

**ORGANIC COATINGS ON MAGNETIC OR
NON-MAGNETIC METAL SUPPORT
NON-DESTRUCTIVE MEASUREMENT OF THE THICKNESS**

Page 1/4

THIS NORME REPLACES NORMES D25 1350 AND D25 1378*This is a translation, the French original shall be used in all cases of litigation**Date of translation : 31/07/2002***FOREWORD**

*This document is established by the PEUGEOT S.A. and RENAULT Groups.
It must not be modified without prior consultation with the "Normalisation Department" of these two Groups.
It is in conformity with the agreement reached between these Departments in APRIL 1989.*

1. OBJECT AND FIELD OF APPLICATION

The object of this méthode is to describe a method of operation for measuring the thickness of the dry paint film of a non-conductive organic coating deposited on a magnetic or non-magnetic metal support.

2. PRINCIPLE

Measurement of the variation of inductance by means of an amplifier when the metal support is magnetic (ferrous metal in particular).

Measurement with Eddy currents when the metal support is non-magnetic (aluminium and alloys, copper and alloys, magnesium and alloys, zinc, titanium, silver, ...).

3. EQUIPMENT

- When the metal support is magnetic, use an apparatus designed for this type of support, for example :
 - PERMASCOPE type ES 2d (X) or EWS 2d (XX), supplier FISCHER, for thicknesses between 0 and 500 µm.
 - DELTASCOPE MP, supplier FISCHER, for thicknesses between 0 and 1000 µm.
 - MONIMETER 2094, supplier FENWICK, for thicknesses between 0 and 3000 µm.
- When the metal support is non-magnetic, use an apparatus designed for this type of support, for example :
 - ISOSCOPE type ECDS T3A, supplier FISCHER, for thicknesses between 0 and 150 µm.

These apparatus have at least two scales of thickness measurement. They are equipped with a probe (sometimes two probes for surfaces that are not flat). Suitable shims for each scale of measurement are also supplied for the calibration of the equipment.

Note : *When considering the purchase of equipment, consult SOGEDAC (service DA/FIG/OC) which recommend a certain number of pieces of equipment studied by the Commission AP 03 B.*

4. METHOD OF OPERATION

For the equipment mentioned in paragraph 3., which all have their own characteristics with regard to voltage application, calibration, number and range of scales for thickness measurement, display, etc., it is advisable to refer to the instructions for each piece of equipment.

A general method of operation which may be used regardless of the equipment must be adhered to :

4.1. Measurements must be carried out away from any magnetic mass.

4.2. The appropriate probe must be connected to the equipment

4.3. Apply voltage to the equipment.

4.4. Check that the electrical voltage is correct when the equipment is operating on batteries.

4.5. Calibration of the equipment

4.5.1. The support on to which the film is deposited is not coated (phosphating, anodising, zinc deposit obtained by galvanising or electro-deposition, ...).

- Place the switch on the first measurement scale.
- Set to zero after placing the probe on the metal terminal supplied with the equipment, or preferably on a support not covered with paint and similar to that on which the thickness of the film is to be measured.
- Place the probe on the terminal or the support mentioned above and on to which the shim suitable for the scale of measurement relating to the thickness of the film has been placed.
- Set the equipment so that it indicates the exact thickness of the shim.
- Re-adjust the zero, if required

4.5.2. The support on to which the film is deposited is coated (phosphating, anodising, zinc deposit obtained by galvanising or electro-deposition, ...).

- Place the switch on the first measurement scale.
- Set to zero after placing the probe on the metal terminal supplied with the equipment.
- In order to obtain an exact measurement of the thickness of the paint film, it is absolutely necessary to previously measure the thickness of the coating, then proceed with the calibration of the equipment (with appropriate shims) on a support not covered with paint, similar (same material, same thickness, same surface finish, same coating) to that on which the thickness of the film is to be measured.
- Set the equipment so that it indicates the exact thickness of the shim to which the thickness of the coat is added.

4.5.3. The support on to which the film is deposited shows very small curvature radii (bars, tubes ...).

- In order to obtain an exact measurement of the thickness of the paint film, it is absolutely necessary to proceed with the zero setting and calibration on a part not covered with paint, identical to that on which the thickness of the film is to be measured.
- Use the probe suited for this type of part.

Note : *When a non-painted support is not available, calibrate the equipment on a part on which the paint film has been stripped. Use a cleaning product with strong alkaline or methylene chloride base. Remove the part from the cleaning bath as soon as the paint film has been removed.*

4.6. Measurement

On most equipment, calibration is only valid for the scale of measurement for which it has been carried out. Switching to another scale therefore requires a new calibration. Proceed in the following manner :

- Carry out an approximate measurement of the thickness.
- According to the result, place the scale switch on the most suitable scale (the scale for which the thickness reading is as near the top of the scale as possible).
- Proceed with the calibration of the equipment for the considered measurement scale as indicated in paragraph 4.5. (use the two shims which are the nearest to the thickness to be measured, one lower and the other greater).
- Carry out a minimum of three film thickness measurements at each measurement location (top or centre or bottom of a plate, for example).

When the paint film is applied to a support covered with a coating (phosphating, anodizing, zinc deposit obtained by galvanising or electro-deposition), ensure that the thickness of the coating is deducted from the thickness reading in order to obtain the thickness of the paint film only,

5. EXPRESSION OF RESULTS

The thickness, in micrometres, of the dry film at a given measurement location is equal to the mean of the measurements carried out at the same location.

ORGANIC COATINGS ON SUPPORT ...	D26 5316	3/4
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6. TEST REPORT

As well as the results obtained, the test report must indicate :

- the reference to this méthode,
- the type of equipment used,
- the probe used,
- the type of support and, if applicable, the type of coating on to which the thickness of the paint film is measured,
- the operating details not specified in the method as well as any possible incidents likely to have affected the results.

7. RECORDS AND REFERENCE DOCUMENTS

7.1. RECORDS

7.1.1. CREATION

- OR : 01/07/1989 – CREATION OF THE NORME.

7.1.2. SUBJECT OF THE MODIFICATION

- A : 27/05/1997 - INTRODUCED INTO IDEM (*French only*).
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7.2. REFERENCE DOCUMENTS

7.2.1. PSA DOCUMENTS

7.2.1.1 Normes

7.2.1.2. Others

7.2.2. EXTERNAL DOCUMENTS

7.3. EQUIVALENT TO :

7.4. CONFORMS TO :

7.5. KEY-WORDS