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मानक



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Mazdoor Kisan Shakti Sangathan

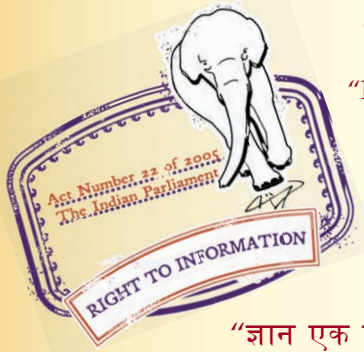
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 11311 (2011): Technical Requirements for Loaders for use in Underground Mines [MED 8: Mining Techniques and Equipment]



“ज्ञान से एक नये भारत का निर्माण”

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

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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भारतीय मानक
भूमिगत खानों में प्रयोग में आने वाले लोडरों की
तकनीकी अपेक्षाएँ
(पहला पुनरीक्षण)

Indian Standard
TECHNICAL REQUIREMENTS FOR LOADERS FOR USE
IN UNDERGROUND MINES
(*First Revision*)

ICS 53.100;73.100.01

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

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Techniques and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1985. The experience gained in implementation of the standard, revision/superseding of reference have necessitated this revision. In view of prevailing conditions, the following requirements have been modified in this standard:

- a) Operational requirements,
- b) Constructional requirements,
- c) Maintenance requirements, and
- d) Safety requirements.

Loaders are extensively used at mine faces in underground mining operations. These machines can be categorized in various ways on the basis of motive power (diesel operated, electrically operated or compressed air operated), mounting (wheeled loader, crawler mounted or track mounted) loading and unloading [front end loader, side-discharge loaders (SDL) or load-haul-dump (LHD) loader], etc. Operation of various types of loaders in underground mining shall meet the requirement of this standard.

In the formulation of this standard, considerable assistance has been derived from the following:

GOST 6935-1962 'Mining loaders — Technical requirement'

GOST 18574-1973 'Loaders for mining'

GOST 5.1461-1972 'Mining loaders — Quality requirements for certified production', issued by the USSR State Committee for Standards Masteva.

Mines Act, 1952 and Rules and Regulations made thereunder have stipulated certain restrictions on the use of loaders in underground mines. Accordingly, the approval of the Competent Authority has to be obtained by the user of the equipment before installation of the equipment.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

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

TECHNICAL REQUIREMENTS FOR LOADERS FOR USE IN UNDERGROUND MINES

(*First Revision*)

1 SCOPE

1.1 This standard lays down the technical requirements for loaders used for loading loose minerals into the means of transport in underground mines.

1.2 This standard does not cover the gathering arm loaders and the front-end-loaders used in surface mining applications.

2 REFERENCES

The standards given in Annex A are 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 in Annex A.

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply.

3.1 Loader — A self-propelled crawler or wheeled machine with an integral front mounted bucket; supporting structure and linkage which loads or excavates through motion of the machine and lifts, transports and discharges material.

4 CLASSIFICATION

Based on the basic criteria, the loaders may be classified as follows:

<i>Basic</i>	<i>Class</i>	<i>Description</i>	<i>Ref to Fig.</i>
Type of loader	A	Rocker shovel loader without bogie	1
	B	Rocker shovel loader with bogie	2
	C	Rocker shovel loader with slewing conveyor	3
	D	Front or side tipping loader including load-haul dump loaders	4 and 5

<i>Basic</i>	<i>Class</i>	<i>Description</i>	<i>Ref to Fig.</i>
Motive power	P	Pneumatic	—
	E	Electric	—
	EF	Electric (flame proof)	—
	D	Diesel	—
Travel mode	R	Rail mounted	1 and 3
	T	Rubber tyred (pneumatic or solid)	2 and 4B
	C	Crawler mounted	4A

5 NOMINAL SIZE

Bucket size of a loader shall define the nominal size of a loader. In case of loader with bogie, the bucket size together with bogie size shall define the nominal size of loader.

5.1 Bucket Size

It is defined by the volume of the rock, in m³, carried by the bucket in heaped condition. The bucket size of a loader shall be selected from the following values based on R10 series of IS 1076 (Part 1):

0.100	0.125	0.160	0.200	0.250
0.315	0.400	0.500	0.630	0.800
1.00	1.25	1.60	2.00	2.50
3.15				

5.2 Bogie Size

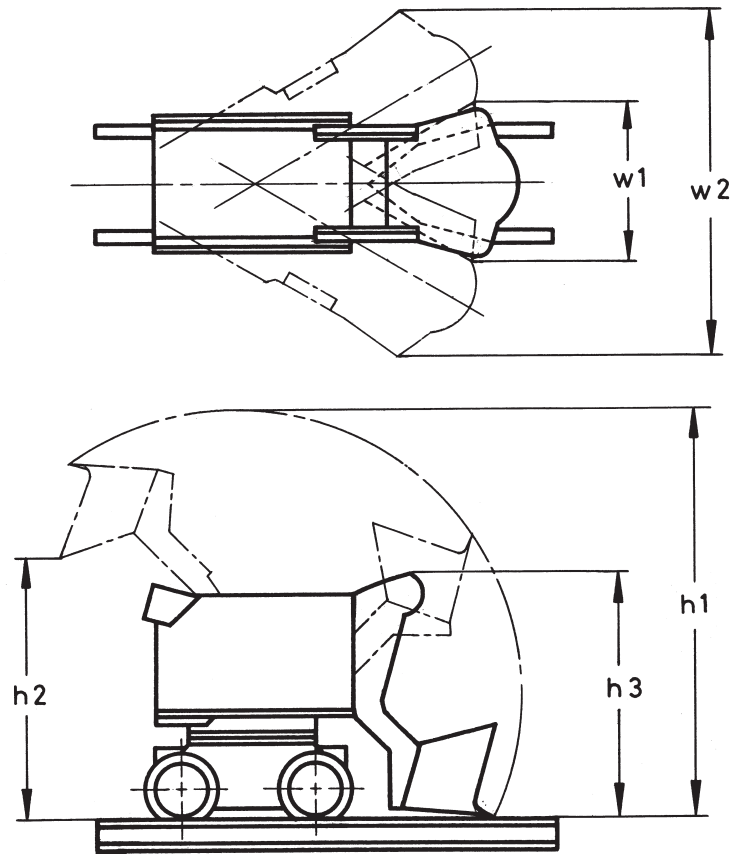
It is defined by the volume of the rock, in m³, carried by the bogie of the loader. It shall be selected from the following values based on R10 series of IS 1076 (Part 1):

1.00	1.25	1.60	2.00	2.50
3.15	4.00	5.00	6.30	8.00
10.00				

6 DIMENSIONS AND OPERATING PARAMETERS

6.1 The main parameters and dimensions of loaders shall be as specified in Table 1.

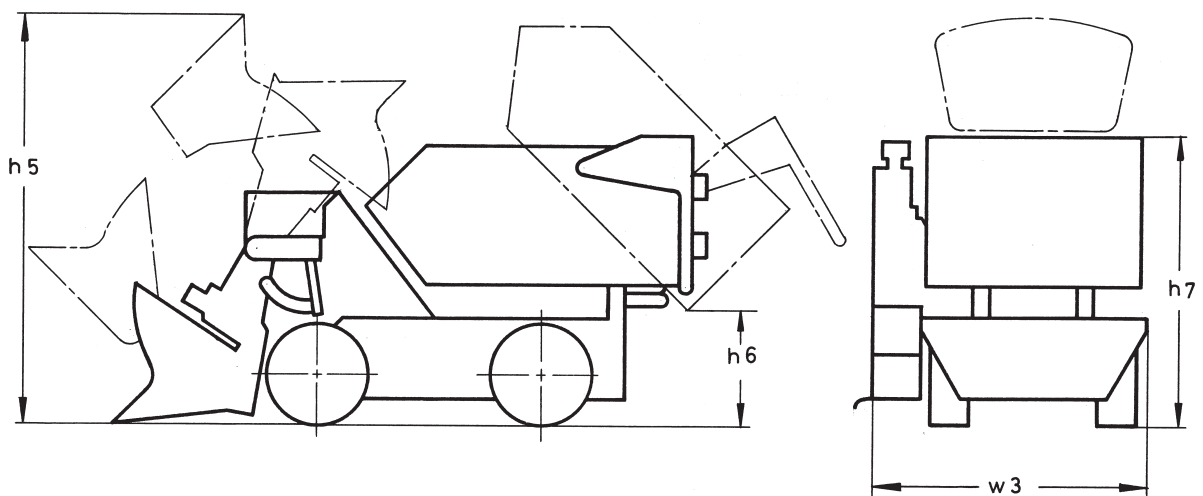
6.1.1 In case of loaders of Type A and Type C, the dimensions specified in Table 1 may be increased by an amount as specified in **6.1.1.1** to **6.1.1.3**, if required by the purchaser.



LEGEND

- $w1$ — Overall Width (Caging)
- $w2$ — Overall Operating Width
- $h1$ — Head Room Height
- $h2$ — Discharge Height
- $h3$ — Overall Height

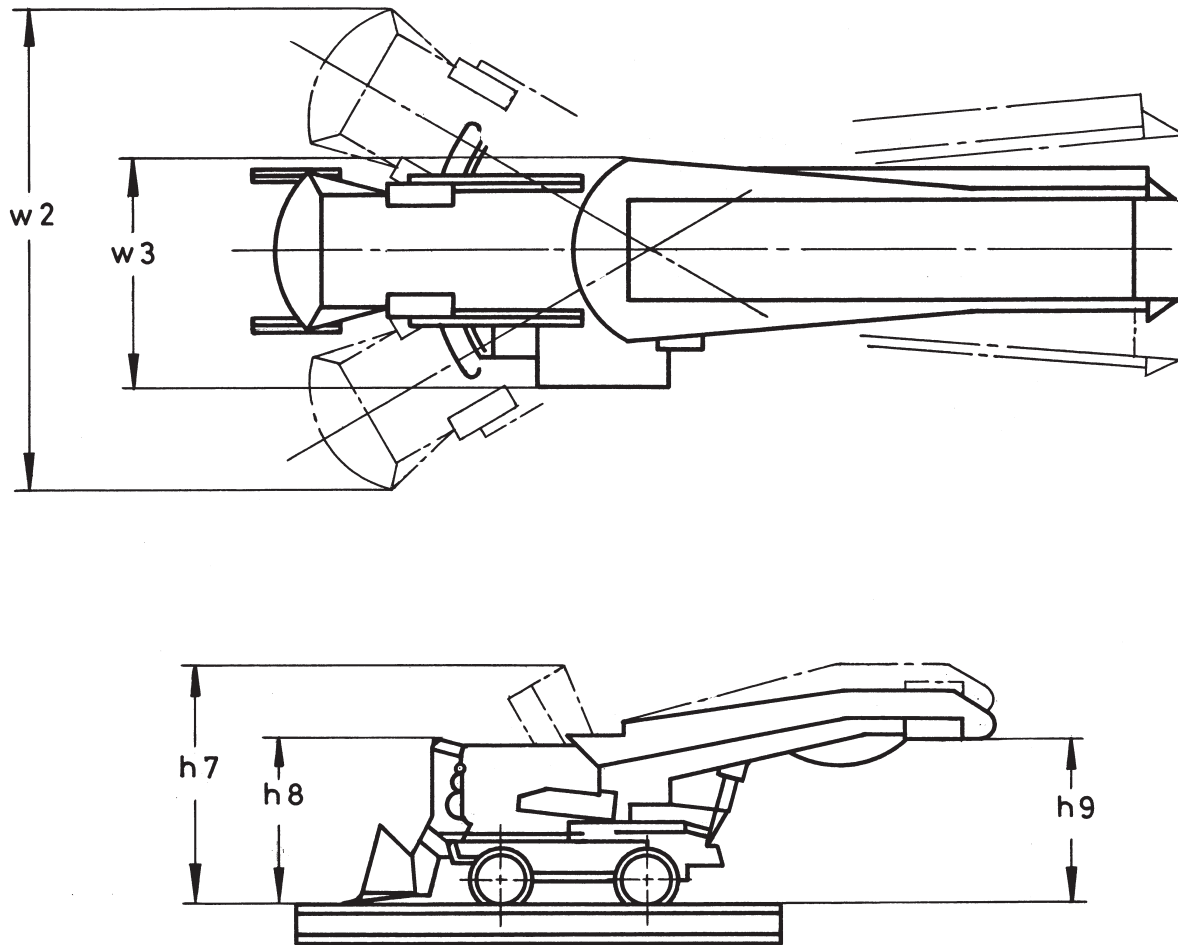
FIG. 1 ROCKER SHOVEL LOADER WITHOUT BOGIE (TYPE A)



LEGEND

- $h5$ — Head Room Height
- $h6$ — Hooper Discharge Height
- $h3$ — Overall Height

FIG. 2 ROCKER SHOVEL LOADER WITH BOGIE (TYPE B)

**LEGEND**

- w_2 — Overall Operating Width
 w_3 — Overall Width
 h_7 — Head Room Height (Bucket Discharge)
 h_8 — Height Over Rocker Arm
 h_9 — Discharge Height (Conveyor)

FIG. 3 ROCKER SHOVEL LOADER WITH SLEWING CONVEYOR (TYPE C)

6.1.1.1 For loaders having unified rail bogie, the height of loaders specified in Table 1 may be increased by 15 percent.

6.1.1.2 For loaders fitted with caterpillar or pneumatic wheels the width, maximum height, transport height and mass of the loaders may be increased by 15, 20, 15 and 20 percent, respectively.

6.1.1.3 For loaders having electrical drive, the width and mass of the loaders may be increased by 300 mm maximum and 15 percent maximum, respectively.

6.2 Working Inclination

Safe operation of loaders shall be ensured when the loaders are employed at working inclinations specified below for different type of mounting:

Type of Mounting	Inclination
Rail	1 in 50
Rubber Tired	1 in 6
Crawler	1 in 4

6.2.1 In case of steeper gradient the requirement shall be as agreed to between the purchaser and the manufacturer.

7 DESIGNATION

A loader for use in underground mines shall be designated by its commonly used name, class designation for type motive power travel mode of loader (*see 3*), size of bucket and bogie (if applicable) and the number of this standard.

Example 1 — As pneumatically operated, rail mounted rocker shovel loader without bogie and 0.200 m³ bucket capacity shall be designated as:

IS 11311 : 2011

Mine Loader APR 200 IS 11311

Example 2 — A pneumatically operated, rubber tyre rocker shovel loader with 0.200 m³ bucket capacity and 2.00 m³ bogie capacity shall be designated as:

Mine Loader BPT 200/2 000 IS 11311

Example 3 — An electrically operated crawler mounted side dump loader of 1.25 m³ bucket capacity shall be designated as:

Mine Loader DEC 1 250 IS 11311

Example 4 — A rubber tyre, pneumatically operated load-haul dump loader of 3.15 m³ bucket capacity shall be designated as:

Mine Loader DPT 3 150 IS 11311

8 GENERAL REQUIREMENTS

8.1 Constructional Requirements

8.1.1 The design of the loaders shall be such as to ensure:

- a) Safety in operation and maintenance;
- b) That it is possible to dismantle the loader into reasonably size sub-assemblies and reassemble it by using simple hand tools for the purpose of transportation into mines and to different working places inside the mine, dimensions and weight of the largest and — heaviest components shall be as agreed between the purchaser and the manufacturer/supplier;
- c) That the main components of the loader such as the prime mover and control devices are readily accessible for inspection, control and maintenance;
- d) That control levers, pedals and buttons are conveniently located; and
- e) A plate indicating safe load bearing capacity of the canopy shall be affixed on it to protect the driver/operator for rest/side fall.

8.1.2 In loaders of Type C, the slewing-angle of the conveyor shall be 10° and 5° minimum in vertical and horizontal planes, respectively.

8.1.3 In loaders of Type C, extendable type of coupler bar may be provided to facilitate into long tubs.

8.1.4 If required by the purchaser, loaders of Type C shall be provided with a winch system for changing of tubs while loading in a drift.

8.1.5 All rail mounted loaders of Type A and C, irrespective of motive power, shall be equipped with power swing arrangement if the bucket size exceeds 0.400 m³.

8.1.6 If required by the purchaser, the bucket of rail mounted loaders of Types A and C shall be equipped with side ploughs to increase the cleanup width but any such increase in cleanup width shall be restricted to 25 percent maximum.

8.1.7 If required by the purchaser, electrically operated loaders may be provided with remote control arrangements.

8.1.7.1 Remote control arrangements, if provided, shall conform to the requirements specified by the purchaser.

8.1.8 Subject to statutory requirements, the electrically operated loaders shall conform to IS 2148.

8.1.8.1 Circuits and other control equipment shall be intrinsically safe and shall conform to IS 5780.

8.1.9 The cable couplers and adaptors used in loaders with electric drive shall conform to IS 6789 and receiving flexible cables conforming to IS 14494.

8.1.10 Pneumatically operated loaders shall be fitted with hose couplers conforming to IS 13078 and shall be able to receive hose conforming to IS 446 or IS 635 fitted with mating couplers conforming to IS 13078.

8.1.11 All electrically driven loaders shall be provided with a cable reeling drum for efficient and safe handling of electric cable. The cable reeling drum shall have a limit switch or other effective arrangement to ensure that during operation of loader, machine will be stopped when two turns (dead turns) of cable are left in the drum. The direction and speed of the cable reeling drum shall be matching with the direction and speed of the machine (loader) itself.

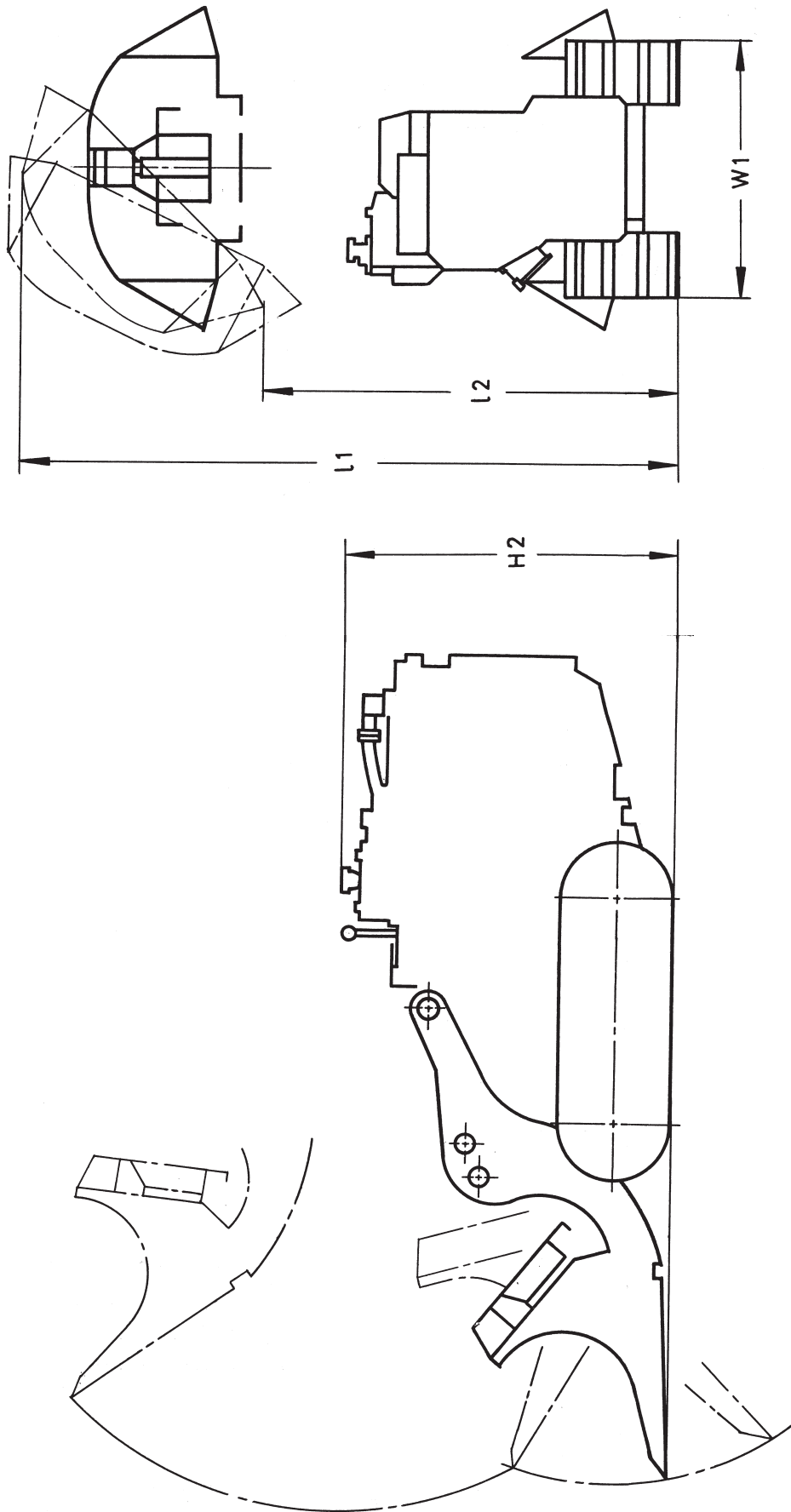
8.1.12 If required by the purchaser, all crawler mounted loaders of Type D may also be provided with cable reeling arrangements conforming to **8.1.11**.

8.1.13 All external surfaces except machined surfaces shall be painted for providing protection against corrosion during transport, storage or operation.

8.1.14 The colour of the external paint shall be so chosen as to give good visibility in the underground environment. Colours such as black, grey, dark blue or dark green shall be avoided.

8.1.15 The temperature in the oil bath of the gear unit and the hydraulic system of the loaders shall not exceed 85°C when the loader is in operation, where fire resistant hydraulic fluid is used, the working temperature of the same shall not exceed 90 percent of the maximum temperature permitted for the type of fluid.

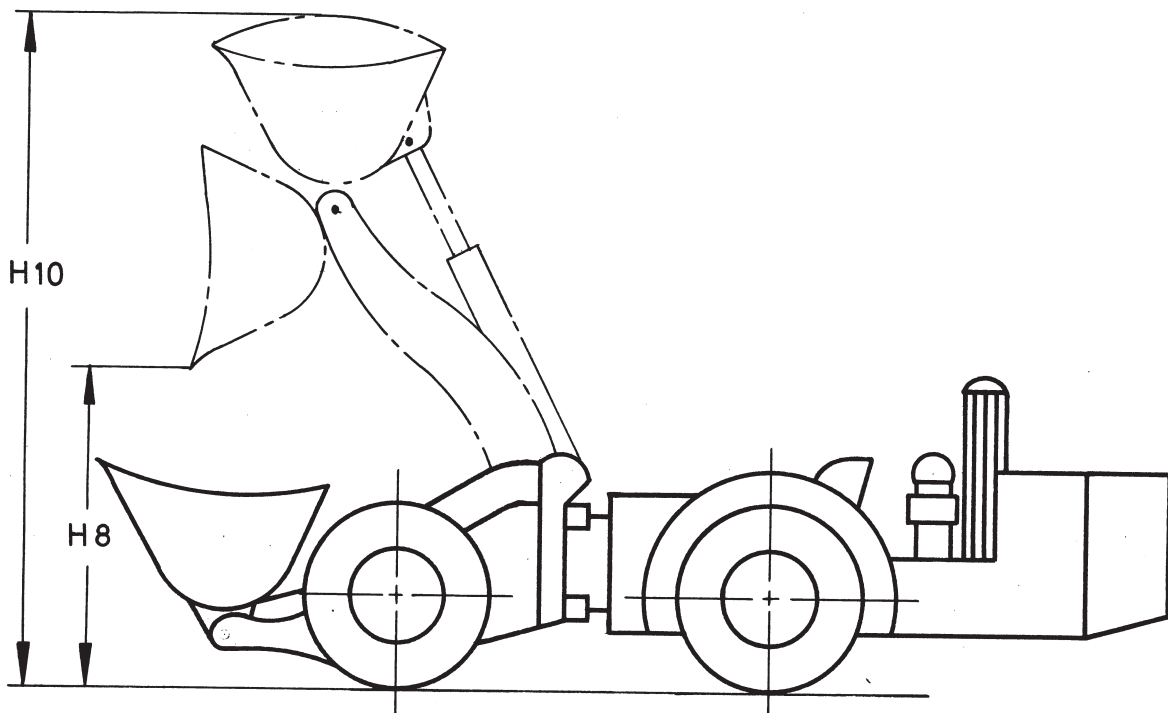
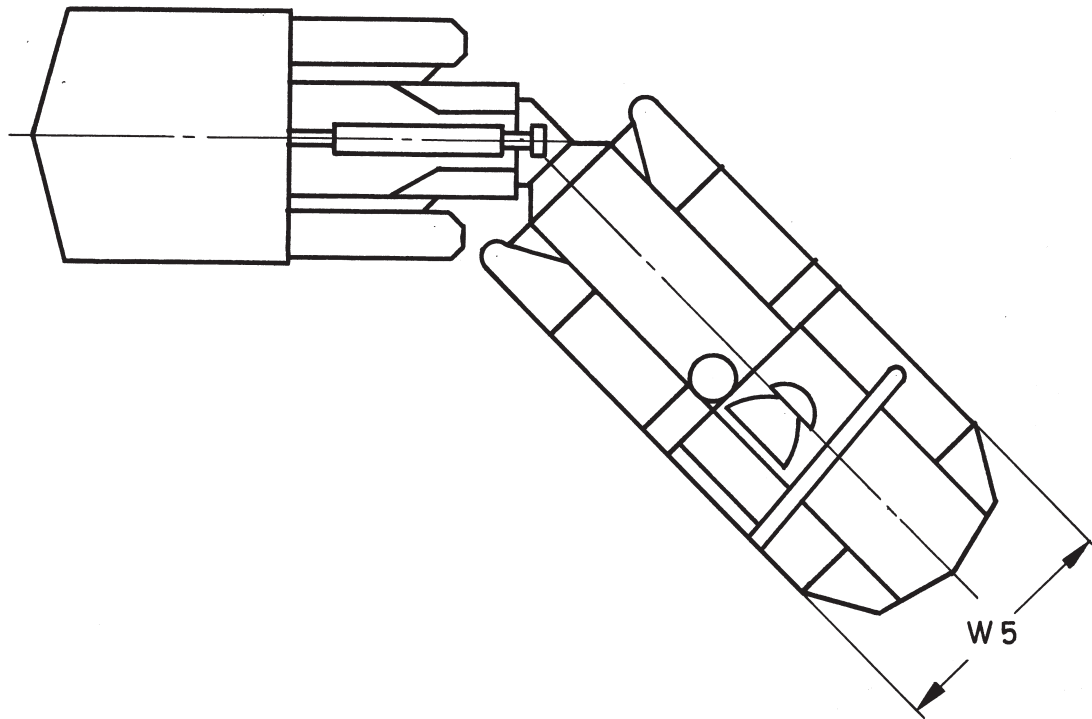
8.1.16 The bearings and the gearing arrangements shall be properly enclosed so that neither the lubricant leaks nor dirt and dust penetrate to the lubricant, hydraulic fluid and hydraulic system as a whole.



LEGEND

- L1 — Head Room Height
- L2 — Discharge Height
- H2 — Overall Height
- W1 — Overall Width

FIG. 4 SIDE TIPPING LOADER (TYPE D)



LEGEND

- H8* — Discharge Height
- H10* — Head Room Height
- W5* — Overall Width

FIG. 5 FRONT TIPPING LOADER (TYPE D)

Table 1 Dimensions and Operating Parameters of Loaders
(Clause 6.1)

SI No.	Type		Bucket Capacity m ³	Overall Dimensions Without Attachments				Mass of Loader Without Attachments t	Clean up Width Min mm	Size of Rock Pieces Max mm	Density of Material Loose State Max t/m ²
	Designation	Travel Mode		Width Max mm	Tramming Height Max mm	Total Height Max mm	Unloading Height Min mm				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	A	Rail mounted, Crawler mounted or rubber tyred	0.100-0.20 0.20-0.315 0.315-0.50	900 1 100 1 500	1 250-1 300 1 450-1 550 1 500-1 600	2 000-2 150 2 250-2 550 2 450-2 850	1 100-1 500 1 300-1 700 1 400-1 800	1.8-2.2 3.5-4.0 4.7-5.0	1 900-2 100 2 200-2 400 2 400-3 250	200 250 300	2.2 2.2 2.2
ii)	B	Rubber tyred	0.10-1.0 ¹⁾ 0.25-1.4 ¹⁾ 0.5-2.5 ¹⁾	1 800 2 000 2 200	2 200 1 600 1 800	2 350 2 450 2 700	480 ²⁾ 550 ²⁾ 600 ²⁾	3.0-3.5 3.5-6.0 6.5-8.0	²⁾ ²⁾ ²⁾	200 250 300	2.2 2.2 2.2
iii)	C	Rail mounted	0.2-0.25 0.315-0.5 0.63-1.0	1 350 1 850 1 900-2 000	1 850 2 000 2 700-2 800	1 900 2 500 2 800-3 400	1 300-1 550 ³⁾ 1 450-2 150 ³⁾ 1 900-2 100 ³⁾	5.0-6.0 6.8-7.8 12.0-23.0	3 000 3 500 4 500-6 000	250 300 400	2.2 2.2 2.2
iv)	D	Crawler mounted	0.2-0.4 0.4-0.75 0.75-1.5	1 250 1 700 2 200	1 500 1 800 2 000	— — —	Ground level 1 800 mm, Max Ground level 2 200 mm, Max Ground level 2 200 mm, Max	3.0-4.5 7.0-9.0 8.0-11.0	²⁾ ²⁾ ²⁾	250 300 400	2.2 2.2 2.2
v)	E	Rubber tyred	0.5-0.8 0.8-1.7 1.7-3.8	1 400 1 800 2 500	1 400 1 900 1 850	— — —	Ground level 1 200 mm, Max Ground level 1 900 mm, Max Ground level 1 500 mm, Max	5.0-7.0 7.5-12.0 18.0-22.0	²⁾ ²⁾ ²⁾	400 500 600	2.2 2.2 2.2

NOTES

1 'A' type loaders on rubber tyre or crawlers also have theoretically unlimited cleanup range.

2 'A' and 'B' type loaders may have track gauges of 600 (762), 900, 1 000 and 1 062 mm depending on size as required by the purchaser.

3 In 'A' and 'C' type loaders the width may vary depending on the track gauges. The width shown on the table corresponds to the width of the main loader body.

4 In 'A', 'B' and 'C' type loaders the trimming height and total height may vary depending on the discharge height of the bucket. Tub figures in the table show a range of values corresponding to the discharge height. For each bucket capacity the manufacturer shall provide at least two discharge heights depending on user's requirements.

5 The design of the couplers behind the loader shall conform to that of the tubs or mine cars. The design shall also provide for coupling of tubs or mine cars at minimum two points in the vertical plane to facilitate the use of cars of different capacities and coupler heights to be used with the same loader.

6 The trimming heights do not include the height over the operator's canopy, when installed at the request of the purchaser.

¹⁾ Refers to capacity of the bogie/hopper.

²⁾ Theoretically unlimited cleanup range.

³⁾ Refers to discharge height of conveyor.

⁴⁾ Refers to discharge height of bogie/hoppers.

8.1.17 Low fluid levels, temperature cut off switches to be provided.

8.1.18 All hydraulic hose/hoses assemblies shall be of a type having the approval of the statutory authority.

8.1.19 *Head Lights*

8.1.19.1 All electrically and diesel driven loader shall be provided with at least two head light unit on the front and one at rear of each loader. If required by the purchaser, the pneumatically driven loader may also be provided with lighting arrangement.

8.1.19.2 The head light units shall be so mounted that they are in a fixed position and protected from external damage by recessing in the equipment frame or otherwise guarded in an appropriate manner. Such headlights shall have adequate illumination and shall not cause glare to the persons employed around the loader.

8.1.20 *Warning Device*

8.1.20.1 D type rubber-tyre loaders, diesel or electric crawler loaders shall have a bell, horn or other suitable warning device located conveniently near the operator. Audio-visual warning device shall be provided with back gear.

8.1.20.2 Any red colour suitable reflecting material including fluorescent paint shall be provided on each end of the loaders.

8.1.21 *Brakes*

8.1.21.1 D type rubber-tyre loaders (diesel or electric) and crawler loaders shall be equipped with adequate brakes. Apart from the service brakes, they shall also be equipped with a parking brake. The parking brakes shall be so designed as to apply automatically in the event of failure of motive power or stoppage of the prime mover.

8.1.21.2 The braking devices of the loaders shall not allow simultaneous application or release of the brakes when the loader is stationary.

8.1.21.3 All loaders of crawler mounted type shall be equipped with a suitable anti-roll-down device of a type as agreed by the purchaser and the supplier.

8.1.21.4 All electrically driven loaders shall be provided with a deadman's switch or other devices which shall not permit the starting of the prime mover or release of the brakes unless the operator occupies his seat.

8.1.22 *Fire Extinguishers*

All Type D loaders (diesel or electrically driven) shall be fitted with suitable fire extinguisher carried in a location easily accessible to the operator and protected

by position from external damage. The fire extinguishers provided on loader shall conform to relevant Indian Standard.

8.1.23 *Fuel Tank*

8.1.23.1 In diesel operated loaders fuel tank shall be made leak proof and shall be fabricated from sheet of minimum thickness of 1.5 mm welded at all seams. A vent opening shall be provided in the fuel filler cap so that atmospheric pressure is maintained inside the tank.

8.1.23.2 The fuel tank shall have a definite position in the equipment assembly and no provision shall be made for attachment of any auxiliary fuel tank.

8.1.23.3 The capacity of the fuel tank shall not exceed the amount of fuel necessary to operate the engine at full load continuously for approximately four hours.

8.1.24 *Fuel Lines*

8.1.24.1 All fuel lines shall be protected against damage in ordinary use and shall be designed, fabricated and secured to resist breakage from vibration.

8.1.25 The hydraulic system of loaders shall be designed to operate efficiently using hydraulic fluids conforming to IS 10532 (Part 2) or IS 10532 (Part 3) or IS 10532 (Part 4).

8.1.25.1 The hydraulic fluids for operation of hydraulic system of loaders shall be selected in accordance with IS 10531.

8.2 *Operational Requirements*

8.2.1 All loaders of Types A, B and C irrespective of motive power and travel mode shall be provided with an operator's platform of substantive construction so as to secure a firm and safe place for the operator so that visibility is clear.

8.2.2 All Type D loaders irrespective of motive power and travel mode shall be equipped with an operator's seat so designed and positioned as to give good visibility, safety and comfort.

8.2.2.1 The I.C. engine used as prime movers for loaders shall be of flame proof type and shall be equipped with features like frame-traps heat exchangers and exhaust conditioners/scrubbers. The engine shall conform to the relevant specifications of engines for use in underground mines.

8.2.3 The loaders of Types A, B and C shall be provided with operating levers on either the right or left side of the loader as required by the purchaser. For this purpose, the right and left side shall mean the right and left hand side of a person standing behind the loader and facing it with the bucket and away from him.

8.2.3.1 If required by the purchaser the loaders may be provided with double sided controls.

8.2.4 When in operation the control levers of the loaders of Types A, B and C, when released, shall automatically come back to the neutral position.

8.2.4.1 The lever controlling the 'lift' operation of loaders is exempted from the requirements of **8.2.4**.

8.2.5 The force required to operate the control levers and pedals shall not exceed 50 N and 100 N respectively.

8.2.6 Loaders with pneumatic drive shall work satisfactorily when supplied with compressed air at the main inlet of the loader at a pressure of 0.5 MPa.

8.2.7 In case of diesel driven loader, the exhaust gases, as sampled at the engine exhaust manifold, shall not contain under any load condition more than 1 500 and 1 000 ppm of carbon monoxide and oxides of nitrogen, respectively.

8.2.7.1 Use of chemical neutralizers may be adopted to achieve the above results.

8.3 Maintenance Requirements

8.3.1 Two instruction manuals shall be provided to the purchaser with each loader which shall lay down instructions regarding the following:

- a) Instructions for proper operation of the loader;
- b) Instructions for proper maintenance of the loader including lubrication schedule;
- c) Instructions for proper storage of loader;
- d) Instructions regarding proper lifting and caging of loader for transportation;
- e) Instructions for proper dismantling and assembly of main and sub-assemblies of loader;
- f) Instructions to properly diagnose troubles which may be encountered in operation and their remedial measures (trouble shooting);
- g) List of spare parts;
- h) Safety check list for the operation of the loader;
- j) Towing instruction;
- k) Lubricants to be used and their equivalents;
- m) Air consumption in case of pneumatically operated loaders;
- n) Instructions for different periodic adjustment;
- p) Hydraulic and electric circuit diagram;
- q) Location of retention ring for tubeless tyres for high capacity loaders; and
- r) Minimum and maximum operational pressure of tubeless tyres for high capacity loaders.

8.3.2 All openings in the loaders shall be covered properly to prevent ingress of dirt or dust to the vital components.

8.3.3 All grease points and nipples shall be so positioned that they are easily serviceable and do not break off easily. The loaders shall be provided with a centralized or local greasing system as agreed between purchaser and the supplier.

8.3.3.1 Grease nipples shall conform to IS 4009 (Part 1) or IS 4009 (Part 2) or IS 4009 (Part 3).

8.3.4 All compressed air powered loaders fitted with pneumatic tyre shall be equipped with an arrangement for tyre inflation at the main air valve of the loader.

8.4 Safety Requirements

8.4.1 All loaders of Types A, B and C shall be provided with a strong guard bar or any other device to ensure that material falling from the bucket do not roll down to the operator.

8.4.2 In pneumatically or diesel powered loaders it shall be ensured that all exhausts from motor or other ports are directed away from the operator.

8.4.3 All pneumatically powered loaders of bucket capacity exceeding 0.400 m³ shall be provided with silencing devices, if required by the purchaser.

8.4.4 It required by the purchaser all Type D loaders, irrespective of motive power or mode of travel shall be provided with a FOPS (Falling Objects Protection System) type of canopy.

8.4.5 In all types of loaders when the bucket arms are kept in a raised position for the purpose of maintenance, an effective safe mechanical arrangement shall be provided to block the arms in that position.

8.4.6 All lift and roll back cylinders should be provided with hose fail check valves.

8.4.7 In all types of compressed air powered loader, the main air inlet to the machine shall be located away from the operator in such manner that in the case of accidental disconnection of the compressed air supply hose, the risk of injury to operator is minimized.

8.4.8 All electric powered loaders shall be equipped with a key operated starter switch to prevent unauthorized operation of the loader.

9 TESTING

9.1 No Load Test

Each loader shall be tested in no load condition and following shall be verified for satisfactory performance:

IS 11311 : 2011

- a) Operation of the running portion of the loader including control handles, levers and buttons;
- b) Force on control handles and pedals;
- c) Working of drive and other assemblies of machine; and
- d) Working of retracting part and conveyor.

9.2 Load Test

This test, carried out on benches, shall be conducted to verify the satisfactory operation of the retracting part, mechanism of movement, conveyor and electrical, hydraulic and pneumatic systems.

10 INFORMATION TO BE SUPPLIED BY THE MANUFACTURER TO THE PURCHASER

Following information shall be supplied by the manufacturer to the purchaser with each loader:

- 1) Weight;
- 2) Length;
- 3) Width;
- 4) Height with boom lowered;
- 5) Wheel track;
- 6) Wheel base;
- 7) Turning radius, interior/exterior;
- 8) Bucket hoisting height;
- 9) Maximum dumping clearance;
- 10) Reach of bucket at maximum dumping clearance;
- 11) Maximum dumping angle with lifted boom;
- 12) Maximum pull in angle with lowered boom;
- 13) Bucket width;

- 14) Bucket capacity level;
- 15) Bucket capacity heaped pay load;
- 16) Maximum lifting force;
- 17) Break out force;
- 18) Thrust;
- 19) Lifting time;
- 20) Lowering time;
- 21) Bucket dump time;
- 22) Power of the motor;
- 23) R.P.M.;
- 24) Maximum torque;
- 25) Forward speed;
- 26) Reverse speed;
- 27) Maximum ground pressure caused due to weight of the machine; and
- 28) Clearance of Mechanical/Electrical components from ground.

11 MARKING

A marking plate shall be affixed on each loader, bearing the following information, at a conspicuous place preferably near the control panel:

- a) Manufacturer's name, trade-mark and address;
- b) Type of loader;
- c) Serial number of loader;
- d) Supply phase, voltage and amperage if electrical power is used;
- e) Month and year of manufacture; and
- f) Flameproof certification marking, where applicable.

ANNEX A*(Clause 2)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
446 : 1987	Rubber air hose (<i>fourth revision</i>)	5780 : 2002	Electrical apparatus for explosive gas atmospheres — Intrinsic safety “i” — Specification
635 : 1982	Oil and solvent resistant hose of rubber	6789 : 1972	Bolted flameproof cable couplers and adaptors
1076 (Part 1) : 1985	Preferred numbers: Part 1 Series of preferred numbers	10531 : 1983	Code of practice for selection and use of fire-resistant hydraulic fluids
2148 : 2004	Electrical apparatus for explosive gas atmospheres — flameproof enclosures “d”	10532	Specification for fire resistant hydraulic fluids:
4009	Grease nipples	(Part 2) : 1983	Invert emulsion (water in oil) type
(Part 1) : 1981	Button head grease nipples (<i>first revision</i>)	(Part 3) : 1983	Water glycol type
(Part 2) : 1981	Conical head grease nipples (<i>first revision</i>)	(Part 4) : 1983	Phosphate esters type
(Part 3) : 1995	Cup type — Specification	13078 : 1991	Pneumatic hose couplings
		14494 : 1998	Elastomer insulated flexible cables for use in mines

ANNEX B*(Foreword)***COMMITTEE COMPOSITION**

Mining Techniques and Equipment Sectional Committee, MED 8

<i>Organization</i>	<i>Representative(s)</i>
Directorate General of Mines Safety, Dhanbad	SHRI S. J. SIBAL (<i>Chairman</i>) SHRI T. S. MUKHERJEE (<i>Alternate</i>)
Andhra Pradesh Heavy Machinery & Engg Ltd, Vijaywada	SHRI TRIPURANANI T. RAO SHRI YELISETTI S. KUMAR (<i>Alternate</i>)
Bharat Coking Coal Ltd, Dhanbad	SHRI RAMJI SAHAY
Bharat Earth Movers Ltd, Bangalore	SHRI V. R. S. PRASAD RAO SHRI H. S. SATISH CHANDRA (<i>Alternate</i>)
Central Coalfields Ltd, Ranchi	SHRI D. SINGH SHRI A. N. JHA (<i>Alternate</i>)
Central Mechanical Engineering Research Institute, Durgapur	SHRI P. K. SEN SHRI MAW NANDI SARKAR (<i>Alternate</i>)
Central Mine Planning & Design Institute Ltd, Ranchi	SHRI S. K. CHATERJI SHRI U. ROY (<i>Alternate</i>)
Central Mining Research Institute, Dhanbad	SHRI A. K. GHOSH SHRI S. K. RITOLIA (<i>Alternate</i>)

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<i>Organization</i>	<i>Representative(s)</i>
Eastern Coalfields Limited, Sanctoria	SHRI S. CHATERJEE SHRI C. B. SAHAY (<i>Alternate</i>)
Eimco Elecon (India) Ltd, Vallabh Vidyanagar	SHRI A. M. DESHPANDE SHRI RAVINDRA LUTHRA (<i>Alternate</i>)
Gujarat Mineral Development Corporation, Ahmedabad	SHRI S. N. MATHUR SHRI A. L. THAKORE (<i>Alternate</i>)
Hindalco Industries Ltd, Distt Sonbhadra	SHRI K. K. DAVE SHRI B. K. JHA (<i>Alternate</i>)
Hindustan Copper Ltd, Kolkata	SHRI R. C. SINGLA SHRI P. K. SHARMA (<i>Alternate</i>)
Hindustan Zinc Limited, Udaipur	SHRI H. B. V. Rao
Indian Chain Pvt Ltd, Kolkata	SHRI PRADIP CHITLANGIA SHRI LALIT MOHAN (<i>Alternate</i>)
Mahanadi Coalfields Limited, Distt Sambalpur	SHRI S. K. MURAKA SHRI A. K. GHOSH (<i>Alternate</i>)
Manganese Ore (India) Ltd, Nagpur	SHRI G. P. KUNDARGI SHRI G. WANGNEO (<i>Alternate</i>)
Mecon Ltd, Ranchi	SHRI H. C. MISHRA SHRI H. K. BHANJDEV (<i>Alternate</i>)
Nanda Millar Co, Kolkata	SHRI J. P. GOENKA SHRI PANKAN GOENKA (<i>Alternate</i>)
National Aluminium Co Ltd, Bhubaneswar	SHRI A. CHAKRABORTYI SHRI M. M. GANTAYAT (<i>Alternate</i>)
National Mineral Development Corporation Ltd, Hyderabad	SHRI A. K. GUPTA SHRI A. K. SHUKLA (<i>Alternate</i>)
Neyveli Lignite Corporation Ltd, Neyveli	SHRI G. RAMAKRISHNAN
Simplex Engineering & Foundry Works Pvt Ltd, Bhilai	SHRI P. G. BHANDERI SHRI MUKESH JAIN (<i>Alternate</i>)
South Eastern Coalfields Ltd, Bilaspur	SHRI KAPIL K. RAI SHRI D. BHATTACHARJEE (<i>Alternate</i>)
Steel Authority of India Ltd, Ranchi	DR B. K. JHA SHRI DEBASHISH KARMAKAR (<i>Alternate</i>)
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The Hutti Gold Mines Company Ltd, Distt Raichur	DR M. L. PATIL
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Western Coalfields Ltd, Nagpur	SHRI G. L. N. REDDY SHRI C. A. VENKATESWARLU (<i>Alternate</i>)
BIS Directorate General	SHRI C. K. VEDA, Scientist 'F' and Head (MED) [Representing Director General (<i>Ex-officio</i>)]

Member Secretary
SHRI T. V. SINGH
Scientist 'E' (MED), BIS

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