

# information



## CTC STANDARD FOR THE SAFETY OF HIRED AND USED CYCLES

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### 1 Introduction

The subject order of this document is generally similar to the structure of BS6102/1 and ISO4210 (which is very similar to the BS), but differ from and are generally less onerous than the requirements of these standards - which apply only to new solo bicycles. It is presumed that these standards contain an allowance for wear and tear, so it would be unreasonable to expect a used cycle to behave identically. For example: BS/ISO allows 2mm of runout in the rotational truth of wheels, which is extended to 3mm to allow for the tendency of wheels to develop minor buckles. Such buckles cannot always be entirely removed by truing and do not constitute a serious hazard.

Other differences arise from the differences between the assessment of bicycles before sale (not necessarily fully assembled) and cycles that are presented to the customer in a ready to use condition, i.e. for hire. For example: whereas BS and ISO standards set requirements for the position of a height limit mark on a handlebar stem, these guidelines assume that there is such a mark and require that it is not exposed. This document must also cater for privately imported cycles and those that pre-date the implementation of the Pedal Cycles Safety Regulations (which call up BS6102/1), so a minimum insertion is specified for when there is no such mark.

Where possible I have endeavoured to provide a measurement of what may be considered acceptable. In many cases it has not been possible to find a measurement, so this document remains more qualitative than one would ideally wish for. This is necessary in order that a cycle may be checked against these Guidelines using simple methods and tools. Inevitably, there will be situations where it remains open to interpretation as to whether, for example, a handlebar is loose in its stem. It should be noted that some of the most vital points of safety are those upon which it is most difficult to put a figure. The existence of a measurement should *not* confer more importance upon one aspect of a cycle relative to another.

Many of the characteristics of a cycle are largely to do with the quality of ride provided to the customer and would have to be grossly in error before constituting a significant risk of accident or injury. I have assumed nevertheless, that it is good practice to provide cycles that meet reasonable standards of quality as well as safety. But more importantly, a fault that is not in itself a matter of safety may often indicate a more serious underlying problem. For example: it is easy to get used to a bicycle frame that is moderately out of track (front and rear wheels follow separate paths, parallel but a few cm apart) and many people are content



to ride bicycles in this condition. But this fault generally indicates that the bicycle has been abused in some way so as to bend and possibly weaken the frame. All of the points to be checked indicate the general condition of the cycle. A cycle that has been maintained or repaired to a good condition of quality is also more likely to be safe.

## 2 Scope

The following document provides guidelines for checking the safety and quality of cycles offered for hire. It is primarily required for reference by the Code of Practice for Cycle Hire, but also provides a suitable standard of safety for the sale of used cycles.

Solo bicycles fall entirely within the scope of this Standard, but most of its provisions also apply to tandems and tricycles and this is indicated by the use of the term general term: 'cycle'. Where tricycles are excluded this is indicated by the specific term: 'bicycle'. The terms cycle and bicycle include tandems except where it is specified that something applies to solo (bi)cycles only. Some requirements are also made with regard to commonly fitted accessories, e.g. child seats.

It is not intended that mechanics should check every cycle point by point against this document, but rather that they should learn to recognise the level of quality and performance required by it. It should be necessary to make a closer inspection only when some aspect of a used cycle appears borderline.

This document is not necessarily complete. If something is found that is not covered by these Guidelines but is clearly a fault, the cycle should not be hired or sold.

## 3 General

### 3.1 Sharp edges

There shall be no sharp edges that may come into contact with a user during normal use or handling of the cycle.

Ends of brake and gear cables shall be covered with protective caps or otherwise treated to prevent unravelling.

Handlebar ends shall be covered either by the grips or separate protective plugs.

### 3.2 Frame and fork

There shall be no apparent damage or distortion of the frame or fork. Particular points to be checked include:

- a) The undersides of the top and down tubes near to the head tube, where any ripples in the tube wall indicate that the frame may have been damaged in a frontal collision.
- b) The alignment of the fork and head tube, where any apparent misalignment (in cycles where the fork is not intended to be at a different angle as a specific design feature) indicates damage as above. In cases where the original front centre distance (between front wheel and bottom bracket centres) is known, this dimension shall be correct to within  $\pm 1$ cm.
- c) Straightness of frame tubes (those designed to be straight), especially seat tubes of ladies frames and all seatstays. Any deviation from straightness shall not exceed  $5^\circ$ .
- d) All surfaces of the frame and fork to be inspected for cracks and signs of tubes parting from one another or emerging from lugs.

### 3.3 Tracking

A bicycle shall not be out of track by more than 4% of its wheelbase.

**Note** Should the front wheel be displaced to the right, a tracking error of this magnitude (some 4cm for a typical adult bicycle) may easily be measured by holding a horizontal straightedge against the left side of the rear wheel - a few cm above the ground so that

it contacts the rear tyre in two places. Alternatively, if the straightedge cannot be made to touch the left side of the rear tyre in two places (indicating a left-displaced front wheel): offer the straightedge to the right side instead.

Then turn the front wheel to this side until the front of this tyre also touches the straightedge.

Measure the gap between the straightedge and the other, rearward point of closest approach of the front tyre. The tracking error is then half of this gap.

A convenient double-sided straightedge is made by a loop of elastic around the bottom parts of the two wheels. Turn the front wheel whichever way until the three-point contact described above is just made.

### **3.4 Cables and wiring**

All brake and gear cable casings and any electrical wiring shall be securely fastened to the frame at intervals not exceeding 300mm. Except for the section of a brake or gear cable casing between handlebar and first point of attachment, which may be up to 600mm long.

There shall not be more than one broken strand in any brake or gear cable, for example at a pinch bolt.

## **4 Brakes**

### **4.1 Strength and security**

All parts of braking systems shall be securely attached to the cycle frame, fork or handlebar.

There shall be no failure in any part of either braking system when the appropriate brake lever is squeezed hard. The brake cable in particular shall be securely anchored at the brake, so that it does not pull through.

### **4.2 Brake blocks**

Brake blocks shall be securely attached to the brakes, in a position such that the brake pad touches nothing other than the intended braking surface when the brake is operated.

Each brake block shall have at least a 2mm thickness of pad surface remaining.

### **4.3 Binding**

The brakes shall not bind (both wheels shall rotate freely without catching on the brake blocks) when the steering is turned to any angle up to 30° either side of straight-ahead. Lift the wheel clear of the ground and spin it by hand to check.

The wheel shall continue to rotate, but slight binding is permitted, when the steering is turned to any angle up to 60° either side of straight ahead.

In the event of a brake cable failing, it shall not be possible for any part of the brake mechanism to inhibit rotation of the wheel.

**Note:** when cantilever brakes are fitted, they may require something (generally a reflector bracket) to keep the straddle cable off the tyre. It should also be ensured that the brake arms cannot spring back into the spokes in the event of a straddle failure.

### **4.4 Operation and adjustment**

The brake levers shall not require excessive force in order to operate the brakes and full braking performance shall be achieved before the brake lever reaches the end of its range of movement (i.e. touches the handlebar).

## 4.5 Performance

### 4.5.1 Both brakes

On adult-sized cycles the brakes (using both brakes or mainly the front brake) shall be capable of bringing the cycle and rider to a smooth safe stop in dry conditions from a velocity of 24kmph (15mph) within a distance of 5.5m. In wet conditions, the speed and stopping distance requirements shall be 16kmph (10mph) and 7.5m.

### 4.5.2 Rear brake only

The equivalent requirements using only the rear brake, from the same respective speeds, shall be 14m dry and 19m wet.

**Note** Tricycles are permitted to have both brakes operating upon the front wheel (or wheels), in which case this clause does not apply.

### 4.5.3 Low speed testing

If for any reason a speed of 24kmph cannot be safely attained by the tester, the dry condition tests may be performed at 16kmph, with a maximum stopping distance of 2.5m using both brakes and 6.3m with rear brake only.

**Brake Test Table** – a summary of the above requirements

<b>Conditions:</b>	<b>Dry</b>	<b>Dry – low speed</b>	<b>Wet</b>
<b>Speed:</b> – km/h (mph)	24 (15)	16 (10)	16 (10)
<b>Brakes used</b>	<b>Maximum Stopping Distance</b> – m		
Both	5.5	2.5	7.5
Rear only	14.0	6.3	19.0

**Note** This is one point upon which requirements are undiminished from the latest version of BS6102/1. Brake performance is so important that no reduction in safety can be permitted. Nevertheless, it is usually possible to achieve these levels even on heavily used cycles at small cost by cleaning and lubrication, or by the renewal of blocks and cables.

The rear brake only requirements are adapted from ISO4210.

## 5 Steering

### 5.1 Free movement

The steering shall be free to turn through at least 60° either side of straight-ahead. Slight stiffness shall be accepted, provided that the steering is free enough for the weight of the front fork and wheel etc. to turn it when the cycle is leaned at up to 45° to one side or the other (wheels not touching the ground).

As the steering is turned and as the cycle is pedalled it shall not be possible for the toe of a rider's shoe, when 110mm in front of the centre of either pedal, to touch the front wheel or mudguard.

### 5.2 Bearing shake

Any slackness in the headset bearings shall not permit a range of movement greater than 5mm at the front hub, measured as a variation in front centre distance.

The headset adjustment shall be securely locked.

### **5.3 Handlebar and stem security**

The handlebar shall be securely clamped to resist rotation in the stem. And the stem shall likewise be secured in the fork.

### **5.4 Stem insertion**

The stem height limit mark shall be inside the fork, or at least partly inside if it is a wide mark. If there is no such mark, the stem shall be inserted to a depth of at least two and a half times its diameter.

The customer shall be warned against exceeding this height limit, except when further extension is prevented by a mechanical stop.

### **5.5 Handlebar alignment**

The handlebars shall not be bent, i.e. the shape shall be symmetrical and according to the original specification, and shall be aligned parallel to the front wheel axle, to within  $\pm 5^\circ$ .

## **6 Wheels**

### **6.1 Security**

Each wheel shall be assembled with its axle fully engaged with the frame or fork and with clearances of at least 3mm on each side of the tyre. And these clearances shall not differ by more than 3mm.

Wheel nuts or other securing devices shall be tight.

The front wheel shall be equipped with devices that retain this wheel in the fork when the axle nuts (or other primary securing devices) are loosened.

### **6.2 Rotational truth**

If the wheel is used with rim brakes, its runout (total range of apparent movement when rotated) shall not exceed 3mm either laterally or radially.

If the wheel is not used with rim brakes, its runout shall not exceed 5mm either laterally or radially.

### **6.3 Bearing shake**

Any slight looseness in the bearings shall not permit a range of lateral movement greater than 1mm at the rim.

### **6.4 Rim wear**

The material of the sides of rims that are acted upon by rim brakes shall not be worn by the brake blocks to less than half of its original thickness.

Additionally, alloy rims shall not be so worn that they fail or distort when the tyres that are fitted to them are inflated to a pressure 30% greater than the maximum marked upon them. Deflate to normal operating pressure within one minute.

**Note** If in doubt it is preferable to discard the rims rather than perform this 'proof test'. Nevertheless, if the rim survives without apparent damage it is safe to ride.

### **6.5 Spokes**

There shall be no broken or missing spokes.

All wheel spokes shall be tight enough to remain in tension when a person of appropriate weight for the design of cycle (70kg in the case of adult cycles) sits on the cycle.

## 6.6 Tyres

### 6.6.1 Tyre condition

Tyre treads shall not be so worn as to obliterate any significant part of the tread (other than decorative surface patterns). Minor tread cuts and superficial sidewall abrasions etc. shall be permitted, provided that casing cords are not cut through.

### 6.6.2 Tyre pressure: (solo bicycles only)

Tyres shall be inflated to a pressure not exceeding the maximum marked on them and not less than the minimum appropriate to the tyre section and rider weight, given by the table below. In borderline cases, where the rider cannot be categorised with certainty by weight, the higher minimum pressure shall be applied.

#### Tyre Pressure Table

Approx. rider size:	Child	Youth & Small Adult	Large Adult
Rider weight:	under 35kg (5½ stone)	35 to 70kg	over 70kg (11 stone)
Tyre Section	Minimum inflation pressure – bar (psi)		
22 to 25mm	4.5 (65)	6.0 (87)	7.5 (109)
28 to 32mm	3.0 (44)	4.0 (58)	5.5 (80)
35 to 42mm	2.0 (29)	3.0 (44)	4.0 (58)
47 to 60mm	1.5 (22)	2.0 (29)	3.0 (44)

### 6.6.3 Tandem and Tricycle tyre pressures

Tyres shall be inflated as in 6.6.2, to a pressure not exceeding the maximum marked on them and not less than a minimum derived from the Table above. Tandem minimum tyre pressures shall be taken from the sum of riders' weight, and where this results in a total of more than 105kg, add one bar (14psi) to the figures in the last column. Tricycle minimum tyre pressures may be taken from the next lower weight category.

## 7 Transmission

### 7.1 Pedal/crank alignment

The pedal and crank to which it is attached shall not be so bent as to produce more than 6° run-out (total angular displacement from one extreme to the other) as the crank is rotated.

**Note** A misalignment of this magnitude should be visible; but may easily be shown and measured as the crank is rotated by placing a spirit level on the pedal, aligned with its spindle.

### 7.2 Bottom-bracket bearing shake

Any slight looseness in the bottom-bracket bearings shall not permit a range of lateral movement greater than 0.5mm, measured at the crank pedal hole centre.

### 7.3 Gears and chain

**Notes** Any of the following requirements that can be applied to a single chainwheel and sprocket shall be so applied. Inner means nearer to the centreline of the cycle.

#### 7.3.1 Sprockets & chainwheels

Variable gears shall shift smoothly and predictably.

The chain shall not de-rail beyond the innermost or outermost chainwheel or sprocket when pedalled forwards with any derailleur gear mechanism set at one or other shift limit. Neither shall the chain derail from any valid combination of chainring and sprocket when pedalled backwards.

Valid combinations include:

- a) all rear sprockets (including a single sprocket) with a single chainring, the inner ring of a double and the middle ring of a triple
- b) all except the innermost sprocket with the outer ring of a double
- c) all except the inner two sprockets with the outer ring of a triple
- d) all except the outer two sprockets with the inner ring of a triple

### **7.3.2 Chain**

If there is not a sprung chain tensioner (e.g. no rear derailleur mechanism), the chain shall not be so tight as to bind at any point as the crank is turned and yet shall be tight enough at the slackest point that the chain cannot be lifted clear of any tooth with which it should be fully engaged.

The chain shall be properly lubricated and not so worn as to show more than 1.5% elongation (0.15in measured over a 10 inch length - normally 20 links).

## **8 Saddle**

The saddle shall not be cracked or split, and shall be adjusted so that the top surface is within 10° of the horizontal.

The saddle shall be securely fixed on the seatpost and this shall also be secure, with its height limit mark inside the frame.

If there is no height limit mark, a length of seatpost shall be inserted that is at least two and a half times its diameter.

The customer shall be warned against exceeding this height limit, except when further extension is prevented by a mechanical stop.

## **9 Lighting**

No lamps or reflectors are required on cycles used exclusively in daylight. But if it can be anticipated that a cycle may be used on a public highway during the hours of darkness (between sunset and sunrise), it shall be equipped with the following:

- a) Red rear lamp.
- b) Red rear reflector.
- c) White front lamp.
- d) Colourless front reflector on cycles with dynamo lighting that goes off at standstill.
- e) Amber (yellow/orange) reflectors on the front and back of each pedal.

Any lamps and reflectors that are fitted, whether required or not, shall be clean, function correctly and be securely fixed so as to face squarely towards and be clearly visible from the appropriate directions.

**Note** Some of the reflectors required to be on new bicycles at the point of sale are required neither by Lighting Regulations nor this standard.

## **10 Accessories**

### **10.1 General**

All parts and accessories (for example mudguards, chainguards, a carrier, a propstand, a dynamo) shall be securely fixed to the cycle and shall fulfil their intended function.

## **10.2 Identity marking**

Hire cycles shall each be identified by a unique number or code marked on the cycle.

## **10.3 Bell**

If a bell is fitted it shall be in working order.

## **10.4 Mudguards**

Mudguards and mudguard stays shall be clear of the tyre by at least 5mm.

## **10.5 Child seat**

A child seat may be fitted only to the rear of a hire cycle. If such a seat is fitted, it shall be equipped with shoulder straps plus a waist and/or between the legs strap, or other restraints sufficient to retain a child in a sitting position in the seat. The cycle wheel shall be shielded or the childseat equipped with shields and leg restraints so that it is impossible to bring a child's foot/shoe into contact with the wheel.