

KENYA STANDARD

KS 2177: 2017

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**Admixtures for concrete, mortar and grout
—Test methods Part 13: Reference masonry
mortar for testing mortar admixtures**

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The following organizations were represented on the Technical Committee:

1. Architectural Association of Kenya
2. Bamburi Cement
3. CHRYSO Eastern Africa Limited
4. Concrete Products (K)Ltd
5. Consumer Information Network
6. Howards Humpreys East Africa LTD
7. Institute of quantity surveyors of Kenya
8. Kenya Industrial Research and Development Institute (KIRDI)
9. Kenya Institute of Highways and Building Technology (KIHBT)
10. Ministry of Transport, Infrastructure, Housing and Urban Development.
11. National Environment Management Authority
12. National Housing Corporation
13. Technical University of Kenya
14. University of Nairobi
15. Kenya Bureau of Standards — Secretariat

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

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Admixtures for concrete, mortar and grout —Test methods Part 13: Reference masonry mortar for testing mortar admixtures

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Foreword

This Kenya Standard was revised by the Concrete Technical Committee, under the guidance of the standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

This Kenya Standard is part of the series KS 2769 Admixtures for concrete, mortar and grout — Test methods which comprise the following:

- Part 1: Reference concrete and reference mortar for testing
- Part 2: Determination of setting time
- Part 4: Determination of bleeding of concrete
- Part 5: Determination of capillary absorption
- Part 6: Infrared analysis
- Part 8: Determination of the conventional dry material content
- Part 10: Determination of water soluble chloride content
- Part 11: Determination of air void characteristics in hardened concrete
- Part 12: Determination of the alkali content of admixtures
- Part 13: Reference masonry mortar for testing mortar admixtures
- Part 14: Determination of the effect on corrosion susceptibility of reinforcing steel by potentiostatic Electro-chemical test
- Part 15: Reference concrete and method for testing viscosity modifying admixtures

This standard is applicable together with the standards of the series KS 2770 Admixtures for concrete, mortar and grout.

Admixtures for concrete, mortar and grout — Test methods Part 13: Reference masonry mortar for testing mortar admixtures

1. Scope

This Standard specifies the constituent materials, the composition and the mixing procedure to produce a reference masonry mortar with a prescribed consistence for testing mortar admixtures as defined in KS 2770. It also describes the determination of the water reduction of the test mix compared to the control mix.

2. Normative references

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

KS EAS 148-1-2016: Cement — Test methods — Part 1: Determination of strength

KS EAS 148-2-2016: Cement — Test methods — Part 2: Chemical analysis

KS EAS 148-6-2016: Cement — Test methods — Part 6: Determination of fineness

KS EAS 18-1, *Cement - Part 1: Composition, specifications and conformity criteria for common cements*

KS 2770-3, *Admixtures for concrete, mortar and grout — Part 3: Admixtures for masonry mortar — Definitions, requirements, conformity, marking and labelling*

EN 1008, *Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

EN 1015-4, *Methods of test for mortar for masonry - Part 4: Determination of consistence of fresh mortar (by plunger penetration)*

EN 1015-7, *Methods of test for mortar for masonry - Part 7: Determination of air content of fresh mortar*

3. Constituent materials

3.1. Cement

The reference masonry mortar shall be made with CEM I cement of strength class 42.5 or 52.5, conforming to KS EAS 18-1.

The cement used shall have a C₃A content of 7 % to 11 % by mass calculated from chemical analysis according to KS EAS 148-2 and a specific surface of (3 200 to 4 600) cm²/g determined according to KS EAS 148-6.

3.2. Sand

A natural sand of normal density (relative density 2.5 – 2.8) shall be used. The size fractions of the sand shall comply with

Table 1. The sand shall be used in an oven dry condition.

Aperture size (mm)	Percentage by mass passing the test sieve
4.0	100
2.0	90– 100
1.0	60– 90
0.5	40– 75

0.25	25– 50
0.125	10– 30
0.063	0– 10

3.3. Mixing water

Water according to EN 1008 shall be used as mixing water.¹⁾

4. Reference masonry mortar

Where specified, tests on reference mortar are performed as comparative tests. That is comparing the performance of the reference mortar containing an admixture (test mix) with the performance of the reference mortar without an admixture (control mix). The air content of the control mix shall not exceed 5 % by volume when determined in accordance with EN 1015-7, method A.

5. Production of reference mortar with standard consistence

5.1. Mix proportions

The control and test mixes shall be in accordance with Table 2.

Table 2 — Mix details

	Control mix	Test mix
Sand	3 440 g	3 440 g
Cement	640 g	640 g
Admixture	Nil	Compliance Dose
Water	As required	As required
Consistence measured according to EN 1015-4	(40 ± 5) mm	Within ± 3 mm of consistence of control mix

Record to the nearest 1 g the total quantity of water required (including any contributed by the admixture).

For test mix mortars, the quantity of admixture added shall be sufficient to produce the required air content and retardation time if appropriate. The dose of admixture shall be recorded.

5.2. Mixing procedure

Prior to mixing, each of the constituents shall be conditioned to a temperature of (20 ± 2) °C.

Place all the sand and then the cement in the mixing bowl of a mixer complying with KS EAS 148-1 and mix for 30 s at low speed.

Continue mixing and add half of the mixing water during the next 30 s and mix for a further 60 s.

During a further 30 s of mixing, add the third quarter of the water and the admixture²⁾.

During a further 30 s of mixing, add the final quarter of the mixing water. If necessary, the quantity of water shall be adjusted to obtain the required consistence.

¹ Distilled or ionized water can be used in special cases

² If recommended by the manufacturer, admixtures can be added at a different time in the mixing sequence.

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Continue mixing at low speed for 60 s after all the water has been added.

Stop the mixer for 60 s and during this time remove any unmixed material from the sides and bottom of the bowl using the mixer paddle.

Restart the mixer at high speed and mix for 60 s. Total mixing process time shall be 6 min.

Immediately after completion of mixing, the consistence shall be determined in accordance with EN 1015-4 and the air content in accordance with EN 1015-7, method A. If the required consistence and air content are not achieved, the mix shall be discarded. A new test mix shall be prepared with the water content adjusted.

5.3. Mortar for test after standing

Prepare a test mix as described in 5.1 and 5.2. Cover the mixing bowl to prevent loss of water by evaporation and allow to stand for the period of time prescribed in KS 2770-3. After the required standing period from completion of mixing, remix the mortar in the bowl for 10 s using a palette knife.

5.4. Mortar for test after extended mixing

Prepare a test mix as described in 5.1 and 5.2. Then continue mixing at low speed for a further 15 min.

6. Calculation of water reduction (air entraining/plasticizing admixtures)

Calculate the percentage water reduction, W , resulting from inclusion of the admixture, from the following formula:

$$W = \frac{(C - T)}{C} \times 100$$

where

C is the water requirement of the control mix in g;

T is the water requirement of the test mix in g.

The water reduction shall be reported to the nearest 1 %.

7. Test report

The test report shall include the following information for control and test mixes:

- Cement:
 - Factory where produced;
 - Type;
 - C_3A content;
 - Specific surface area;
- Sand:
 - Source;
 - Type;
 - Grading;
- Consistence;
- Air content;
- Water content of each mix;
- Water reduction of test mix (for air entraining/plasticizing admixtures);
- Admixture name, batch/reference number and dose in g.