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भारतीय मानक मसौदा
**तिपहिया साइकिल, एकल हाथ चालित (दाएं/ बाएं) (जूनियर आकार) —
विशिष्टि**

(IS 17155: 2019 का पहला पुनरीक्षण)

Draft Indian Standard

**Tricycle, Single Hand Propelled (Right / Left) (Junior Size) —
Specification**

(First revision of IS 17155: 2019)

ICS 11.180.10

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

Last date for comments: **03 July 2024**

FOREWORD

(Formal clauses will be added later)

This standard was originally published in 2019. The first revision of this standard has been brought out to incorporate the revised cross references and revised grades of material referred in the IS.

As the single hand propelled tricycle (right/left) junior size are to be used by invalids having different stature and with varied form of disabilities of lower extremities, all the dimensions cannot be fixed. Therefore, keeping in view not to restrict the improvements in design and at the same time to ensure interchangeability of replaceable components, only the essential dimensions have been specified.

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.

1 SCOPE

This standard specifies the overall dimensions and functional requirements for single hand propelled tricycle used as conveyance by invalid children having disability of lower extremities. It does not include power driven tricycle.

2 REFERENCES

The standards given below 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 investing ate the possibility of applying the most recent editions of these standards.

| IS No. | Title |
|------------------------|---|
| IS 277 : 2018 | Galvanized steel strips and sheets (plain and corrugated) — Specification (<i>seventh revision</i>) |
| IS 287 : 1993 | Permissible moisture content for timber used for different purposes recommendations (<i>third revision</i>) |
| IS 303 : 2024 | Plywood for general purposes Specification (<i>fourth revision</i>) |
| IS 399 : 1963 | Classification of commercial timbers and their zonal distribution (<i>first revision</i>) |
| IS 401 : 2001 | Preservation of timber — Code of practice (<i>fourth revision</i>) |
| IS 513 (Part 1) : 2016 | Cold reduced carbon steel sheet and strip: Part 1 Cold forming and drawing purpose (<i>sixth revision</i>) |
| IS 624 : 2003 | Bicycles — Rims — Specification (<i>fourth revision</i>) |
| IS 630 : 2005 | Bicycle spokes (plain) and nipples for spokes — Specification (<i>third revision</i>) |
| IS 960 : 2005 | Bicycles rim tapes and buckles (<i>second revision</i>) |
| IS 1068 : 1993 | Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium - Specification (<i>third revision</i>) |
| IS 1259 : 2022 | Vinyl coated fabrics - Specification (<i>fourth revision</i>) |
| IS 1331 : 1971 | Cut sizes of timber (<i>second revision</i>) |
| IS 1573 : 1986 | Electroplated coatings of zinc on iron and steel (<i>second revision</i>) |
| IS 2039 : 1991 | Steel tubes for bicycle and cycle rickshaws — Specification (<i>second revision</i>) |
| IS 2403 : 2014 | Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets (<i>third revision</i>) |
| IS 2414 : 2005 | Cycle and rickshaw pneumatic tyres — Specification (<i>fourth revision</i>) |
| IS 2415 : 2015 | Cycle — Rubber tubes (Moulded/ jointed) — Specification (<i>fourth revision</i>) |
| IS 2898 (Part 1): 2019 | Rolling Bearings — Balls Part 1 Steel Balls (<i>second revision</i>) |
| ISO 3290-1: 2014 | |
| IS 4454 (Part 1): 2001 | Steel wires for mechanical springs: Part 1 Patented and cold drawn steel wires — Unalloyed (<i>third revision</i>) |

| | |
|----------------|---|
| IS 4923 : 2017 | Hollow steel sections for structural use — Specification (<i>third revision</i>) |
| IS 7298 : 2021 | Textiles - Cotton Webbing Proofed and Unproofed - Specification (<i>first revision</i>) |
| IS 8698 : 1984 | Expanded vinyl coated fabrics – Specification (<i>second revision</i>) |
| IS 16305: 2017 | Cycle – Glossary of terms used in the bicycle industry |

3 NOMENCLATURE

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

4 MATERIAL

4.1 Tubing

The tube used in the frame work of tricycle shall confirm to ERW (C1, C2 or C3) quality specified in IS 2039.

4.2 Standard Tricycle Components

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

4.3 Seat and Back Rest

4.3.1 Seat

Seat shall have plywood base of minimum 6 mm thickness conforming to IS 303 or shall have base of wooden planks of not less than 10 mm thickness and mounted on a wooden frame or shall have sheet metal base having minimum 1.0 mm thickness suitably formed. 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 conforming to IS 8698.

4.3.2 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 shall have plywood base of minimum 6 mm thickness conforming to IS 303 with wooden beading or shall have sheet metal support having 1.0 mm minimum thickness suitable formed.

Back rest 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 1259.

4.4 Footrest, Seat Walls and Tool Box

4.4.1 Foot Rest

Shall be made from mild steel sheet conforming to Class 3 of IS 277 having a minimum thickness 1.25 mm or mild steel chequered sheet of thickness 3 ± 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.

4.4.2 Seat Walls

Shall be made from mild steel sheet conforming to Class 3 of IS 277 having a thickness 1.25 mm or mild steel CRA sheet Grade CR0 IS 513 (Part 1) having thickness 1.0 mm.

4.4.3 Tool Box

Shall be made from mild steel sheet conforming to IS 227 having a thickness 0.5 mm or GI sheet of thickness 0.3 mm.

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

4.5 Spring Wire

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

4.6 All other metallic components shall be of mild steel.

4.7 Timber

Timber for seat frame and other parts shall be seasoned heart wood of any of species of timbers specified for furniture and cabinet making in IS 399. Heart wood 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.

4.8 Bearing Balls

The ball bearing shall conform to Grade G 200 of IS 2898 (Part 1).

5 SHAPE AND DIMENSIONS

The typical shape and dimensions of the single hand propelled tricycle shall be as shown in Fig. 1 and Table 1.

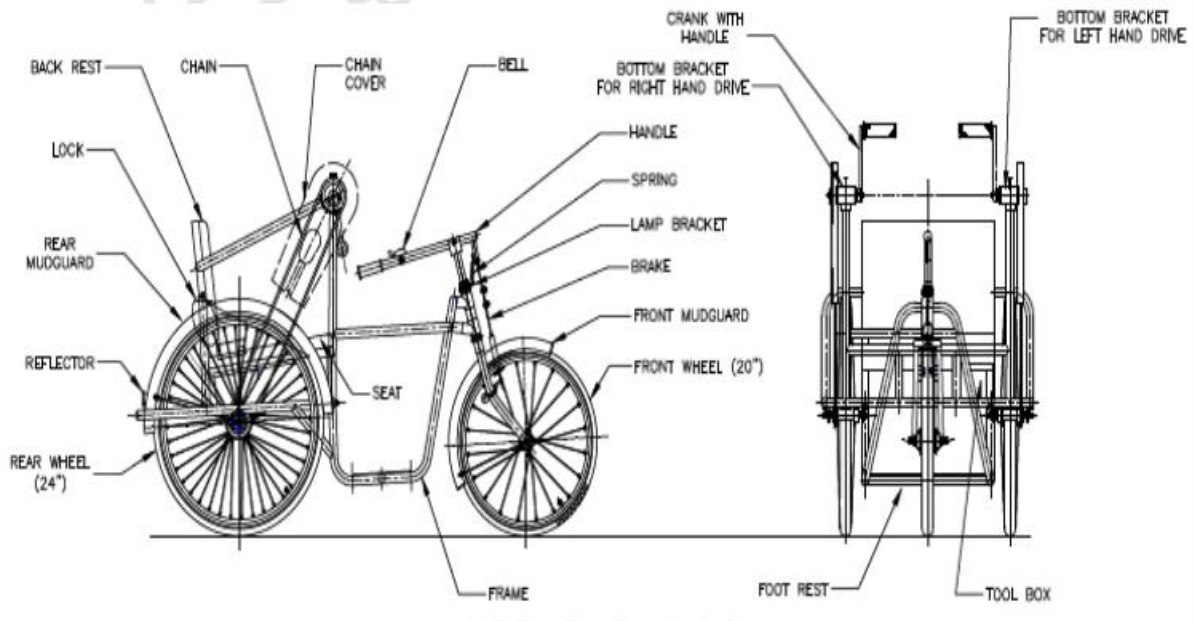


Fig. 1 Tricycle Single Hand Propelled (Right / Left) Junior Size — Typical

Table 1 Dimensions of Tricycle, Hand Propelled Junior Size
(Clause 4)

| Sl No. | Nomenclature | Size (in mm) |
|--------|---------------------------------------|--------------|
| (1) | (2) | (3) |
| i) | Overall length | 1690 ± 50 |
| ii) | Overall width | 750 ± 50 |
| iii) | Overall height | 990 ± 50 |
| iv) | Width of foot rest | 200 ± 10 |
| v) | Length of foot rest | 450 ± 50 |
| vi) | Clearance of foot rest from ground | 145 ± 25 |
| vii) | Seat length | 470 ± 50 |
| viii) | Seat width | 450 ± 25 |
| ix) | Back height from seat | 365 ± 25 |
| x) | Length of steering handle | 360 ± 15 |
| xi) | Height of rear wheel supporting frame | 300 ± 25 |
| xii) | Leverage of steering handle | 5 : 1 |

6 REQUIREMENTS

6.1 Frame

The tube used in the frame work shall conform to ERW quality specified in IS 2039 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 of lever type, 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. It shall be pivoted at 5:1 length towards the other end which shall have a toggle joint for connecting with the front brakes.

6.3 Tyres and Tubes

Tyres and tubes used shall be 20" × 1 3/8" size for front wheel and 24" × 1 1/2" size for rear wheels heavy duty type conforming to IS 2414 while tubes shall conform to IS 2415.

6.4 Wheel Rims

Wheel rims for the tricycle shall be type beaded edges 'BE', size 20" × 1 3/8" front wheel and 24" × 1 1/2" 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 shall be of 2.0 mm nominal diameter and shall conform to IS 630.

There shall be 20 holes in the front wheel and 40 spokes in each of the rear wheels. When assembled, the spokes shall be cross without touching each other. A suitable bicycle rim tape conforming to IS 7298 or IS 960 shall be wrapped around the rim, over riveting of spokes, to protect the tube being damaged by heads of spokes.

6.5 Mudguards

They 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 4.0 mm diameter wire. It shall extend 150 mm beyond the forks whereas the rear mudguard shall extend 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.

6.6 Brakes

Usual brakes shall be provided to the front wheel of the tricycle which shall be capable of applying by pressing the steering handle bar downwards. However, if required by the purchaser, brakes may be provided to each of the rear wheel too, with suitable means of applying brakes to both the wheels simultaneously. Brakes shall be effective and light to operate.

6.7 Sprocket and Free Wheel

The tricycle shall be provided with one set of sprocket and free wheel. The sprocket shall be of 22 teeth and free wheel shall be of 18 teeth. The sprocket-welded integral with a hub shall be mounted along with a crank of 175 mm length (centre to centre) on an axle which shall rest in the bottom bracket on two ball cup bearings. The height of the bottom bracket shall be so kept that while cranking, maximum height of elbow does not go above the level of the shoulder.

6.8 Front Wheel Hub

Front wheel hub assembly shall be standard unit, with each end of the hub provided with cup and cone type ball bearings. Bearings and races shall be hardened and polished. Provision shall be made for adjustment of the front wheel bearing assembly and positive locking after adjustment.

6.9 Rear Wheel Hub

Rear wheel hub assembly shall be standard unit and shall be mounted on the axle by means of cup and cone type ball bearings provided at each end of the hub. Bearings shall be hardened and ground. Provision for adjustment of the bearing shall be integral to the assembly and positive locking after adjustment shall be made.

6.10 Drive Chain

Drive Chain shall conform to Designation 081 of IS 2403.

6.11 Tool Box

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

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) Red reflector on each mudguard at the rear
- c) Set of tools (optional)
- d) Rear view mirror (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 atleast the following

- a) Adjustment of braking system
- b) Alignment of wheels
- c) Inflation of tyres and complete lubrication of operating mechanisms

- d) Handicapped sign to be prominently displayed at the front and the back.

7 FINISH

7.1 The frame of the tricycle 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 enameled, spray painted 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 in accordance with Service Condition No.3 of IS 1068 or shall be plated zinc in accordance with Grade 1 of IS 1573 specification for electroplated coatings zinc on iron and steel.

8 TESTS

8.1 Road Test Each tricycle shall be road tested by riding to a minimum distance of 1.5 km at speed of 8 to 10 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 Maneuverability

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 35 kg weight at steering handle end, 35 kg at each of the crank handles, 75 kg at the foot rest and 100 kg at the seat. The tricycle shall be subjected to this 245 kg load for not less than 15 min
- b) There shall be no damage after the test.

8.4 Brake Test

The tricycle selected shall be tested for stopping ability while 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. The test shall be accomplished with a rider of 55 ± 5 kg weight.

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
- 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 thereunder, 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.