Asociación para el Estudio de las Tecnologías de Equipamiento de Carreteras, S.A
(Association for the development of technologies for road equipment, S.A)

C/ Isaac Peral, nº 1 (nave 4). E-28914 Leganés (Madrid) - Spain - Tel. +34 916 800 160 - Fax. + 34 916 886 001 - aetec@aetec.es

Quality control of road marking materials. Durability test.
Road markings: Evaluation of the perfomance in use.

ROAD MARKING MATERIALS

(Durability against abrasion: EN 13197)

DURABILITY CERTIFICATE Nº 2264/P-R-I

Delivered to: **VERNISOL S.P.A.**
Via delle Industrie, 4
26020 SPINADESCO (CR)

Date: **July 12th, 2010**

The CERTIFIED TEST RESULTS (type, intended use, durability level and technical classes) are only valid when the same materials (same trade marks and dossages) are applied as a system (**CERTIFIED ROAD MARKING SYSTEM**).

A) IDENTIFICATION OF THE CERTIFIED ROAD MARKING SYSTEM

MATERIALS IDENTIFICATION		PRODUCER(S)	Thickness µm	Dossage g/m²
Nature: White acrylic paint Trade mark[1]: **SPART. ACRILICO BIANCO T** Applied by: Spray		**VERNISOL S.P.A.**	**390**	**600**
Nature: Glass beads Trade mark[2]: **850 - 125 T** Applied by: Drop-on		**POTTERS-BALLOTINI**		**400**

1) The sample of the tested material complies with the relevant requirements specified in EN 1871. The resulting classes and the identification parameters can be suplied by the manufacturer or by this Laboratory with authorization of the manufacturer.
2) The tested material is identified by means of its **CE Declaration of Conformity** and their accompanying documents.

B) TEST RESULTS: initial and retained values and their technical classes, in accordance to EN 1436

TYPE OF MATERIAL: (general class in accordance to its nature and the application instructions)

White acrylic paint without premix glass beads applied by spray and with drop-on glass beads.

INTENDED USE	P-R	ROUGHNESS	RG2	TYPE	I

DURABILITY LEVEL		RELEVANT TECHNICAL CLASSES			
		R_L	β	Qd	SRT
INITIAL	P0	R5	B5	Q5	S3
RETAINED	P4	R2	B5	Q5	S2
	P5	R2	B5	Q5	S2
	P6	R2	B4	Q4	S3
DRYING TIME (informative)					18 Mint.

aetec (English version)	Nº	DATE	Technical Director	Document reference	
DURABILITY CERTIFICATE This certificate is identical to the original spanish version	2264/P-R-I	July 12th, 2010	D. David Calavia	I-7-MC	Rev. 0 Page 1 de 1

aetec	INFORMATIVE ANNEX TO THE DURABILITY CERTIFICATE	VERNISOL S.P.A.	Date: July 12th, 2010	Nº	2264/P-R-I

1.- Test conditions

in accordance with the specifications given in EN 13197 (annex F)

Test plates	1 Roughness RG2 Size G
Test plates orientation	Parallel to the movement ot the loading wheels
Test conditions during application	tª amb: 27ºC HR: 33% Material temperature (thermoplastic) ºC x
Materials applied, % desviation on requested	Film maker material: 0,33 Glass beads: 0,00 Antiskid aggregates: x Mixture: x
Test Tyres	Pirelli P 6000 205/65 R15 94V
Numer of wheels	4
Load on wheels (N)	3000 ± 300
Tyre air pressure (Mpa)	0,25 ± 0,02
Support angle (degrees)	0º ± 20'
Steering angle (degrees)	alternating + 1º (± 10') / - 1º (± 10')
Room temperature	between + 5ºC and + 10ºC
Dryving cycle	4000 wheel passages with water (approx. 2 h) at a turntable speed of 10 km/h ± 1 km/h followed by cycles of 10000
Room temperature	between + 5ºC and + 10ºC
Dryving cycle	In acordance to **prEN 13197: 2009**
Periodicity of measurements	0,01; 0,05 (optional); 0,1; 0,2; 0,5; 1,0; 2,0; 3,0 y 4,0 x 10^6

PERFOMANCE REQUIREMENTS (EN 1436)			DURABILITY LEVEL - REQUIRED Nº OF ROLL-OVERS AND INTENDED USE		
CHARACTERÍSTIC		CLASSES and THRESHOLD VALUES in accordance whit EN 1436	LEVEL	r.over x 10^6	INTENDED USE
Night-time visibility under ... conditions: R_L, mcd·m^{-2}·lx^{-1}	DRY	R2 (100)[1] - R1 (80)[2]	P0	<0,05	
	RAIN	RR1 (25)	P1	0,05	Not qualified road marking
	WET	RW1 (25)	P2	0,1	Temporary road marking
Day-time visibility	(x,y)	inside the relevant polygon	P3	0,2	Temporary road marking
	β (X10^{-1})	B2 (0,3)[1] - B1 (0,2)[2]	P4	0,5	Permanent road marking
	Qd	Q2 (100)[1] - Q1 (80)[2]	P5	1,0	Permanent road marking
Skid resistance	SRT	S1 (45)	P6	2,0	Permanent road marking
Erosion: % retained	%	not required[3]	P7	4,0	Permanent road marking

1) for white colour 2) for yellow colour

3) On wear simulator test, some minimum value can be specified for this characteristic.

3.- TEST RESULTS: initial and retained values and their technical classes

in accordance with EN 1436

CHARACTERISTIC		value and technical class for each number of wheel passages x 10^6																Classes		
		0,01 (P0)		0,1 (P2)		0,2 (P3)		0,5 (P4)		1,0 (P5)		2,0 (P6)		3,0		4,0 (P7)		MAX.	AVER.	MIN.
Night-time visibility R_L, mcd·m^{-2}·lx^{-1}	R_L	**388**	R5	**293**	R4	**207**	R4	**132**	R2	**119**	R2	**136**	R2	**NPD**	NPD	**NPD**	NPD	**R5**	**R2**	**R2**
Day-time visibility	(x,y)	**320**	**341**	**320**	**342**	**321**	**342**	**321**	**343**	**322**	**344**	**323**	**344**	**NPD**	**NPD**	**NPD**	**NPD**	**pass**	**pass**	**pass**
	β (x10^{-1})	**71,7**	B5	**73,1**	B5	**70,4**	B5	**65,3**	B5	**62,6**	B5	**56,2**	B4	**NPD**	NPD	**NPD**	NPD	**B5**	**B5**	**B4**
	Qd	**261**	Q5	**282**	Q5	**262**	Q5	**231**	Q5	**201**	Q5	**173**	Q4	**NPD**	NPD	**NPD**	NPD	**Q5**	**Q5**	**Q4**
Skid resistence	SRT	**56**	S3	**52**	S2	**47**	S1	**50**	S2	**54**	S2	**56**	S3	**NPD**	NPD	**NPD**	NPD	**S3**	**S2**	**S1**

4.- Key words for the identification of type of material, intended use and technical classes

The **type of material** is identified in accordance with the classification given in Mandate M/111

The **intended use** is defined by three groups of key words.

A first key word to identify if it is for permanent or temporary purposes.

- **P** For permanent road marking.
- **T** For temporary road marking.

A second key to identify the retroreflective properties of the road marking

- **R** For road markings retroreflective under dry conditions
- **RW** For road markings retroreflective under dry and wet conditions
- **RR** For road markings retroreflective under dry, wet and rain conditions
- **NR** For non retroreflective road markings.

The third key is to identify the type of road marking

- **I** Conventional road marking
- **II** Road marking with special properties to enhance the retroreflection in wet or rainy conditions

The **level of durability** is given by one of the traffic classes described in Table 4 of EN 13197 and it is determined by the number of roll-overs necessary until a value of any required characteristic goes under its relevant threshold value specified in EN 1436 (see also clause 2 above: pass/fail criteria).

Each level of durability is also defined by their relevant **technical classes** (EN 1436).

- **NPD** Means Not Performace Determined for the characteristic.
- **FAIL** Means that the value obtained for this characteristic does not comply with the minimum required in EN 1436.

The maximun, minimum and average classes achieved for each characteristic along the test are also given for informative purposes.

5.- Interpretative note

The performace levels achieved by a road marking system on the durability test, shall not be interpreted as being a guarantee for the working life in practice. The latter depends on many factors beyond the materials such as desing, location (type of road surface, weather conditions, etc.) and application conditions.

aetec (English version) INFORMATIVE ANNEX TO THE DURABILITY CERTIFICATE	Nº	Date	Technical Director	Document reference
This certificate is identical to the original spanish version	2264/P-R-I	July 12th, 2010	D. David Calavia	I-9-MC Rev. 0 Page 1 of 1

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- Quality control of road marking materials. Durability test.
- Road markings: Evaluation of the perfomance in use.

TEST REPORT FOR THE DURABILITY OF ROAD MARKING MATERIALS

TEST REPORT	Nº	2264

Delivered to: **VERNISOL S.P.A.**
Via delle Industrie, 4
26020 SPINADESCO (CR)

Date: **July 12th, 2010**

A) IDENTIFICATION OF THE TESTED ROAD MARKING SYSTEM

BASE MATERIAL

Trade mark:	**SPART. ACRILICO BIANCO T**			
Nature:	White acrylic paint			
Dossage	**600** g/m^2	Thickness	**390**	µm
Producer:	**VERNISOL S.P.A.**			
Applied by:	Spray			

DROP ON MATERIALS

	Glass beads	Antiskid aggregates	Retroreflective materials
Trade mark:	**850 - 125 T**	**x**	**x**
Nature:	Glass beads	x	x
Dossage g/m^2	**400**	**x**	**x**
Producer:	**POTTERS-BALLOTINI**	**x**	**x**
Applied by:	Drop-on	x	

PREMIX GLASS BEADS

Trade mark:	**x**
Nature:	x
Dossage g/m^2	**x**
Producer:	**x**

B) TEST RESULTS: initial and retained values and their technical classes, in accordance to EN 1436

TYPE OF MATERIAL: White acrylic paint without premix glass beads applied by spray and with drop-on glass beads.

CLASS OF ROUGHNESS	RG2

Roughness of the test plate on which the assembly has been tested

DURABILITY LEBEL		RELEVANT TECHNICAL CLASSES					
		dry R_L	rain RR	wet RW	β	Qd	SRT
INITIAL	**P0**	**R5**	**NPD**	**NPD**	**B5**	**Q5**	**S3**
RETAINED	**P4**	**R2**	**NPD**	**NPD**	**B5**	**Q5**	**S2**
	P5	**R2**	**NPD**	**NPD**	**B5**	**Q5**	**S2**
	P6	**R2**	**NPD**	**NPD**	**B4**	**Q4**	**S3**
	P7	**NPD**	**NPD**	**NPD**	**NPD**	**NPD**	**NPD**
DRYING TIME (Informative)						**10 Mint.**	

aetec (English version) TEST REPORT	Nº	DATE	Technical Director	Document reference
This test report is identical to the original spanish version	2264	July 12th, 2010	D. David Calavia	I-6-MC Rev. 0 Page 1 of 1

The details of the test are given in an informative annex to this test report.

aetec	INFORMATIVE ANNEX TO THE TEST REPORT OF DURABILITY	VERNISOL S.P.A.	Date: July 12th, 2010	Nº	2264

1.- Test conditions

in accordance with the specifications given in EN 13197 (annex F)

Test plates	1 Roughness RG2 Size G
Test plates orientation	Parallel to the movement ot the loading wheels
Test conditions during application	tª amb: 27ºC HR: 33% Material temperature (thermoplastic) ºC x
Materials applied, % desviation on requested	Film maker material: 0,33 Glass beads: 0,00 Antiskid aggregates: x Mixture: x
Test Tyres	Pirelli P 6000 205/65 R15 94V
Numer of wheels	4
Load on wheels (N)	3000 ± 300
Tyre air pressure (Mpa)	0,25 ± 0,02
Support angle (degrees)	0º ± 20'
Steering angle (degrees)	alternating + 1º (± 10') / - 1º (± 10')
Room temperature	between + 5ºC and + 10ºC
Dryving cycle	In acordance to **prEN 13197: 2009**
Deviation:	Not
Periodicity of measurements	0,01; 0,05 (optional); 0,1; 0,2; 0,5; 1,0; 2,0; 3,0 y 4,0 x 10^n

2.- Pass/fail criteria

in accordance with the minimum values and classes specified for the different characteristics in EN 1436

PERFOMANCE REQUIREMENTS (EN 1436)			DURABILITY LEVEL - REQUIRED Nº OF ROLL-OVERS AND INTENDED USE		
CHARACTERÍSTIC		CLASSES and THRESHOLD VALUES in accordance whit EN 1436	LEVEL	r.over x 10^6	INTENDED USE
Night-time visibility under ... conditions: R_L, mcd·m^{-2}·lx^{-1}	DRY	R2 (100)[1] - R1 (80)[2]	P0	<0,05	
	RAIN	RR1 (25)	P1	0,05	Not qualified road marking
	WET	RW1 (25)	P2	0,1	Temporary road marking
Day-time visibility	(x,y)	inside the relevant polygon	P3	0,2	Temporary road marking
	β (X10^{-1})	B2 (0,3)[1] - B1 (0,2)[2]	P4	0,5	Permanent road marking
	Qd	Q2 (100)[1] - Q1 (80)[2]	P5	1,0	Permanent road marking
Skid resistance	SRT	S1 (45)	P6	2,0	Permanent road marking
Erosion: % retained	%	not required[3]	P7	4,0	Permanent road marking

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3.- TEST RESULTS: initial and retained values and their technical classes

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CHARACTERISTIC		value and technical class for each number of wheel passages x 10^6																Classes		
		0,01 (P0)		0,1 (P2)		0,2 (P3)		0,5 (P4)		1,0 (P5)		2,0 (P6)		3,0		4,0 (P7)		MAX.	AVER.	MIN.
Night-time visibility R_L, mcd·m^{-2}·lx^{-1}	dry R_L	388	R5	293	R4	207	R4	132	R2	119	R2	136	R2	NPD	NPD	NPD	NPD	R5	R2	R2
	rain RR	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD
	wet RW	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD	NPD
Day-time visibility	(x,y)	320	341	320	342	321	342	321	343	322	344	323	344	NPD	NPD	NPD	NPD	pass	pass	pass
	β (x10^{-1})	71,7	B5	73,1	B5	70,4	B5	65,3	B5	62,6	B5	56,2	B4	NPD	NPD	NPD	NPD	B5	B5	B4
	Qd	261	Q5	282	Q5	262	Q5	231	Q5	201	Q5	173	Q4	NPD	NPD	NPD	NPD	Q5	Q5	Q4
Skid resistence	SRT	56	S3	52	S2	47	S1	50	S2	54	S2	56	S3	NPD	NPD	NPD	NPD	S3	S2	S1
Erosion - % retained	%	100	*	100	*	95	*	90	*	85	*	70	*	*	*	*	*	*	*	*

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aetec (English version) INFORMATIVE ANNEX TO THE TEST REPORT OF DURABILITY. This report is identical to the original spanish version	Nº	Date	Technical Director	Document reference
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