



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS A 6202 : 1997

Expansive additive for concrete

ICS 91.100.30

Descriptors : expanding cement, concrete admixtures, concretes

Reference number : JIS A 6202 : 1997 (E)

A 6202 : 1997

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently, JIS A 6202:1995 has been revised and replaced with this Standard. In this revision, the standard, JIS R 5201, having relation to this Standard, is revised in order to make the correspondence with the International Standard, therefore this Standard has been revised to achieve the nice coordination with the standard.

In JIS A 6202, the following Annexes are attached.

- Annex 1 (normative) Test method of expansibility of expansive additive by using mortar
- Annex 2 (informative) Test method of restrained expansion and contraction of expansive concrete
- Annex 3 (informative) Test method of compressive strength of expansive concrete after restrained curing

Date of Establishment: 1980-03-01

Date of Revision: 1997-08-20

Date of Public Notice in Official Gazette: 1997-08-20

Investigated by: Japanese Industrial Standards Committee

Divisional Councils on Civil Engineering
and Architecture

JIS A 6202 : 1997, First English edition published in 1998-01

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

Expansive additive for concrete

Introduction With the application of standard, normative references to the standard shall be simultaneously referred to. This Japanese Industrial Standard **JIS A 6202** was established in 1980 to cope with the requirement of quality standard in view of that the large amount of expansive additive for concrete has been used as admixture in the fields of cement mortar and cement concrete.

1 Scope This Japanese Industrial Standard specifies the expansive additive for concrete which is used for admixture in concrete or mortar (hereafter referred to as “expansive additive”).

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. As to those normative references, the most recent editions thereof shall be applied.

JIS B 0205	<i>Metric coarse screw threads</i>
JIS B 0209	<i>Limits of sizes and tolerances for metric coarse screw threads</i>
JIS B 1181	<i>Hexagon nuts and hexagon thin nuts</i>
JIS B 7503	<i>Dial gauges</i>
JIS G 3101	<i>Rolled steels for general structure</i>
JIS G 4401	<i>Carbon tool steels</i>
JIS R 5201	<i>Physical testing methods for cement</i>
JIS R 5202	<i>Method for chemical analysis of Portland cement</i>
JIS R 5210	<i>Portland cement</i>
JIS Z 1505	<i>Kraft paper sacks for cement</i>
JIS Z 8401	<i>Rules for rounding off of numerical values</i>
JIS Z 8801	<i>Test sieves</i>
JIS Z 9001	<i>General rules for sampling inspection procedures</i>

3 Definition The definition of term used in this Standard shall be as follows.

- a) **expansive additive** Admixture which produces such as ettringite or calcium hydroxide due to hydration reaction when mixed with cement and water, and then which causes the concrete or mortar to expand.

4 Quality The quality of expansive additive shall conform to the requirements in Table 1 when being tested according to from 5 to 7.

Table 1 Quality of expansive additive

Items			Specified value	Applicable test subclause
Chemical composition	Magnesium oxide	%	5.0 max.	6.1
	Ignition loss	%	3.0 max.	6.2
	All alkalis	%	0.75 max.	6.3
	Chloride ion	%	0.05 max.	6.4
Physical properties	Specific surface area	cm ² /g	2 000 min.	7.1
	Residue on 1.2 mm sieve (¹)	%	0.5 max.	7.2
	Set	Initial setting	min	60 and after
		Closing of setting	h	Within 10
	Expansibility (Rate of length change)	%	7 days	0.025 min.
			28 days	– 0.015 min.
	Compressive strength N/mm ²	3 days	12.5 min.	7.5
		7 days	22.5 min.	
		28 days	42.5 min.	

Note (¹) The sieve with 1.2 mm means the metal wire cloth with 1.18 mm nominal size specified in **JIS Z 8801**.

5 Sample

5.1 Sampling The size and sampling method of samples shall conform to the agreement between the parties concerned with delivery.

5.2 Preparation Keep taken sample in a moisture-proof airtight container which can be sealed closely. When about to be tested, put it inside laboratory to make its temperature the same as room temperature.

6 Method for chemical analysis

6.1 Magnesium oxide The chemical analysis of magnesium oxide shall follow **12** of **JIS R 5202**.

6.2 Ignition loss The chemical analysis of ignition loss shall follow **6** of **JIS R 5202**.

6.3 All alkalis The chemical analysis of all alkalis shall be calculated according to **3** (Quality) of **JIS R 5210** after carrying out measurement by **14** of **JIS R 5202**.

6.4 Chloride ion The chemical analysis of chloride ion shall follow **19** of **JIS R 5202**.

Remarks : Chlorine content calculated according to **19.7** of **JIS R 5202** shall be regarded as the content of chloride ion.

7 Method for physical test

7.1 Test for specific surface area Test for specific surface area shall follow **7.1 of JIS R 5201**.

7.2 Test for residue on 1.2 mm sieve

7.2.1 Implements for test

- a) **Sieve** The sieve for test shall be the metal wire cloth with 1.18 mm nominal size specified in **JIS Z 8801**.
- b) **Balance** It is preferable to use both the balance with 2 kg of weighing capacity and 2 g of reciprocal sensibility, and the balance with 100 g of weighing capacity and 0.1 g of reciprocal sensibility.

7.2.2 Procedures Weigh 1 000 g of sample with the balance with 2 kg capacity, place it in a sieve, make its surface flat by means of gentle moving the sieve, tap the sieve at the rate of 150 times per minute with one hand, and rotate the sieve by about 1/6 circumference at every 25 tappings.

While tapping on like above, when the passing through the sieve for 1 minute becomes 0.5 g or less, stop the tapping, and weigh the mass of residue on the sieve with the balance with 100 g capacity.

7.2.3 Calculation Calculate the residue on a 1.2 mm sieve according to the following formula, and round it off to first decimal place according to **JIS Z 8401**.

$$r = \frac{w_2}{w_1} \times 100$$

where, r : residue on 1.2 mm sieve (%)

w_1 : mass of sample (g)

w_2 : mass of residue on sieve (g)

7.3 Test for set The test for set shall be carried out as specified in **8 of JIS R 5201**. However, the cement paste having a standard softness shall be produced by using admixture in which 380 g of ordinary Portland cement specified in **JIS R 5210** and 20 g of expansive additive are mixed thoroughly beforehand ⁽²⁾.

Note ⁽²⁾ Mixing is preferably carried out by means of shaking up-and-down and right-and-left the bag with both hands for about 1 minute after putting cement, expansive additive and suitable amount of air in a plastic bag measuring about 20 cm by 40 cm and then sealing the bag.

7.4 Test for expansibility The test for expansibility shall follow Annex 1 (normative).

Informative reference : The test for expansibility of concrete under uniaxially re-strained condition shall follow Annex 2 (informative).

7.5 Test for compressive strength The test for compressive strength shall follow **10 of JIS R 5201**. The type of cement and the mix proportion and mixing of mortar, however, shall be carried out as follows.

- a) **Type of cement** The cement shall be the ordinary Portland cement specified in **JIS R 5210**.
- b) **Mix proportion of mortar** The mix proportion of mortar shall follow Table 2.
- c) **Weighing of sample** The weighing of sample shall be carried out using a balance capable of weighing to the nearest 0.1 g.

Table 2 Mix proportion of mortar

Material	Symbol	Mass of material g
Cement	<i>C</i>	427.5 ± 2.0
Expansive additive	<i>E</i>	22.5 ± 0.1
Standard sand	<i>S</i>	1 350.0 ± 5.0
Water	<i>W</i>	225.0 ± 1.0

Informative reference $\frac{W}{C + E} = 0.50$

$$\frac{E}{C + E} = 0.05$$

$$\frac{S}{C + E} = 3$$

- d) **Mixing method** The mixing method of mortar shall follow **10.4.3** of **JIS R 5201**. In advance, however, cement and expansive additive shall be sufficiently mixed (²).

Informative reference : The test for compressive strength of expansive concrete under restrained condition shall follow Annex 3 (informative).

8 Inspection For the inspection of expansive additive, pick up the sample according to rational sampling system, carry out the tests specified in **6** and **7**, and the one, which conforms to the requirements in **4**, shall be judged as acceptance. The lot size of an inspection shall follow **JIS Z 9001** or the agreement between the parties concerned with delivery.

When delivery inspection is carried out, carry out the inspection without delay to prevent weathering of the expansive additive after delivery.

9 Packaging When expansive additive is packaged, use kraft paper sacks superior air-tightness than those specified in **JIS Z 1505**.

10 Marking Mark the following items on the wrapping sack when expansive additive is packaged, and on the invoice when no packaging.

- a) Name (³)
- b) Net mass
- c) Name of manufacturer or its abbreviation
- d) Year and month of shipment

The year and month of shipment may be omitted by the agreement between the parties concerned with delivery.

Note (³) Commodity name may be used instead of the name.

11 Report Manufacturer must submit the test record when purchaser requested it. The form of a test record is preferable as shown in Table 3.

6

A 6202 : 1997

Table 3 Form of report

Test record of expansive additive for concrete					
Name of manufacturer _____					
Name of commodity ○○○○○○○○					
Year and month _____					
Items			Specified value by JIS A 6202	Measured value	
Chemical composition	Magnesium oxide %		5.0 max.		
	Ignition loss %		3.0 max.		
	All alkalies %		0.75 max.		
	Chloride ion %		0.05 max.		
Physical properties	Fineness	Specific surface area cm ² /g	2 000 min.		
		Residue on 1.2 mm sieve (¹) %	0.5 max.		
	Set	Initial setting min	60 and after		
		Closing of setting h	Within 10		
	Expansibility (Rate of length change) %		7 days	0.025 min.	
			28 days	- 0.015 min.	
	Compressive strength N/mm ²		3 days	12.5 min.	
			7 days	22.5 min.	
			28 days	42.5 min.	

Note (¹) The sieve with 1.2 mm means the metal wire cloth with 1.18 mm nominal size specified in **JIS Z 8801**.

Contact office Name of company • Department in charge

Location

Telephone number

Remarks : The size of the paper shall be A series No. 4 (210 mm × 297 mm) of Japanese Industrial Standard.

Annex 1 (normative)
Test method of expansibility of expansive additive by using mortar

1 Scope This Annex 1 (normative) specifies the test method of expansibility of expansive additive for concrete by using mortar.

2 Implements for test

2.1 Formwork Formwork shall be the form for moulding of mortar specimen as specified in 10.1 (2) of JIS R 5201.

2.2 Restraining device As shown in Annex 1 Fig. 1, the restraining device shall be composed of a restraining bar and 2 restraining end plates which have been constructed with 4 nuts, and when being constructed, the surfaces of 2 restraining end plates, contacting with mortar, shall be nearly parallel and free from slant or twist. Confirm whether twist exists or not with using a surface plate before employing them.

- a) The restraining bar, made of material conforming to SK4 specified in JIS G 4401, shall be made by thread rolling over whole length of polished steel wire with 3.5 mm in diameter, and measures 158 mm in length one end of which makes sphere of 2.5 mm in radius, to use it as a gauge. Screw thread shall be the nominal designation of M4×0.7 ⁽¹⁾ screw thread specified in JIS B 0205.

Never reuse this restraining bar.

Informative reference : The sectional area of restraining bar is 9.87 mm² on the base of its effective diameter.

- b) The restraining end plates, square type with 39.5 mm in side length and 5 mm in thickness, shall conform to SS400 specified in JIS G 3101.
- c) Nuts are made of SS400 specified in JIS G 3101, and its shape and dimensions are Class 1 coarse hexagon nut specified in JIS B 1181. The screw thread shall be the nominal designation of M4×0.7 ⁽²⁾ screw thread specified in JIS B 0205.

Notes ⁽¹⁾ The allowable limit dimension and tolerance of screw thread shall be 8g (or Grade 3) specified in JIS B 0209 or the superior.

⁽²⁾ The allowable limit dimension and tolerance of screw thread shall be 7H (or Grade 3) specified in JIS B 0209 or the superior.