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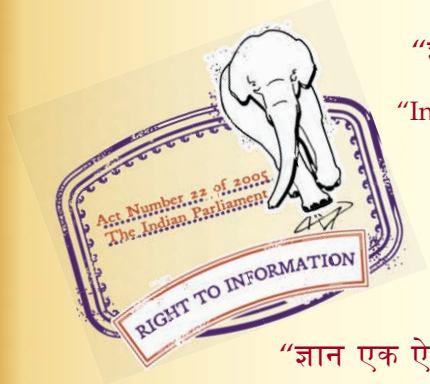
IS 10033 (1992): Zircon and Graphite based core and mould washes [MTD 14: Foundry]



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"Knowledge is such a treasure which cannot be stolen"

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IS 10033 : 1992
(Reaffirmed 2003)

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(पहला पुनरीक्षण)

Indian Standard

ZIRCON AND GRAPHITE BASED CORE AND MOULD WASHES — SPECIFICATION

(First Revision)

UDC 621·744·527·7 : 666·762·55

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1992

Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foundry Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This Standard was first published in 1981. On the basis of experience gained during these years it has been decided to revise this standard incorporating a table giving 12 grades of washes depending on the physical form, carrier and the base refractory material.

The use of a refractory wash or coating on moulds and cores is done to achieve better surface finish. The surface finish is mainly achieved by the refractoriness of the coating and its ability to form an impervious layer on the mould or core surface. The wash coating or layer helps avoiding metal penetration and metal mould reaction. The wash may be either a water or an alcohol base as the carrier. The coating strength is developed either by baking or by igniting the sample depending on the type of carrier.

Zircon washes may be used for both steel and iron castings whereas the use of graphite wash is limited mainly to iron castings. Depending on the mode of use the wash may be termed as Dipping or Brushing variety.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ZIRCON AND GRAPHITE BASED CORE AND MOULD WASHES — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the requirements for zircon and graphite based core and mould washes used in foundries.

2 REFERENCES

The Indian Standards given below are necessary adjuncts to this standard:

IS No.	*Title*
75 : 1973	Linseed oil, raw and refined (*second revision*)
1387 : 1967	General requirements for the supply of metallurgical materials (*first revision*)
3018 : 1977	Standard silica sand for raw material testing in foundries
4269 : 1981	Dextrin for use in foundries (*first revision*)
10085 : 1982	Methods for chemical analysis of zircon flour or sand
12446 : 1988	Bentonite for use in foundries

3 SUPPLY OF MATERIAL

General requirements relating to the supply of material shall be as laid down in IS 1387 : 1967.

4 GRADES

There shall be 12 grades of washes depending on the physical form as given in Table 1.

NOTE — Alcohol base wash should not contain more than 5 percent methanol.

5 CONDITION OF THE MATERIAL

The material shall be of uniform nature free from lumps whether in powder, paste or in ready to use form.

6 CHEMICAL COMPOSITION

6.1 Zircon Wash

When tested in accordance with IS 10085 : 1982 the ZrO_2 content of ZW and ZA grade wash shall not be less than 60 percent.

NOTES

1 For a minimum of 40 percent ZrO_2 content the percentage of zircon flour in the wash shall be minimum 62·5 percent.

2 For certain specific applications higher ZrO_2 content may be required which will be as per the agreement between the customer and supplier.

Table 1 Grades of Washes

(*Clause* 4)

Name of the Wash	Grades
(1)	(2)
Water Base Zircon Wash Powder	ZW — Powder wash
Water Base Zircon Wash Paste	ZW — Paste was
Water Base Zircon Wash Ready to Use	ZW — Ready to use
Water Base Graphite Wash Powder	GW — Powder wash
Water Base Graphite Wash Paste	GW — Paste wash
Water Base Graphite Wash Ready to Use	GW — Ready to use wash
Alcohol Base Zircon Wash Powder	ZA — Powder wash
Alcohol Base Zircon Wash Paste	ZA — Paste wash
Alcohol Base Zircon Wash Ready to Use	ZA — Ready to use
Alcohol Base Graphite Wash Powder	GA — Powder wash
Alcohol Base Graphite Wash Paste	GA — Paste wash
Alcohol Base Graphite Wash Ready to Use	GA — Ready to use

7 TEST REQUIREMENTS

7.1 Method of test for washes, shall be as given in Annex A.

7.2 Settling Tendency

Grade GA and GW shall not settle at all when left undistrubed for 1 h after adjustment of the specified baume. Grades ZW and ZA may settle to some extent but shall be such that it is possible to remix by minor stirring only. The settled material shall not form hard mass. After standing for 24 h undisturbed condition the clear liquid separation at the top shall be 3 percent maximum for ZA and ZW.

7.3 Coating Quality

Wash when prepared and applied as per the recommendation of supplier shall be of the following quality:

a) The wash shall give an uniform coating free of cracks before and after baking.

b) The dried coating shall be hard enough so that by scratching with finger nail, coating does not peel off and by gentle rubbing material is not transferred to the finger.

c) Alcohol base wash coated surface after ignition shall be free from wet patches on the surface.

7.4 Rheological Properties

The wash recommended for coating by dipping and spraying shall be free from dripping.

7.4.1 In the case of water based wash recommended for brush and swabing application a certain amount of flow is desirable.

7.5 Bench Life

Mixed water based wash shall not decompose within 76 hours of storage in open condition.

7.6 Thermal Stability

The painted surface of the specimen (50 mm × 50 mm) shall be free from any crack for water base zircon washes. For graphite wash (water base) isolated hair line cracks are allowed on the surface but the coating shall not spall out and leave the core surface as long as the specimen is hot.

8 SAMPLING

Sampling for testing shall be in accordance with Annex B.

9 STORAGE QUALITY

The user shall store the material as stipulated by the manufacturer. The period for which a wash may be stored without deterioration shall be indicated by the manufacturer. Within the shelf life period if the material does not meet the requirements given in 7, it shall be declared as not complying with the standard even though the lot might have been accepted after testing on its arrival.

10 PACKING

The packing shall be as agreed between the purchaser and the manufacturer.

11 MARKING

11.1 The bags or the containers shall be marked with manufacturer's name, production batch No., date of manufacture and date of expiry.

11.2 The material may also be marked with the Standard Mark.

ANNEX A

(*Clause* 7.1)

TESTING PROCEDURE FOR THE WASHES

A-1 RAW MATERIALS REQUIRED SHALL MEET THE FOLLOWING REQUIREMENTS

A-1.1 Sand

Silica sand as specified in IS 3018 : 1977.

A-1.2 Bentonite

Bentonite conforming to IS 12446 : 1988.

A-1.3 Yellow Dextrin

Dextrin conforming to Grade 1 of IS 4269 : 1981.

A-1.4 Fireclay

Plastic.

A-1.5 Linseed Oil

Raw linseed oil conforming to Grade 1 of IS 75 : 1973.

A-1.6 Wash

Wash under test either in paste or powder form.

A-1.7 Carrier

Water or the specified solvent for the wash.

A-2 APPARATUS

A-2.1 Roller type laboratory sand mill of 2 to 5 kg capacity.

A-2.2 Polythene beaker of 2 litre capacity.

A-2.3 Electrical stirrer.

A-2.4 Laboratory core baking oven with air circulation and temperature control.

A-2.5 Muffle furnace capable of maintaining 1 000°C ± 5°C.

A-2.6 Standard sand testing equipments.

A-2.7 *p*H meter.

A-3 COMPOSITION OF SAND AND ITS PHYSICAL PROPERTIES FOR TESTING WATER BASE ZIRCON WASHES

A-3.1 Composition

Sand	100 parts
Bentonite	6-8 percent of sand by mass
Fireclay (Optional)	2 percent of sand by mass
Y, Dextrin	0·5-1 percent of sand by mass
Water	Desired quantity

NOTE — This sand composition is mainly used so that during test it does not interfere in the evaluation of wash quality.

Physical Properties:

Moisture, percent	5·2 to 6·0
Permeability	100 to 150
Green Crushing Strength (MPa)	0·04 to 0·06

A-3.2 Preparation of the Wash

Wash shall be prepared from the sample drawn as in **8** and mixed in the mechanical stirrer with the specified carrier in a beaker of 2-litres capacity. The volume shall not be less than 1·5 litre. For water base zircon washes during initial mixing the Baume' shall be adjusted to 84°, Min. Mixing time shall not be less than 25 minutes. Water base washes shall be kept overnight in sealed condition before adjustment of the final Baume' for test (82° Be for ZW).

For all other grades of washes the Baume', during initial mixing shall be kept 10 points above the specified Baume' for application. Before measuring the Baume' the air bubble on the surface shall be broken by gentle tapping on the container.

A-3.3 Coating Procedure (Water Base Zircon Washes)

Five numbers of 50 mm × 50 mm standard sand samples shall be prepared from the sand mix (*see* **A-3.1**). Four samples are required for dipping, drying and firing and the other shall be fired after baking without wash coating as a blank sample.

For brushing variety the samples shall be dipped in the wash soaked for 7-10 seconds, taken out vertically and quickly kept inverted on the plate.

For dipping variety, after inverting the specimen as above, a little extra wash shall be given on the top of the coated specimen with the help of a spoon/spatula and by rocking, it shall be distributed even on the top surface. Care shall be taken so that the extra wash does not trickle to the sides.

A-3.4 Dripping Test

The sample after soaking for 7-10 seconds, shall be taken out and lightly shaken thrice to drain out the extra wash. Observation shall be made after inverting the sample for dripping.

A-3.4 Drying and Firing

Samples shall be air dried for 15 minutes before coating and 30 minutes after coating. Coated samples shall then be dried at 220°C for 2 hours, cooled to room temperature and fired at 1 000°C ± 5°C for 5 to 10 minutes. Two samples for each soaking time shall be fired and observation shall be made for cracking of the top disc.

A-3.6 *p*H Determination

10 gms of wash (dry powder) shall be mixed with 100 ml distilled water and *p*H shall be determined by any standard equipment. The wash after mixing shall be kept for 30 minutes before it is tested.

A-3.7 Settling Tendency

The prepared wash at specified Baume' shall be kept undisturbed for 1h. Settling shall be checked by dipping a glass rod slowly up to the bottom.

A-3.8 Bench Life

200 ml of wash after preparation shall be kept in a clean beaker. The top shall be properly closed by a polythene paper to avoid evaporation. Bad smell and foaming on stirring shall indicate fermentation.

A-3.9 Coating and Testing Procedure for Water Base Graphite Wash

Clauses **A-3.4**, **A-3.6**, **A-3.7** and **A-3.8** shall apply except the samples to be used for coating. Any oil sand tensile specimen having tensile strength more than 2·413 MPa in properly baked condition shall be used. Drying time after coating shall be 1/2 hour at 220°C.

A-4 THERMAL STABILITY

A-4.1 Baked tensile specimen as mentioned in **A-3.9** shall be dipped and soaked for 7 to 10 seconds (at specified Baume') and shall be kept inverted after taking out from wash. Dryed in the oven for 1/2 hour at 220°C. Cooled to room temperature in desiccator and fired for 3 minutes at 1 000°C ± 5°C. The specimens shall be visually examined after taking out from the furnace. There should be no crack or flaking of the paint.

A-5 COATING AND TESTING PROCEDURE FOR ALCOHOL BASE WASHES

A-5.1 Specimens for coating shall be same as mentioned in A-3.9.

A-5.2 The specimen shall be dipped at 55 ± 2° Baume' and soaked for 1 to 2 seconds and taken out. It shall be then ignited.

A-5.3 Observations as given in 7.3 (a, b, c) shall be made after the flame is extinguished.

ANNEX B

(*Item* 8)

SAMPLING AND CRITERIA FOR CONFORMITY OF WASHES

B-1 LOT

B-1.1 In any consignment, all the containers/bags containing the same grade of material and manufactured under similar conditions shall be grouped together to constitute a lot.

B-1.1.1 Samples shall be taken and tested from each lot for ascertaining the conformity.

B-2 SCALE OF SAMPLING

The number of containers/bags, to be selected, shall be according to col 1 and 2 of Table 2.

B-2.2 The containers/bags shall be selected at random. For this purpose, the provisions given in IS 4905 : 1968 shall be used.

Table 2 Scale of Sampling

(*Clause* B-2)

No. of Containers/Bags in the lot	No. of Containers/Bags to be Selected
(1)	(2)
Up to 50	5
51 to 100	8
101 to 300	13
301 to 500	20
501 and above	32

B-3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-3.1 From each of the selected container/bags specified in col 1 and 2 of Table 2, adequate quantity of material shall be taken and mixed thoroughly to form a composite sample.

B-3.1.1 The sample prepared as specified in B-3.1 shall be used to test chemical composition settling tendency, coating quality, rheological properties, bench life.

B-3.2 The lot shall be considered as conforming to the specification, if the sample tested for various tests (*see* B-3.1.1) conform to the corresponding requirements.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, tosting and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use oft he Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

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Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

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