trebuia acoperit.
- **CAUZE POSIBILE:** tehnica de aplicare deficitara & lipsa controlului de calitate
- **PREVENIRE:** aplicarea bunelor practici in procesul de vopsire si a personalului de executie si control calificat / instruit.
- **REMEDIERE:** curatare suprafata (daca este afectata de rugina sau contaminata cu substante straine si vopsire cu acelasi sistem

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT:** sistem de vopsire incorect
- **DESCRIERE:** stratul de vopsea este deteriorat, prezinta incretituri, crapaturi.
- **CAUZE POSIBILE :** utilizare de materiale de vopsire incompatibile
- **PREVENIRE:** utilizati materiale compatibile, in concordanta cu recomandarile producatorilor de vopsea.
- **REMEDIERE:** indepartare totala a stratului de vopsea, curatare si revopsire cu utilizarea sistemului corect.

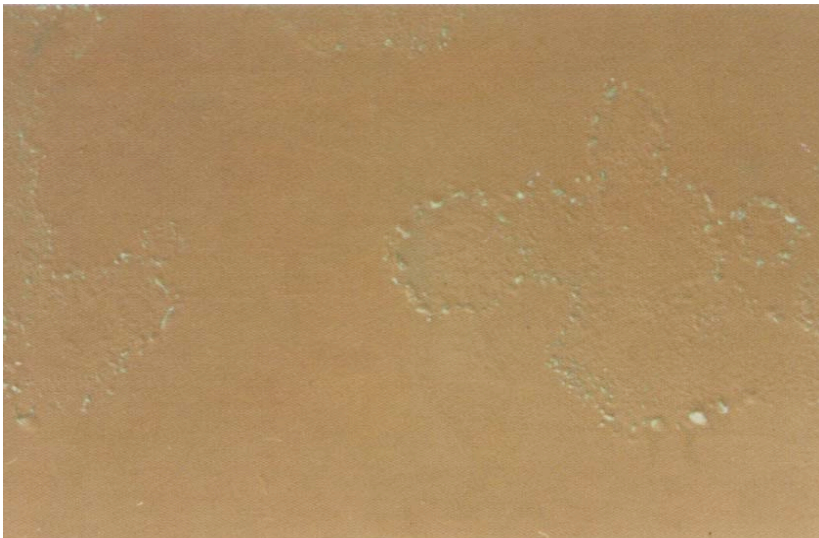


- **DEFECT:** sistem de vopsire incorect.
- **DESCRIERE:** aceleasi ca mai sus
- **CAUZE POSIBILE:** aceleasi ca mai sus
- **PREVENIRE:** aceleasi ca mai sus
- **REMEDIERE:** aceleasi ca mai sus

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT:** piele de crocodil
- **DESCRIERE:** crapaturi largi (seamana cu pielea de crocodil) si adinci, crapatura putind penetra pina la substratul metalic.
- **CAUZE POSIBILE :** tensiuni in stratul de acoperire, suprafata contractindu-se mult mai repede decit restul stratului de vopsea. Se poate datora unui strat prea gros corelat cu lipsa de flexibilitate a vopselei. Se intilneste la sistemele de vopsire cu primul strat moale (soft) si stratul final prea dur (hard topcoat).
- **PREVENIRE:** utilizati sistemul corect. Evitati aplicarea excesiva. Evitati aplicarea la temperaturi ridicate.
- **REMEDIERE:** depinde de zona afectata

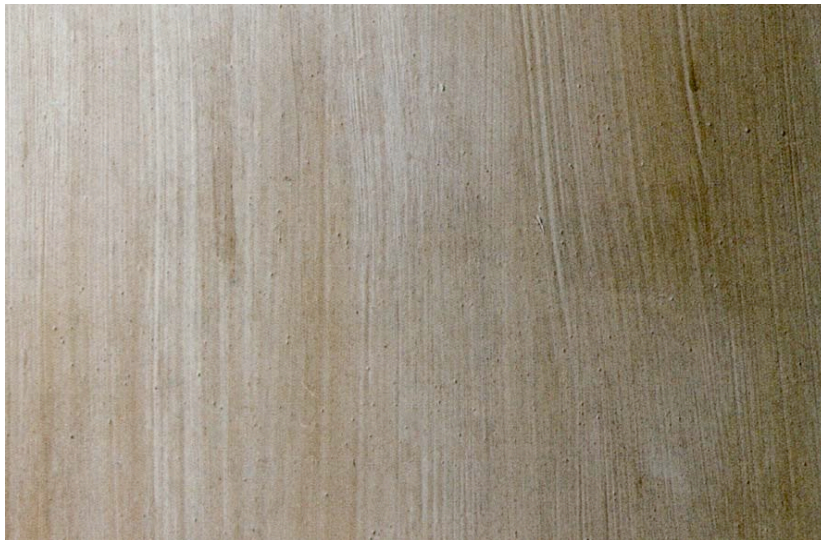


- **DEFECT:** corodare cu aluminiu
- **DESCRIERE:** stratul de vopsea este "spuzit" datorita coroziei aluminului din substratul metalic
- **CAUZE POSIBILE:** substratul de aluminiu este poros (pulverizat incorect), stratul de vopsea este prea subtire sau are continut bule de solvent sau aer.
- **PREVENIRE:** utilizati sisteme de acoperire corecte (conform indicatiilor producatorului de vopsea). Aplicati vopseaua in straturi de grosime corespunzatoare
- **REMEDIERE:** curatare prin sablare si reacoperire.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: decolorare / albire**
- **DESCRIERE:** stratul de acoperire isi pierde total culoarea
- **CAUZE POSIBILE :** datorat depozitarii in conditii de mediu total nefavorabile sau a unei agresiuni chimice.
- **PREVENIRE:** utilizati un sistem de vopsire stabil (pigmenti stabili in raport cu mediul extern). Evitati depozitarea in mediu cu vapori de substante chimice.
- **REMEDIERE:** indepartare a stratului de acoperire, curatare si revopsire.

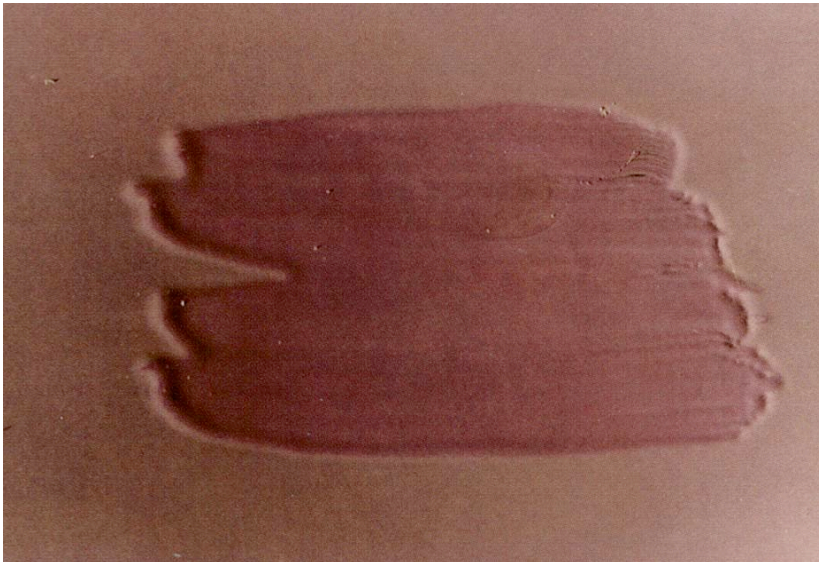


- **DEFECT: transpirare / decolorare**
- **DESCRIERE:** patare stratului de vopsea datorita difuziei (dizolvarii) culorii stratului de dedesupt. Defect des intilnit in cazul produselor pe baza de bitum acoperite cu vopsele alchidice. Des intilnit si in cazul produselor de acoperire emulsionabile.
- **CAUZE POSIBILE:** datorat dizolvarii totale sau partiale a straului de dedesupt in stratul de acoperire Apare la utilizarea unor solventi puternici in stratul de acoperire.
- **PREVENIRE:** utilizati sisteme de vopsire corecte (materiale compatibile).
- **REMEDIERE:** indepartare totala a straturilor afectate, curatire si revopsire.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: decolorare**
- **DESCRIERE:** decolorarea graduala a vopselei (insotita uneori si de pierderea luciului) la expunerea in mediul ambiant (decolorarea pare sa se accentueze in prezenta umezelii).
- **CAUZE POSIBILE :** pigmentarea incorecta, utilizarea de pigmenti organici, substrat foarte poros.
- **PREVENIRE:** utilizati sisteme de vopsire corecte.
- **REMEDIERE:** indepartare totala a stratului afectat, curatare si revopsire.



- **DEFECT: “injectare”/innecare**
- **DESCRIERE:** defect care apare imediat dupa aplicare, datorita separatiei pigmentilor. Aspectul este de intensificare a culorii: zona afectata se ususca intr-o culoare mai intensa decit restul suprafetei..
- **CAUZE POSIBILE:** Sedimentarea vopselei, separarea pigmentului
- **PREVENIRE:** Utilizati materialele indicate, preparate conform indicatiilor producatorului de vopsea.
- **REMEDIERE:** raziure, curatare suprafata, revopsire cu materiale adecvate.

CATALOG DE DEFECTE LA VOPSIRE



- **DEFECT: separarea vopselei**
- **DESCRIERE:** vopseaua prezinta o separare a pigmentilor de compusul lichid. Apare la vopseaua depozitata. Utilizarea vopselei ca atare poate duce la defecte ale stratului vopsit.
- **CAUZE POSIBILE :** stocare indelungata / vopseaua a iesit din termenul de garantie. Preparate incorect formulate sau incorect amestecate. Situatii intilnita des la grundurile bogate in compusi de zinc.
- **PREVENIRE:** utilizati vopseaua in termenul de garantie. Preparati si amestecati corect materialele de vopsire.
- **REMEDIERE:** -



- **DEFECT: crapaturi (ca de pamint uscat)**
- **DESCRIERE:** stratul de vopsea este strabatut de o retea de crapaturi adinci : aspectul este de noroi uscat
- **CAUZE POSIBILE:** aplicarea excesiva, mai ales pentru grundurile bogate in pigment (ex. silicatii de zinc, vopselele pe baza de apa).
- **PREVENIRE:** utilizati tehnici de aplicare in concordanta cu tipul materialelor. Pastrati grosimea de strat specificata de producator.
- **REMEDIERE:** razuiti tot statul afectat, curatati suprafata si reaplicati corect sistemul indicat

***Va multumesc
pentru atentie!!!***