

**MATERIALS AND PARTS IN THE PASSENGER COMPARTMENT
APPEARANCE BEHAVIOUR TO ARTIFICIAL LIGHT
AT HIGH AND MEAN TEMPERATURES**

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No use restriction*This is a translation, the French original shall be used in all cases of litigation**Date of translation : 30/10/2006***FOREWORD**

This document is equivalent to the document from the Renault SAS and Renault Trucks Groups of reference [D47 1431](#).

*It must not be modified without prior consultation with the Standards Department of these Groups.
It is in conformity with the agreement reached between these Groups and PSA PEUGEOT CITROËN in **October 2006**.*

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PASS CPT MATERIALS AND PARTS – APPEARANCE BEHAVIOUR	D47 1431	2/12
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RECORDS

Suffix	Date	Type of modifications
OR	01/10/1977	CREATION OF THE NORME.
A	01/02/1983	COMPLETE REWRITE OF THE NORME.
B	01/11/1986	MODIFICATIONS TO § 3.3.3. and 7.
C	01/05/1989	MODIFICATIONS TO § 3.3., 5. and 7.
D	01/09/1992	COMPLETE REWRITE OF THE NORME
E	01/09/1994	COMPLETE REWRITE OF THE NORME.
F	17/10/1996	INTRODUCED INTO IDEM (<i>French only</i>)
G	08/01/1998	COMPLETE REWRITE OF THE NORME.
H	25/01/2000	UP-DATE OF THE METHOD.
J	15/09/2000	MODIFICATION TO THE TEST SPECIMEN HOLDER AND LOWERED SURFACE TEMPERATURE
K	25/10/2006	BROUGHT INTO LINE WITH THE NEW FORMATTING OF D NORMES. TITLE CHANGED. MODIFICATIONS TO § 1., 4 AND 13. REWRITE OF § 5., 9 AND 11.

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1.OBJECT AND FIELD OF APPLICATION

The object of this method is to assess the resistance of the appearance of certain materials to the action of a light source at high temperature (standard test specimen holders) or mean temperature (modified test specimen holders with infrared filter KG1). The mean temperature shall only be used if specified in the standard documents.

This test method concerns materials and parts for passenger compartment such as woven and knitted textiles, textile-cellular material composites, textile floor coverings subjected to special conditions, plastic sheets, self-pigmented or self coloured plastics (for example transparent or opalescent plastic materials), hide trims, plastic coated textiles (TEP), non woven textiles, steering wheel foam materials, etc.

2.REFERENCE DOCUMENTS

Paragraph specific to the PSA Peugeot Citroën tests

2.1.NORMES

A10 0153	MATERIAL TEST METHOD - DRAFTING
A10 0156	TEST REPORT - DRAFTING
D15 1343	COLOURED MATERIALS - VISUAL COMPARISON OF COLOURS IN A LIGHT CHAMBER
D25 1413	PAINT COATINGS RUBBERS AND PLASTICS - MEASUREMENT OF GLOSS
ISO 105-A02	TEXTILES. COLOUR FASTNESS TESTS. PART A02 : GREY SCALE FOR ASSESSING CHANGE IN COLOUR
NF EN ISO 105-B02 /A1	TEXTILES - COLOUR FASTNESS TESTS. PART B02 : COLOUR FASTNESS TO ARTIFICIAL LIGHT : XENON ARC LAMP

2.2.REGULATIONS

Not applicable.

2.3.OTHER DOCUMENTS

Not applicable.

2.4.EXPRESSION ON DOCUMENTS

Not applicable.

3.TERMINOLOGY AND DEFINITION

Paragraph specific to the PSA Peugeot Citroën tests

A dictionary (glossary) of the main terms and their definitions used within the "Direction des Plates-formes, des Techniques et des Achats" can be consulted in-house via the DPTA glossary.

([Nectar](http://nectar.inetpsa.com) : <http://nectar.inetpsa.com>). This glossary is constantly up-dated with new definition.

3.1.DEFINITIONS

Not applicable.

3.2.ACRONYMS

TEP	Plastic Coated Textile
RSA	Renault SA Constructor
RT	Renault Trucks Constructor

4.PRINCIPLE

To expose a test specimen of material to light and heat of a xenon arc burner.

5.EQUIPMENT

5.1.FADE-OMETER CI 3000+ AGEING APPARATUS

With xenon arc from the Company ATLAS. The **Fade-Ometer** Ci3000+ is the only apparatus authorised for approvals and type approvals.

5.1.1.ACCESSORIES

5.1.1.1.Test specimen holders

- Stainless steel test specimen holders and masking devices 145 mm x 45 mm (supplier : ATLAS Ref. : 39-1867).
- Modified test specimen holders and masking devices to support infrared filters KG1 (5.1.1.6.) so that a temperature of 85°C (- 3°C / 0°C) may be obtained on the surface of the test specimens, see description in Appendix 2.

Note : *Unless otherwise specified in the standard documents, use standard test specimens holders and masking devices.*

5.1.1.2.White support cards which are used as test specimen supports.

5.1.1.3.Internal filter in borosilicate type S

Commercial reference ATLAS : 20.2773.000.

5.1.1.4.External filter in clear glass

Commercial reference ATLAS : SODALIME 20.2797.000.

5.1.1.5.Black standard thermometer (BST)

In sheet metal onto plastic support, used continuously.

5.1.1.6.Infrared filter KG1

Dimensions 45 mm x 100 mm and 2 mm thick.

Commercial reference ATLAS : K61.

5.1.2.INSTALLATION

- The apparatus must be installed in a clean room, preferably with a slight overpressure, if possible at a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $50\% \pm 5\%$ relative humidity. This apparatus must be calibrated regularly by the Manufacturer.
- Supply of distilled or demineralised water. The resistivity must be greater than $2 \text{ M}\Omega\cdot\text{cm}$. The pH must be between 6 and 8. The amount of dry particles must be less than 1 ppm of which SiO_2 is less than 0,5 ppm.
- Supply of filtered and oil free compressed air, with a pressure between 2 and 3 bar.

5.1.3.MAINTENANCE

- Water-cooled Xenon burner lamp : 4500 W; replace the burner every 2400 hours or less.
- Internal filter : change every 450 hours.
- External filter : change every 2100 hours.
- Black standard thermometer (BST) : to be cleaned with polish every 300 hours and replaced once a year or after 8000 hours of use.
- Regulating cell (quartz pipe) : to be cleaned with ethanol every 300 hours and before calibration.
- In the specific use of modified test specimen holder with filter KG1 :
 - clean with ethanol at the beginning of each filter test,
 - change the filters after every 4200 hours of testing.

5.1.4.CALIBRATION AND SETTINGS

Display the following settings :

5.1.4.1.Humidity

Set the relative humidity to 30% on the display panel.

5.1.4.2.Chamber temperature

Set the temperature of the chamber to 66°C and check that the temperature shown on the thermometer (5.1.1.5.) is $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$, if required, adjust the ventilation speed in order to obtain the temperature of $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

5.1.4.3.Luminous energy of the burner

To be set to $1,4 \text{ W/m}^2$ for a wavelength of 420 nm.

5.1.4.4.Calibration of the regulating cell

Use a standard burner lamp supplied by the Manufacturer, adjust if required the value of the irradiation read off the display panel.

Carry out the calibration in the empty carousel at a constant temperature obtained after 30 minutes of operation.

Operation to be carried out every 450 hours.

5.2.BLUE SCALE STANDARDS

The standards are woollen fabrics dyed blue in conformity with norme NF EN ISO 105-B02/A1. They range from No.1 (very poor colour fastness) to No. 8 (very good colour fastness). Use only standards No. 4, 5, 6, 7 sufficiently large to take test specimens 20 mm wide placed onto the support (5.1.1.2.) without being bonded.

After each test, level 6 from the blue scale standards must be graded according to **paragraph 11.1.**

5.3.GREY SCALE FOR ASSESSING THE CHANGE IN COLOUR

This scale is defined by norme ISO 105-A02. Use preferably the 9-degree scale.

5.4.MASKING DEVICES

Masking devices are used for assessing the contrast in colour on the different aged test specimens. These masking devices consist of neutral grey cards (RSA – RT) or black (PSA) in which windows of dimensions 30 mm x 30 mm are made (identical to the dimensions of the grey scales) spaced at 20 mm or less. The neutral grey colour is approximately that of the band corresponding to the 2/3 grading on the grey scale for the assessment of the change in colour (5.3.) (for example CHARTE neutral grey card from KODAK) . The black colour is that of the masking device from the grey scale (5.3).

6.PREPARATION OF SOLUTIONS

Not applicable.

7.REPRESENTATIVENESS OF SAMPLES

Paragraph specific to the PSA Peugeot Citroën tests

The samples must be representative of the scale to be characterised. To provide this representativeness, it is necessary to find out the basic characteristics of the population studied. The selection criteria for the test specimens or samples must be specified in the Test Report (RE), in conformity with norme [A10 0156](#).

Contact the PSA DPTA/DITV/PMXP/MXP/EMR/PFRC department in order to find out the guidelines to follow.

8.PREPARATION OF TEST SPECIMENS

- Test specimens must be cut out in the longitudinal direction of the material.

Note 1 : *To identify the direction, cut out the lower right hand corner of the test specimen.*

Note 2 : *In the case of textiles, the cut must be made in the weaving or knitting direction.*

- In the specific case of velour, check that the pile is orientated downwards.
- In the case of steering wheels, take a foam test specimen of maximum surface with a thickness not exceeding 3 mm.
- Take test specimens of suitable dimensions for test specimen holders, in the case of composite materials, take test specimens of dimensions 133 mm x 45 mm \pm 2 mm.
- Fix the test specimens to the support cards (5.1.1.2.) with a clip at the top and bottom for composite materials, or any other heat resistant fixing methods for other materials.
- Cut out pieces of approximately 40 mm x 20 mm from the blue standards No. 4, 5, 6, 7 (5.2.).
- Clip the pieces side by side onto a support card (5.1.1.2.) in the following order (see Appendix) :
 - 7 in the highest part of the exposed area,
 - 6 under the blue standard No. 7, at the hottest level,
 - 5 approximately in the middle of the support card,
 - 4 below, which is at approximately 40 mm from the lower end of the support card.

Place the test specimens and the standards on the test specimen holders (5.1.1.1.) and place the masking devices vertically so as to hide half the test specimens and blue standards. The observation window must be located to the right of the test specimen by agreement.

Note : *Produce as many test specimens as required in order to expose all the colours of the material to be tested. In the specific case of transparent or opalescent plastic materials, arrange a support card (5.1.1.2.) on the reverse side of the test specimen without bonding.*

9.PROCEDURE

FADE OMETER CI 3000 (5.1.) AGEING APPARATUS

- Wipe the filter (5.1.1.4.) with “kitchen paper” soaked in ethanol to remove any possible deposits.
- Place the test specimen holders in the ageing test apparatus; ensure that each test specimen holder contains a test specimen or failing that a support card (5.1.1.2.) used as test specimen supports.
- For the specific use of modified test specimen holders with filter KG1 for material exposure at mean temperature, arrange also for a blue scale standard to be positioned behind a KG1 filter.
- Switch on the apparatus and check the display of all parameters.
- Leave the test specimens in the ageing test apparatus for 150 hours or any other duration specified in the documents.
- Examine the recordings and check that the parameters conform to the set requirements.
- During the test, after 1 hour operation, check the parameters mentioned in paragraphs 5.1.4.1, 5.1.4.2. and 5.1.4.3.
- After the test, remove the test specimens and standards from the ageing test apparatus. Before assessing the colour change, rest the materials in darkness at ambient temperature for 2 hours in order to avoid a false grading due to phototropy.

10.REMARKS

Paragraph specific to the PSA Peugeot Citroën tests

Not applicable.

11.EXPRESSION OF RESULTS

Examine the materials aged in the lighting conditions defined in test method D15 1343 with the "white light" illumination device D65 (day light).

To assess the differences in colour, cover the test specimens and standards with the masking devices (5.4.) in order to compare identical surfaces and reduce the effect of nearby colours.

11.1.ASSESSMENT OF THE CHANGE IN COLOUR WITH THE GREY SCALE

Check that the area of the test specimen which is not exposed has not changed by comparing it with a new sample of the material tested. (Certain materials are heat sensitive and the contact with the metal frame may deteriorate their appearance). If it has changed, assess according to the method described below by positioning the new sample edge to edge with the exposed part of the sample tested.

To assess the change in colour, cover the test specimen and the grey scale (5.3.) with the masking device (5.4.), in order to compare identical surfaces.

In order to grade the test specimen, the manipulation takes place under the lamp D65, remaining on the ground of the enclosure ([D15 1343](#)), and seek the worst observation angle to assess the change

Move the grey scale until a change in colour corresponding to that of the test specimen between the exposed area and the masked area is found (or new sample). Note the degree recorded on the grey scale (for example : 3/4).

11.2.ASSESSMENT OF THE VARIATIONS IN APPEARANCE

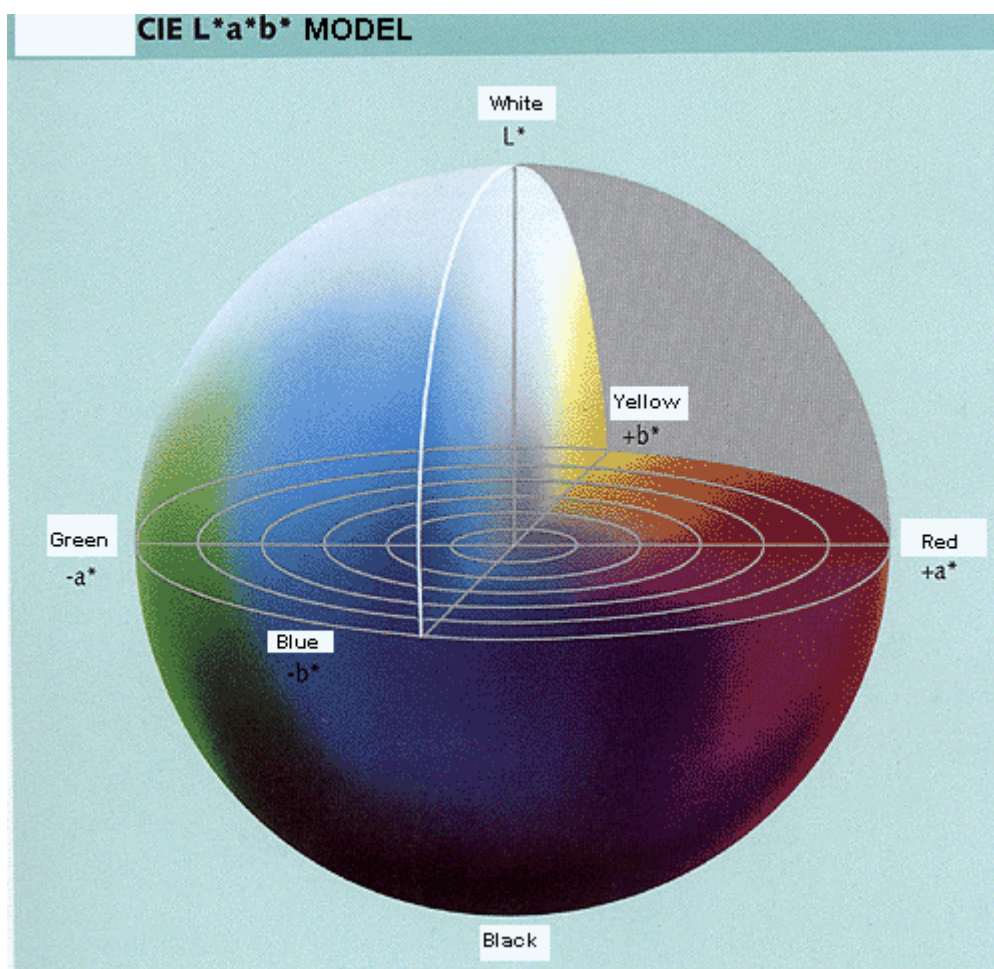
The following assessments are made without using the mask (5.4.), in order to compare larger surfaces for a better observation.

11.2.1.ASSESSMENT OF THE CHANGE IN LUMINANCE

Criterion	Result	Abbreviation for grading
Variation in luminance along the L axis.	• lighter	C
	• darker	F

11.2.2.ASSESSMENT OF THE VARIATION IN COLOUR

Criterion	Result	Abbreviation for grading
Variation in colour along the a and b axes	• redder	R
	• greener	V
	• yellower	J
	• bluer	B



11.2.3.ASSESSMENT OF THE VARIATION IN GLOSS

Criterion	Result	Abbreviation for grading
Variation in gloss	<ul style="list-style-type: none"> • matter • glossier 	Ma Br

Take the gloss measurement according to test method [D25 1413](#) if it is required in the technical specifications (exposed area in relation to the masked area or new reference material if the masked area has changed in colour).

11.2.4.OTHER OBSERVATIONS

Also note any deterioration in appearance such as : Fissures, cracks, exudation, heterogeneity, porosity (or microporosity), etc.

11.3.EXPRESSION ON THE DOCUMENT

The following is to be recorded :

- the degree of colour change according to the grey scale (11.1.)
- the variation in appearance (11.2.)

Example : *3/4 C J Ma Fissures (test specimen graded 3/4 on the grey scale, lighter, change to yellow, matter and fissures in the exposed area..*

- the variation in gloss (with initial gloss and final gloss) measured according to test method [D25 1413](#).
- any other observation.

12.TEST REPEATABILITY

Check the repeatability of the test by checking the blue scale against a blue scale from another test (eg. : test n-1) carried out in the same setting conditions. If this is not the case, the test specimens that have been subjected to the ageing cycle must not be graded. Check on the plotting paper that all the parameters are valid. If applicable, calibrate (5.1.4.4.). Carry out a counter-test. If the problem persists, contact S.A.V. ATLAS.

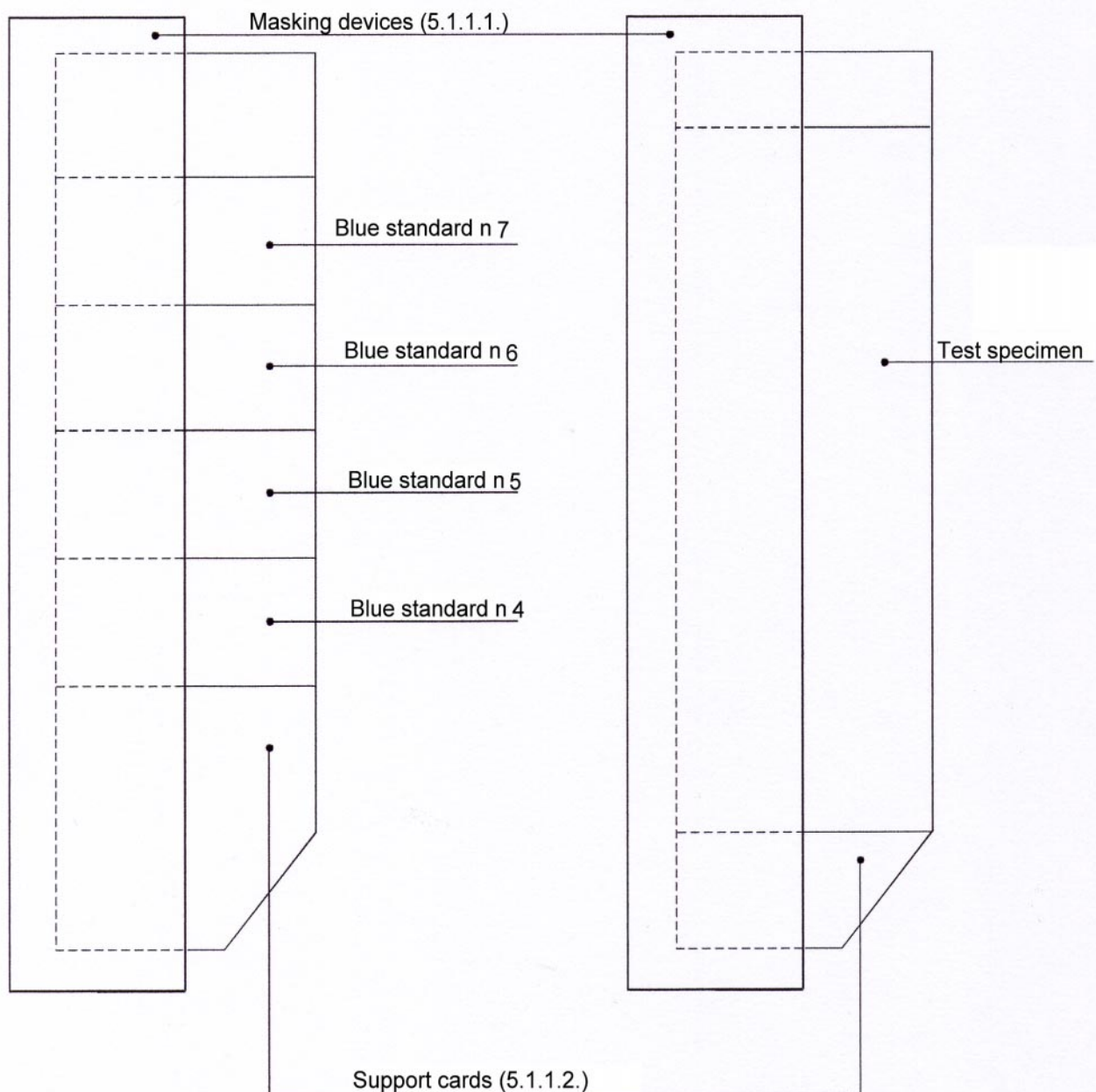
13.TEST REPORT

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

- the reference to this method,
- the references of the material or the part tested and the name of the supplier,
- the duration of exposure, the age and luminous energy of the burner may be requested according to each case,
- the special test conditions, for example : modified test specimen holder with infrared filter KG1 for tests at a mean temperature,
- the mandatory recording of the change in colour such as : luminance, chromaticity or gloss,
- the mandatory recording of all deteriorations in the appearance of the test specimen,
- the operating details not specified in the method as well as any possible incidents likely to have affected the results.

Appendix 1

Blue standards and test specimen assembly



Appendix 2

Schematic diagram of modified test specimen holders

