***भारतीय मानक***

***Indian Standard***

**IS 7632 : 20XX**

**Doc. : CHD 26 (14570) F**

***अधिस्फोटकों — विशिष्टि***

*( पहला* पुनरीक्षण )

**Detonators — Specification**

*( First Revision )*

ICS 71.100.30

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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**December 2024 Price Group**

Explosives and Pyrotechnics Sectional Committee, CHD 26

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

A detonator is a device used to trigger an explosive. Detonators are usually initiated by mechanical or electrical means.

This standard was originally published in 1975. In this first revision, vibration test has been added for types A-2, A-3 and grade B detonators. An advisory note regarding loose composition is added under drop test in case of A-2 and A-3 type detonators. In the sampling plan, the number of detonators to be tested for vibration test of instantaneous electric detonators has been modified.

Through notification in official gazette dated 29 September 2023, the Central Government, for the security concerns and public safety, has prohibited the manufacture, possession and import of the electric detonator (explosive of Class 6 Division 3 or UN Class 1 Division 1) throughout the country with effect from the 1st day of April, 2025. It is anticipated that the use of electric detonators will be replaced by electronic detonators. The specifications for electronic detonators are covered under IS 18462: 2023.

The composition of the committee responsible for the formulation of this standard is given at **Annex A**.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. 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*

DETONATORS — SPECIFICATION

(*First revision*)

**1 SCOPE**

This standard prescribes the requirements, methods of sampling and test for detonators used for blasting purposes.

**2 REFERENCES**

The standards given below contain provisions which through reference in this text, constitute provisions of and necessary adjuncts to this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 1260 (Part 1) : 1973 | Pictorial marking for handling and labelling of goods Part 1 Dangerous goods (*first revision*) |
| IS 4905 : 2015/ISO 24153 : 2009 | Random sampling and randomization procedures (*first revision*) |
| IS 6609 (Part 3) : 2023 | Commercial blasting explosives and accessories — Methods of test Part 3 Detonators, general and permitted (*first revision*) |
| IS 10081 : 1981 | Terms relating to commercial explosives, pyrotechnics and blasting practices |
| IS 18462: 2023 | Electronic Detonators — Specification |

**3 TERMINOLOGY**

For the purpose of this standard, the terms and definitions given in IS 10081, in addition to the following, shall apply.

**3.1 Permitted** **Detonators**

Under the coal mines regulation, only detonators which have been approved by the Director General of Mines Safety are used in any mine in which approved safety lamps are required to be used. Such detonators are termed as permitted detonators and these include instantaneous electric detonators for simultaneous firing, delay electric detonators and electronic detonators.

NOTE — Electric detonators will be phased out by the end of FY 2024-25. Please refer to IS 18462: 2023 for specifications of electronic detonators.

**4 GRADES**

**4.1** The detonators shall be of two grades, namely:

*Grade A* – General, and

*Grade B* – Permitted.

**5** **TYPES**

**5.1** Depending upon the conditions of use and type of construction, the detonators shall be of the following types:

|  |
| --- |
| *Grade A – General* |
| Type A-1 | Plain (ordinary) detonators |
| Type A-2 | Instantaneous electric detonators |
| Type A-3 | Delay electric detonators |
| *Grade B – Permitted* |
| Type B-1 | Instantaneous electric detonators |
| Type B-2 | Delay electric detonators |

**5.2** Under each type, the detonators shall be of two strengths, namely, No.6 and No. 8.

**6** **REQUIREMENTS**

**6.1 For Type A-l**

**6.1.1** *Drop Test*

When subjected to drop test as prescribed in **4.2** of IS 6609 (Part 3), none of the detonators shall detonate nor there shall be any loose composition inside the tubes.

**6.1.2** *Vibration Test*

Whensubjected to vibration test as prescribed in **4.4** of IS 6609 (Part 3) and examined visually, there shall neither be any loose composition inside the tubes nor it shall come out of the tube during the testing and the detonators shall not explode during the test.

**6.1.3** *Strength Test*

**6.1.3.1** *By sand bomb method*

WhenType A-l detonators are tested in sand bomb as prescribed in **4.5** of IS 6609 (Part 3), the percentage of crushed sand passing through 500-micron and 250-micron IS Sieves shall be as follows:

|  |  |
| --- | --- |
| *Strength of detonator* | *Percentage of sand passing through* |
| 500 micron IS sieve | 250 micron IS sieve |
| No.6 | Not less than 35 | Not less than 30 |
| No.8 | Not less than 50 | Not less than 45 |

**6.1.3.2** *By lead plate method*

When Type A-l detonators are subjected to test as prescribed in **4.6** of IS 6609 (Part 3), they shall produce dent on the witness plate corresponding to at least C-3 class [**4.6.3.3** of IS 6609 (Part 3)].

**6.2** **For Type A-2**

**6.2.1** *Drop test*

When subjected to drop test as prescribed in **4.2** of IS 6609 (Part 3), none of the detonators shall detonate.

NOTE — Manufacturers shall ensure that there is no loose composition inside detonators before assembly.

**6.2.2** *Snatch Test*

WhenType A-2 detonators are subjected to the snatch test as prescribed in **4.3** of IS 6609 (Part 3), they shall not fire when a jerk is applied to the lead wires.

**6.2.3** *Strength Test —*same as prescribed in **6.1.3.1** and **6.1.3.2**.

**6.2.4** *Water Resistance*

WhenType A-2 detonators are subjected to water resistance test as prescribed in **4.1** of IS 6609 (Part 3), they shall give the same performance when tested by the method prescribed in **4.6** of IS 6609 (Part 3) and shall conform to the indentation as prescribed in **6.1.3.2**.

**6.2.5** *Electrical Resistance*

When Type A-2 detonators are subjected to electrical resistance measurement as prescribed in **4.7** of IS 6609 (Part 3), ‘the value shall lie within the range specified by the manufacturer.

**6.2.6** *No* *Fire Current*

When Type A-2 detonators are subjected to no fire current test at 180 mA and for 300s as prescribed in **4.8** of IS 6609 (Part 3), they shall not fire.

**6.2.7** *Series Firing Test*

When a series of ten type A-2 detonators are subjected to the series firing test as prescribed in **4.9** of IS 6609 (Part 3), all the detonators shall fire successfully with the current and within the application time of the current as specified by the manufacturer.

NOTE — The test method given at **4.9** of IS 6609 (Part 3) provides a test method to determine the minimum series firing current, however for the sake of requirement given in **6.2.7**, the detonators shall be tested for the current and time as specified the manufacturer.

**6.2.8** *Vibration test*

Whensubjected to vibration test as prescribed in **4.4** of IS 6609 (Part 3), the detonators shall not explode during the test.

**6.3** **For Type A-3**

**6.3.1** *Drop Test*

When subjected to drop test as prescribed in **4.2** of IS 6609 (Part 3), none of the detonators shall detonate.

NOTE — Manufacturers shall ensure that there is no loose composition inside detonators before assembly.

**6.3.2** *Snatch Test* **—** same as prescribed in **6.2.2**.

**6.3.3** *Strength**Test* **—** same as prescribed in **6.1.3.1** and **6.1.3.2**.

**6.3.4** *Water Resistance* **—** same as prescribed in **6.2.4**.

**6.3.5** *Electrical Resistance* **—**sameas prescribed in **6.2.5**.

**6.3.6** *No Fire Current* **—** same as prescribed in **6.2.6**.

**6.3.7** *Series Firing Test* **—** same as prescribed in **6.2.7**.

**6.3.8** *Delay Time Measurement*

Themanufacturer shall declare the nominal delay interval for each delay of the different types of delay detonators. In delay time measurement, the scatterof any particular delay number of any type shall be such that not more than 5 percent of the detonators tested shall have delay timing overlapping with the delay timing of the adjacent numbers.

**6.3.9** *Vibration test*

Whensubjected to vibration test as prescribed in **4.4** of IS 6609 (Part 3), the detonators shall not explode during the test.

**6.4 For** **Grade B (Permitted Detonators)**

**6.4.1** *Drop Test*

When subjected to drop test as prescribed in **4.2** of IS 6609 (Part 3), none of the detonators shall detonate.

**6.4.2** *Snatch Test* **—** same as prescribed in **6.2.2**.

**6.4.3** *Strength**Test* **—** same as prescribed in **6.1.3.1** and **6.1.3.2**.

**6.4.4** *Water Resistance* **—** same as prescribed in **6.2.4**.

**6.4.5** *Electrical Resistance* **—**sameas prescribed in **6.2.5**.

**6.4.6** *No Fire Current* **—** same as prescribed in **6.2.6**.

**6.4.7** *Series Firing Test* **—** same as prescribed in **6.2.7**.

**6.4.8** *Delay Time Measurement (For Type B-2 only)* **—**same as prescribed in **6.3.8**.

**6.4.9** *Gas* *Incendivity Test*

When Type B-l detonators are subjected to gas incendivity test asprescribed in**5.2**of IS 6609 (Part 3), they shall not cause more than 14 gas ignitions in 200 tests. In case of Type B-2, 200 detonators of each delay shall be tested and none of the individual delay shall cause more than 14 gas ignitions.

NOTE — Gas incendivity test is a type test and it is not required to be carried out on every lot if the particular type of construction has been tested by Central Mining Research Station and approved by Directorate General of Mines Safety. However, it is recommended to perform this test in case if there is a manufacturing gap of 6 months or more.

**6.4.10** *Coal Dust Incendivity Test*

When Type B-l detonators are subjected to coal dust incendivity test as prescribed in **5.3** of IS 6609 (Part 3), they shall not cause any ignition in 50 tests. In case of Type B-2, 50 detonators of each delay shall be tested and none of the individual delay shall cause any ignition.

NOTE — Coal dust incendivity test is a type test and it is not required to be carried out on every lot if the particular type of construction has been tested by CSIR - Central Institute of Mining and Fuel Research and approved by Directorate General of Mines Safety. However, it is recommended to perform this test in case if there is a manufacturing gap of 6 months or more.

**6.4.11** *Vibration test*

Whensubjected to vibration test as prescribed in **4.4** of IS 6609 (Part 3), the detonators shall not explode during the test.

**7 PACKING AND MARKING**

**7.1 Packing**

The detonators shall be packed as agreed to between the purchaser and the supplier. The packing shall conform to the provisions of *Explosives (Amendment) Rules*, 2019.

**7.2** **Marking**

**7.2.1** Eachpackage shall be marked with the followinginformation:

a) Name, grade, type, strength and delay time (if applicable) of the product;

b) Number of pieces in the package;

c) Manufacturer’s name and/or his recognized trade-mark, if any; and

d) Date of manufacture and lot number to enable the batch of manufacture to be traced from records.

**7.2.2** The package shall also be marked with the appropriate symbol specified in IS 1260 (Part 1).

**7.2.3** In case of Grade A detonators, the cases shall also be clearly marked ‘NOT FOR USE IN GASSY MINES’.

**7.2.4** The marking shall further be in conformity to the provisions of *Explosives (Amendment) Rules*, 2019.

**7.2.5** *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *BIS Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

**8** **SAMPLING**

**8.1 Lot**

**8.1.1** Cases of detonators of same grade, same type and belonging to the same batch of manufacture shall be grouped together to constitute a lot.

**8.1.2** Detonators constituting the sample shall be drawn from each lot separately for deciding the conformity of the lot to the requirements of the specification.

**8.2** **Plain (Ordinary) Detonators**

**8.2.1** Number of detonators to be selected at random from the lot shall depend on the lot size and shall be in accordance with co1 2 of Table 1. In order to ensure randomness of selection, procedures given in IS 4905 may be followed.

**Table 1 Scale of sampling of plain (ordinary) detonators**

(*Clause* 8.2.1)

|  |  |  |
| --- | --- | --- |
| **S No.** | **No. of detonators in the lot** | **Sample size** |
| (1) | (2) | (3) |
|  | Up to 10 000 | 50 |
|  | 10 001 to 25 000 | 100 |
|  | 25 001 and above | 125 |

At least 25 percent cases shall be sampled and equal number of detonators drawn from each case to constitute the sample of the required size.

**8.2.2** *Number of Tests*

The number of detonators to be drawn from each lot for carrying out various tests shall be as given in the Table 2.

**Table 2 Number of ordinary/plain detonators to be tested for each test**

(*Clause* 8.2.2)

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Test** | **No. of detonators to be tested** |
| (1) | (2) | (3) |
|  | Drop test | 10 |
|  | Vibration test | 20 |
|  | Strength test | 5 |

**8.2.3** *Criteria for conformity*

For deciding the conformity of the lot to the requirements of this specification, the test results of each characteristic shall meet the corresponding requirements specified in the relevant clauses.

**8.3** **Instantaneous Electric Detonators and Delay Electric Detonators**

**8.3.1** The number of detonators to be selected shall be according to Table 3.

**Table 3 Scale of sampling of Instantaneous Electric Detonators and Delay Electric Detonators**

(*Clause* 8.3.1)

|  |  |  |
| --- | --- | --- |
| **S No.** | **No. of detonators in the lot** | **Sample size** |
| (1) | (2) | (3) |
|  | Up to 10 000 | 100 |
|  | 10 001 to 25 000 | 200 |
|  | 25 001 and above | 250 |

**8.3.2** *Number of Tests for Instantaneous Electric Detonators*

The number of detonators taken for the determination of eachcharacteristic shall be as given in the Table 4.

**Table 4 Number of instantaneous electric detonators to be tested for each test**

(*Clause* 8.3.2)

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Test/Characteristic** | **No. of detonators to be tested** |
| (1) | (2) | (3) |
|  | Water resistance | 5 |
|  | Drop test | 5 |
|  | Snatch test | 5 |
|  | Strength test | 5 |
|  | Electrical resistance | 5 |
|  | No fire current | 10 |
|  | Series firing (10 detonators in series) | 20 |
|  | Vibration test | 40 |

**8.3.3** *Number of Tests for Delay Electric Detonators*

The number of detonators taken for determination of each characteristic shall be as given in Table 5.

**Table 5 Number of delay electric detonators to be tested for each test**

(*Clause* 8.3.3)

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Test/Characteristic** | **No. of detonators to be tested** |
| (1) | (2) | (3) |
|  | Water resistance | 5 |
|  | Drop test | 5 |
|  | Snatch test | 5 |
|  | Vibration test | 40 |
|  | Strength test | 5 |
|  | Electrical resistance | 5 |
|  | No fire current | 10 |
|  | Series firing (10 detonators in series) | 20 |
|  | Delay timing | 20 |

**8.3.4** *Criteria for Conformity for Instantaneous Electric Detonators and Delay Detonators*

For declaringthe conformity of the lot to the requirements of the specification, the test results ofeach of the above characteristics shall meet the corresponding requirementsin the relevant clauses.

**ANNEX A**

( *Foreword* )

**COMMITTEE COMPOSITION**

Explosives and Pyrotechnics Sectional Committee, CHD 26

|  |  |
| --- | --- |
| *Organization* | *Representative(s)* |
| DRDO-High Energy Materials Research Laboratory, Pune | DR A P DASH (***Chairperson***) |
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| Ayyan Fireworks Manufacturers Association, Sivakasi | SHRI ABIRUBEN G |
| CDET Explosives Industries Pvt. Ltd., Nagpur | SHRI RAGHAV RATHI |
| CSIR-Central Institute of Mining and Fuel Research, Dhanbad | DR C SAWMLIANADR FIROZ ALI (*Alternate*) |
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| Consumer Guidance Society of India, Mumbai | SHRI SITARAM DIXITDR M S KAMATH (*Alternate*) |
| Directorate General of Mines Safety, Dhanbad | SHRI SAIFULLAH ANSARISHRI DEEPAK PRABHAKAR (*Alternate*) |
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| Fireworks Manufacturers Association (North India), Gwalior | SHRI HARISH MILWANI |
| GOCL Corporation Ltd., Hyderabad | SHRI C.N SAINATHSHRI N Venkatesh (*Alternate*) |
| Gudiya Fireworks, Delhi | SHRI R K JainSHRI KSHITIJ JAIN (*Alternate*) |
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| NLC India Limited, Chennai | SHRI M MUTHUKUMARAN |
| Ordnance Factory Bhandara, Bhandara | SHRI D VIKASSHRI D. K. URKUDE (*Alternate*) |
| Petroleum and Explosives Safety Organization (PESO), Nagpur | SHRI P KUMARSHRI P SEENIRAJ (*Alternate*) |
| Solar Industries India Ltd., Nagpur | SHRI P P DEOTARE SHRI A K JAIN (*Alternate*) |
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| Standard Fireworks, Sivakasi | SHRI M. S. SARAVANAN |
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| The Coronation Fireworks Factory, Sivakasi | SHRI K JEYAKUMAR (*Alternate*) |
| The Indian Fireworks Manufacturers Association (TIFMA), Sivakasi | SHRI T KANNAN |
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| *Member Secretary*SHRI MOHIT GARGSCIENTIST ‘C’ / DEPUTY DIRETOR(CHEMICAL), BIS |

Explosives Panel, CHD 26: P4

|  |  |
| --- | --- |
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| CDET Explosives Industries Pvt. Ltd., Nagpur | SHRI RAGHAV RATHI  |
| CSIR-Central Institute of Mining and Fuel Research, Dhanbad | DR C SAWMLIANADR FIROZ ALI (*Alternate*) |
| Central Mine Planning and Design Institute Ltd., Ranchi | SHRI BINAY KUMAR SINGHSHRI SATYENDRA NARAYAN (*Alternate*) |
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