INTERNATIONAL STANDARD

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Welding — Test for shop primers in relation to welding and allied processes —

Part 4: Emission of fumes and gases

Soudage — Essai sur peintures primaires en relation avec le soudage et les techniques connexes —

Partie 4: Émission des fumées et des gaz

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17652-4 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Unification of requirements in the field of metal welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

ISO 17652 consists of the following parts, under the general title *Welding — Test for shop primers in relation to welding and allied processes*:

— *Part 1: General requirements*

— *Part 2: Welding properties of shop primers*

— *Part 3: Thermal cutting*

— *Part 4: Emission of fumes and gases*

Contents

Foreword

This document (EN ISO 17652-4:2003) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DS, in collaboration with Technical Committee ISO/TC 44 “Welding and allied processes”.

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of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

EN ISO 17652 consists of the following parts, under the general title: *Welding – Test for shop primers in relation to welding and allied processes*:

- *Part 1: General requirements*
- *Part 2: Welding properties of shop primers*
- *Part 3: Thermal cutting*
- *Part 4: Emission of fumes and gases*

Annex ZA is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Welding and allied processes produce particulate fume and gaseous by-products which may be harmful to human health and the environment. Application of a shop primer is likely to alter the composition and rate of the emission.

A knowledge of the quantity of particulate fume and gases generated and the composition of the particulate fume may be useful for occupational hygienists in accessing workplace atmospheres. Emission rates cannot be directly related to fume concentrations existing in a welder's breathing zone, but shop primers with low emission rates are supposed to produce less fume concentration compared with high emission rates for the same welding condition.

1 Scope

This part of this standard specifies rating of shop primers as regards their influence on emission of fumes and gases during welding.

For precaution for protection of health, safety and environment during testing, see EN ISO 17652-1.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 439, *Welding consumables - Shielding gases for arc welding and cutting.*

EN 440, *Welding consumables - Wire electrodes and deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification.*

EN ISO 2808, *Paints and varnishes - Determination of film thickness (ISO 2808:1999).*

EN ISO 4063, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:1998).*

EN ISO 6947, *Welds — Working positions — Definitions of angles of slope and rotation (ISO 6947:1993).*

EN 10025:1990, *Hot rolled products of non-alloy structural steels — Technical delivery conditions.*

EN 10238, *Automatically blast-cleaned and automatically prefabricated primed structural steel products.*

EN ISO 15011-1, *Health and safety in welding and allied processes - Laboratory method for sampling fume and gases generated by arc welding - Part 1: Determination of emission rate and sampling for analysis of particulate fume (ISO 15011-1:2002).*

prEN ISO 15011-2, *Health and safety in welding and allied processes - Laboratory method for sampling fume and gases generated by arc welding - Part 2: Determination of emission rates of gases, except ozone (ISO/FDIS 15011-2:2002).*

EN ISO 17652-1:2003, *Welding - Test for shop primers in relation to welding and allied processes - Part 1: General requirements (ISO 17652-1:2003).*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions in EN ISO 17652-1:2003 apply.

4 Emission test

4.1 Preparation of test piece

2 × 3 test pieces with shop primers shall be prepared for each shop primer. Further, 2 × 3 abrasive blasted test pieces shall be used as a reference.

Each test piece shall consist of one mild steel plate conforming to S275 of EN 10025. The dimensions of the test pieces shall be as follows:

10 mm × 100 mm × 500 mm

The test pieces shall be abrasively blasted until Sa 2½ (ISO 8501-1:1988) in order to remove the mill scale. The components shall have smooth, flat, undamaged surfaces and any burrs shall be removed to ensure a good fit-up.

The six test pieces with shop primer shall be coated on the top side with shop primer prior to testing. The thickness of the shop primer shall be in accordance with the manufacturer's recommendation.

When no agreed procedure is specified EN 10238 shall apply. The thickness of the shop primer shall be uniform and in accordance with the supplier's recommendation. Unless otherwise specified, the specimens can be welded after a drying period of at least 10 days at a surface temperature above 10°C but below 40°C and at a minimum air humidity of 50 %.

The thickness shall be checked, e.g., by use of small smooth steel plates or glass plates. See also EN ISO 2808 and EN 10238.

4.2 Procedure

4.2.1 Welding

The influence of the shop primer on the fume and gas emission associated with welding shall be measured using the fume box technique in accordance to EN ISO 15011-1 and prEN ISO 15011-2.

The test piece is mounted in the fume box, flat so that welding can proceed in the welding position PA in accordance with EN ISO 6947. Declaration of the properties on a shop primer according to this standard shall be based on metal active gas welding (process 135 according to EN ISO 4063) using the following weld data, see Table 1. Three pieces shall be welded for each process.

Table 1 - Rating test welding parameters

Welding process	135, see EN ISO 4063	135, see EN ISO 4063
Current	250 A ± 5 %	250 A ± 5 %
Voltage	30 V ± 5 %	28 V ± 5 %
Welding speed	300 mm/min ± 5 %	300 mm/min ± 5 %
Shielding gas	C1: 100 % CO_2, see EN 439	M21: 82 % Ar, 18 % CO_2 see EN 439
Gas flow rate	15 l/min ± 5 %	15 l/min ± 5 %
Gas cup diameter	16 mm to 19 mm	16 mm to 19 mm
Stick out	18 mm to 20 mm	18 mm to 20 mm
Consumable, classification	G3 Si 1, see EN 440	G3 Si 1, see EN 440
Consumable, diameter	1,2 mm	1,2 mm
Polarity	+ on electrode	+ on electrode

The test pieces shall have room temperature prior to welding.

In addition, the wire feeding speed shall be recorded for each test.

4.2.2 Testing

The fume and gas emission rates are determined for each test as specified in prEN ISO 15011-1 and prEN ISO 15011-2 and the sampled fumes and gases are analysed in order to determine the significant chemical components.

NOTE The fume should be analysed for at least the following elements: Fe, Mn, Zn, Cu, Pb, Cr(T), F. The gases should be analysed for at least NO, NO_2 and CO, as appropriate. Other possible gaseous decomposition products like xylene, ethanol, butanol, methanol, isopropylalcohol, formaldehyde, phenol should be analysed if they are supposed to be emitted in relevant quantity that might harm human health and the environment.

Average emission rates are determined from each series of three test pieces. For each component is determined:

— average emission rate, test pieces with shop primer;

— average emission rate, test pieces without shop primer;

— change in emission rate = (average emission rate, test pieces with shop primer) minus (average emission rate, test pieces without shop primer).

Emissions of fumes and gases to be reported as specified in prEN ISO 15011-2.

5 Assessment of result

The analysis shall provide sufficient information to enable documentation of conformity to national health and safety regulations and other relevant requirements. A fume data sheet may have to be prepared.

6 Test report

The report shall contain the following information:

a) trade mark of the shop primer;

b) type of shop primer;

c) observed dry film thickness;

d) description of welding equipment used in the tests;

e) specification of the test pieces (materials certificates);

f) process used for welding;

g) observed changes in emission rate for all relevant chemical components;

h) a combined measure of the additional environmental loads due to application of a shop primer may also be calculated on the basis of the observed changes in emission rates. However, such calculations depend on national legal requirements or other requirements and unequivocal reference to the applied requirements have to be included in any reporting of a combined measure of the additional environmental loads;

l) date, name and address of the test body;

j) signature by the responsible person.