Standardisation and Certification of Wheel Chairs

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0. What Standardization means

It is an activity of formulating Indian Standards aimed at solving recurring problems by pooling the knowledge and experience of the experts concerned in the field.

1. What is a standard

Any item has a fitness for use. The consumer has some requirements to make that item fit for use, the manufacturer translates those requirements and fabricates that item fit for the purpose, such requirements are termed as characteristics or specifications. The acceptability of these specifications by the majority of all concerned becomes a standard specification.

2. How wheel chair was selected for standardization

The Advisory Committee for the Development of Surgical Instruments, Equipment and Appliances, of the Government of India, proposed amongst other items, the item of wheel chair to be taken up for the formulation of National Standard.

3. Procedure for formulation of a standard

The Sectional Committee consists of experts representing manufacturers, consumers and technical interests. When an item is taken up on the programme of work, the concerned Technical Committee entrusts the job of drafting the standard to an expert member of the Committee. The draft is considered by the Committee and after suitable modifications, it is issued in wide circulation for eliciting comments throughout the country and some cases abroad also. The Committee then finalizes the document for publication after modifying the document in the light of comments received as a result of wide circulation.

4. Quality characteristics

The following are the Indian Standards for wheel chairs:

IS : 6571-1972 Non-folding wheel chairs, institutional model;

IS : 7454-1974 Wheel chairs, folding with removable armrests and swinging footrest;

IS : 8086-1976 Wheel chairs, folding type, junior size.

The above standards contain the following quality characteristics:

(a) Material
(b) Constructional Requirements
(c) Shape and Dimensions
(d) Corrosion Resistance
(e) Workmanship and Finish
(f) Tests
(g) Marking and Packaging

Material—The material for wheel chairs include tubing (IS : 2039-1964 Specification for steel tubes for bicycle and allied purposes), aluminium or mild steel sheets for clothing guards, canes (natural or synthetic) or foam rubber or rubberised coir for the seat and back, cast aluminium for footrests, castors (IS : 4034 Castors for hospital equipment), rims (IS: 624 Bicycle rims), spokes and nipples (IS: 630 spokes (plain) and nipples for spokes), tyres (IS: 2415 cycle tyres) and tubes (IS: 2415-1969 Specification for Cycle Rubber Tubes). The use of other materials have also been permitted which may be better to performance than those specified above.

Constructional Requirements—The back of the wheel chair should be secured to the vertical side members with four galvanized steel screws and should be removable. The seat should be secured on each side with not less than four galvanized steel screws. The back shall start 50 mm above seat top. The frame of the wheel chair should be made up from steel tubing and it should be of welded construction. The welding should be sound and the joints should be fully dressed and smooth finished. There should be no sharp edges or unsealed formations which might harbour dirt or other foreign matter. The various members by themselves shall each be of single piece without any joints. The rear vertical members should be bent and sealed at the top to accommodate plastic handgrips for pushing the chair by an attendant. The ends of the bottom rails at the rear of wheel chairs should be equipped with soft-rubber bumpers. The wheel chairs should be provided with two cast aluminium footrests with corrugated surfaces. The footrest should be capable of swinging about its own axis so that when a disabled person enters or leaves the chair the footrest shall clear the way and not obstruct. In this raised position the footrest should be at an angle of 120° to its normal horizontal position. Suitable guards should be fixed to the supports to prevent the legs of the disabled person from moving backwards on to the wheels. Armrests shall be fitted to each side of the wheel chair and shall be of such a height and shape as to provide adequate security and prevent the disabled person from falling mid sideway out of the chair. The resting surface for arms should be of timber with adequate foam-rubber padding. Hand Rims should be fabricated from tubing. The ends should be joined by welding. The rim should be attached to the wheel by not less than four spring steel brackets secured by suitable screws. Sufficient finger room should be provided for easy manipulation of the wheel chair. The exterior surface of the rim should be free from defects, such as projecting screw heads and roughness. The wheel chair should be provided with one hand brake on each wheel individually hand-operated by levers. Brake should be lock type to prevent wheel from rolling when a disabled person is entering or leaving the chair or when the chair, including person is standing on an incline of 15° from the horizontal. The handle of the brake should extend up to seat level. The brakes should be capable of easy and comfortable operation and should not be stiff. The wheels should be fixed to the frame in such a manner that the fitting should be rugged enough to withstand the shocks during normal use. Each wheel shall be mounted on two bearings of adjustable cup and cone type. Two self-contained bearings on each axis should also be acceptable as an alternative bearing assembly. The wheels should be removable from the chair without disturbing the bearing assembly. Clothing guards should be securely attached to front and rear vertical members of the chair. The clothing guards should have double hemmed edges for mild steel guards and single hemmed edges for aluminium guards to eliminate possibility of sharp projections which might catch and tear clothing. Suitable provision should be made to lubricate the various moving parts of the wheel chair. Wheel chairs should have two swivelling spoke wheel castors, 200 mm diameter. It should have not less than 16 spokes and shall have a minimum load rating of 25 kg. The hub of the castor should have a self-contained ball bearing. The castor should be provided with a non-making, snap-on-solid rubber tyre with a 25 mm tread width. Alternatively two swivelling castors conforming to Identification No. HN 125 of IS: 4034-1968. Specification for castors for hospital equipment should be provided if specifically desired by the purchaser.

Shape and Dimensions—The shape of the wheel chairs is given in the above Indian Stan-

dards. However the overall dimensions for non-folding wheel chairs, Institutional Model are given below:

Dimensions	*Size. mm*
Overall length	1050
Overall width	680
Overall height	910
Seat height from floor at the front	500
Seat height from floor at the back	450
Arm height from seat	225
Seat length	430
Seat width between armrest pipes	430
Back height	380
Back width at seat level	430
Back width at the top	430
Clearance of footrest to floor	90 to 200
Back clearance of frame to floor	100 mm ± 10
Mean rim diameter	500

Corrosion Resistance—The steel is susceptible to corrosion. The corrosion is protected by putting a layer of paint or varnish or coating it with the metallic finishes like nickel, chromium, cadmium, etc.

Workmanship and Finish—Materials and finishes should be non-toxic. All surfaces of the wheel chair should be capable of disinfection and cleaning by the normal hospital methods for this type of equipment. All exposed metallic parts should be finished by painting or plating. When painted the colour of the paint and the number of coats should be subject to agreement between the purchaser and the supplier. Prior to painting, all parts should be degreased, rust-proofed and then suitably protected by an anti-corrosive primer, either by brushing or by spraying and then finished by spraying stoving enamel or air-drying enamel of the specified shade. In every instance each coat should be separately stoved or air-dried as the case may be. The resulting finish should be hard and should not readily chip or flake. When plated, the plating on the mild steel components should conform to Service Grade No. 2 of IS:1068-1968 'Specification for electroplated coatings of nickel and chromium on iron and steels'. The plating on brass components should conform to Service Grade No. 2 of IS:4827-1968 'Specification for electroplated coatings of nickel and chromium on copper and copper alloys'. The anodising of aluminium components should conform to Grade B or Grade D of IS:1868-1968 'Specification for anodic coatings on aluminium'. Welding should fully penetrate and should be sound in every detail. It should be finished flush on the finished stage; there should be no exposed sharp edges in the frame-work or other unsealed formations which might harbour dust. All exterior surfaces should be free from defects and protrusions to avoid hurting the disabled person or tearing his clothing.

Tests—The wheel chair should be subjected to a load of 75 kg. The wheel chair should be wheeled around on an even floor. The chair should move smoothly without any wobbling, rocking or rattling.

Hazard Running Test—The effect of this test is to subject the framework of the wheel chair to simulated conditions similar to the worst conditions ever likely to be met in use. A uniformly distributed test load of 100 kg shall be applied on the frame members which normally carry the seat. Under this load the wheel chair should negotiate, at least once in every metre of travel at 1.6 km/h, a hazard having a vertical drop of 10 mm. This test which should be of three hours uninterrupted duration, should not result in any deleterious effect on the chair, such as failure of joints or welds, breaking or flaking of enamel, wobbling and rattling. Measurements of the height above floor level of the top of the seat support members, and the width between the arms taken above the centre of the seat, shall be recorded both before and after the test. No change in dimensions should be permitted. The change in height dimensions of the seat support members should be adjusted to account for tyre

wear resulting from the test, which wear shall be computed from actual measurements of the wheel diameters taken before and after the test. For the purpose of the above test the chair may be mobile and be mechanically pushed at points on the handle roughly corresponding to the position at which an attendant's hands would be placed when wheeling the chair. Alternatively, the chair may be anchored to a stationary pillar at these points on the handle, and the wheels made to contact an oscillating platform (running on rails) or a rotating drum to which the hazards are fixed.

Marking and Packaging—Wheel chairs should be suitably marked with the manufacturers name, initials or recognized trade-mark and other available information as may be specified in the standard. The packaging is normally left to the agreement between the purchaser and the supplier.

5. ISI Certification Markings

To safeguard the interest of the consumer, ISI is operating a Certification Marking Scheme which gives a third party guarantee to the consumer that the instruments or appliances if carry ISI Marks are in accordance with the requirements of Indian Standards Specifications. ISI Mark is granted on the basis of the testing facilities available in the premises of the manufacturer, qualified personnel to test the product as per the requirements, the product satisfying the requirement of the Indian Standard Specification and their agreeing to implement the scheme of testing and inspection in their processes. There is a continuous supervision of the Indian Standards Institution for maintaining the quality of the product. In case of a complaint from the consumer, the investigation is carried out by ISI and if found substandard, the goods are replaced by the licensee besides some punitive measures taken against them.

ISI Certification Mark has been granted in case of the following two Indian Standards:

IS: 6571-1972 Non-folding wheel chairs, institution model;

IS: 7454-1974 Wheel Chairs, folding with removable armrests and swinging footrests.

6. Conclusion

The formulation of Indian Standards is a continuous process. Standards once formulated can be revised on the basis of comments received from all interests and also on the basis of the feed-back given to the Committee by the laboratories etc. As a result of this process, amendments to standards on wheel chairs have been issued. Ad hoc Panel for Wheel Chairs, is presently engaged in the revision of these standards in order to include the latest technological development in the field. It is hoped that with the implementation of the Indian Standards for wheel chairs, the consumer will be benefited against the use of substandard products.