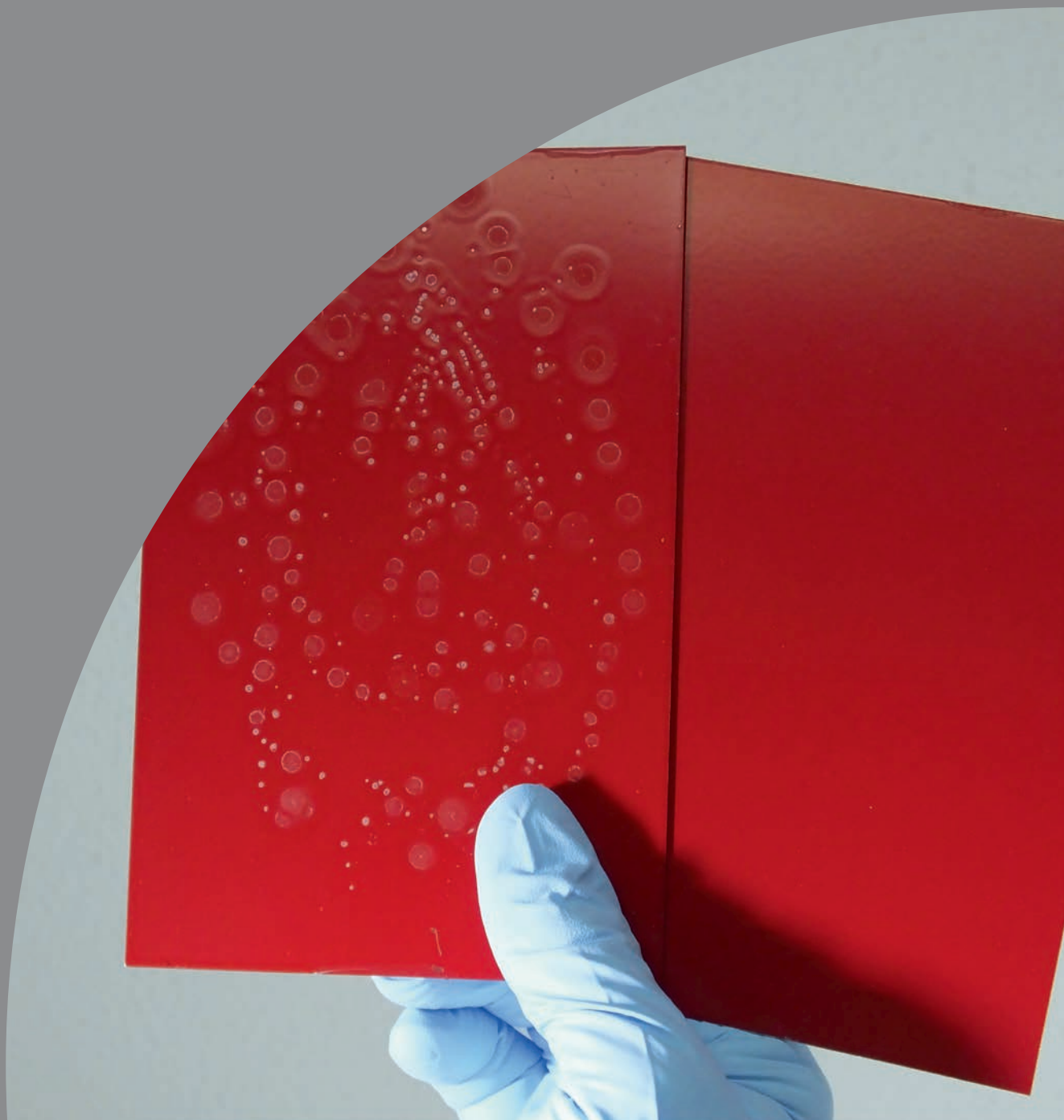
Surface Technology

Paint wetting impairment substances

A practical guide



Content

1 Introduction

Paint wetting impairment substances (LABS) can cause coating defects even in very small quantities and thus affect the quality of the coating. In the automotive industry this topic has been in focus for decades, but of course it is relevant for all painting companies. Operators of painting installations therefore check materials and components used and set requirements for LABS-compliant products to their suppliers.

This guide serves as a reference and provides an overview. The guide makes no claim to completeness.

LABS-conformity versus silicone-freedom

As silicones were initially mainly noticed as substances that interfere with paint wetting, the term „silicone-freedom“ is mistakenly still used today. Whether a substance causes a paint wetting disturbance depends on its interaction with the paint system. The term „LABS-conformity“ describes the requirement independent of the substance.

The point of use is crucial

Depending on the location where a product is used, there may be different requirements for its LABS-conformity.

The VDMA 24364 specification defines requirements for LABS testing taking into account the intended place of use, the intended use of a product and a classification into product groups.

This guide provides assistance

- for a quick and easy introduction to the diverse and complex subject matter of paint wetting impairment substances;
- for a general understanding of statements on LABS-conformity of systems, products and components;
- to carry out the test according to VDMA 24364;
- for possible measures for LABS-conformity in production.

2 LABS

What is LABS?

LABS is the abbreviation of the German term „lackbenetzungsstörende Substanz“ of which the English translation is „paint wetting impairment substance“.

Where does LABS occur?

Paint wetting impairment substances are omni-present in everyday life, so that a contact with these substances takes place regularly. Special precautions must therefore be taken to avoid contamination with substances that interfere with paint wetting.

Typical LABS-sources in the production are:

- Lubricants (moving parts of equipment),
- Release agents and plasticizers from plastic components used in plant engineering or workpieces,
- Residues of drawing agents and lubricants,
- Hoses and sealing compounds,
- Contamination distributed via the room air technology, process air technology or the compressed air system,
- Carry-overs from other production areas,
- Contaminated paint material, e. g. due to improper transport or storage or unsuitable additives (additives, solvents),
- Operating and auxiliary materials such as cleaning agents, cleaning cloths, abrasives, polishing agents, adhesive tapes, gloves, work clothes (e.g. impregnation) or assembly devices.

Typical person-related LABS sources are:

- Cosmetics, skin care products, shampoo, hair spray, hair gel, hair dye, eyeglass cleaner, deodorant, lipstick, aftershave, make-up, skin protection lotion,
- Clothing (e.g. impregnation), shoe care products,
- Food and beverages (fatty acid esters such as butter, fats), drinking cups (separating agents in coffee machines),
- Plastic bracelets or jewellery, fitness tracker, smartphone cases.

What is the consequence of LABS contamination?

LABS contamination can cause coating defects on the painted surface in the form of craters and large-area wetting disturbances.

LABS defects lead to rework or rejects and, if required, to a production stop.

Table 1
Paint wetting defects

Crater	Local wetting defect due to reduced surface tension in the form of round, trough-shaped depressions that can reach down to the substrate.
Wetting defect	Large area disturbance of film formation which prevents complete wetting of the substrate.

LABS or not LABS – what's the defect?

Numerous other painting defects can occur which do not represent a wetting defect. For examples see Table 2, column „not LABS" and the illustrations in 3.3.1.2.

What is the effect of LABS?

Cause for the occurrence of paint wetting disturbances is a contamination of the surface to be painted, the paint or the paint supply system with substances that interfere with the paint wetting above the limit concentration, which causes the wetting disturbance to become effective.

In order that a paint is able to completely wet a substrate, the surface tension of this substrate must be higher than that of the paint. Substances that interfere with paint wetting have a surface tension that is lower than that of the paint. This is why LABS-contaminated surfaces cannot be covered by the paint or cannot be covered without defects. A practical example of the effect of different surface tensions from daily life is the completely wetting water film on the bottom of a stainless steel frying pan compared to a non-stick coated frying pan in which the water film does not completely wet the bottom of the pan.

Which substances are LABS?

Whether or not a substance has a disturbing effect on paint wetting depends on its interaction with the coating system, the surface to be painted and the ambient conditions. Thus, this question cannot be answered in general terms. LABS cannot be clearly assigned to specific substances or groups of substances. Therefore, silicone-freedom is not equivalent to LABS-conformity. It is not possible to draw up a generally valid negative list of substances that interfere with paint wetting.

Table 2

Assignment of paint defects in LABS and not LABS

LABS	Not LABS (examples)
Crater	Paint mist
Microcrater	Residues on the substrate
Large-area or small-area wetting defects	Inclusions (dust) blisters Pops (inclusions of solvents) Runs Adhesion failure

VDA Volume 16, Appendix 10 categorizes / classifies defects and associated defect patterns

Substances that interfere with paint wetting are e.g.:

- Mineral and synthetic oils, fats, silicones or substances containing silicone,
- Graphite, waxes, metal soaps (e.g. aluminium stearate), paraffins, talc,
- Solder pastes, non-ferrous metals,
- High molecular weight polyglycols, other non-silicone plastics (e.g. PTFE) and abrasion of plastics (e.g. polyethylene),
- Release agents and plasticizers from plastic components,
- Ingredients of cosmetics, skin care products or impregnations of clothing.

Is LABS-free possible?

Customers often demand „LABS-free“ as a product feature. This formal basic requirement is not always technically feasible. Many plastics, for example, contain plasticizers or release agents that can interfere with paint wetting. Such materials can never be LABS-free, but can be LABS-compliant depending on the application or area of application. For these a case-by-case testing with regard to their use in LABS-critical areas is required.

What does LABS-conformity mean?

LABS-conformity describes the condition of a material or test specimen, the testing of which according to VDMA 24364 did not cause any paint wetting disturbance. Deviating test methods and coating systems can lead to different results.

3 Testing of LABS-conformity according to VDMA 24364

The procedure for testing LABS-conformity comprises the following steps

- Selection of product group and test class (3.1)
- Testing (3.2)
- Evaluation (3.3)
- Documentation (3.4)

3.1 Selection of product group and test class

The product group is selected on the basis of the intended use of the product and the zone classification. It establishes the application reference for the LABS test and thus sets the basis for the selection of the test class.

The test class shall be selected on the basis of the exposure when the product is used as intended. Table 3 shows examples for selecting the test class.

The relevant surfaces of the product must be considered. Relevant are the surfaces that can release or transfer paint wetting impairment substances into a LABS zone, when the product is used as intended.

A conscious classification of the production areas with regard to LABS relevance allows LABS-compliant products to be required only for the relevant areas. With an appropriate purchasing strategy, money can be saved, as inspection effort and material selection have an influence on the price of LABS-compliant products.

Table 3

Examples for test class selection

Example	Zone			Test class								
	I	II	III	A1	A2	A3	B1	B2	C1	C2	S	T
Electrical cabinet of the spray booth		•							•	•		
High temperature grease	•	•	•								•	
Sealings of the paint dryer	•			•								•
Vacuum grippers	•			•	•							
Paint application robot	•						•	•				
Seal in the paint supply system												
• in contact with solvent or coating material and non-abrasively exposed (e.g. by pig)	•	•				•						
• in contact with solvent or coating material and abrasively exposed (e.g. by pig)	•	•			•	•						
Paint-carrying hoses												
• with abrasive exposure in intended use (e.g. pig, coating material with abrasive components)	•				•	•						
• without abrasive exposure in intended use	•					•						
Valve for paint or solvent												
• in the spray-booth, interior of the valve	•			•								
• in the spray-booth, exterior of the valve	•						•	•				
• outside of the spray-booth, interior of the valve	•			•								
• outside of the spray-booth, exterior of the valve		•							•	•		
Valve for compressed air												
• in the spray-booth, interior of the valve	•						•					
• in the spray-booth, exterior of the valve	•							•				
• outside of the spray-booth, interior of the valve	•						•					
• outside of the spray-booth, exterior of the valve		•							•	•		
Airfilters												
• supply and exhaust air filters; not adjacent to the cabin interior		•							•	•		
• supply and exhaust air filters; adjacent to the cabin interior	•						•					
• recirculation air filters	•						•	•				
Fire dampers and air volume flow controllers												
• of the workshop ventilation, surfaces in contact with the guided air (interior surfaces)		•							•	•		
• the technical ventilation of the spray booth, surfaces in contact with the guided air (interior surfaces)	•						•	•				

3.2 Testing

3. 2. 1 Required tools/aids

All tools/aids (devices, materials and accessories, such as gloves or pipettes) for the test must be LABS-compliant so that they cannot falsify the test result. LABS-contaminated aids can cause a paint wetting disturbance during the LABS test and thus do not allow a statement on the LABS-conformity of the test specimen.

Table 4
Tools/aids for LABS testing

Tool/aid	Note
Test plate	No reuse. No double-sided use. **NOTE:** Smooth surfaces simplify defect detection.
Solvent	Any solvent can be used to clean the test pad as long as the zero test is passed. It is advisable to use the same solvent as the one used in the test for cleaning the test plate. For testing, the solvent must meet the requirements of VDMA 24364. Solvents of technical quality can cause LABS defects. Do not reuse solvent residues or pour them back into the storage container. Solvent handling: • Storage container => Work container => Work equipment => Disposal • Storage requirements; see DGUV 209-046 • Shelf-life data must be recorded and observed
Containment for outgassing test	No reuse of containment. **NOTE:** See VDMA 24364, Table 6
Tweezers	Use cleaned metal tweezers.
Personal protection equipment	Solvent-resistant safety gloves Safety goggles Lab coat
Paper tissues	Lab quality
Cotton swabs	Lab quality
Pipettes / Spray bottles	PE pipettes are inexpensive, simple and safe to use, but have a short lifetime. Glass pipettes allow exact dosing. LABS content of the rubber bellows can lead to a false test result. PE spray bottles are inexpensive, simple and safe to use. Exact dosing is difficult.
Testpaint	Shelf-life data must be recorded and observed.
Ionization gun	An ionizing gun can be used to remove dust.

NOTE
Requirements for occupational safety when applying paints: see DGUV Rules 109-013 „Schutzmaßnahmenkonzept für Spritzlackierarbeiten – Lackaerosoles“.

3. 2. 2 Conducting the test

3. 2. 2. 1 General
The inspection procedure should be described in an inspection instruction. In addition to the test procedure (see VDMA 24364), the test instruction also takes into account the conditions at the location where the test is carried out.

Occupational safety requirements must be observed.
- For handling of chemicals see DGUV 209-046.
- For storage see DGUV 209-046.
- Paint application see DGUV 209-046 and DGUV 109-013.

For comparable test results it is recommended to
- use always the same paint;
- use always the same solvent.

NOTE
The use of different paints and solvents can lead to different results. Documentation of the paints and solvents used is therefore absolutely essential.

NOTE
LABS defects may be caused by different substances depending on the coating system (solvent-based or water-based).

3. 2. 2. 2 Preparation of the test
- Wash hands thoroughly before starting the test.
- Do not use hair sprays, deodorants, perfumes and other cosmetics before and during the test, as their ingredients may influence the test results.
- Test specimens must not be additionally contaminated during the test and must therefore only be handled with cleaned and suitable tools/aids (e.g. tweezers) or with tested gloves.
- To avoid cross-contamination between test specimens
  - tools/aids shall be cleaned;
  - gloves shall be changed;

  before handling further test specimens.
- The test plate must be inspected in advance for damage, craters, etc.
  - Defects that can lead to incorrect assessment must be clearly marked;
  - Test plates with clear or extensive defects shall not be used for the test.
- The test plate shall be cleaned with solvent.
- The test plate shall be clearly marked.

  NOTE
  The marking of the test plate may cause paint wetting defects. Pens used should be type-tested for their LABS-conformity in advance or integrated into the zero test.
- Prepare the test paint and the spray device (spray can or manual spray gun) according to the manufacturer‘s instructions.

NOTE
See DGUV 109-013 „Schutzmaßnahmenkonzept für Spritzlackierarbeiten – Lackaerosole“ for requirements on occupational safety during the application of paints.

3. 2. 2. 3 Zero test

Before performing the test, a zero test shall be performed for each type of sample extraction.

The zero test ensures that at the time of the test, the test environment, the tools/aids and the working materials are LABS-compliant.

If tools/aids, equipment and test environment remain unchanged, this zero test can be sufficient as a basis for further tests with the same type of sample extraction.

If the zero test is not carried out, it is not possible to determine whether a n.o.k. result (n.o.k. = not OK) was caused by the tested product, the test environment or the tools/aids or working materials.

The zero test is passed if the painted test plate does not show any wetting disturbance when the paint is dry.

If the zero test is not passed

- at least one of the tools/aids and/or working materials is a LABS source or
- the tools/aids, working materials or test environment are LABS-contaminated.

Non-LABS-compliant aids and working materials must be identified and replaced by LABS-compliant materials. LABS sources in the test environment must be eliminated.

Table 5

Assignment of zero test to sample extraction

Zero test	test plate	solvents	compressed air	outgassing
Rinse off	•	•		
Dry rubbing off	•			
Rubbing off with solvent	•	•		
Blow off	•		•	
Immerse	•	•		
Direct application	•			
Outgassing	•			•

Table 6
Performing the zero test

Zero test	To be applied at which test?	Test procedure
Test plate	Rinse off Dry rubbing off Rubbing off with solvent Blow off Immerse Direct application Outgassing	1. Carry out the test procedure with a clean test plate using all tools/aids used to perform the test. 2. Paint the test plate with the paint used for the test.
Solvent	Rinse off Rubbing off with solvent Immerse	1. Apply solvent to the cleaned test plate. 2. Carry out the test procedure with a clean test plate using all tools/aids used to perform the test. 3. Let the solvent evaporate. 4. Paint the test plate with the paint used for the test.
Compressed air	Blow off	1. Apply compressed air to the test plate. 2. Carry out the test procedure with a clean test plate using all tools/aids used to perform the test. 3. Paint the test plate with the paint used for the test.
Outgassing container	Outgassing	1. Place the test plate on the outgassing container without test specimen. 2. Carry out the test procedure with a clean test plate using all tools/aids used to perform the test. 3. Paint the test plate with the paint used for the test.

3. 2. 2. 4 Testing / Sample extraction

3. 2. 2. 4. 1 General

The requirements for the test depend on the selected test class. The test class is derived from the product group resulting from the intended use of the product in a LABS zone.

Sample extraction shall be performed from the relevant surfaces. See 3.1 for the definition of relevant surfaces.

For large products to be tested, the representative areas for sample extraction shall be specified.

3. 2. 2. 4. 2 Rinse off

Test specimen smaller than test plate, Figure 1

1. Place the test specimen on the test plate.
2. Pour solvent over the test specimen.
   a. The solvent must remain completely on the test plate.
   b. Non-solvent resistant test specimens must be removed from the test plate in good time.
3. Let solvent evaporate completely.
4. Paint the test plate even and covering.
5. Dry the paint.

Test specimen larger than test plate, Figure 2 and 3

1. Place the test specimen above the test plate.
2. Pour solvent over the test specimen.
   a. The solvent must remain completely on the test plate.
   b. The solvent can also be collected in a cleaned container and then applied to the test plate.
3. Let solvent evaporate completely.
4. Paint the test plate even and covering.
5. Dry the paint.

Figure 1:
Small test specimen on test plate is rinsed off with solvent

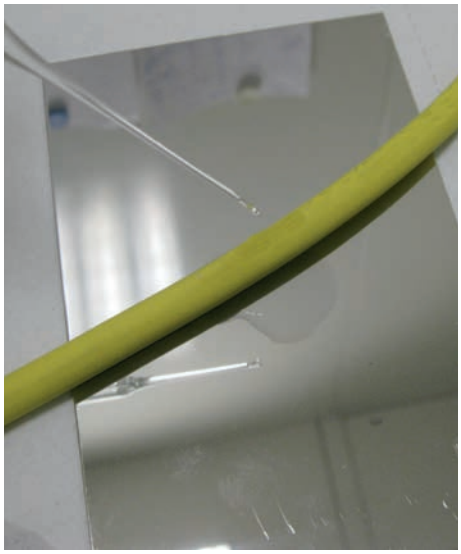


Figure 2:
Hose / cable above test plate

Figure 3:
Rinse off tube in cup

3. 2. 2. 4. 3 Dry rubbing off, Figure 4 and 5

1. Rub test specimen on test plate.
2. Paint the test plate even and covering.
3. Dry the paint.

3. 2. 2. 4. 4 Rubbing off with solvent, Figure 6

1. Apply solvent to test plate.
2. Rub the test specimen in the solvent on the test plate. The solvent must remain completely on the test plate.
3. Let solvent evaporate completely.
4. Paint the test plate even and covering.
5. Dry the paint.

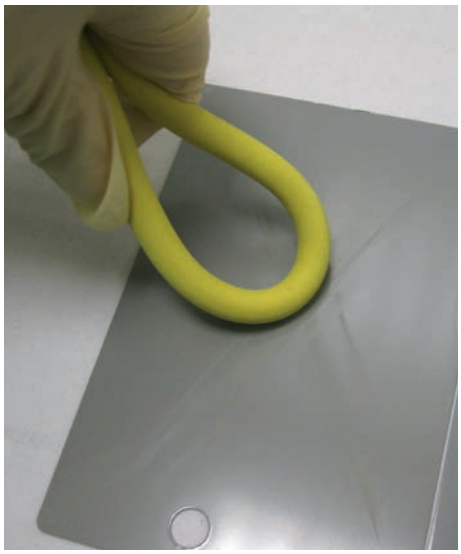


Figure 4:
Rub hose on test plate

Figure 5:
Rub textile on test plate

Figure 6:
Rub hose / cable in solvent on test plate

3. 2. 2. 4. 5 Blow off, Figure 7

1. Blow off relevant surfaces of the test specimen onto the test surface with compressed air. The volume flow rate and distance to the relevant product surface and to the test plate must be selected such that LABS contamination of the product is successfully transferred to the test plate (see Figure 10).

2. Paint the test plate even and covering.

3. Dry the paint.

3. 2. 2. 4. 6 Immerse, Figure 8

1. Place the test specimen in a container containing solvent.

2. Close the container (avoiding contamination and evaporation).

3. The immersion time is 24 hours.

4. Remove the test specimen.

5. Homogenize solvent extract mixture.

6. Apply a subset of the homogenized mixture to the test plate. The mixture must remain completely on the test plate.

7. Let solvent evaporate completely.

8. Paint the test plate even and covering.

9. Dry the paint.

Figure 7
Blowing off an inner surface onto the test plate

Figure 8:
Test specimen in container with solvent

3. 2. 2. 4. 7 Direct application, Figure 9

1. Apply the test specimen to the test plate in an X-shape in a very thin layer.
2. Paint the test plate even and covering.
3. Dry the paint.

3. 2. 2. 4. 8 Outgassing, Figure 10

1. Place the test specimen in the outgassing container (container size see VDMA 24364, Table 6).
2. Cover the outgassing container with a test plate.
3. The outgassing time is 1 hour.
4. The test temperature depends on the intended use of the product.
5. Remove the test plate.
6. Paint the test plate even and covering.
7. Dry the paint.

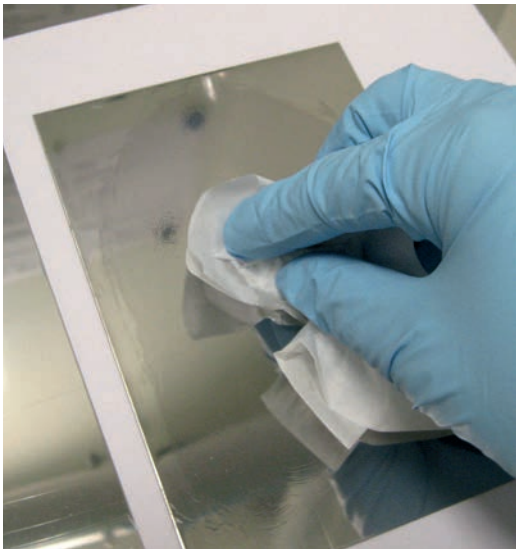


Figure 9:
Applying the test specimen to the test plate

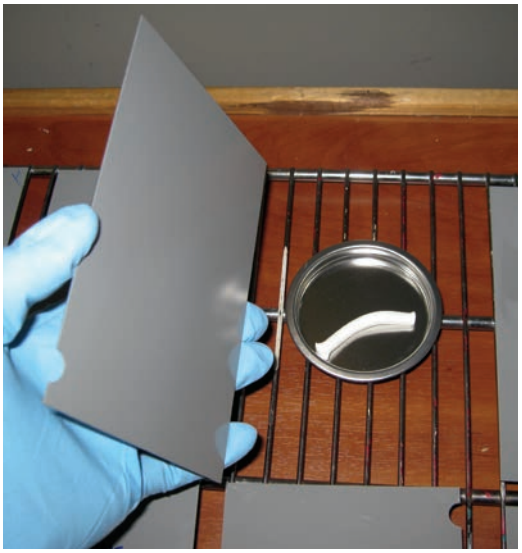


Figure 10:
Test specimen in outgassing container

3. 2. 3 Typical errors when carrying out the test

- For cleaning test plates, the cloths are not changed for each test plate.
- Use of an almost empty paint can (paint splashes and low pigment painting).
- When repeating the painting in the case of a n.O.K. test (n.O.K. = „not OK“), the sample, the spray can or the painting location are not changed.
- Different painting locations during the test (possible differences in temperature, humidity, air currents).
- Paint defects due to too thick sample (not applied thin enough).
- Layer thicknesses are different.
- Paint layer is too thick.

3.3 Evaluation

The evaluation is carried out on the cured paint film in a bright, glare-free location. See EN ISO 13076:2012, 4.2 and 4.3 for information on lighting and procedures for assessing surfaces for the visual inspection of coating defects.

The assessment is done with the unarmed eye, without optical aids for magnification. If there is uncertainty about the type of defect (e.g. crater or pinpricks), a magnifying glass can be used.

The coated test plate is visually checked for surface defects. The inspector must be able to assign defect types to the corresponding causes. VDA volume 16 enables the differentiation from other paint defects.

The test result does not allow any quantification, only the decision „LABS-compliant“ or „not LABS-compliant“.

3. 3. 1 Defect images

3. 3. 1. 1 Paint wetting impairment defects

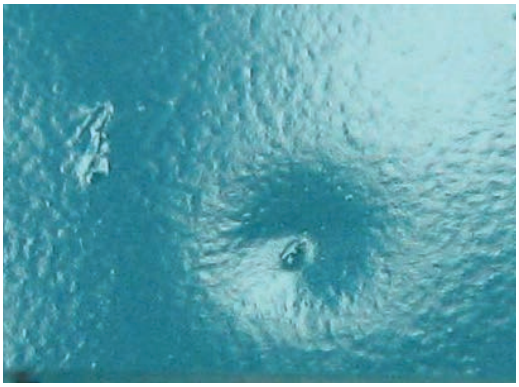


Figure 11:
Crater (LABS-defect)

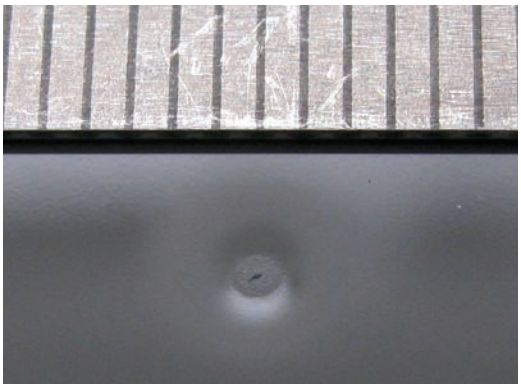


Figure 12:
Crater (LABS-defect)

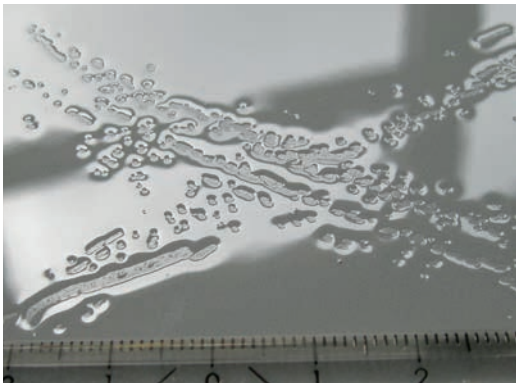


Figure 13:
Wetting disturbance after rubbing off (LABS-defect)

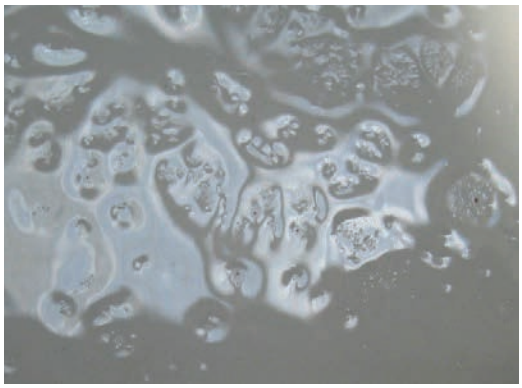


Figure 14:
Wetting disturbance (LABS-defect)

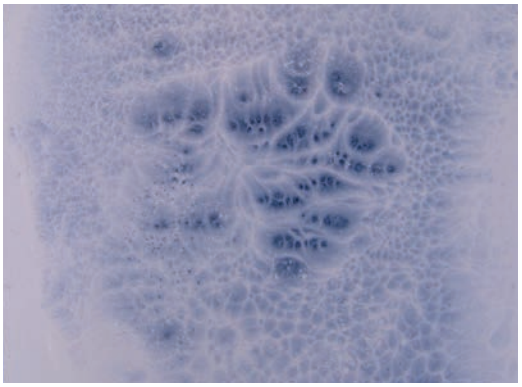


Figure 15:
LABS defects in combination with bleeding

Figure 16a:
LABS defects caused by paint wetting impairment substances dissolved from the O-ring, image with incident light

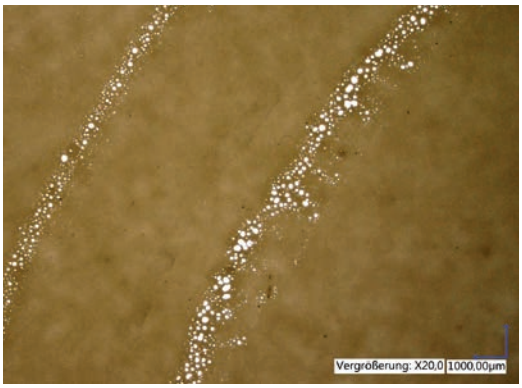


Figure 16b:
LABS defects caused by paint wetting impairment substances dissolved from the O-ring, image with transmitted light

3. 3. 1. 2 Other paint defects (no LABS defects)

Residues on test plates, after extraction testing with solvent. For example, residues from NBR seals (NBR = acrylonitrile-butadiene rubber), which cause discoloration of the paint directly after or hours after painting, but do not produce craters, are classified as LABS-compliant.

Figure 17a:
Crater, but surface wetted with paint throughout (LABS-compliant), image taken with incident light

Figure 17b:
Crater, but surface wetted with paint throughout (LABS-compliant), image taken with transmitted light

Figure 18a:
Overpainted contaminations, which are LABS-compliant, similar to bleedings, image with incident light

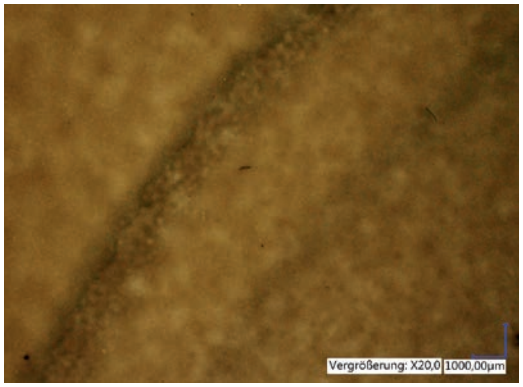


Figure 18b:
Overpainted contaminations, which are LABS-compliant, similar to bleedings, image with transmitted light

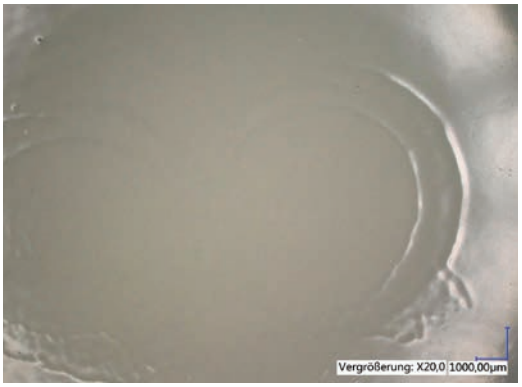


Figure 19a:
Solvent edges along O-ring structure (LABS-compliant), image taken with incident light

Figure 19b:
Solvent edges along O-ring structure (LABS-compliant), image taken with transmitted light

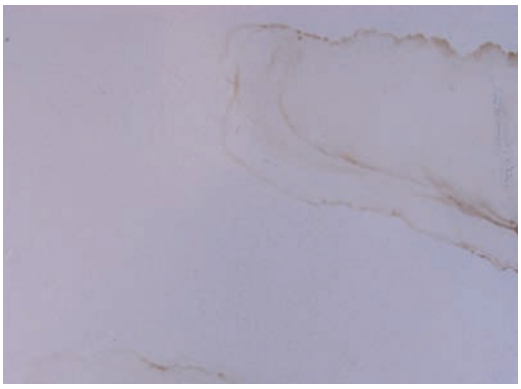


Figure 20:
Bleeding due to oily residue on test plate (no LABS defect)

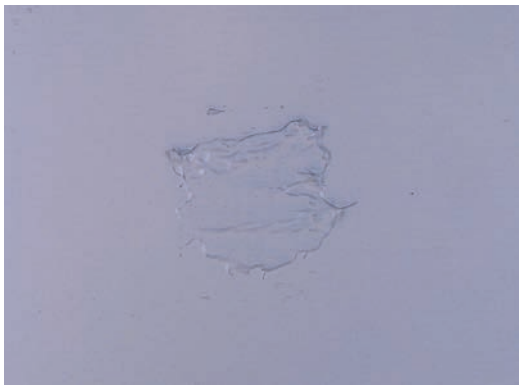


Figure 21:
Overpainted grease (no LABS defect)

Figure 22:
Overpainted oil film which has been applied too thick (no LABS defect)
NOTE: There is a camera focus marker in the center

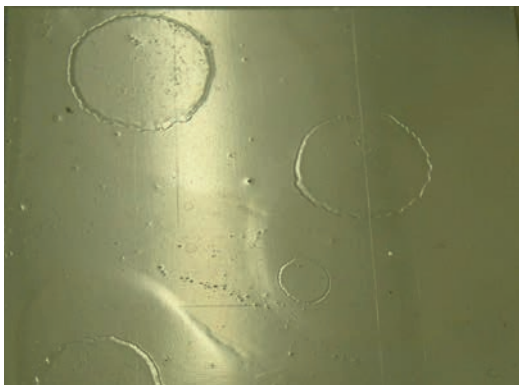


Figure 23:
Overpaintable solvent edges (no LABS defect)

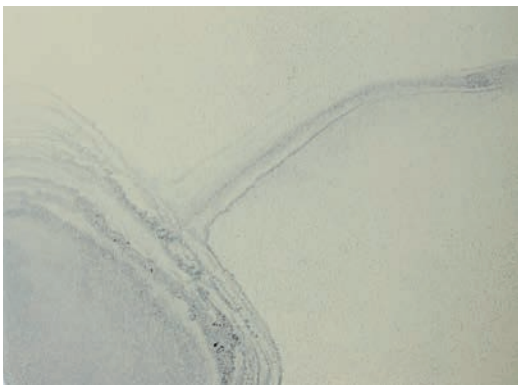


Figure 24:
Bleeding (no LABS defect)

3.4 Documentation

3. 4. 1 Test report

It is recommended that the test report contains the following information:

- Inspector,
- Test date,
- Identification of the test specimen (e.g. material number, manufacturer),
- Intended use of the test specimen
- Zone assignment and test class for which the test was carried out, with a dated reference to the VDMA specification,
- Method of sample extraction,
- Set parameters,
- Exact description of the solvent used,
- Exact description of the test paint used,
- Type of test plate,
- The time of evaluation (flash-off time of the paint) and the condition of the paint film must be defined and documented.
- For larger samples: Which areas of the product were tested (if necessary, photographic documentation),
- Exceptional observations,
- Test result.

3. 4. 2 Sample storage

Instead of storing painted test plates, it is advisable to store them at n.O.K. result (n.O.K. =“not OK“) and to save the image files.

The wetting disturbance itself is difficult to focus with the camera if there is no contrast. Marking the coated test plate has proven to be a good focus aid.

Any existing customer specifications must be taken into account for storage.

3. 4. 3 Comparability of tests

The results of tests for LABS-conformity, which were carried out according to different test standards, are not comparable in principle.

An understanding of the comparability of tests carried out according to different test standards can be obtained by a series of tests carried out in parallel according to the test standards to be compared. It is recommended that the test results are assessed by several persons in order to assess the comparability of the tests according to the test standards to be compared.

4 Preventive measures in production

4.1 Training

Employees and external personnel should be trained with regard to working methods and possible LABS sources. See 2 for possible sources.

Deployment of external personnel in LABS critical areas should be coordinated (e.g. by LABS representatives).

4.2 LABS-compliant production

Paint-wetting impairment substances and non-LABS-compliant products should be banned from the supply chain and production.

LABS-conformity should be tested and ensured for

- materials (mainly plastics and elastomers),
- auxiliaries and supplies,
- work equipment,
- transport containers,
- company-provided care products (soap, skin protection cream),
- work clothes and personal protective equipment.

4.3 Cleaning of LABS-contaminated products

LABS-contaminated products (e.g. by separating agents) can be cleaned wet-chemical or by plasma.

LABS-containing products (e.g. elastomer-containing seals) can be temporarily conditioned in LABS-conformity.

4.4 Carry-over

If the use of substances containing LABS is absolutely necessary, it is advisable to separate this production area from the LABS-compliant production area to such an extent that carry-over (e.g. by production processes, employees) is not possible.

If carry-over by air is not possible, spatial separation by means of partitions or fences is sufficient.

4.5 Marking of LABS-areas

Production areas (LABS-compliant / LABS-non-compliant) should be marked.

For LABS-compliant production areas, transport containers, tools, testing equipment, etc. must be provided.

Before entering the LABS-compliant production area, employees must thoroughly wash their hands and leave work clothes containing LABS (e.g. work coat, shoes) and objects outside.

5 Special cases

5.1 Tampon printing

Tampon printing is an indirect gravure printing process in which the printed image is removed from a printing plate by means of an elastic pad and transferred to the component to be printed.

Printing tampons are made of silicone rubber. This is the only way to achieve ink transfer. Since silicone oil is the best-known substance that interferes with paint wetting, the only way to reduce the risk of „LABS contamination“ is to use printing tampons that are as hard and low in silicone oil as possible, so-called „super-dry“. However, these cannot be used for all printing tasks.

It has to be evaluated how critical a tampon printing on the component surface is. It must be considered whether there is direct contact with the paint or indirect contact with the paint via the compressed air.

Such a product can usually be classified as LABS-compliant according to test class C1 or C2 by VDMA 24364.

If use is desired in areas requiring a higher test class, either alternative technologies (e.g. laser marking) or additional measures (encapsulation of the components) must be applied.

5.2 Adhesive labels

In order to remove adhesive labels from their carrier material and to be able to stick them to a valve as type plates for example, the carrier material must have non-stick properties. The carrier materials for adhesive labels are siliconized papers.

If an adhesive label is removed from the carrier material, silicone residues remain on the adhesive surface. These remain enclosed between the label and component and are therefore uncritical.

When checking for LABS-conformity, however, there are always some n.O.K. results (n.O.K. =“not OK“) because silicone also remains on the surface of the labels. This happens for example, when the labels are applied to a roll of carrier material and minimal abrasion of silicone occurs between the individual layers due to friction.

The criticality of adhesive labels on the component surface must be assessed. It must be considered whether there is direct contact with the paint or indirect contact with the paint, e.g. via compressed air.

Such a product can usually be classified as LABS-compliant according to test class C1 or C2 by VDMA 24364.

If use is desired in areas requiring a higher test class, either alternative technologies (e.g. laser marking) or additional measures (encapsulation of the components) must be applied.

6 Examples of error causes

- Contamination of the product with small amounts of LABS by a robot cable hitting the product. Cumulation of LABS-contamination in the cleaning bath or pretreatment over a longer period of time. If the LABS-concentration is critical, craters will appear in the coating process.
- Abrasive paper residues from upstream work steps.
- Suction pads handle LABS-contaminated and LABS-compliant metal sheets. Formerly LABS-compliant sheets may be contaminated with LABS.
- Use of non LABS-compliant gloves in a LABS-critical area.
- Use of LABS-compliant labels delivered on LABS-containing carrier.

7 Further information

DGUV Regel 209-013 Schutzmaßnahmenkonzept für Spritzlackierarbeiten – Lackaerosole
(Protective measures for spray painting work - Paint aerosols)

DGUV 209-046 Lackierräume und -einrichtungen für flüssige Beschichtungsstoffe
(Painting rooms and equipment for liquid coating materials)

Dekorative Oberflächen von Anbau- und Funktionsteilen im Außen- und Innenbereich von Automobilen – Merkmalsdefinition / Fehleransprache; Anlage zu VDA Band 16, 3. überarbeitete Ausgabe 2016
(Decorative surfaces of add-on and functional parts in the exterior and interior of automobiles - definition of features / defect identification)

Imprint

VDMA
Surface Technology

Lyoner Str. 18
60528 Frankfurt am Main
Germany

Contact
Dr. Martin Riester
Phone +49 69 6603-1290
Fax +49 69 6603-2290
E-Mail martin.riester@vdma.org
Internet ot.vdma.org/en

Editors
Dr. Martin Riester
Astrid Medinger

Typesetting and layout
VDMA Verlag GmbH, DesignStudio

Print
h. reuffurth gmbh, Mühlheim am Main
www. reuffurth.net

Figures
Fraunhofer IPA: Figure Title, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
Festo AG: Figure 15, 20, 21, 22
OVE Plasmatec GmbH: Figure 16a, 16b, 17a, 17b, 18a, 18b, 19a, 19b
Sick AG: Figure 23, 24

Version
May 2018

VDMA
Surface Technology

Lyoner Str. 18
60528 Frankfurt am Main
Germany
Phone +49 69 6603-1290
E-Mail oberflaeche@vdma.org
Internet ot.vdma.org/en

Contact
Dr. Martin Riester
Phone +49 69 6603-1290
Fax +49 69 6603-2290
E-Mail martin.riester@vdma.org
Internet ot.vdma.org/en

ot.vdma.org/en

DesignStudio