

FINISHING PAINTS CLEARCOATS

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1. OBJECT AND FIELD OF APPLICATION

This norme defines the requirements for the physio-chemical characteristics of clearcoats on motor vehicle bodies, applied during first assembly in the paint shops of the PSA PEUGEOT CITROËN Group, on water based or thinned base paints, wet on wet. These requirements are based on the durability and/or applicability of the products.

It applies to interior bodywork clearcoats (as far as this area is defined as requiring a clearcoat) and exterior bodywork on metallic or plastic substrates. From the field of application are excluded :

- clearcoats on transparent materials,
- clearcoats on painted interior parts.

In addition, it defines the slots into which certain physio-chemical characteristics of liquid clearcoats must be located in order to meet the function.

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2. EXPRESSION ON DOCUMENTS

The application of the requirements of this norme must comply with § EXPRESSION ON DOCUMENTS in norme B15 5050.

3. GENERAL REQUIREMENTS

This norme must include document B72 0100.

4. DEFINITIONS

4.1. PAINT COATING

It consists of one or more paint layers. The constituent products of the various layers are from the following categories :

- primary paint (weldable or not), for example cataphoresis,
- intermediate paint (primer),
- finishing paint (base + clearcoat). Lacquers or finishing paints without a clearcoat are excluded from the field of application of this norme.

Only products that can be diluted in organic solvents (single or bi-compound) are considered therein, these are the only products applied at present in our workshops.

4.2. FUNCTIONS OF THE FINISHING CLEARCOAT

The finishing clearcoat must meet 2 general functions defined by the **paint functional analysis**.

- IMPROVE THE VEHICLE TO THE EYES OF THE OBSERVER
 - Function : APPEARANCE
- PROTECT THE VEHICLE AND OTHER PAINT LAYERS FROM THE SURROUNDINGS.
 - Functions :
MECHANICAL STRENGTH, RESISTANCE TO CHIPPING,
RESISTANCE TO CLIMATIC AGEING
RESISTANCE TO WATER AND TO CHEMICAL AGENTS.

Furthermore, the finishing clearcoat must show sufficient application properties for mass production.

4.3. DEFINITIONS OF EXTERIOR AND INTERIOR AREAS

Exterior areas : areas located outside the passenger compartment which are in actual fact in contact with the surroundings. These are located on the vehicle exterior in relation to the sealing joints (for doors, tailgate, sun roof, ...) or the vehicle interior for certain access panels (examples : door interiors,...).

Interior areas : areas located inside the passenger compartment or boot in relation to sealing joints.

4.4. LEVELS OF REQUIREMENTS

As the product is unique for all these areas, one level only of the most stringent functional performances is required corresponding to the exterior areas of the vehicle considered.

The clearcoats selected throughout this norme must therefore enable to reach level "5" or "6" such as defined in norme B15 5050, when they are incorporated into a conventional paint scheme (cataphoresis + primer + base + clearcoat) for motor vehicle bodywork first assembly.

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5. RELATIONSHIP WITH “PAINT” STANDARDS

Approved paints, used according to the application and baking ranges selected for the relevant plant, must meet the requirements defined in § 4.4.

6. QUALITY CONTROL

6.1. PRODUCT APPROVAL

The functional characteristics of new materials are validated during approval by DPTA/DMOV/MXP/PEI on test specimens which are produced to simulate the paint scheme application of the vehicle (s) of the plant concerned.

6.2. PRODUCTION QUALITY CONTROL

The functional characteristics of clearcoats are checked on components sampled from production. The frequency, the number and the type of samples and components taken from finished vehicles for quality control are determined by the DMOV-MXP00-0013 procedure.

6.3. MEETING THE REGULATION

In order to meet the current regulation or the regulation in the process of being set up, the clearcoats must meet the requirements of norme B20 0250.

7. CHARACTERISTICS

7.1. CHARACTERISTICS OF THE LIQUID CLEARCOAT

7.1.1. SINGLE COMPOUND CLEARCOAT

The characteristics of liquid clearcoats are checked during approval. The permissible brackets are determined after measuring the first five delivered batches considered suitable for production.

Document s	Application s	Characteristics		Expression of results	Requirements
D55 1016	(3)	Consistency	Concentrated	s	(*)
			Diluted (1)	s	(*) (6)
D55 1339	(3)	Dilution rate (2)		%	(*)
D55 1017 Condition C	(3)	Amount of dry extract	Concentrated	%	(*)
			Diluted	%	(*) (7)
D55 1018	(3)	Density of the concentrate		kg/m ³	(*)
D55 1344	(4)	Compatibility with plant production thinner		-	(5)
D55 5482	(3)	Resistivity of clearcoats		Ω.cm	(*) (6)
D55 5374		Rheological behaviour		-	(8)

Note :

- (1) The 2,5 cup must be used when the viscosity in cup 4 is ≤ 20 seconds.
- (2) A solvent (or mixture of solvents) may be imposed according to the installations.
- (3) Methods to be carried out systematically.
- (4) Methods to be carried out according to technical demands.
- (5) No anomaly.
- (6) A value may be imposed according to the installations.
- (7) A minimum value may be imposed for health, safety and pollution reasons (atmospheric wastes).
- (8) Method for applying material characteristics, without requirements at present.

(*) Conforms to the approved sample, the value of which must be stated on the approval report, according to the technical specifications B20 0150.

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7.1.1.1. Cleanliness by filtration

Cleanliness of clearcoats shall be assessed by means of test method D55 5411 and the following grading table :

Impurities	Acceptance limit	Demerit
Fibres (F)	$0,2 \leq F < 2 \text{ mm}$	3 points
	$2 \leq F < 8 \text{ mm}$	5 points
	$8 \text{ mm} \leq F$	15 points
	Agglomerates	15 points
Particulates (P)	$60 \leq P < 100 \text{ }\mu\text{m}$	5 points
	$100 \text{ }\mu\text{m} \leq P$	15 points

The acceptance limit is set to ≤ 100 points.

7.1.1.2. STABILITY IN CIRCULATING

The stability of the clearcoat (rheology, and colour if required) shall be verified after ageing corresponding to 3 days circulating without addition within an industrial system. The run limit loss measured according to test method D25 5471 shall not exceed 15% of the nominal value obtained on new product.

7.1.2. BI-COMPOUND CLEARCOATS

The characteristics of liquid clearcoats shall be checked during approval. The permissible brackets shall be determined after measuring compounds taken individually as well as their blend, on the first five delivered batches considered suitable for production.

Documents	Applications	Characteristics		Expression of results	Requirements
D55 1016	(3)	Consistency	Concentrated	s	(*)
			Diluted (1)	s	(*) (6)
D55 1339	(3)	Dilution rate (2)		%	(*) (6)
D55 1017 Condition C	(3)	Amount of dry extract	Concentrated	%	(*)
			Diluted	%	(*) (8)
D55 1018	(3)	Density of the concentrate		kg/m ³	(*)

Note :

- (1) The 2,5 cup must be used when the viscosity in cup 4 is ≤ 20 seconds.
 (2) A solvent (or mixture of solvents) may be imposed according to the installations.
 (3) Methods to be carried out systematically.
 (6) A value may be imposed according to the installations.
 (8) A minimum value may be imposed for health, safety and pollution reasons (atmospheric wastes).

(*) Conforms to the approved sample, the value of which must be stated on the approval report, according to the technical specifications B20 0150.

7.1.2.1. Cleanliness by filtration

The cleanliness of the clearcoat resin shall be assessed by means of test method D55 5411 and the following grading table.

Impurities	Acceptance limit	Demerit
Fibres (F)	$0,2 \leq F < 2 \text{ mm}$	3 points

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	$2 \leq F < 8 \text{ mm}$ $8 \text{ mm} \leq F$ Agglomerates	5 points 15 points 15 points
Particulates (P)	$60 \leq P < 100 \text{ }\mu\text{m}$ $100 \text{ }\mu\text{m} \leq P$	5 points 15 points

The acceptance limit is set to ≤ 100 points.

7.1.2.2. Life expectancy : added viscosity

The life expectancy after producing the mixture is assessed by the time required to obtain a 10% increase of its viscosity, measured by means of test method D55 1016. The minimum value of life expectancy is set to 30 min.

7.1.3. APPLICABILITY

For comparative reasons, the applicability survey shall be carried out on a dark blue opaque base paint.

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D25 5470	Pitting limit (1)	μm	≥ 55
D25 5471	Run limit (1)	μm	55
D25 5472 D25 1413 D25 5463	Appearance potential (1) Specular gloss at 20° - Orange peel = f (thickness) Horizontally Vertically - Weighted depth of image = f (thickness) Horizontally Vertically	Unit Unit Unit Unit Unit	85 ≥ 75 (2) ≥ 60 (2) ≥ 65 (2) ≥ 60 (2)
D25 5473	Rinsability (3)	-	In conformity
D25 5474	Ability of paint mist to wet out again	-	No defect
D25 5472 D25 1413 D25 5463	Conformity in recycling Double application of the method of operation Specular gloss at 20° - Orange peel = f (thickness) Horizontally Vertically - Weighted depth of image = f (thickness) Horizontally Vertically	Unit Unit Unit Unit Unit	No defect 85 ≥ 75 (2) ≥ 60 (2) ≥ 65 (2) ≥ 60 (2)

Note :

(1) Apply, as a reference, a plant production range in the same test conditions.

(2) To the min. thicknesses defined by the DMOV/MXP00-0528 procedure.

(3) For information.

7.2. CHARACTERISTICS OF THE CURED CLEARCOAT

These characteristics are checked on a complete film.

7.2.1. RESISTANCE TO WATER

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D27 1327	Resistance to immersion in water - Duration - Blistering / colour change	h Grading	240 0

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D25 1075	- Adhesion	Grading	a or b
D27 1571	Blistering from humidity		
	- Duration	h	96
	- Blistering / colour change	Grading	0
D25 1075	- Adhesion	Grading	a or b
D27 5438	Ageing in autoclave		
	- Adhesion	Grading	a or b
	- Adhesion in recycling	Grading	a or b
	- Blistering	Grading	0

7.2.2. RESISTANCE TO CHIPPING

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D24 1312	Resistance to chipping		
	- Normal appearance chipping	Grading	≤ 2
	- Rework appearance chipping (1)	Grading	≤ 3
D29 5342	- Number of impacts to the substrate		
	Substrates :		
	- Uncoated steel	Grading	1
	- Coated sheets, aluminium and mazak	Grading	2
	- Plastics	Grading	-

Note : (1) Rework at the end of the track and recycling shall be examined.

7.2.3. RESISTANCE TO CLIMATIC AGEING

Documents	Characteristics	Expression of results	Levels of requirements	
			Phase 1	Phase 2
D27 1389	Artificial ageing (Xenon arc : WOM)			
	- Duration (3 cycles)	h	504	1008
D25 1413	- Gloss variation (angle of measurement 20°)	%	≤ 10	≤ 10
B15 5020	- Surface defects		No defects	No defects
D15 5362	- Cracking	Note	No cracking	No cracking
D25 1075	- Adhesion	Grading	a or b	a or b
D27 5439 Procedure A	Artificial ageing to UVBs			
	- Duration	h	504	1008
D25 1413	- Gloss variation (angle of measurement 20°)	%	≤ 10	≤ 10
B15 5020	- Surface defects		No defects	No defects
D15 5362	- Cracking	Note	No cracking	No cracking
D25 1075	- Adhesion	Grading	a or b	a or b
D27 5439 Procedure B	Artificial ageing to UVBs + thermocycles			
	- Duration (number of modules)		2	4
D25 1413	- Gloss variation (angle of measurement 20°)	%	≤ 15	≤ 15
B15 5020	- Surface defects		No defects	No defects
D15 5362	- Cracking	Note	No cracking	No cracking
D25 1075	- Adhesion	Grading	a or b	a or b

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D27 1526	Natural ageing (*) Site : FLORIDA Duration	Month	18	36
D25 1413	Cleaning and polishing, then : - Gloss variation (angle of measurement 20°)	%	≤ 10	≤ 10
B15 5020	- Surface defects	No defects	No defects	No defects
D15 5362	- Cracking	No cracking	No cracking	No cracking
D25 1075	- Adhesion	Note Grading	a or b	a or b

Note : (*) Taking the duration into account, the results of natural ageing tests shall be given from experience.

7.2.4. RESISTANCE TO CHEMICAL AGENTS

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D27 5437	Solvent thinning - Xylene - Ethanol	min min	≥ 3 ≥ 3
D27 5377	Staining - by the iso-octane/toluene blend - by the hexadecane/ α-methyl-naphtalene blend - by temporary protection products - by protection removal products - by glass wash liquids	Grading Grading Grading Grading Grading	0 0 0 0 0
D27 1433	Resistance to diluted sulphuric acid	Grading	≤ 2
D27 5415	Resistance to biological attacks	Grading	≤ 3

7.2.5. MECHANICAL CHARACTERISTICS

7.2.5.1. Adhesion and scratchability

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D25 1075	Adhesion	Grading	a or b
D24 5359	Resistance to the action of mechanical wash brushes		
D25 1413	When new - Residual gloss (20°angle) - Variation with initial gloss	UB UB	≥ 70 ≤ 20
S84 4105	After simulation of ageing on storage park by :		
D25 1413	- Residual gloss (20° angle) - Variation from initial gloss	UB UB	≥ 70 ≤ 20

7.2.5.2. Elasticity

These characteristics are only valid for paint coatings applied to steel sheets and aluminium which have been subjected to a surface treatment of nominal thickness : 0,7 mm to 1,2 mm.

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Documents	Characteristics	Expression of results	Levels of requirements	
			Phase 1	Phase 2
D25 1298	Hardness using the Persoz pendulum test	s	≥ 180	≥ 180
D25 1342	ERICHSEN cupping	mm	≥ 3	≥ 5

Note : Hardness of the clearcoats measured here is the intrinsic hardness of the material; it shall be measured on a clearcoat film applied on its own, to sheet metal, to thicknesses of 30 µm and 50 µm, baked at 140° for 20 minutes.

8. DEFINITION OF THE BONDING RANGE

8.1. ADHESION OF BONDING MASTICS TO FIXED GLASS

In consistency with norme B14 1820.

Documents	Characteristics	Expression of results	Requirements
			Phases 1 and 2
D41 5464 Condition A	After 10 days at ambient temperature - Peeling test in critical conditions	Cohesive failure of the clearcoat	None
		Adhesive failure clearcoat to base	None
		Surface % of adhesive failure	≤ 30 no adhesive failure within the bead width
D47 1165 D41 5464 Condition A	After ageing H7 at 60° - Peeling test in critical conditions	Cohesive failure of the clearcoat	None
		Adhesive failure clearcoat to base	None
		Surface % of adhesive failure	≤ 30 no adhesive failure within the bead width

Note : Other finishing materials (primer and base paints) being validated, the only acceptable failures in the test are :

- Cohesive failure of the mastic bead
- Adhesive failure of the mastic bead < 30% of the surface without affecting the whole width of the bead.

8.2. ADHESION OF WATER RAIL SEALS

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2

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D51 1485	10 minutes after bonding - Peeling test	N/cm	15
D51 1485	24 hours after bonding - Peeling test	N/cm	20

8.3. ADHESION OF SEALING FILMS

In consistency with norme B65 6230.

Documents	Characteristics	Expression of results	Levels of requirements
			Phases 1 and 2
D51 1485	10 minutes after bonding - Peeling test	N/cm	4

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9. RECORDS AND REFERENCE DOCUMENTS

9.1. RECORDS

9.1.1. CREATION

- OR : 12/03/2002 – CREATION OF THE NORME.

9.1.2. SUBJECT OF THE MODIFICATION

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9.2 REFERENCE DOCUMENTS

9.2.1. PSA DOCUMENTS

9.2.1.1 Normes

B14 1820	BONDING FUNCTIONS AFTER FINISHING PAINT – GLAZING ELEMENTS BONDED TO BODY EXTERIOR
B15 5020	PAINT COATINGS – DEFINITION OF SPECIFIC TERMS
B15 5050	PAINT COATINGS – FINISHED VEHICLES
B20 0150	PRODUCTS SUBJECT TO A PRODUCT APPROVAL SPECIFICATION – GENERAL REQUIREMENTS
B20 0250	MATERIALS SUBJECT TO REGULATIONS – USE RESTRICTION WITHIN THE PSA PEUGEOT CITROËN GROUP
B65 6230	PLASTIC SHEETS AND COMPOUNDS FOR SEALING
B72 0100	PAINT SUPPLIES – ALL TYPES – GENERAL REQUIREMENTS
D15 5362	PLASTIQUES ET REVETEMENTS DE PEINTURES – PHENOMENES DE FENDILLEMENT ET D'ECAILLAGE – STANDARD DE REFERENCE
D24 1312	PAINT COATINGS – RESISTANCE TO CHIPPING
D24 5359	PAINT COATINGS – RESISTANCE TO THE ACTION OF MECHANICAL WASH BRUSHES
D25 1075	PAINT COATINGS – CROSS HATCH TEST
D25 1298	PAINT AND VARNISH COATINGS – HARDNESS TEST (PERSOZ PENDULUM)
D25 1342	PAINT COATINGS AND SIMILAR PRODUCTS – ERICHSEN CUPPING
D25 1413	PAINT COATINGS – RUBBERS AND PLASTICS – GLOSS MEASUREMENT
D25 5463	PAINT COATINGS – ORANGE PEEL AND DEPTH OF IMAGE MEASUREMENT
D25 5470	PAINT COATINGS – PITTING LIMIT ASSESSMENT OF FINISHING PAINTS
D25 5471	PAINT COATINGS – RUN LIMIT ASSESSMENT OF PRIMER SURFACERS AND CLEARCOATS
D25 5472	PAINT COATINGS – ASSESSMENT OF A CLEARCOAT FINISH POTENTIAL
D25 5473	REJETEMENTS DE PEINTURES – EVALUATION DE LA RINÇABILITE DES PEINTURES
D25 5474	REJETEMENTS DE PEINTURES – EVALUATION DE L'APTITUDE DES PEINTURES AU REMOILLAGE DES BROUILLARDS
D27 1327	PAINT COATINGS – RESISTANCE TO IMMERSION IN WATER (FORD TANK)
D27 1389	PAINT COATINGS – RUBBERS AND PLASTICS – ARTIFICIAL AGEING BY THE WEATHER-OMETER
D27 1433	PAINT COATINGS AND SIMILAR PRODUCTS – RESISTANCE TO DILUTED SULPHURIC ACID
D27 1526	PAINTS, CLEARCOATS AND SIMILAR PRODUCTS – NATURAL AGEING TEST
D27 1571	PAINT COATINGS – BLISTERING FROM HUMIDITY
D27 5377	PAINT COATINGS – STAINING BY CHEMICAL PRODUCTS
D27 5415	PAINT COATINGS – RESISTANCE TO BIOLOGICAL ATTACKS
D27 5437	PAINT COATINGS – STAINING BY CHEMICAL PRODUCTS
D27 5438	REJETEMENTS DE PEINTURES FEUIL FINI – RESISTANCE AU VIEILLISSEMENT EN AUTOCLAVE
D27 5439	REJETEMENTS DE PEINTURES – VIEILLISSEMENT ARTIFICIEL AUX ULTRAVIOLETS
D29 5342	PAINT COATINGS ON METALLIC SUBSTRATE – HIGHLIGHTING AND GRADING OF IMPACTS REACHING THE SUBSTRATE
D41 5464	MASTICS POLYURETHANNE POUR COLLAGE VITRAGE – ADHERENCE PAR PELAGE SUR FINITION PEINTURE EN CONDITIONS CRITIQUES
D47 1165	PRODUCTS APPLIED TO BODY IN WHITE OR COATED WITH PAINT, PLASTICS – ACCELERATED AGEING

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D51 1485	GLUES AND ADHESIVES – PEELING AT RIGHT ANGLE
D55 1016	ADHESIVES, PAINTS AND SIMILAR PREPARATIONS – CONSISTENCY (CUP METHOD)
D55 1017	LIQUID PREPARATIONS – DETERMINATION OF THE CONVENTIONAL DRY EXTRACT
D55 1018	MASTICS, ADHESIVES, PAINTS AND SIMILAR PREPARATIONS – DENSITY (PYCNOMETER METHOD)
D55 1339	PAINTS AND SIMILAR PREPARATIONS – DILUTION RATE
D55 1344	PAINTS AND SIMILAR PREPARATIONS – COMPATIBILITY WITH DILUENTS
D55 5374	PEINTURES SOLVANTES – CARACTERISTIQUES RHEOLOGIQUES (VISCOSIMETRE ROTATIF A CYLINDRES COAXIAUX)
D55 5411	PAINTS – CLEANLINESS (FILTERING)
D55 5482	PEINTURES DE FINITION – MESURE DE RESISTIVITE ET DE CONDUCTIVITE
S84 4105	PROCESSUS DE REVETEMENT – GAMME DE SIMULATION DU VIEILLISSEMENT SUR PARCS DE STOCKAGE POUR ESSAIS EN LABORATOIRE

9.2.1.1. Others :

DMOV-MXP00-0013	SUIVI QUALITE DU FEUIL EN USINE
DMOV-MXP00-0528	REFERENTIEL D'EPAISSEURS DE CUISSON ET D'ASPECT

9.2.2. EXTERNAL DOCUMENTS

9.3. EQUIVALENT TO :**9.4. CONFORMS TO :****9.5. KEY-WORDS**