BS EN 4171:2011

BSI Standards Publication

Aerospace series — Paints and varnishes — Test method for determination of phosphoric acid index

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National foreword

This British Standard is the UK implementation of EN 4171:2011.

The UK participation in its preparation was entrusted to Technical Committee ACE/65/-/3, Paints, Surface Finish and Protective Treatments for Aerospace Purposes for Aerospace Purposes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Luft- und Raumfahrt - Beschichtungsstoffe - Prüfverfahren zur Bestimmung des Phosphorsäure-Index

This European Standard was approved by CEN on 27 August 2011.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 4171:2011) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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1 Scope

This European test standard specifies a method for the titration and determination of the phosphoric acid content of an hydroalcoholic solution for aerospace applications.

This test method is relevant for the determination of total acidity and phosphoric acid content in a reactive thinner of a wash primer or in metal cleaners.

2 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.

EN ISO 1513, *Paints and varnishes - Examination and preparation of test samples (ISO 1513)*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

EN ISO 15528, *Paints, varnishes and raw materials for paints and varnishes - Sampling (ISO 15528)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
reactive thinner
alcoholic phosphoric acid solution, which reacts with the metallic substrate and the base

3.2
metal cleaner
aqueous phosphoric acid solution for the removal of slightly oxidic films on aluminium

4 Principle

The phosphoric acid content is determined by titration with aqueous solution of sodium or potassium hydroxide after ionisation of the phosphoric acid.

Successive pH jumps allow the determination of:

— total acidity;

— phosphoric acid content.

5 Apparatus

— conical flasks: 250 ml;

— burette: 50 ml or 100 ml;

— PTFE coated magnetic stirrer;

— pipette: 10 ml;

— buffered solutions (pH = 4,5 and pH = 6,2);

— indicator solution (helianthine and phenolphtalein);

— automatic acid/base titrator or glass electrode (and SCE electrode);

— 1 N sodium or potassium hydroxide solution: (calibrate N using phthalic acid).

All chemicals are analytical reagent grade. Titration has to be carried out accordingly.

6 Specimen

Test specimen shall be taken directly from the original container. See EN ISO 1513 and EN ISO 15528.

7 Procedure

— In the conical flask containing an accurate volume of 10 ml, (Vs), of the test specimen, add approximately 150 ml of fresh distilled water in accordance with EN ISO 3696;

— Introduce the magnetic stirring bar and put the erlenmeyer on the magnetic stirrer;

— Add few drops of both coloured indicators in case of manual procedure;

— Introduce the glass electrode and the SCE in case of pH-f (V) procedure;

— Using automatic or manual procedure add slowly the alkaline solution and record alkaline solution volume versus pH or colour change;

— Determine accurately the volume of alkali added to achieve the first and second end points indicated by observed jumps in pH using the potentiometric method or colour change in the case of the manual procedure. According to the pKa of the phosphoric acid (2,1, 7,2, 12,7) three main pH jumps are theoretically detected, but the two first jumps (pH 4,5 and 9) are detected with good accuracy (see Figure 1);

— Note V_1 and V_2, the alkaline solution volume required to obtain these two pH jumps or colour change.

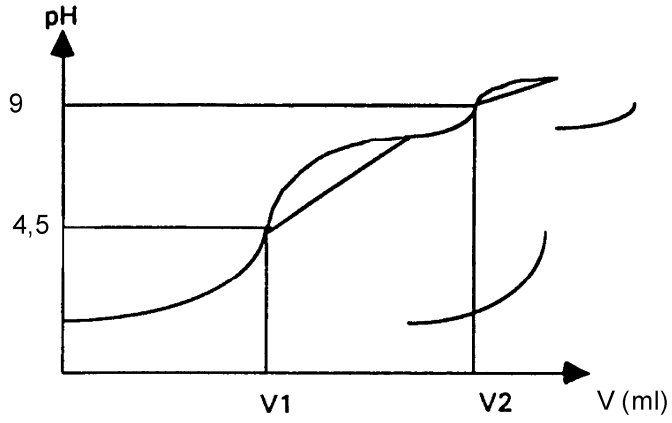

Figure 1 — Titration of phosphoric acid by a strong base. Typical curve

CAUTION — In case of solution containing phosphoric acid as only acidic material, theoretically V1 = V2 but due to carbonic acid dissolved in water V2 may be slightly higher than V1.

8 Results

Acid normality: $\mathrm{N}_1 = \dfrac{(V_1 \times \mathrm{N})}{V_s}$

H_3PO_4 content: $\mathrm{Na} = 3 \times (V_2 - V_1) \times \dfrac{\mathrm{N}}{V_s}$

In order to avoid the contribution of the presence of any other strong acid in the test specimen, for the calculation of the phosphoric acid content only the difference ($V_2 - V_1$) shall be used.

9 Designation

EXAMPLE

Description block	**Identity block**
PHOSPHORIC ACID INDEX	**EN4171**

Number of this standard

10 Test report

This test standard specifies a method for the titration and determination of the phosphoric acid content of an hydroalcoholic solution used in etch primer activators for aerospace applications.

a) Reference to this European Standard (EN 4171);

b) date;

c) product designation;

d) batch number;

e) code number;

f) N (Normality of sodium or potassium hydroxide solution);

g) N1 (Acid normality);

h) Na (H_3PO_4 content);

i) test procedure: coloured indicators, pH = f (V).

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