PS: 616 & 617 - 2017

PAKISTAN STANDARD SPECIFICATION

FOR

ENAMEL PAINT EXTERIOR AND INTERIOR (UNDERCOATING, FINISHING COLOUR) (FIRST REVISION)

PAKISTAN STANDARDS AND QUALITY CONTROL AUTHORITY,
STANDARDS DEVELOPMENT CENTRE,
Plot No. ST-7A, Block-3, Scheme 36, Gulistan-e-Johar Karachi

PAKISTAN STANDARD SPECIFICATION FOR ENAMEL PAINT EXTERIOR AND INTERIOR (UNDERCOATING, FINISHING COLOUR) (FIRST RIVISION)

0. FOREWORD

0.1 This Pakistan Standards was adopted by the Pakistan Standards and Quality Control Authority on 28th, February, 2017 after the draft finalized by the "Paints and Allied Material technical committee had been approved by the "National Standard Committee for Chemicals".

0.2 This Pakistan Standard was first published in 1966. This revision has been prepared based on the views/recommendations of consumers, manufacturers paint specialists, Chemists, Chemical Engineers, scientists and other stakeholders have been given full consideration.

0.3 In this revision, the committee has merged PS 616 and PS 617 into one standard, in the view of international standards because there is no significant difference in composition and performance requirements for exterior and interior paints.

0.4 While preparing this standard assistance taken from ISO, ASTM and IS acknowledged with thanks.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with the final values observed or calculated expressing the result of a list or analysis, shall be rounded off in accordance with PS: 103-1991 "Rule for Rounding off Numerical Values (1st Revision). The number of Significant places returned in the rounded off values shall be same as that of the specified values in this standards.

0.6 The Technical Committee responsible for the preparation of the Standard revised and updated it according to the requirement and progress in the country.

1 SCOPE

1.1 This Standards prescribes the performance requirements, methods of sampling and testing for the material commercially known as Enamel paint, Exterior/interior, (1) Undercoating (2) Finishing. The material is used in painting systems for protection and decoration.

Normative References:

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 835-1, Laboratory glassware — Graduated pipettes — Part 1: General requirements
ISO 1517:1973, Paints and varnishes — Surface-drying test — Ballotini method
ISO 2114, Plastics (polyester resins) and paints and varnishes (binders) — Determination of partial acid value and total acid value
ISO 2811-1, Paints and varnishes — Determination of density — Part 1: Pyknometer method
ISO 3681, Binders for paints and varnishes — Determination of saponification value — Titrimetric method
ISO 4630-1, Clear liquids — Estimation of colour by the Gardner colour scale — Part 1: Visual method
ISO 4630-2, Clear liquids — Estimation of colour by the Gardner colour scale — Part 2: Spectrophotometric method
ISO 4793, Laboratory sintered (fritted) filters — Porosity grading, classification and designation
ISO 5661, Petroleum products — Hydrocarbon liquids — Determination of refractive index
ISO 15528, Paints, varnishes and raw materials for paints and varnishes — Sampling
ISO 2813:2014: Paints and varnishes -- Determination of gloss value at 20 degrees, 60 degrees and 85 degrees.
ISO 9117-1:2009, Paints and varnishes -- Drying tests -- Part 1: Determination of through-dry state and through-dry time.
ISO 9117-3:2010, Paints and varnishes -- Drying tests -- Part 3: Surface-drying test using ballotini.
ASTM D 1640: Drying time, set to touch, dust free, etc.
ISO 3270:1984, Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing.
ISO 3696:1987, Water for analytical laboratory use — Specification and test method.
ISO 15184:2012, Paints and varnishes -- Determination of film hardness by pencil test
ASTM D 3363 “Standard Test Method for Film Hardness by Pencil Test”.
ISO/DTR 19402, Paints and varnishes -- Adhesion of coatings.
ASTM D 522, Method-B, Flexibility:
ASTM D 3359, Method A, Adhesion or ASTM D 4541.
ASTM D 56 “Standard Test Method for Flash Point by Tag Closed Cup Tester”.
ASTM D 3278 “Standard Test Methods for Flash Point of Liquids by Small Scale Closed Cup Apparatus”
AOAC 974.02, ASTM 1645, 1613, ASTM E1613-04 by AAS,USEPA 6010, USEPA 6020, USEPA 3052, “Determination of heavy metal by AAS/ICP-OES”
ASTM Designation: E 1347, Determination of opacity.

3. TERMINOLOGY

3.1 For the purpose of this standard, the terms and definition will be incorporated from ISO 4618.

4. REQUIREMENTS

The product shall also comply with the requirements specified in the Table-1

TABLE -1
REQUIREMENTS FOR ENAMEL PAINT (UNDERCOATING, FINISHING COLOUR)

Parameter	Performance Requirements		Test Method
	Primer	Finish	
Consistency	(1) 20-30 sec F-4 Cup (4:1) at 25 °C ± 1 (2) 7- poise min at temperature 25 C	(1) 240-450 sec F-4 Cup at 25 °C ± 1 (2) 7-11 poise at temperature 25 C	(1) ISO 2431:2011: Paints and varnishes -- Determination of flow time by use of flow cups (2) (a)ISO 2884-1:1999: Paints and varnishes -- Determination of viscosity using rotary viscometers -- Part 1: Cone-and-plate viscometer operated at a high rate of shear (b) ISO 2884-2:2003: Paints and varnishes -- Determination of viscosity using rotary viscometers -- Part 2: Disc or ball viscometer operated at a specified speed
Drying time, max at 25 °C and 40-60 % RH (1) Surface Dry (2) Hard Dry	4 hours 12 hours	6 hours 24 hours	(1) ISO 9117-1:2009 Paints and varnishes -- Drying tests -- Part 1: Determination of through-dry state and through-dry time. (2) ISO 9117-3:2010 Paints and varnishes -- Drying tests -- Part 3: Surface-drying test using ballotini. (3) Drying time, set to touch, dust free, etc.: Refer to ASTM Designation: D 1640.
Finish (1)Undercoating (2)Finishing	Smooth and matt	Smooth & matt/glossy	Physical evaluation
Opacity	2-3 coats	2-4 coats (80-120 micron)	Dry opacity: On a black/white Leneta chart, Form 2A Opacity, draw down a film of the sample covering both black and white portions of the chart. Unless otherwise specified, use a 10 mil gap draw-down blade. Dry the specimen 24 hours at 25ºC. Using a suitably calibrated filter photometer conforming to ASTM Designation: E 1347, measure alternately the 45°/0° daylight luminous directional reflectance of the specimen over the white and black portions of the chart. Calculate dry opacity as follows: Dry Opacity = Reflectance over black / Reflectance over white Similar results may be obtained from spectrophotometers conforming to ASTM Recommended Practice E 308.

Gloss	Matt 0-30 at angle of 60°	Matt-0-30 at angle of 60° Glossy- 80% min. at angle of 60°	ISO 2813:2014: Paints and varnishes -- Determination of gloss value at 20 degrees, 60 degrees and 85 degrees
Color (1)Undercoating (2)Finishing	On choice	On choice	Physical evaluation
Scratch Hardness	Not applicable/practicable for enamel primer	Not applicable/practicable for enamel finishing	ISO 15184:2012 Paints and varnishes -- Determination of film hardness by pencil test ASTM D 3363 "Standard Test Method for Film Hardness by Pencil Test".
Flexibility & Adhesion	Not applicable/practicable for enamel primer	Not applicable/practicable for enamel finishing	(1) ISO/DTR 19402 Paints and varnishes -- Adhesion of coatings. (2) Flexibility: Follow ASTM Designation: D 522, Method-B. (3) Adhesion: Follow ASTM Designation: D 3359, Method A or ASTM Designation: D 4541.
Flash Point	-4C	-4C	(1)ASTM D 56 "Standard Test Method for Flash Point by Tag Closed Cup Tester". (2) ASTM D 3278 "Standard Test Methods for Flash Point of Liquids by Small Scale ClosedCup Apparatus"
Heavy Metal 1. Lead (Pb), max 2.Chromium (Cr), max 3. Cadmium (Cd), max	 100 ppm 100 ppm 100 ppm	 100 ppm 100 ppm 100 ppm	AOAC 974.02 ASTM 1645, 1613, ASTM E1613-04 by AAS, USEPA 6010, USEPA 6020, USEPA 3052
Weight per Liter	1.2-1.6 kg per liter	0.90 -1.40 kg per liter	
Shelf Life	Normally 2years, Keep in shade.	Normally 2 years, Keep in shade.	
Marketing & Delivery	As agreed with the purchase	As agreed with the purchase	

5. PACKING AND MARKING

5.1 **Packing—** unless otherwise agreed between the purchaser and the supplier, the paint shall be packed in metal containers.

5.2 **Marking—** Each container shall be marked with the following:

a) Name and class of material
b) Name and address of the manufacture and/or his recognized trade-mark, if any;
c) Volume of the material

d) Batch No. or lot No. in code otherwise; and
e) Month and year manufacture.
f) Container may also be marked with the PSQCA Certification Mark.

6. SAMPLING

6.1 Preparation of Test Samples

6.1.1 The sample shall be submitted in three different containers each containing not less than 500ml of the material.

6.1.2 **Bulk supply sample—**Representative sample of the material shall be drawn and treated as prescribed.

7. TEST METHODS

7.1 Test shall be conducted according to the methods prescribed in ISO, ASTM and IS.

7.2 **Quality of Reagent—** Unless specified otherwise, pure chemicals and distilled water shall be employed in tests.

NOTE. Pure chemicals shall means chemical that not contains impurities which affect the result of analysis.

7.3 Comparison with the performance of the registered sample shall be carried out on the basis of the records maintained for the registered sample (see 4.2.1).

8. CRITERIA FOR CONFORMITY

9.1 A lot shall be declared conforming to the requirements of this standard if the test results of the composite samples satisfy the requirements prescribed in clause 4 of this standard.