

इंटरनेट

मानक

### Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 4595 (1969): General requirements for non-sparking tools  
[PGD 5: Assembly Hand Tools]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE

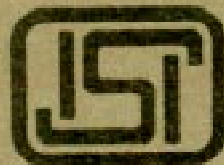


IS : 4595 - 1969

*Indian Standard*  
GENERAL REQUIREMENTS FOR  
NON-SPARKING TOOLS

( First Reprint JUNE 1983 )

UDC 621.9.021:[669.018.89]



© Copyright 1969

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

# Indian Standard

## GENERAL REQUIREMENTS FOR NON-SPARKING TOOLS

### Hand Tools Sectional Committee, EDC 12

<i>Chairman</i>	<i>Representing</i>
SHRI K. N. P. RAO	The Tata Iron and Steel Co Ltd, Jamshedpur
<i>Members</i>	
SHRI K. R. VENKATACHALAM ( <i>Alternate to</i> Shri K. N. P. Rao)	Metalcraft ( India ) Ltd, Calcutta
SHRI SISIR BANERJEE SHRI H. N. GANGULY ( <i>Alternate</i> )	Indian Navy Railway Board ( Ministry of Railways )
DIRECTOR OF FLEET MAINTENANCE SHRI L. R. GOSAIN LT-COL J. C. JOSHI	Department of Defence Production, Ministry of Defence ( DGI )
SHRI M. R. S. SOORMA ( <i>Alternate</i> )	The Mysore Implements Factory, Hassan
SHRI S. K. KEMPAIAH SHRI N. S. VENKATESHA ( <i>Alternate</i> )	Directorate General of Supplies & Disposals
SHRI G. KUPPUSWAMY SHRI S. N. VOHRA ( <i>Alternate</i> )	Development Commissioner, Small Scale Industries ( Ministry of Industrial Development & Company Affairs )
SHRI D. MAJUMDAR	National Test House, Calcutta
SHRI G. B. JAKHETIA ( <i>Alternate</i> )	Ministry of Food, Agriculture, Community Develop- ment & Co-operation
SHRI S. D. MAJUMDAR SHRI T. H. NIRMAL	Gobindo Sheet Metal Works & Foundry, Calcutta Kumar Industries, Parli ( S. Malabar )
SHRI GOBINDO PROSAD PAUL SHRI E. K. RAMAKRISHNAN SHRI K. SANKARANARAYANAN	Directorate General of Technical Development ( Ministry of Supply, Technical Development & Materials Planning )
SHRI SATISH CHANDRA ( <i>Alternate</i> )	Director of Industries, Government of Haryana
SHRI R. P. SOOD SHRI M. SRINIVASAN	Railway Board ( Ministry of Railways )
SHRI R. T. S. RANGIAH ( <i>Alternate</i> )	Usha Forgings & Stampings Limited, New Delhi
SHRI R. M. TALATI SHRI R. M. MOUDGILL ( <i>Alternate</i> )	Engineer-in-Chief's Branch, Army Headquarters
SHRI T. C. THADANI SHRI M. V. PATANKAR, Director ( Mech Engg )	Director General, ISI ( <i>Ex-officio Member</i> )
<i>Secretary</i>	
SHRI B. L. RAINA	
Assistant Director ( Mech Engg ), ISI	

( Continued on page 2 )

( Continued from page 1 )

Non-Spark Safety Tools Study Group, EDC 12/SG

*Convenor*

SHRI K. SANKARANARAYANAN

*Representing*

Directorate General of Technical Development  
( Ministry of Supply, Technical Development  
& Materials Planning )

*Members*

SHRI S. K. LAHIRI

Lahiris Architectural Industries Private Ltd,  
Calcutta

SHRI H. A. RAMDALE

Geo Miller & Co Private Ltd, Calcutta

SHRI P. CHATTERJEE ( Alternate )

SHRI R. P. SHARMA

Oil and Natural Gas Commission, Dehra Dun

# *Indian Standard*

## GENERAL REQUIREMENTS FOR NON-SPARKING TOOLS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 29 January 1969, after the draft finalized by the Hand Tools Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** This standard lays down the requirements for non-sparking tools. These tools are made of non-ferrous alloy having a low sparking hazard and a low magnetic permeability. These tools are used in the presence of flammable gases, dust and explosives and other applications where low magnetic permeability is essential.

**0.3** While preparing this standard, assistance has been derived from GGG-W-642 a 'Wrench, bung (non-sparking and non-magnetic)' issued by USA Federal Supply Service.

**0.4** 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 covers the general requirements for non-sparking tools.

### 2. MATERIAL

**2.1** Non-sparking safety tools shall be manufactured from any suitable non-sparking material. The chemical composition of one of such non-sparking materials is given below:

<i>Constituent</i>	<i>Percent</i>
Aluminium	8.5 to 10.5
Iron	3.5 to 5.5
Nickel	4.5 to 6.5
Manganese	1.5, <i>Max</i>
Copper	Remainder

---

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

**2.1.1** The content of the impurities in the non-sparking material, the composition of which is indicated in 2.1, shall not exceed the limits given below:

<i>Constituent</i>	<i>Percent</i>
Tin	0.10
Lead	0.05
Silicon	0.25
Magnesium	0.05

The total content of impurities shall not exceed 0.30 percent.

**2.1.2** The material shall have a minimum ultimate tensile strength of 70 kgf/mm<sup>2</sup>.

### **3. HARDNESS**

**3.1** The working edges of non-sparking tools shall have a hardness value within the hardness range of 190 to 230 *HV* ( see IS : 1810-1961\* ).

### **4. SHAPES AND SIZES**

**4.1** The shapes, sizes and dimensions of various types of non-sparking hand tools shall be as specified in the relevant specifications.

### **5. WORKMANSHIP AND FINISH**

**5.1** The non-sparking safety hand tools shall be free from defects, such as fins, scales, cracks, seams, burrs, or any other defect which may adversely affect the proper functioning of the product. Flash lines shall be removed sufficiently to blend smoothly with adjacent surfaces.

### **6. MARKING**

**6.1** The tools shall be marked with the manufacturer's name or trade-mark. The year of manufacture shall also be stamped, if required by the purchaser.

**6.1.1** The tools shall also be marked with the name, abbreviation or chemical symbol of the alloy used in the manufacture of the tool.

**6.1.2** The tools may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act, and the Rules and Regulations made thereunder. Presence of this 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 during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

\*Method for Vickers hardness test for light metals and their alloys.



## 7. PACKING

7.1 The tools shall be suitably wrapped in paper and packed in cardboard cartons. The cardboard cartons shall be marked with designation, size of the tool and the manufacturer's name or trade-mark.

## 8. SAMPLING

8.1 Unless otherwise agreed to between the supplier and the purchaser, the sampling plan and criteria for conformity given in Appendix A shall be followed.

## 9. TESTS

### 9.1 Sparking Test

9.1.1 *Apparatus* — The sparking test shall be conducted in an explosion chamber having a volume of 127.4 dm<sup>3</sup>. The chamber shall be furnished with a hot plate for vaporizing gasoline, a means of admitting gasoline and oxygen at atmospheric pressure, a fan for mixing the gasoline vapour and oxygen, two electrodes or other suitable means for providing electric spark, a 75 mm diameter by 6 mm thick metal wheel having coarsely knurled surface on the circumference and rotating at a speed of 10 000 revolutions per minute and a fixture for holding the test specimen against the circumference of the metal wheel while applying pressure from the outside of the chamber. The metal wheel shall be made of carbon tool steel conforming to T90 of IS : 1570-1961\* with a maximum sulphur and phosphorus content of 0.025 percent each and heat-treated to a hardness value of 700 to 820 HV (see IS : 1501-1959†). The gasoline used during these tests shall be aviation gasoline conforming to grade 100/130 of IS : 1604-1960‡. An oxygen analyzer shall be used to determine the percentage of oxygen in the chamber.

9.1.2 *Procedure* — A test specimen approximately 6 mm in diameter by 50 mm in length shall be made from the material used in the manufacture of the tools, and shall be subjected to the sparking test. The specimen shall be mounted in the holder fixture and the chamber shall be sealed. Oxygen shall be admitted into the chamber until the oxygen content in the air reaches 50 percent. A pan resting on the hot plate shall then be filled in with 20 cm<sup>3</sup> of gasoline through an opening of the top of the chamber. The opening shall be sealed and the fan turned on and the gasoline evaporated. After the gas is completely evaporated, the fan shall be turned off and the specimen held against the rotating wheel with a

\*Schedules for wrought steels for general engineering purposes.

†Method for Vickers hardness test for steel.

‡Specification for aviation gasoline.

force of 1.134 kgf. If no explosion occurs before 5 seconds, the mixture shall be exploded by means of the electric spark to demonstrate the presence of an explosive mixture. Three runs shall be made with the test specimen and if the specimen explodes the gasoline and oxygen-enriched air mixture during any of these runs, the tool represented by the specimen tested shall be disapproved for use as a non-sparking tool.

**9.2 Magnetic Permeability Test** — The magnetic permeability of the manufacturing material shall not exceed 1.02 and shall be determined by any suitable method.

## APPENDIX A

( Clause 8.1 )

### SAMPLING OF NON-SPARKING TOOLS AND CRITERIA FOR CONFORMITY

#### A-1. SCALE OF SAMPLING

**A-1.1 Lot** — In any consignment all the non-sparking tools of the same type, shape and size, and manufactured from the same material under essentially uniform conditions of manufacture shall be grouped together to constitute a lot.

**A-1.2** For ascertaining the conformity of the lot to the requirements of the relevant specification, tests shall be carried out for each lot separately. The number of non-sparking tools to be selected at random for this purpose shall be in accordance with col 1 and 2 of Table 1.

**TABLE 1 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES**

( Clauses A-1.2, A-1.3 and A-2.1.1 )

NO. OF NON-SPARKING TOOLS IN THE LOT	SAMPLE SIZE	PERMISSIBLE NUMBER OF DEFECTIVE TOOLS
<i>N</i>	<i>n</i>	
(1)	(2)	(3)
Up to 25	5	0
26 „ 50	8	0
51 „ 100	13	0
101 „ 300	20	1
301 „ 500	32	1
501 „ 1 000	50	2
1 001 and above	80	3

**A-1.3** To ensure the randomness of selection, random number tables shall be used. In case they are not available, one of the following procedures is recommended:

- a) If all the tools are packed in one box, then starting from any tool in the lot, count them in one order as 1, 2, 3, ....., etc, up to  $r$  and so on, where  $r$  is the integral part of  $N/n$  ( $N$  being the number of tools in the lot and  $n$  being the number of tools to be selected). Every  $r$ th tool thus counted shall be withdrawn to constitute the sample.
- b) If the tools are packed in different cartons, then a suitable number of cartons (at least 20 percent of the total in the lot subject to a minimum of 2) shall be selected at random and as far as possible equal number of tools shall be drawn from each carton to get the required number specified in col 2 of Table 1.

## **A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY**

**A-2.1** The tools selected according to **A-1.3** shall be examined for hardness, shapes and sizes, and workmanship and finish. Any tool failing to meet the requirements for any one or more of the characteristics shall be considered as defective.

**A-2.1.1** If the number of defective tools is less than or equal to the corresponding number given in col 3 of Table 1, the lot shall be declared in conformity to the requirements of the characteristics mentioned in **A-2.1**.

**A-2.2** If so desired by the purchaser, one test specimen from every batch or melt of the material shall be supplied by the manufacturer for subjecting it to each of the tests, namely, chemical analysis, tensile strength, sparking and magnetic permeability.

**A-2.2.1** The lot shall be declared conforming to the requirements of the above characteristics if all the test specimens satisfy the relevant requirements.

**A-2.3** The lot shall be declared conforming to the requirements of the relevant specification if it is found satisfactory according to **A-2.1.1** and **A-2.2.1**.

# 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	Conversion
Force	newton	N	1 N = 1 kg.1 m/s <sup>2</sup>
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 <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

## INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31

Telegrams : Manaksanstha

### Regional Offices:

Telephone

Western : Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern : 5 Chowringhee Approach	CALCUTTA 700072	23-08 02
Southern : C. I. T. Campus, Adyar	MADRAS 600020	41 24 42

### Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Gangotri Complex, Bhadbhada Road, T.T. Nagar	BHOPAL 462003	6 27 16
22E Kalpana Area	BHUBANESHWAR 751014	5 36 27
Ahimsa Bldg, SCO 82-83, Sector 17C	CHANDIGARH 160017	2 83 20
5-B-56C L. N. Gupta Marg	HYDERABAD 500001	22 10 83
D-277 Todarmal Marg, Banipark	JAIPUR 302006	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	8 12 72
Patliputra Industrial Estate	PATNA 800013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27