

IS : 12086 - 1987
(Reaffirmed 2003)
Edition 1.1
(1991-09)

Indian Standard
**SPECIFICATION FOR
HYDRAZINE HYDRATE**

(Incorporating Amendment No. 1)

UDC 547.234 : 54-162.32

BHEL, Ramachandrapuram,
Date: 20-07-2009 Time: 08:23:16

© BIS 2005

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

Price Group 3

Indian Standard

SPECIFICATION FOR HYDRAZINE HYDRATE

Boiler Water Sectional Committee, CDC 57

Chairman

SHRI P. C. D. G. SAMUEL

Representing

Madras Refineries Ltd, Madras

Members

SHRI J. N. BHOWMIK

West Bengal State Electricity Board, Calcutta

SHRI B. K. SANTRA (*Alternate*)

SHRI T. M. BALASUBRAMANIAN Central Electrochemical Research Institute (CSIR),
Karaikudi

DR G. VENKATACHARI (*Alternate*)

SHRI R. N. BANERJEE

Development Consultants Pvt Ltd, Calcutta

SHRI S. K. CHATTERJEE (*Alternate*)

SHRI D. CHATTERJEE

Delta Enterprises Pvt Ltd, Calcutta

CHEMIST & METALLURGIST II, Railway Board (Ministry of Railways)

RDSO, LUCKNOW

CHEMIST & METALLURGIST

(W. R.) (*Alternate*)

SHRI SOMENATH GHOSE

Jai Guru Engineering Co (India), Calcutta

SHRI ANANDAMOY GHOSE (*Alternate*)

SHRI VIJAY KUMAR GOEL

Ministry of Industry (Department of Industrial
Development), New Delhi

SHRI G. T. JADEJA

Tata Hydro-Electric Power Supply Co Ltd, Bombay

SHRI B. K. GANDHI (*Alternate*)

SHRI J. JHA

Central Electricity Authority, New Delhi

SHRI KSHIRSAGAR

Maharashtra State Electricity Board, Bombay

DR V. M. KELKAR

Engineers India Ltd, New Delhi

SHRI K. RUDRAPPA (*Alternate*)

SHRI K. R. KRISHNASWAMY

Central Power Research Institute, Bangalore

SHRI G. UDAYABHASKAR (*Alternate*)

SHRI S. MAHADEVAN

Chemical Consultants, Madras

DR P. K. MATHUR

Indra Gandhi Centre for Atomic Research (BARC),
Kalpakkam

SHRI R. NATARAJAN

Bharat Heavy Electricals Ltd, Tiruchchirappalli

SHRI T. R. NAGARAJAN (*Alternate I*)

DR A. PRABHAKAR RAO (*Alternate II*)

SHRI R. NATARAJAN

Hindustan Dorr-Oliver Ltd, Bombay

SHRI SUBASH VERMA (*Alternate*)

SHRI ANIL G. PANDIT

Thermax Pvt Ltd, Pune

(Continued on page 2)

© BIS 2005

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

IS : 12086 - 1987

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI C. L. PATEL	Gujarat Electricity Board, Ukai (Gujarat)
SHRI R. G. MANDAN (<i>Alternate</i>)	
SHRI RAM GOPAL	National Thermal Power Corporation Ltd, New Delhi
SHRI R. K. DWIVEDI (<i>Alternate</i>)	
SHRI N. RAMACHANRAN	Ion Exchange (India) Ltd, Bombay
SHRI A. B. TONGAONKAR (<i>Alternate</i>)	
DR S. K. ROY	IEL Limited, Calcutta
SHRI N. B. SAINANI	Indian Farmers Fertilizer Co-operative Ltd, New Delhi
SHRI G. H. JOSHI (<i>Alternate</i>)	
SHRI M. V. SASTRY	IAEC Ltd, Bombay
SHRI M. K. SENGUPTA	Hindustan Fertilizer Corporation Ltd, Durgapur
SHRI A. K. BHATTACHARJEE (<i>Alternate</i>)	
DR V. K. SETH	Projects & Development India Ltd, Sindri
SHRI D. P. SINGH	Delhi Electric Supply Undertaking, New Delhi
SHRI K. B. CHHABRA (<i>Alternate</i>)	
SHRI G. P. SINGH	Steel Authority of India Ltd, New Delhi
SHRI A. P. SINHA (<i>Alternate</i>)	
SHRI R. SWAMINATHAN	National Organic Chemical Industries Ltd, Bombay
SHRI M. D. VIJAYARANGAM	Tamil Nadu State Electricity Board, Madras
SHRI V. TULASIRAMAN (<i>Alternate</i>)	
SHRI SATISH CHANDER, Director (Chem)	Director General, BIS (<i>Ex-officio Member</i>)

Secretary

SHRI S. ARAVAMUDHAN
Joint Director (Chem), BIS

Chemicals for Boiler System Subcommittee, CDC 57 : 3

Convener

SHRI S. MAHADEVAN Chemical Consultants, Madras

Members

SHRI B. B. AJMANI	Railway Board (Ministry of Railways)
SHRI C. D. DIXIT (<i>Alternate</i>)	
SHRI ANANDAMOY GHOSE	Jai Guru Engineering Co (India), Calcutta
SHRI SOMENATH GHOSE (<i>Alternate</i>)	
SHRI S. CHANDRASEKHAR	Ion Exchange (India) Ltd, Bombay
SHRI N. RAMACHANDRAN (<i>Alternate</i>)	
SHRI D. CHATTERJEE	Delta Enterprises Pvt Ltd, Calcutta
SHRI A. K. ROY (<i>Alternate</i>)	
SHRI G. R. DUBEY	Gwalior Rayon Silk Mfg (Wvg) Co Ltd, Birlagram
SHRI G. B. KHER (<i>Alternate</i>)	
SHRI S. N. GOSWAMI	Shriram Foods & Fertilizer Industries, New Delhi

(Continued on page 9)

Indian Standard

SPECIFICATION FOR HYDRAZINE HYDRATE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 1 January 1987, after the draft finalized by the Boiler Water Sectional Committee had been approved by the Chemical Division Council.

0.2 This edition 1.1 incorporates Amendment No. 1 (September 1991). Side bar indicates modification of the text as the result of incorporation of the amendment.

0.3 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for hydrazine hydrate.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS : 11671-1985† shall apply.

3. REQUIREMENTS

3.1 The material shall be colourless liquid free from visible impurities and suspended particles.

3.2 The material shall comply with the requirements given in Table 1.

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in mild steel drums suitably lined with plastic material or in PVC carboys.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to boiler water.

TABLE 1 REQUIREMENTS FOR HYDRAZINE HYDRATE

(Clause 3.2)

SL NO.	CHARACTERISTIC	REQUIREMENT	METHODS OF TEST, REF TO
(1)	(2)	(3)	(4)
i)	Purity (as hydrazine hydrate), percent by mass, <i>Min</i>	80	Appendix A
ii)	Relative density, 20°C/20°C, <i>Min</i>	1.05	IS : 3025 (Part 12)-1983*
iii)	pH of 1 percent solution at 20°C, <i>Min</i>	10.5	IS : 3025 (Part 11)-1983†
iv)	Boiling range	115 to 119°C	IS : 5298-1983‡
v)	Colour, Hazen Units, <i>Max</i>	10	IS : 3025 (Part 4)-1983§
vi)	Residue on evaporation, percent by mass, <i>Max</i>	0.01	10 of IS : 3025-1964
vii)	Ash content, g/100 ml, <i>Max</i>	0.003	11 of IS : 3025-1964
viii)	Ammonia content (as NH ₃), <i>Max</i> , percent by mass	0.3	5 of IS : 2488 (Part 4)-1974¶
ix)	Iron (as Fe), ppm, <i>Max</i>	5	32 of IS : 3025-1964
x)	Copper (as Cu), ppm, <i>Max</i>	5	36 of IS : 3025-1964
xi)	Silica (as SiO ₂), ppm, <i>Max</i>	5	30 of IS : 3025-1964
xii)	Chloride (as Cl), ppm, <i>Max</i>	5	24 of IS : 3025-1964
xiii)	Sulphates (as SO ₄), ppm, <i>Max</i>	5	21 of IS : 3025-1964
xiv)	Water insoluble matter, percent by mass, <i>Max</i>	0.005	Appendix B

*Methods of sampling and test (physical and chemical) for water and waste water: Part 12 Density (*first revision*).

†Methods of sampling and test (physical and chemical) for water and waste water: Part 11 pH Value (*first revision*).

‡Method for determination of distillation range and of distillation yield (*first revision*).

§Methods of sampling and test (physical and chemical) for water and waste water: Part 4 Colour (*first revision*).

|| Methods of sampling and test (physical and chemical) for water used in industry.

¶Methods of sampling and test for industrial effluents, Part 4.

4.2 Marking — The containers shall be marked with the following:

- Name of the material;
- Net volume or mass;
- Batch number;
- Name of the manufacturer or his registered trade-mark, if any; and
- Suitable cautionary note as follows:

NOTE — It has been known that hydrazine hydrate is likely to have some carcinogenic properties. Hydrazine hydrate as a product should not be used in boilers, the steam from which will be used in a process industry, processing food and/or skin products.

4.2.1 The containers may also be marked with the Standard Mark.

NOTE — 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, testing 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 of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

5. SAMPLING

5.1 General Requirements of Sampling

5.1.1 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

5.1.2 The sampling instruments shall be clean and dry.

5.1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instruments and the containers for samples from adventitious contamination. To draw a representative sample from a container, the material shall be mixed thoroughly by suitable means before sampling.

5.1.4 The sample shall be placed in clean and air-tight glass bottles or other suitable containers on which the material has no action and which have been previously washed several times with the material to be sampled.

5.1.5 The sample containers shall be of such a size that they are filled by the sample leaving an ullage of not more than five percent.

5.1.6 Each sampling container shall be sealed air-tight after filling, and marked with full details of sampling, the date of sampling and the year of manufacture of the materials.

5.2 Scale of Sampling

5.2.1 *Lot* — All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture, the batches shall be marked separately and the groups of containers in each batch shall constitute separate lots.

5.2.2 For ascertaining conformity of the material in a lot to the requirements of this specification, samples shall be tested for each lot separately. The number of containers to be selected at random from lots of different sizes shall be in accordance with Table 2.

TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING
(Clause 5.2.2)

LOT SIZE	SAMPLE SIZE
N	n
(1)	(2)
3 to 15	3
16 to 40	4
41 to 65	5
66 to 110	7
111 and above	10

5.2.2.1 In order to ensure randomness of selection, the following procedure shall be adopted:

Arrange all the containers in the lot in a systematic manner and starting from any one, count them as 1, 2, 3,..... up to r , where r is the integral part of N/n (N and n being the lot size and sample size respectively). Every r th container thus counted shall be withdrawn to constitute the test sample.

5.3 Preparation of Test Samples

5.3.1 From each of the containers selected according to **5.2.2.1**, equal portions of the material shall be taken out so that the total quantity collected from all the containers is about 3 litres. This shall be the composite sample.

5.3.2 The composite sample shall be divided into 3 test samples not less than 1 litre each. These test samples shall be transferred immediately to clean dry bottles which are sealed air-tight with glass stoppers and marked with the particulars of sampling as given in **5.1.6**. One test sample shall be sent to the purchaser and one to the supplier. The third test sample bearing the seals of the purchaser and the supplier shall constitute the referee sample, to be used in case of dispute.

5.3.3 Tests for determination of all characteristics shall be conducted on the composite sample.

5.4 Criteria for Conformity

5.4.1 The lot shall be declared as conforming to the requirements of this specification if all the test results on the composite sample satisfy the corresponding requirements.

6. TESTS

6.1 Tests shall be conducted as prescribed in col 4 of Table 1.

6.2 Quality of Reagents — Unless otherwise specified, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities.

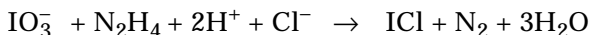
APPENDIX A

[Table 1, *Sl No.* (i)]

DETERMINATION OF PURITY OF HYDRAZINE HYDRATE

A-0. PRINCIPLE

A-0.1 Hydrazine reacts with potassium iodate under the usual Andrew's conditions as follows:



thus, $\text{KIO}_3 \equiv \text{N}_2\text{H}_4$

A-1. REAGENTS

A-1.1 Potassium Iodate Solution — 0.025 M. Dissolve exactly 5.35 g of dried potassium iodate in one litre of de-oxygenated water.

A-1.2 Carbon Tetrachloride

A-2. PROCEDURE

A-2.1 Weigh accurately about 0.08 to 0.1 g of hydrazine hydrate. Add a mixture of 30 ml of concentrated hydrochloric acid and 20 ml of de-oxygenated water. Shake well. Add 5 ml of carbon tetrachloride. Titrate against potassium iodate solution, with continuous shaking. At first the colourless organic layer of carbon tetrachloride changes to blood red and then just decolourises at the end point.

A-3. CALCULATION

A-3.1 Purity of hydrazine hydrate, percent =
$$\frac{0.00125 \times V_1 \times 100}{M}$$

where

V_1 = volume in ml of potassium iodate solution, and

M = mass in g of the sample.

*Specification for water for general laboratory use (*second revision*).

APPENDIX B

[Table 1, Sl No. (xiv)]

DETERMINATION OF WATER INSOLUBLE MATTER

B-1. PROCEDURE

B-1.1 Weigh accurately about 10 g of the material in a beaker and add equal quantity of water. Mix well with a glass rod. Filter the contents of the beaker quantitatively through a previously weighed sintered glass crucible No. 4. Wash the beaker with water and filter this also. Similarly wash the crucible a few times with water. Dry the crucible in an air oven at $105 \pm 2^\circ\text{C}$. Weigh the dried crucible for constant weight.

B-2. CALCULATION

B-2.1 Water insoluble matter, percent by mass = $\frac{M_1}{M_2} \times 100$

where

M_1 = mass in g of the residue after drying, and

M_2 = mass in g of the sample taken for test.

(Continued from page 2)

<i>Members</i>	<i>Representing</i>
SHRI K. R. KRISHNASWAMY	Central Power Research Institute, Bangalore
KUMARI P. S. RAJALAKSHMI (<i>Alternate</i>)	
SHRI S. M. C. PILLAI	National Thermal Power Corporation Ltd, New Delhi
SHRI S. DASGUPTA (<i>Alternate</i>)	
SHRI S. N. RAYCHOUHARY	Hindustan Lever Ltd, Bombay
SHRI H. N. CHAKRABORTY (<i>Alternate</i>)	
DR SANDIP ROY	IEL Limited, Calcutta
SHRI R. BHARGAVA (<i>Alternate</i>)	
SHRI M. V. SUBRAMANIAM	Tata Hydro-Electric Power Supply Co Ltd, Bombay
SHRI L. N. INDURKAR (<i>Alternate</i>)	
DR A. K. WAGLE	Thermax Pvt Ltd, Pune
DR U. D. DATAR (<i>Alternate</i>)	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

