JIS A 5021

Amendment Point of JIS for Recycled Aggregate for Concrete class H

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Topics

1. History of establishment and amendment of JIS
2. Member of amendment committee and process of discussion
3. Amendment point of JIS A 5021
4. Handling in JIS A 5308, Notification by Ministry of Land, Infrastructure, Transport and Tourism, JASS 5

1. History of establishment and amendment of JIS

History of establishment and amendment of JIS

- 2002～2004
  - Japan Concrete Institute “Standardization research committee for recycled product by concrete mass of construction waste” (Chairman Prof. Atsuhiko Machida, Saitama University)
- 2005 Established **JIS A 5021** (recycled aggregate H for concrete)
- 2006 Established JIS A 5023（Concrete using recycled aggregate L)
- 2007 Established JIS A 5022（Concrete using recycled aggregate M)
- 2011 Amendment（**JIS A 5021**）
- 2012 Amendment（JIS A 5022 and JIS A 5023）
- 2016 Supplement revision（**JIS A 5021**, JIS A 5022 and JIS A 5023）
- 2016
  - Japan Concrete Institute “Draft preparing committee for JIS amendment of recycled aggregate” (Chairman Prof. Takafumi Noguchi, the University of Tokyo)
- 2018（?）Amendment（**JIS A 5021**, JIS A 5022 and JIS A 5023）

Transition of quality standard for recycled aggregate

Year	Institution or organization which established the standard Name of standard		Coarse aggregate		Fine aggregate	
			density (g/cm³)	absorption (%)	density (g/cm³)	absorption(%)
1977	Architectural Association Standard(draft) for using recycled aggregate and recycled concrete and description		over 2.2	under 7	over 2.0	under 13
1986	Ministry of Construction Quality standard for recycled coarse aggregate Standard for concrete using recycled coarse aggregate					
1994	Ministry of Construction Provisional Standard classified by purpose for reuse of concrete byproduct	Type 1	—	under 3	—	under 5
		Type 2	—	under5	—	under10
		Type 3	—	under7	—	
1999	Japan Construction Center Quality standard of recycled aggregate for building structure		over 2.5	under3.0	over 2.5	under3.5
2000	Japan Concrete Institute TR A 0006（Concrete using recycled aggregate）		—	under7	—	under10
2005	Japan Concrete Institute Recycled aggregate for concrete	JIS A 5021 (Class H)	over 2.5	under3.0	over 2.5	under
2006		JIS A 5022 (Class M)	over 2.3	under5.0	over 2.2	under
2007		JIS A 5023 (Class L)	—	under7.0	—	under13.0

2. Member of amendment committee and process of discussion

Member of Draft preparing committee for JIS amendment of recycled aggregate

	Name	Belonging to
Chairman	Takafumi Noguchi	The University of Tokyo
executive	Akio Koyama	Meiji University
secretary	Atsushi Ueno	Tokyo Metropolitan University
member	Nobuo Hisauchi	Ministry of Land, Infrastructure, Transport and Tourism
	Yoshihiko Otaki	Ministry of Economy, Trade and Industry
	Hiroyuki Tanano	Building Research Institute
	Hirohisa Koga	Public Works Research Institute
	Yasuhiro Dosho	Meijo University
	Kouji Mano	Japan Testing Center for Construction Materials
	Tomoyoshi Hamaguchi	General Building Research Corporation of Japan
	Hisashi Tateyashiki	Mitsubishi Materials Corporation
	Keiichi Shibatani	Kyoboshi Co., Ltd.

	Name	Belonging to
member	Hiroyuki Sato	Miyamatu Jonan Co., Ltd.
	Tomoyuki Hosono	Masuo Recycle Co., Ltd.
	Masanori Kouno	Okumura Corporation
	Kazushi Tsujimoto	ZENNAMA
	Yosaku Ikeo	Takenaka Corporation
	Kazuhisa Yoda	Kajima Corporation
	Yasuhiro Kuroda	Shimizu Corporation
	Kenichi Horiguchi	Taisei Corporation
	Yasumichi Kamishiro	Obayashi Corporation
	Hiroaki Ishizuka	Ueda the Works Co., Ltd
	Isao Hiruma	Japanese Standards Association
parties	Yasuo Munakata	Ministry of Economy, Trade and Industry
secretariat	Kazunori Takada	Japan Concrete Institute

Process and subject of discussion

- Executive secretary meeting（Apr.5 2016）
- The 1st Committee（June.3 2016）
- The 2nd Committee（July.13 2016）
- The 3rd Committee（Sep.5 2016）
- The 4th Committee（Oct.18 2016）
- The 5th Committee（Dec.21 2016）
- The 6th Committee（Feb.1 2017）
- Executive secretary meeting（Feb.22 2017）
- Executive secretary meeting（May 8 2017）

- Method of identify original aggregate and method of sampling original concrete with no record
- Method of test for Chloride content of recycled aggregate
- Condition using return concrete
- Frequency of test for chloride content of recycled aggregate concrete M
- Method of countermeasure restraint ASR of concrete using recycled aggregate M
- Method of calculation of alkali amount in recycled aggregate M
- Division of quality for recycled aggregate concrete using mixture of recycled aggregate L and natural aggregate
- Classification of recycled aggregate concrete L, frequency of slump test
- Mixture ratio of aggregate and admixture dosage in designing mix proportion of recycled aggregate concrete L
- Propriety for JIS combined certification of recycled aggregate concrete at certificated plant of JIS A 5308

3. Amendment point for JIS A 5021

Contents of JIS A 5021

6 Manufacture

- Preventing bad influence of original concrete as for the raw material of recycled aggregate H
- Light-weight aggregate concrete
  - Conventional
    - Light-weight aggregate shall be accepted by means of fine grinding by advanced treatment such as crushing, grinding or segregating in manufacturing process for recycled aggregate H
- Matter of concern
  - Influence in case any incorporation
  - Adjustment with JIS A 5022 and JIS A 5023

The manufacture of recycled aggregate H shall be as follows.

A) The original concrete ・・・・・・・・・・.

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F) The concrete using light-weight aggregate shall not be used for the original concrete.

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7.10 Test of chloride content

- Young material age original concrete which hardened return concrete: it is difficult to measure exactly by means of influence of disturbance ion
  - Supplement revision in 2016
    - " When disturbance ion shall be influenced, pH of supernatant which extracted chloride may be adjusted as about 7."
    - Task: To establish detailed requirement for adjustment specimen and to select proper reagent
  - This amendment
    - Adoption of various test method
      - Additional of JIS A 1154(Methods of test for chloride ion content in hardened concrete, required pH adjustment, extract all of the chloride content)
      - silver nitrate titration + absorption spectrophotometry + potentiometric titration
    - Potassium chromate (deleterious substance)⇒change to Fluorescein sodium given in JIS K 0101

The chloride content test shall be performed in accordance with either of the followings.

A) In accordance with 5.5(chloride) of JIS A 5002
   However analyzing chloride content(density of chloride ion) in liquid of specimen shall be in accordance with Clause 4(analyzing method) in JIS 1144. While the quantity of specimen shall be 1000g and 4/3 times the test result values shall be taken as the chloride content.

B) In accordance with JIS A 1154

A.3 Sampling method of original concrete

- Alkali-silica reactivity of recycled aggregate : It is important to be in Division A(harmless)
- Identification of original aggregate is important. (When identification is unknown, the running cost shall be increased due to over sufficient quality management or countermeasure alkali-silica reactivity)
  - According to work record of demolished construction, mix proportion report of original concrete or test result certificate of original aggregate etc., the class and place of production or name of product of the original aggregate shall be identified.
    - Possibility for in existence of these documents are low.
  - A portion of the original concrete shall be taken at observation beforehand and as a result the original aggregate shall be identified with unknown place of production and name of product.
    - Sampling by the manufacturer of recycled aggregate is difficult.
  - Method of realistically possible for recycled aggregate manufacturer
  - Method and frequency to obtain as same accuracy as which sampling from construction

Sampling method of original concrete shall be in accordance with one of the followings.

A) Sampling from the construction

B) Sampling from concrete mass

1. A portion of the original concrete shall be taken in such a size that the identification of the color, shape and size of the original aggregate is possible at unloading site.
2. Sampling of original aggregate shall be made more than once in each 10t of concrete mass.

Identification of original aggregate in original concrete

Sampling core from same construction

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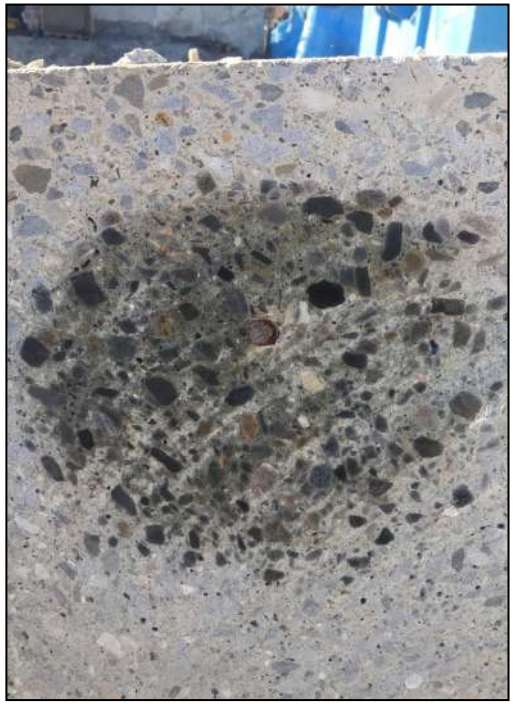
Concrete mass at unloading site

Sampling method and division of original concrete

- Demolished concrete block made by cutting construction
  - The sample crushed as size of human head or smaller shall be judged
- The concrete mass shall be confirmed as to be demolished in each construction
  - Usage of construction waste manifest etc.(industrial waste managing table)
  - Preservation of information and sampling observation record

Method for discrimination of original aggregate



- When many adhering substance are on the concrete mass and cannot discriminate
- Washing and water spray

Usage of return concrete

- Return concrete⇨ Condition for original concrete (requirement for property)
- Result of discussion : maintain current requirement
  - **Hardened** return concrete⇨ original concrete⇨ **recycled aggregate H**
  - A product made by collected washed return concrete（**same factory**）⇨ **collected aggregate**
  - A product made by collected washed return concrete（**different factory**）⇨ **XX aggregate**

4. Handling in JIS A 5308, Notification by Ministry of Land, Infrastructure, Transport and Tourism, JASS 5

JIS A 5308: 2019

- Compensation of chloride content of concrete using recycled aggregate H
  - Elution of chloride ion from recycled aggregate H＝3/4 of whole chloride ion
  - 1/4 of them shall be fixed in adhered paste

$$C_0 = \frac{C_1 \times W_1}{100} + \frac{1}{4} \times \frac{C_2 W_2}{100}$$

C_0: Chloride content of concrete using recycled aggregate H（kg/m³）

C_1: Density of chloride ion of the water in fresh concrete（%）

W_1: Unit water amount using mix proportion（kg/m³）

C_2: Density of chloride ion in the recycled aggregate H（%）

W_2: Amount of recycled aggregate H using mix proportion（kg/m³）

Notification by Ministry of Land, Infrastructure, Transport and Tourism

- No.814 Notification by Ministry of Land, Infrastructure, Transport and Tourism in June 13, 2016
  - Amendment of No. 1446 Notification by Ministry of Construction in 2000
  - JIS A 5308（ready mixed concrete）－2014（excluding the product using collected aggregate）
  - Concrete using recycled aggregate H shall be authorized as designated architectural materials

Significant amendment of JASS 5（202X）

- Recycled aggregate concrete class H
  - Special specification

    Section 28（recycled aggregate concrete）

    ⇨ General specification

    Section 3（class and quality of concrete）～Section11（quality management and inspection）
  - Section 2　Required performance of structure and member
    - Environmental consideration（?）
      - Evaluation in accordance with recycling resource utilization factor（?）

Thank you for listening

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