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(पहला पुनरीक्षण)

Battery Operated Motorized Tricycle — Specification

(First Revision)

ICS 11.180.10, 43.150

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Artificial Limbs, Rehabilitation Appliances and Equipment for the Persons with Disability Sectional Committee, MHD 09

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Artificial Limbs, Rehabilitation Appliances and Equipment for the Persons with Disability Sectional Committee had been approved by the Medical Equipment and Hospital Planning Division Council.

This standard was first published in 2019. This revision of this standard has been brought out to align the cross references to the latest standards and to incorporate the updated designation of materials as per currently used methods of performance.

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

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 same as that of the specified value in this standard.

Indian Standards

BATTERY OPERATED MOTORIZED TRICYCLE — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies the overall dimensions and functional requirements for battery operated tricycle used as conveyance by invalid having disability of lower extremities. Battery operated tricycle is a new form of powered tricycle.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of 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 these standards.

3 NOMENCLATURE

For the purpose of this standard, the nomenclature various parts as given in Fig. 1 and IS 16305 shall apply.

4 SHAPE AND DIMENSIONS

The typical shape and dimensions of the battery operated tricycle shall be as shown in Fig. 1 and Table 1.

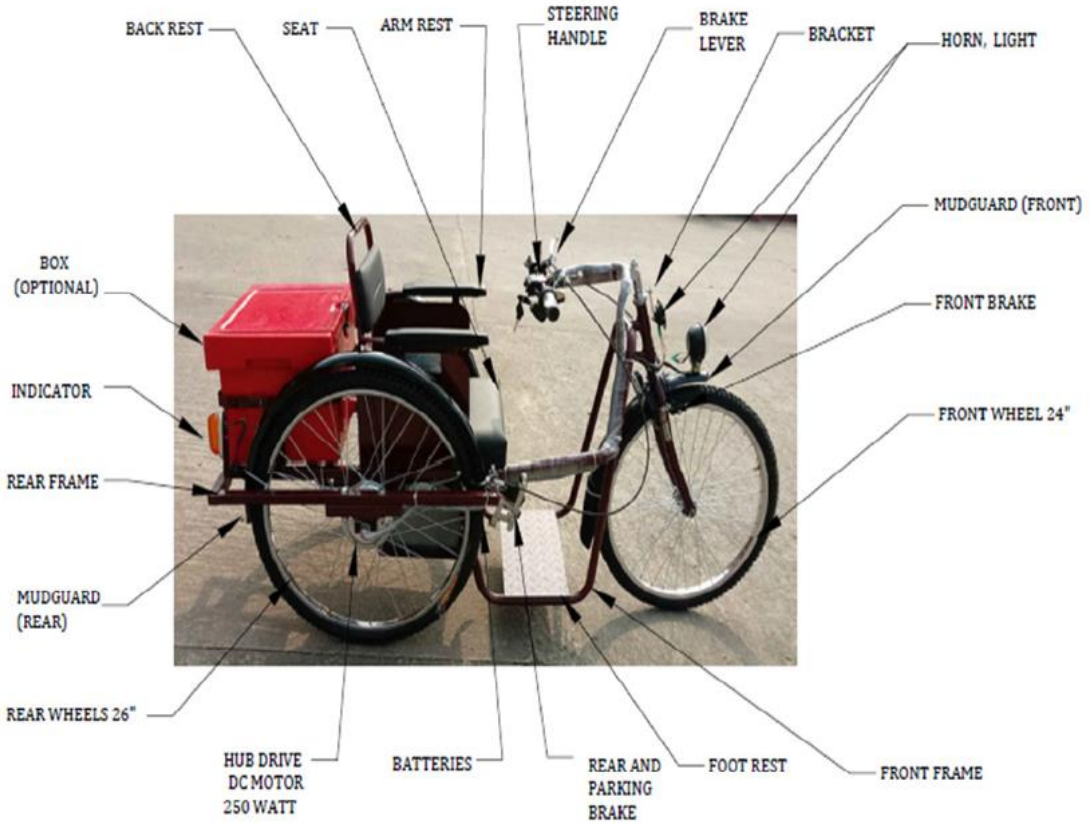

FIG. 1 BATTERY OPERATED MOTORIZED TRICYCLE (TYPICAL)

Table 1 Dimensions of Battery Operated Tricycle

(*Clause* 4)

Sl No.	Nomenclature	Size (in mm)
(1)	(2)	(3)
i)	Overall length	1 750 ± 50
ii)	Overall width	800 ± 50
iii)	Overall height	900 ± 50
iv)	Width of foot rest	200 ± 10
v)	Length of foot rest	450 ± 10
vi)	Ground clearance	120 *Min*
vii)	Armrest height from seat	250 ± 25
viii)	Seat length	410 ± 25
ix)	Seat width	450 ± 25
x)	Back height from seat	400 ± 25
NOTES **1** Steering handle design can be made according to user comfort. **2** Dimensions of foot rest and back height from seat modified as per user comfort.		

5 MATERIAL

5.1 Tubing

The tube used in the frame work of tricycle shall confirm to ERW/CEW quality specified in IS 2039 (Part 1 to Part 3), IS 3074 or IS 4923.

5.2 Standard Tricycle Components

Standard components used in the fabrication of tricycle shall be made to the relevant Indian standards on bicycle components if applicable. List of relevant Indian Standards on bicycle components is given in Annex B.

5.3 Seat and Back Rest

5.3.1 *Seat*

Seat shall have plywood base of minimum 8 mm thickness confirming to IS 303 or shall have base of wooden planks of not less than 10 mm thickness mounted on a wooden frame or shall have a sheet metal base having minimum 1.0 mm thickness suitably formed or made of engineering plastic as per IS 7078. The seat made from any of the above method shall be padded with foam rubber cushioning or other equally suitable material and covered with suitable expanded vinyl coated fabrics confirming to IS 8698.

5.3.2 *Back Rest*

Back rest shall have plywood support of minimum 3 mm thickness mounted on a wooden frame and the rear side of the back rest shall be covered with plywood of minimum 3 mm thickness or back rest shall have plywood base of minimum 8 mm thickness confirming to IS 303 or shall have sheet metal support having 1 mm minimum thickness suitably formed or made of engineering plastic as per IS 7078. Back rest made from any of the above methodshall be padded with foam rubber cushioning or other equally suitable material and covered with suitable expanded vinyl coated fabrics confirming to IS 8698.

5.4 Footrest, Seat Walls and Tool Box

5.4.1 *Foot Rest*

Foot rest shall be made from mild steel sheet conforming to Type – Ordinary, Designation GP, Grade O, conforming to IS 277 having a thickness 1.25 mm or mild steel chequered sheet of thickness 3 mm ± 1.00 mm excluding raised portion or aluminium alloy sheet of 2 mm minimum thickness or high impact polystyrene or equivalent polymer moulded chequered sheet of thickness 6 mm minimum including raised portion.

5.4.2 *Seat Walls*

Seat walls shall be made from mild steel sheet conforming to Type – Ordinary, Designation GP, Grade O, conforming to IS 277 having a thickness 0.5 mm or mild steel CRA sheet grade ‘O’ IS 513 (Part 1) having thickness 0.5 mm.

5.4.3 *Tool Box*

Tool box shall be made from mild steel sheet conforming to Type – Ordinary, Designation GP,

Grade O, conforming to IS 277 having a thickness 1.0 mm.

NOTE — Tool box shall be treated as optional accessories based on agreement between the purchaser and the supplier.

5.5 Spring Wire

The spring wire used in the brake assembly shall conform to IS 4454 (Part 1).

5.6 All other metallic components shall be of mild steel.

5.7 Timber

Timber for seat frame and other parts shall be seasoned heart wood of any species of timbers specified for furniture and cabinet making in IS 399. Heartwood of non-durable timbers and sapwood, if present, shall be given a suitable treatment in accordance with IS 401. Timber used shall be free from prohibited defects and it shall have not more than the permissible defects as prescribed in IS 1331 for grade I timber for non-structural use. Permissible moisture content in timber shall be as recommended in IS 287.

6 REQUIREMENTS

6.1 Frame

The tube used in the frame work shall confirm to ERW quality specified in IS 2039 or IS 3074 or IS 4923. The frame assembly shall be sound and of robust construction. There shall be no sharp edges or unsealed formations.

6.2 Steering Handle Bar

The steering handle bar shall be fitted to the head tube and it shall be of such length as can be conveniently held by the driver without drooping ahead. The handle shall be light to manoeuvre and it shall have a suitable plastic or rubber hand grip at its holding end to facilitate proper gripping.

6.3 Driving Mechanism

Hub drive d.c. motor 250 watt powered by traction batteries shall be fitted in the wheel of tricycle. The Ah rating of traction battery, voltage rating of motor and also number of traction batteries can be changed fulfilling the distance range requirement of 1.

6.4 Tyres and Tubes

Tyres and tubes used shall be minimum 24 inch size for front and rear wheels, tyres conforming to IS 2414 while tubes shall conform to IS 2415.

6.5 Wheel Rims

Wheel rims for the tricycle shall be size minimum 24 inch for front and rear wheels conforming to IS 624. They shall be free from pitting or uneven plating. Spoke holes shall be properly punched or drilled. The spokes diameter shall be of 2.6 mm as per IS 630. There shall be 36 spokes in the front and rear wheels. When assembled, the spokes shall be cross without touching each other. A canvass tape of 12 mm wide conforming to IS 7298 or rim tape of 12 mm wide conforming to IS 960 shall be wrapped around the rim, over riveting of spokes, to protect the tube being damaged by heads of spokes.

6.6 Mudguards

Mudguards shall be made from mild steel sheets, properly formed ‘open type’ with beaded edges. The front mudguards shall be provided with a steel stay made from minimum 4.0 mm diameter wire. It shall extend 150 mm beyond the forks whereas the rear mudguard shall extend 75 mm below the wheel stay on each side. A clearance of not less than 25 mm shall be provided between mudguard and the tyres and a clearance of minimum 10 mm between the wheel and fork shall be given. The mudguards shall be free from dents and other defects.

6.7 Brakes

Suitable type of brake, shall be fitted in the rear and front wheel, which shall be capable of applying by pressing the brake lever.

6.8 Front Wheel Hub

Front wheel hub assembly shall be standard unit.

6.9 Rear Wheel Hub

6.9.1 Right side rear wheel fitted with hub drive d.c. motor. This shall be optional if required hub drive d.c. motor may be fitted with left side rear wheel also.

6.9.2 Left side rear wheel hub assembly shall be standard unit.

6.10 Tool Box

A tool-cum-accessories box with suitable means for locking shall be provided behind the seat. This shall be optional if required by the purchaser.

6.11 Armrest

The armrest at its two sides shall be properly built so as to provide maximum comfort to the person

driving the tricycle. The armrests shall be provided with adequate foam rubber padding all over on top.

6.12 Lubrication

All moving parts of the equipment normally requiring lubrication shall be provided with means for such lubrication.

6.13 Suitable means shall be provided on the underside of the tricycle for keeping the crutches or walking stick securely and conveniently.

6.14 Accessories

The following items shall be furnished as accessories:

a) Horn or bell;
b) Front or head light;
c) Right-left indicator at the rear;
d) Red reflector on each mudguard at the rear;
e) Set of tools (optional);
f) Rear view mirror (optional); and
g) Bicycle frame lock (optional).

6.15 Servicing and Adjustment

Prior to the delivery of the tricycle, the supplier shall service and adjust each tricycle for operational use, including at least the following:

a) Adjustment of braking system;
b) Alignment of wheels;
c) Inflation of tyres and complete lubrication of operating mechanisms; and
d) Handicapped sign to be prominently displayed at the front and the back.

7 FINISH

7.1 The frame of the tricycle, steering handle and mudguards, prior to assembly, shall be thoroughly cleaned by suitable means to remove rust, scale and oily substances. These shall be then chemically rust proofed and stove enamelled, spray painted, powder coated or otherwise finished to give a glossy finish. The colour of the finish shall be as agreed to between the purchaser and the supplier.

7.2 All the metallic parts other than those mentioned in **7.1** shall have a smooth finish and shall be plated chromium over nickel conforming to the relevant Indian Standard or shall be plated zinc conforming to the relevant Indian Standard.

8 TESTS

8.1 Road Test

Each tricycle shall be road tested by riding with a rider of 70 kg ± 5 kg weight for a minimum distance of 5 km at speed of 10 km/h to 20 km/h. Travel shall include, but not be limited to, level unimproved roads for testing. All the components as well as the tricycle shall be intact and no part shall be loosened on completion of the test.

8.2 Manoeuvrability

The tricycle shall be operated at moderate speed and shall turn and steer without difficulty of operation, structural or component failure.

8.3 Static Load Test

The tricycle selected for static load test shall be loaded as follows:

a) Place 20 kg weight at steering handle end, 100 kg at the foot rest and 100 kg at the seat. The tricycle shall be subjected to this 220 kg load for not less than 15 min; and
b) There shall be no damage after the test.

8.4 Brake Test

The tricycle selected shall be tested for stopping ability whiling travelling down on 8 percent dry hard surface gradient at 15 km/h and it shall stop within a distance of 10 m. It shall be capable of braking to full stop from a speed of 15 km/h within 8 m on a dry hard surface level road, free from loose dirt and gravel.

8.5 Test for Finish

A solid steel ball of 13 mm diameter shall be dropped from a height of 1.5 m on any painted surface of the tricycle. The paint at the place where the steel ball strikes shall stand the impact without showing any sign of tear or peeling off.

9 MARKING

9.1 The tricycle shall be marked by putting a label or otherwise with the following:

a) Manufacturer’s name, initials or recognized trademark;
b) Batch no. and date of manufacture; and
c) Any special information regarding design or intended use.

9.2 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 *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed there under, and the product(s) may be marked with the Standard Mark.

10 PACKING

The packing shall be done as agreed to between the purchaser and the supplier.

ANNEX A

(*Clause 2*)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 277 : 2018	Galvanized steel strips and sheets (plain and corrugated) — Specification (*seventh revision*)
IS 287 : 1993	Permissible moisture content for timber used for different purposes — Recommendations (*third revision*)
IS 303 : 1989	Plywood for general purposes — Specification (*third revision*)
IS 399 : 1963	Classification of commercial timbers and their zonal distribution
IS 401 : 2001	Preservation of timber — Code of practice (*fourth revision*)
IS 513 : 2016	Cold reduced low carbon steel sheets and strips
IS 624 : 2003	Bicycles — Rims — Specification (*fourth revision*)
IS 630 : 2005	Bicycle spokes (plain) and nipples for spokes —— Specification (*third revision*)
IS 960 : 2005	Bicycle rim tapes and buckles — Specification (*second revision*)
IS 1331 : 1971	Specification for cut sizes of timber
IS 2039 (Part 1 to Part 3) : 1991	Steel tubes for bicycle and cycle rickshaws — Specification (*second revision*)
IS 2414 : 2005	Cycle and rickshaw pneumatic tyres —— Specification (*fourth revision)*
IS 2415 : 2015	Cycle — Rubber tubes (Moulded/Jointed) — Specification (*fourth revision)*
IS 3074 : 2013	Steel tubes for automotive purposes — Specification (*third revision*)
IS 4454 (Part 1) : 2001	Steel wire for mechanical springs — Specification: Part 1 Cold drawn unalloyed steel wire (*third revision*)
IS 4923 : 2017	Hollow steel sections for structural use —— Specification (*third revision*)
IS 7078 : 1973	Plastics used in instrument industry
IS 7298 : 2021	Textiles — cotton webbing proofed and unproofed — Specification (*first revision*)
IS 8698 : 2022	Specification for expanded vinyl coated fabrics (*second revision*)
IS 16305 : 2017	Cycle — Glossary of terms used in the bicycle industry

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https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/Indian_standards/isdetails/

ANNEX B

(*Clause* 5.2)

RELEVANT INDIAN STANDARDS ON BICYCLE COMPONENTS

IS No.	*Title*
IS 532 : 2006	Bicycle tube valves and valve-tubing (*third revision*)
IS 624 : 2003	Bicycle rims (*fourth revision*)
IS 629 : 2013	Bicycle — Hub assemblies (*third revision*)
IS 3074 : 2005	Steel tubes for automotive purposes — Specification (*third revision*)
IS 960 : 2005	Bicycle rim tapes and buckles (*second revision*)
IS 1131 : 2006	Bicycle bottom bracket axle (*third revision*)
IS 1132 : 2009	Bicycle — Bottom bracket adjustable ball cup (PH type) (*third revision*)
IS 1281 : 2014	Bicycle — Cranks and chain wheels (*third revision*)
IS 1282 : 2018	Bicycle cotter pins, washers and nuts — Specification (*second revision*)
IS 1283 : 1995	Bicycle — Free-wheels (*second revision)*
IS 2061 : 1995	Bicycle — Front forks (*first revision)*
IS 2973 : 2017	Bicycle steering head assembly — Specification (PH type) (*second revision)*

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ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Artificial Limbs, Rehabilitation Appliances and Equipment for the Persons with Disability Sectional Committee, MHD 09

Organization	*Representative*
All India Institute of Medical Sciences, New Delhi	DR SANJAY WADHWA **(*Chairperson*)**
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Artificial Limbs Manufacturing Corporation of India, Kanpur	SHRI A. K. SINGH SHRI VISHAL SHUKLA (*Alternate* I) SHRI PRASHANT THAKUR (*Alternate* II)
Bhagwan Mahaveer Viklang Sahayata Samiti, Jaipur	DR TARUN KUMAR KULSHARESTHA DR DEEPENDRA MEHTA (*Alternate*)
Defence Bio-Engineering and Electromedical Laboratory, Ministry of Defence, Bengaluru	DR S. N. KARTIK DR V. MALLIKARJUNA REDDY M. (*Alternate* I) SHRIMATI A. HEMALATHA (*Alternate* II)
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MS GURPREET KAUR
SCIENTIST 'C'/DEPUTY DIRECTOR
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