SRI LANKA STANDARD 926 : PART 2 : 1991

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SPECIFICATION FOR

BICYCLES
PART 2 - TEST METHODS

SRI LANKA STANDARDS INSTITUTION

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PART 2 - TEST METHODS

SLS 926 : Part 2 : 1991

Gr.12

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Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR BICYCLES
PART 2 - TEST METHODS

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Sri Lanka Standards Institution on 91-10-29, after the draft,finalized by the Drafting Committee on Bicycles, had been approved by the Mechanical Engineering Divisional Committee.

This standard is presented in two parts; namely,

SLS 926 Part 1 : 1991 Safety and performance requirements
Part 2 : 1991 Test methods

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 an analysis shall be rounded off in accordance with SLS 102. The number of significant figures to be retained in the rounded off value shall be same as that of the specified value in this standard.

In the preparation of this standard, assistance obtained from publications of the International Organization for Standardization, the British Standards Institution and the Bureau of Indian Standards is gratefully acknowledged.

1 SCOPE

This part of the Sri Lanka Standard specifies the methods of test of bicycles and sub-assemblies.

2 REFERENCES

SLS 102 Presentation of numerical values
SLS 926 Bicycles
Part 1 Safety and performance requirements.

3 METHODS OF TEST

3.1 Brake block test

The test shall be conducted on a fully assembled bicycle with the brakes adjusted to a correct position, and with a rider weighing 70 kg, or an equivalent mass, on the saddle. Each brake lever shall be actuated with a force of 180 N, which is maintained during the test.

The bicycle shall then be subjected to five forward and five rearward movements, each of not less than 75 mm distance.

3.2 Brake system load test

3.2.1 *Hand-operated brake*

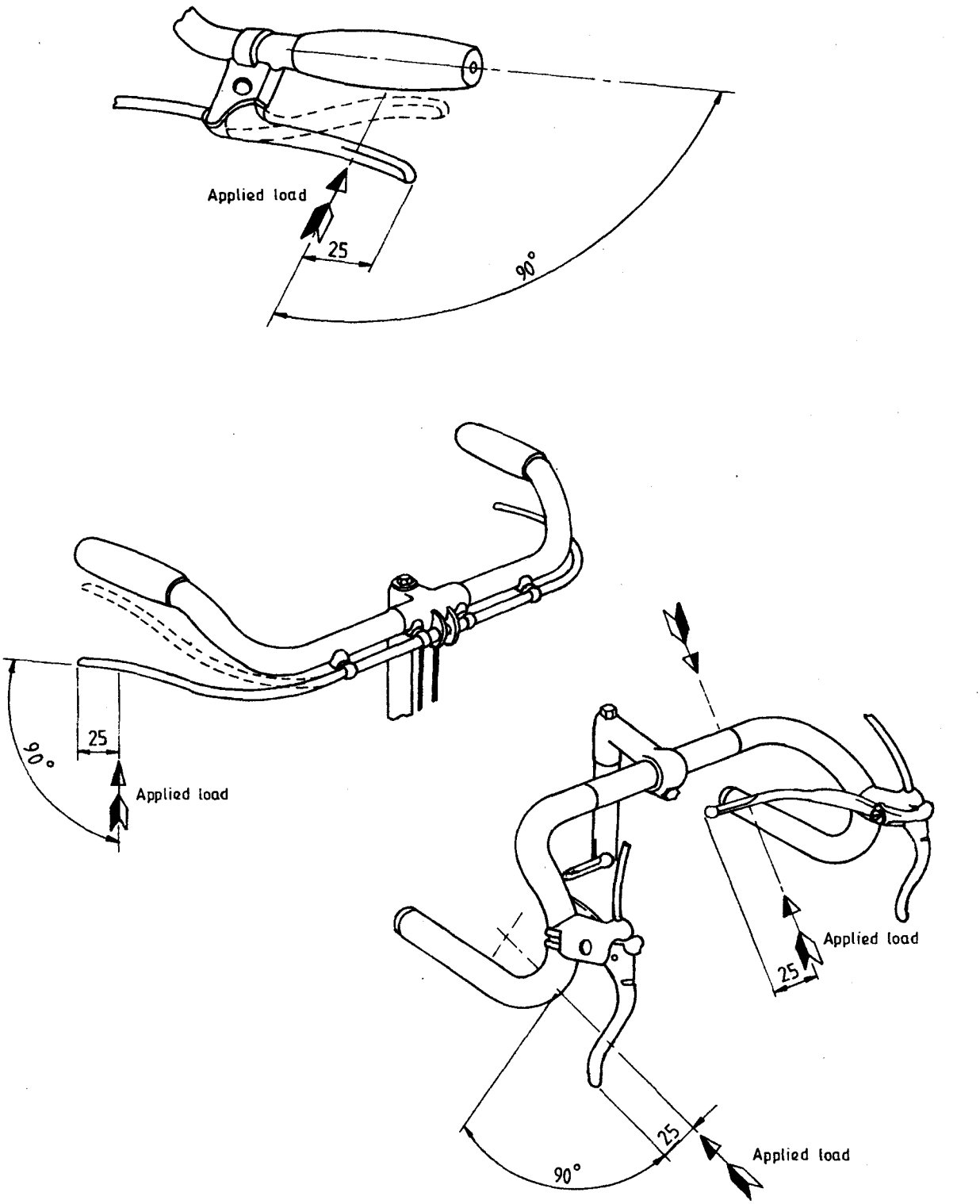
The test shall be conducted on a fully assembled bicycle. After it has been ensured that the braking system is correctly adjusted, a force shall be applied to the brake lever at a point 25 mm from the end of the lever and in a direction normal to the handlebar grip in the plane of travel of the lever, as shown in Figure 1. This force shall be 450 N, or such lesser force as is required to bring

a) a cable-brake lever into contact with the handlebar grip, or with the handlebar in the absence of a grip;

b) a cable-brake extension lever level with the upper surface of the handlebars or in contact with the handlebars;

c) a rod-operated brake lever level with the upper surface of the handlebar grip.

This test shall be repeated for a total of ten times on each handbrake lever.



Dimensions in millimetres

FIGURE 1 - Applied loads on handbrake levers

3.3 Braking performance test

Unless otherwise stated, these requirements apply to both dry and wet test conditions.

3.3.1 *Test bicycle*

This test shall be conducted on a fully assembled bicycle after the brakes have been subjected to the load test detailed in 3.2. The brakes may be re-adjusted to a correct position if necessary and the tyres shall be inflated to the recommended pressure, as marked on the tyre.

3.3.2 *Test track*

3.3.2.1 An indoor test track shall be used if possible. Where an outdoor track is used, special attention should be paid to ambient conditions throughout the tests.

3.3.2.2 The gradient of the track shall not exceed 0.5 per cent.

a) If the gradient is less than 0.2 per cent, all runs shall be carried out in the same direction.

b) If the gradient lies between 0.2 per cent and 0.5 per cent, alternate runs shall be carried out in opposite directions, when testing under wet conditions.

3.3.2.3 The surface shall be hard, of concrete or fine asphalt, free from loose dirt or gravel. The minimum coefficient of friction between the dry surface and the bicycle tyre shall be 0.5.

3.3.2.4 The test track shall incorporate a timing device to provide an accurate measurement of speed at the commencement of braking. The inaccuracy of the timing system shall not exceed 2 per cent.

3.3.2.5 The track shall be essentially dry at the commencement of tests. When testing to the requirements of 4.2.4.1, of SLS 926 : Part 1 : 1991, the track shall remain dry throughout the tests.

3.3.2.6 The wind speed on the track shall not exceed 3 m/s during the tests.

3.3.3 *Instrumentation*

The test bicycle shall be instrumented to include the following:

3.3.3.1 Calibrated speedometer or tachometer, accurate to within 5 per cent to indicate the approximate speed at commencement of the test

3.3.3.2 Marker system, to provide the means for determining the commencement of the braking distance. A separate marker system shall be provided for each braking system, and shall be activated by the handbrake lever. Each system shall operate to provide a mark on the test surface within 0.025 s from the commencement of movement of the lever or crank in the braking operation. Both marker systems shall be positioned on the same transverse plane of the bicycle.

3.3.3.3 Stops, fitted to the handlebar to limit the handgrip force on the brake lever. This also applies to brake extension levers. (see 3.3.5).

3.3.3.4 Water spray system, to provide wetting of the braking surfaces, consisting of a water reservoir connected by tubing to a pair of nozzles on the front wheel and a pair of nozzles on the rear wheel. A quick-acting on/off valve shall be included for control by the rider. Each nozzle shall provide a flow of water of not less than 4 ml/s. Distilled water at ambient temperature shall be used.

Details of the positions and directions of nozzles for caliper, internal expander, band and disc are given in Figures 2 to 6 .

3.3.4 *Rider mass*

The combined mass of the rider and instrumentation on the bicycle shall be between 70 kg and 85 kg. Where two separate braking systems are provided, a greater braking distance shall be allowed for masses over 70 kg at the rate of 0.011 x (specified braking distance in metres per kilogram).

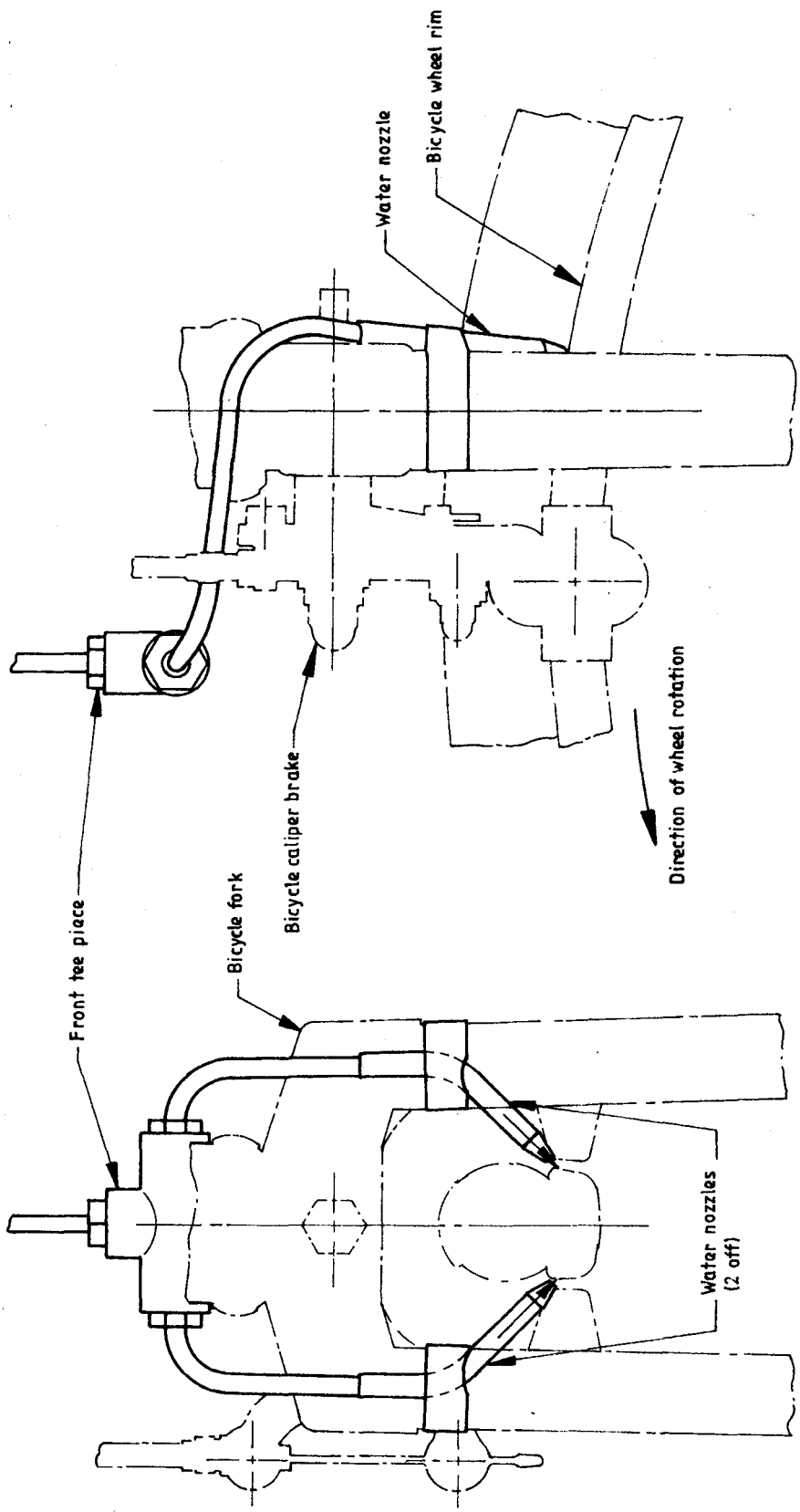


FIGURE 2 - Water nozzles for caliper brake (front)

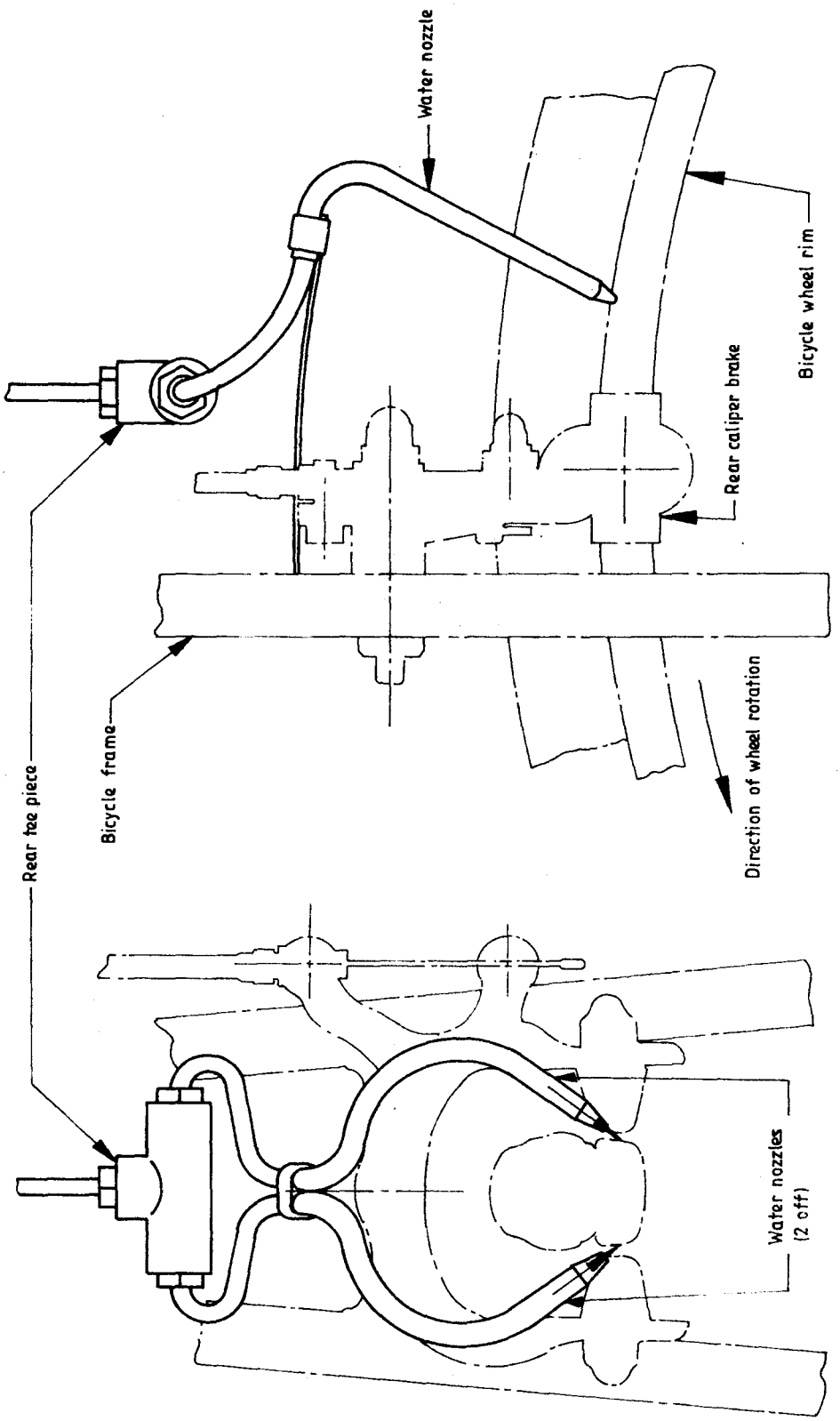


FIGURE 3 - Water nozzles for caliper brake (rear)

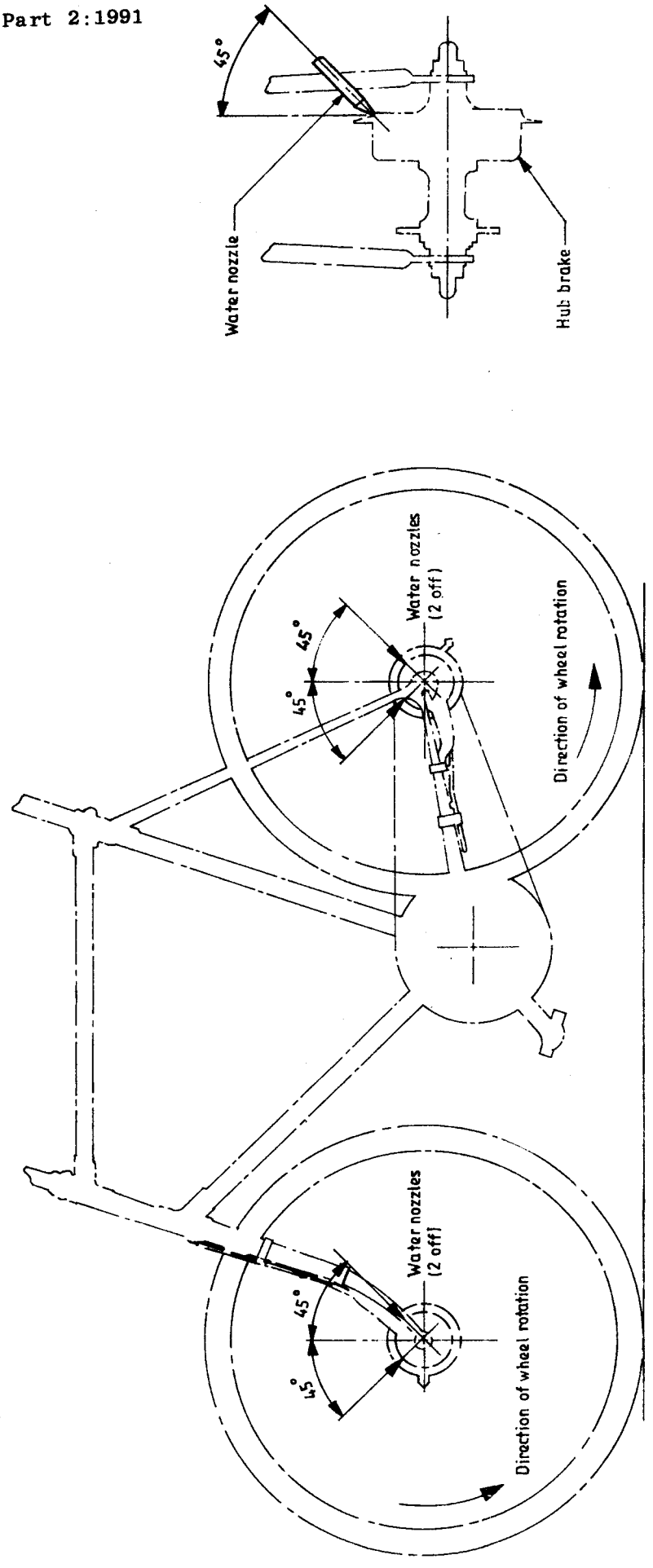


FIGURE 4 - Water nozzles for internal expanding brake (front and rear)

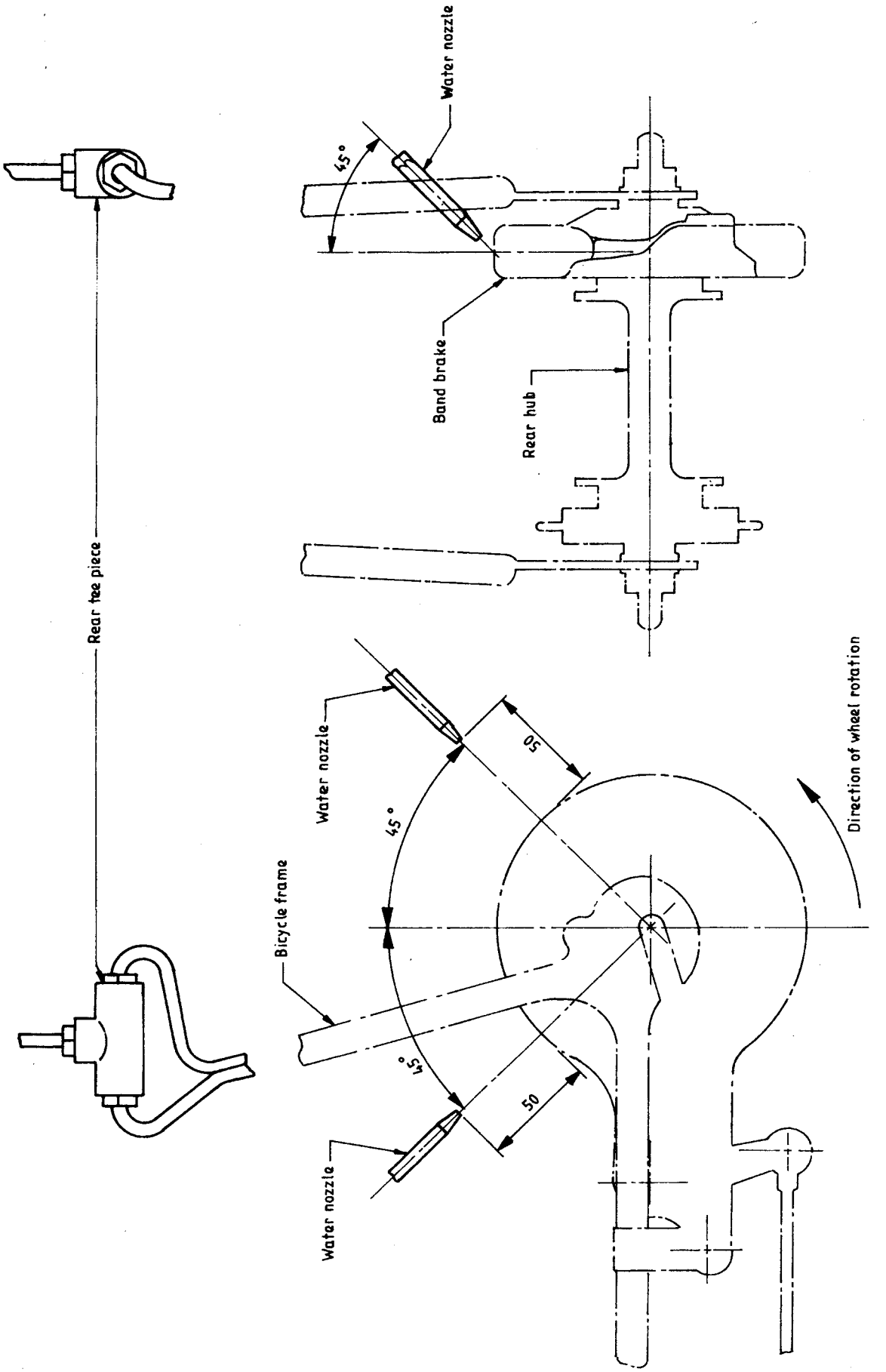


FIGURE 5 - Water nozzles for band brake

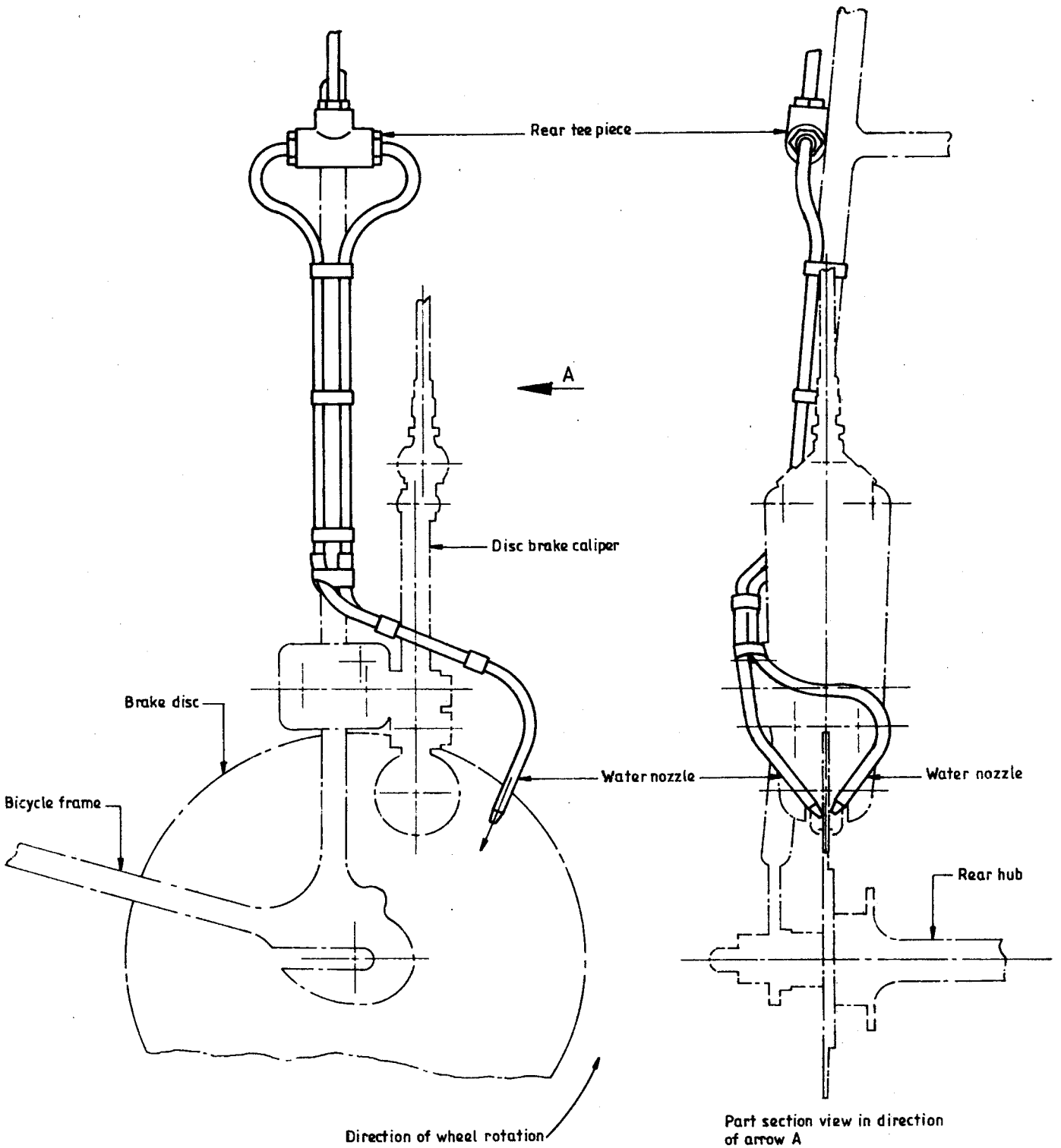


FIGURE 6 - Water nozzles for disc brake (rear)

3.3.5 *Force applied to brakes*

Bicycles with hand-operated brakes shall be tested using a handgrip force not exceeding 180 N. The handgrip force shall be applied at a point 25 mm from the end of the lever as shown in Figure 1. A check shall be carried out before and after each series of test runs to verify the lever load.

3.3.6 *Method*

3.3.6.1 Test runs under dry conditions

The rider shall attain the specified test speed. He shall stop pedalling immediately before passing the timing device, and apply the brake(s) immediately after passing the timing device. The bicycle shall be brought to a smooth, safe stop. The braking distance shall be measured from the first mark to the centre of the marking device.

3.3.6.2 Test runs under wet conditions

The method shall be as given in 3.3.6.1 with the addition that the wetting of the braking system(s) shall commence not less than 25 m prior to application of the brake(s) and terminate not more than 15 m prior to application of brake(s).

3.3.6.3 Number of valid test runs

If the gradient of the track is less than 0.2 per cent, the following runs shall be made :

a) five consecutive valid runs under dry conditions;

b) two acclimatization runs under wet conditions (results not recorded); and

c) five consecutive valid runs under wet conditions.

If the gradient of the track lies between 0.2 per cent and 0.5 per cent, the following runs shall be made :

d) five consecutive valid runs under dry conditions;

e)two acclimatization runs under wet conditions (results not recorded); and

f) ten consecutive valid runs under wet conditions. Alternate runs in opposite directions.

A rest period not exceeding 3 min may be taken between successive runs.

3.3.7 *Speed/distance correction factor*

A correction factor shall be applied to the measured braking distance if the speed as checked by the timing device is not precisely that specified in **4.2.4. of SLS 926 : Part 1 : 1991.**

The corrected braking distance, S_c, shall be determined from the formula

$$S_c = \left[\frac{V_s}{V_m}\right]^2 X\ S_m$$

where

S_m is the measured braking distance;
V_s is the specified test speed; and
V_m is the measured test speed.

3.3.8 *Validity of test runs*

3.3.8.1 A test run shall be considered invalid if one of the following occurs

a) excessive side-skid
b) loss of control.

NOTE

With certain types of braking system, it may not be possible to avoid entirely some skidding of the rear wheel during braking; this is considered acceptable provided that a) or b) above do not occur as a result.

3.3.8.2 If the corrected braking distance exceeds the specified braking distance, a test run may be considered invalid if:

a) the speed at the commencement of the test exceeds the specified test speed by more than 1.5 km/h ;

b) the front brake is activated after the rear brake as indicated by the marks;

NOTE:

As the front brake provides a very high percentage of retardation in the prescribed braking tests, it is therefore important that it be applied first. In order that the maximum available braking power is utilized, it is also important that minimum delay occurs in applying the rear brake.

c) the distance between the marks for the front and rear brakes exceeds 1 m, measured along the surface of the track; and

d) after a test run in which excessive side-skid or loss of control has occurred, a series of braking distances exceed the specified limit.

3.3.8.3 If the corrected braking distance is less than the specified braking distance, a test run shall be considered invalid if

a) the speed at commencement of the test is more than 1.5 km/h below the specified test speed; and

b) the distance between the point where the speed is confirmed and the mark for the rear brake exceeds 2 m, measured along the surface of the track.

If the corrected braking distance exceeds the braking distance specified in 4.2.4 of SLS 926 : Part 1 : 1991 the test run shall be considered valid.

3.3.9 *Test result*

3.3.9.1 Braking under dry conditions

The test result shall be the average value of the corrected braking distances (see 3.3.7) of the test runs of 3.3.6.3 a) or d).

For compliance with the requirements of 4.2.4.1, of SLS 926 : Part 1 : 1991 the above figure shall not exceed the braking distance specified in 4.2.4.1 of SLS 926 : Part 1 :1991 plus the distance allowed for mass as described in 3.3.4, if applicable.

3.3.9.2 Braking under wet conditions

The test result shall be the average value of the corrected braking distances (see 3.3.7) of the test runs of 3.3.6.3 c) or f).

For compliance with the requirements of 4.2.4.2 of **SLS 926 : Part 1 : 1991** the above figure shall not exceed the braking distance specified in 4.2.4.2 of **SLS 926 : Part 1 : 1991** plus the distance allowed for mass as described in 3.3.4 if applicable.

3.4 Steering assembly test

3 4.1 *Handlebar stem*

3.4.1.1 Torque test

With the handlebar stem securely clamped in a fixture to the minimum insertion depth (see 4.3.2 of **SLS 926 : Part 1 : 1991**, and a test bar or handlebar assembled securely to the stem, a torque of 108 N.m shall be applied to the stem by means of the test bar in a plane parallel to the stem and in the direction of the stem centre-line, as shown in Figure 7.

3.4.1.2 Static load test

With the handlebar stem securely clamped in a fixture to the minimum insertion depth (see 4.3.2 of **SLS 926 : Part 1 : 1991**, a force of 2 kN shall be applied through the handlebar attachment point in a forward direction and at 45^0 from the axis of the stem shank as shown in Figure 8.

3.4.2 *Torque test, handlebar and stem*

With the stem of the handlebar assembly securely clamped to the minimum insertion depth in the fixture, a force of 220 N shall be applied simultaneously to each side of the handlebar in a direction and at the location that will provide a maximum turning moment at the junction of the handlebar and stem. Where this location occurs at the end of the handlebar, the force shall be applied as near to the end as is practicable, and in any case not further than 15 mm from the end. see Figure 9.

NOTE

According to the shape of the handlebar, the applied loads might be in a different direction from that illustrated.

Where the handlebar/stem assembly is secured by means of a clamp, the torque applied to the fastener shall not exceed the torque recommended for such fasteners.

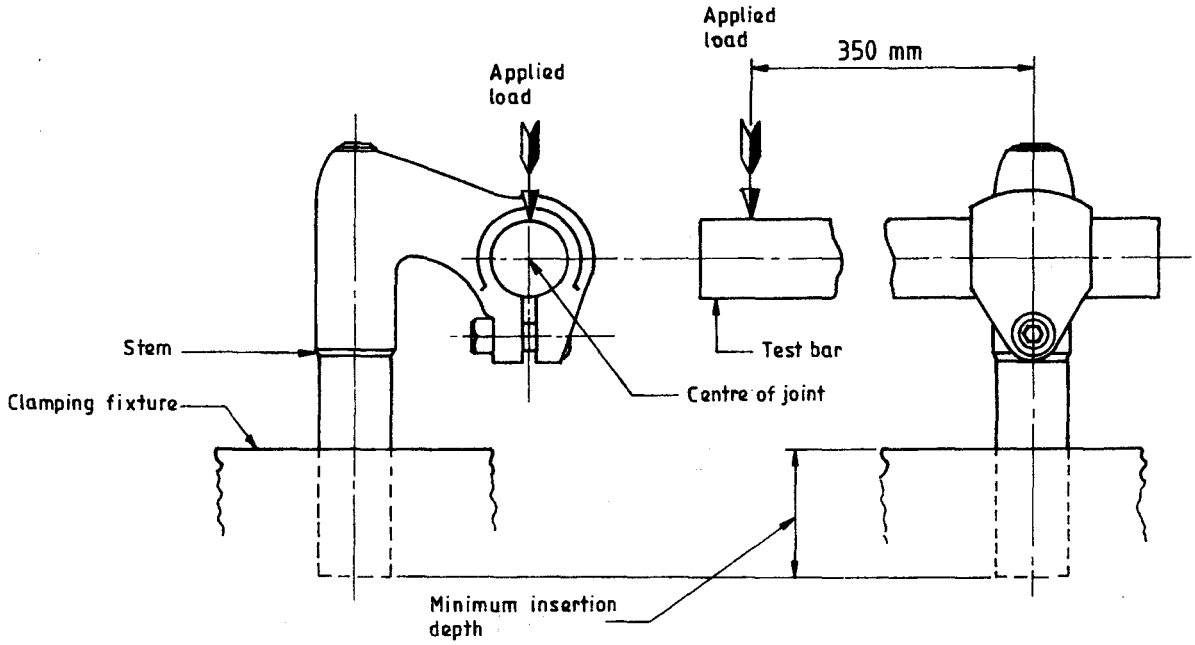


FIGURE 7 - Torque test on handlebar stem

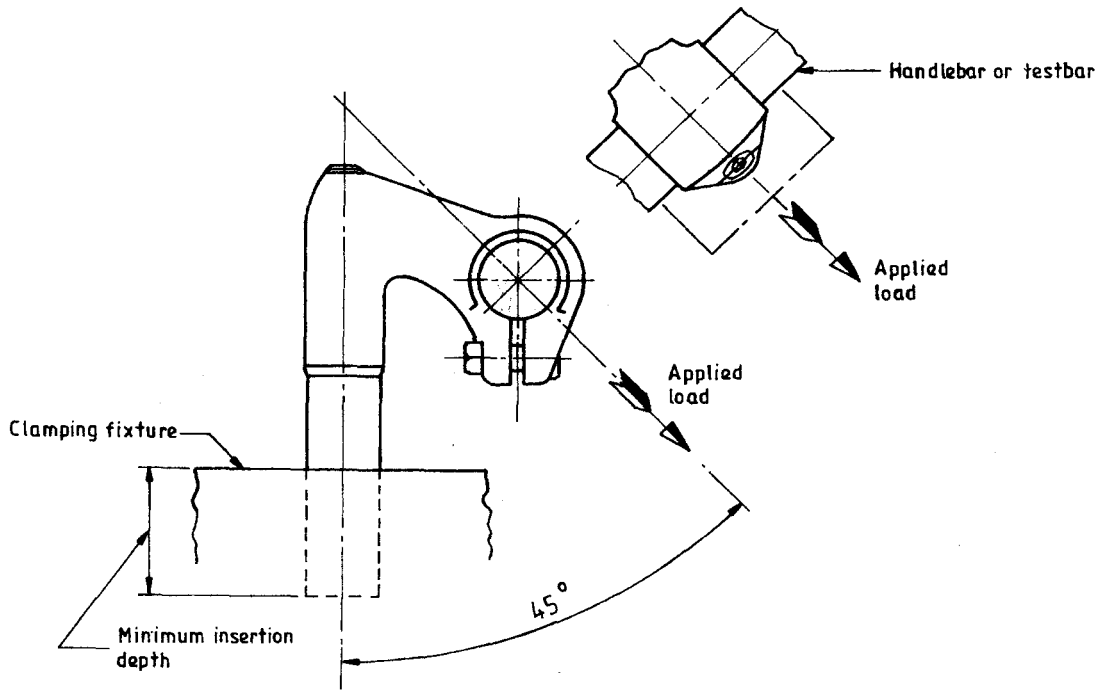


FIGURE 8 - Static load test on handlebar stem

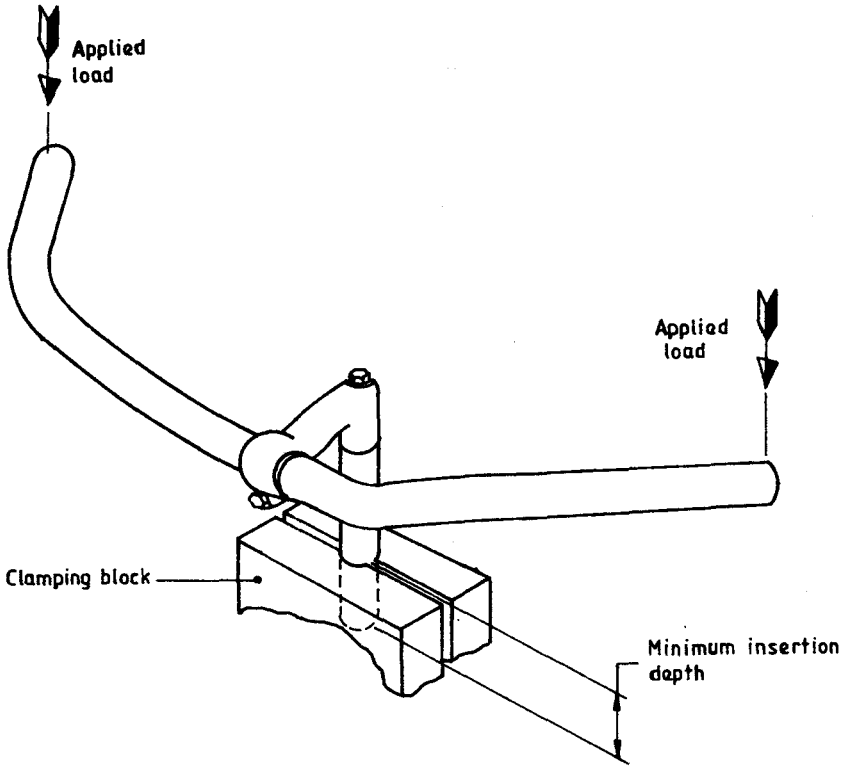


FIGURE 9 - Torque test on handlebar/stem assembly

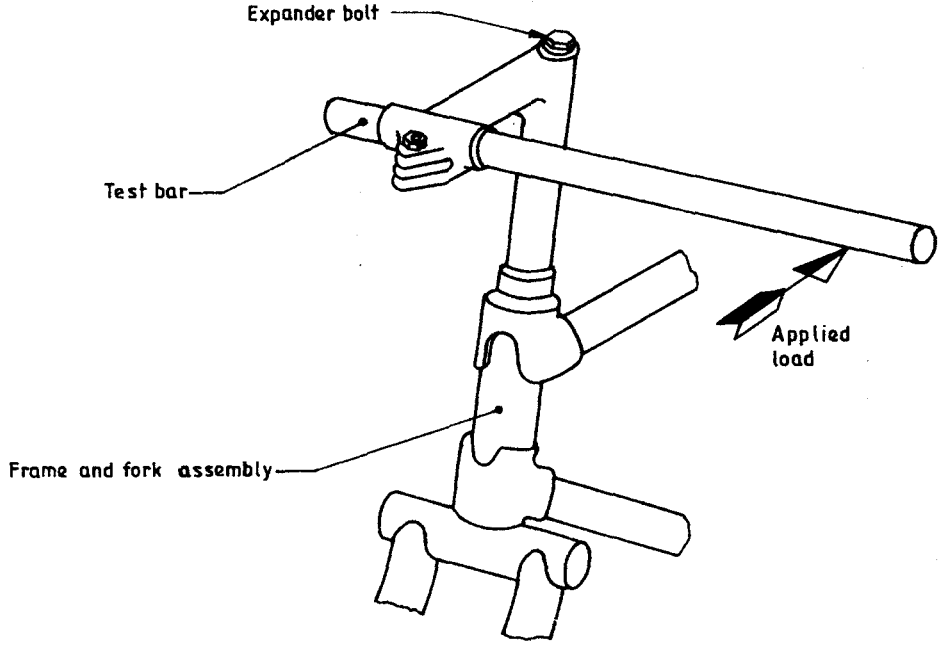


FIGURE 10 - Torque test on handlebar/fork clamping device

3.4.3 *Torque test, handlebar stem and fork stem*

With the handlebar stem correctly assembled in the frame and fork stem, and the expander bolt tightened in accordance with the manufacturer's instructions, a torque of 25 N.m shall be applied to the handlebar/fork clamping device, as shown in Figure 10.

3.5 **Impact tests on frame/fork assembly**

3.5.1 *Falling mass test*

This test shall be conducted on a frame and fork assembly. Where a frame is convertible for male and female riders by the removal of a bar, it shall be tested with the bar removed.

The distance between the axle centre lines shall be measured. A low-mass roller shall be assembled in the front fork, and the frame/fork assembly held vertically and clamped to a rigid fixture by the rear axle attachment points as shown in Figure 11.

A mass of 22.5 kg shall be dropped vertically through a height of 180 mm so as to strike the low-mass roller at a point in line with the wheel centres and against the direction of the fork rake.

3.5.2 *Falling frame/fork assembly test*

The test shall be conducted on the frame/fork/roller assembly used for the test in 3.5.1.

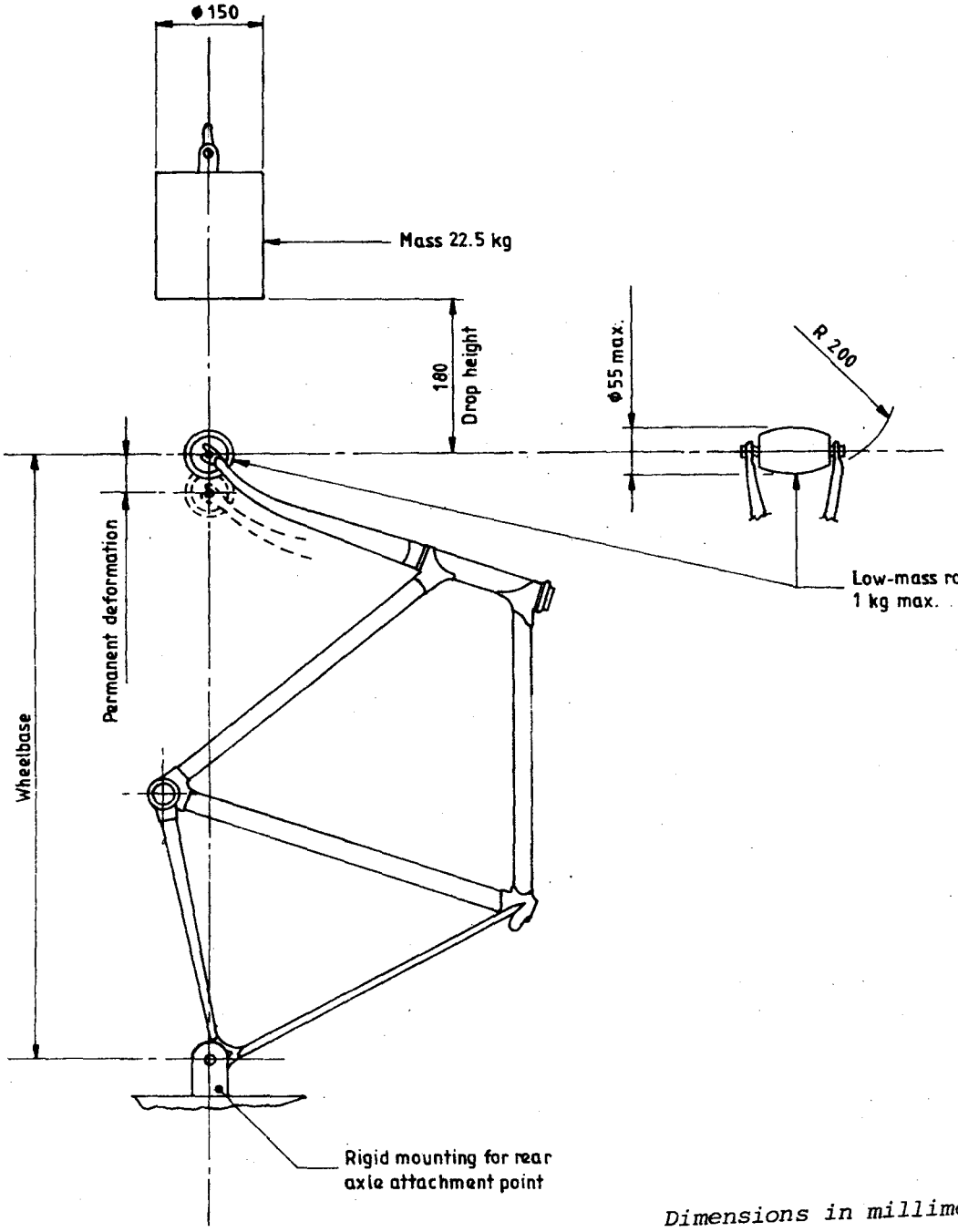
The assembly shall be mounted at the rear axle attachment points so that it is free to rotate about the rear axle, in a vertical plane. The front fork shall be supported by a flat steel anvil so that the frame is in its normal position of use. A mass of 70 kg shall be securely fixed to the seat pillar with its centre of gravity on the axis of, and 75 mm from the top face of the seat tube when measured along the seat tube axis. The assembly shall be rotated about the rear axle, so that the centre of gravity of the 70kg mass is vertically above the rear axle, and then allowed to fall freely to impact on the anvil.(see Figure 12.)

The test shall be repeated to provide a total of two such impacts.

3.6 **Static load test (wheel)**

With the wheel suitably supported and clamped in position, as shown in Figure 13, a force of 178 N shall be applied at one point on the wheel rim, perpendicular to the plane of the wheel. The force shall be applied once only, for a duration of 1 min.

If the wheel hub is offset, the force shall be applied in the direction of the offset as shown in Figure 13.



Dimensions in millimetres

FIGURE 11 - Impact test (falling mass)

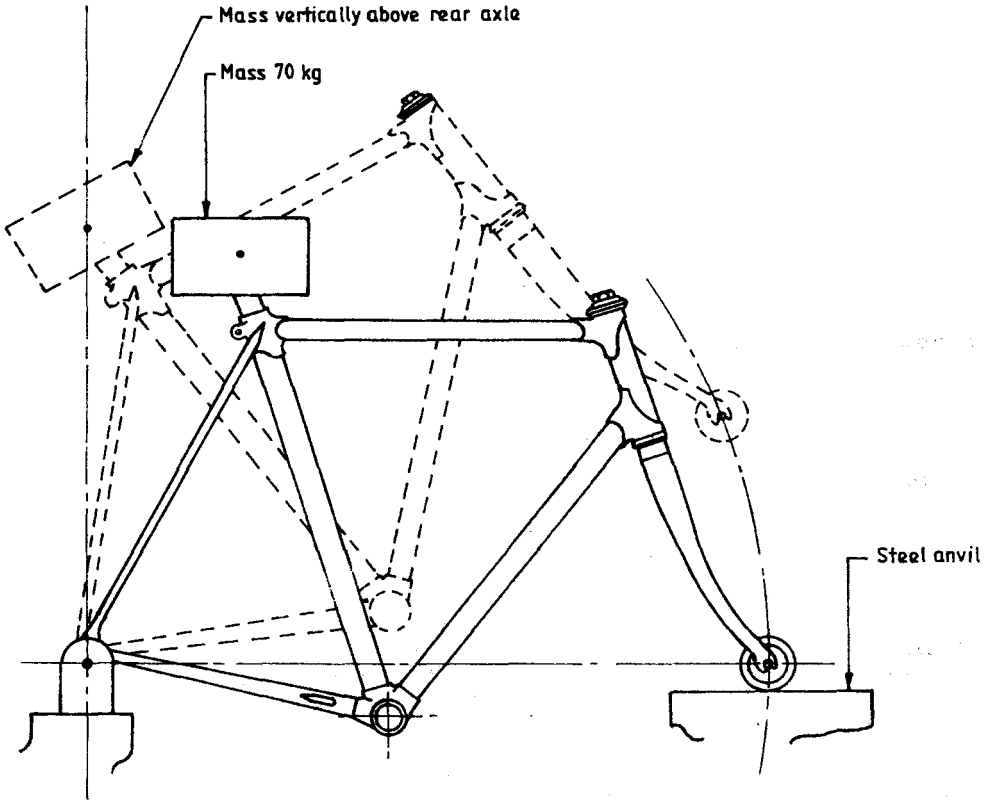


FIGURE 12 - Impact test (falling frame/fork assembly)

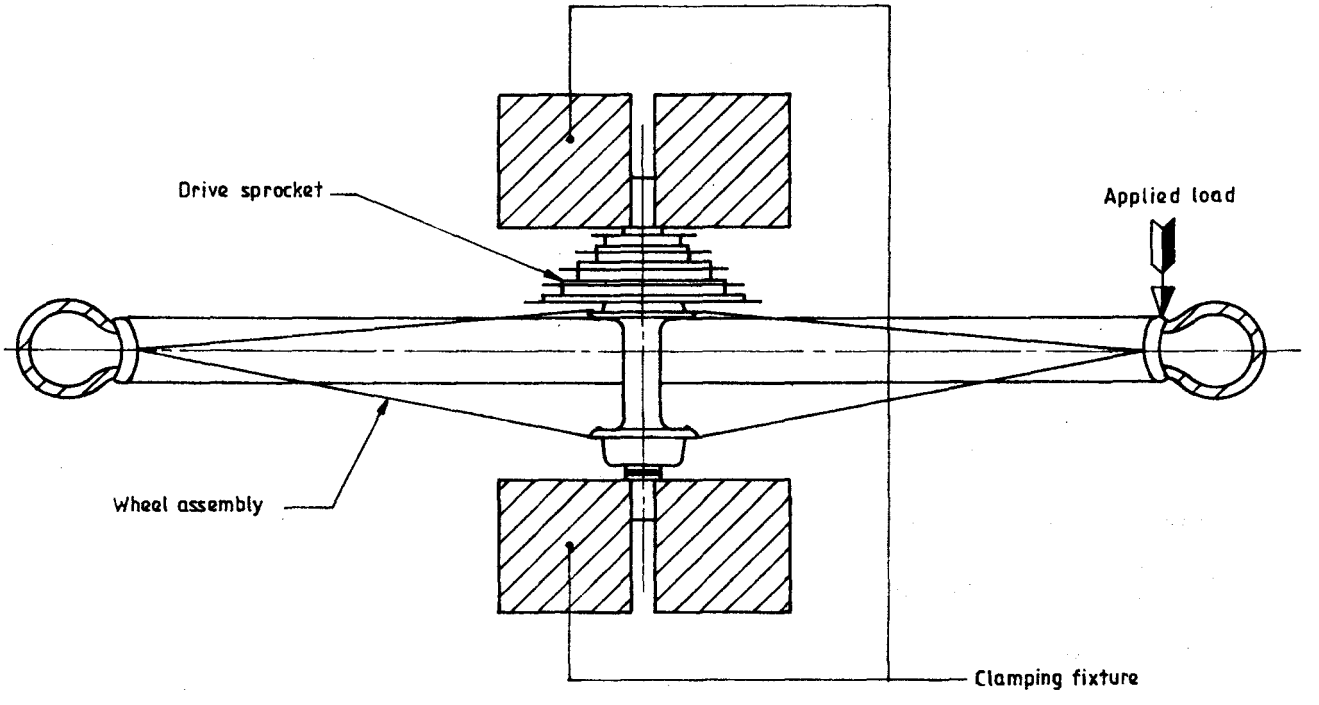


FIGURE 13 - Static load test on wheel

3.7 Pedal tests

3.7.1 *Drive system static load test*

The test shall be conducted on an assembly comprising frame, pedals transmission system, rear wheel assembly and, where appropriate, the gear change mechanism. The frame shall be supported with its central plane vertical, and with the rear wheel clamped securely at the rim to prevent the wheel rotating.

3.7.1.1 Single speed system

3.7.1.1 a) With the left-hand crank in the forward horizontal position, a force of 1500 N shall be gradually applied vertically drownwards to the centre of the left-hand pedal.

The force shall be maintained for 15 s.

Should the system yield or the drive sprockets tighten such that the crank rotates while under load to a position more than 30 ^{0} below horizontal, the crank shall be returned to horizontal, or to some appropriate position above horizontal to take account of system yield, and the test repeated.

3.7.1.1 b) On completion of the test 3.7.1.1 a) the test shall be repeated with the right-hand crank in the forward horizontal position and the load applied to the centre of the right-hand pedal.

3.7.1.2 Multispeed system

3.7.1.2 a) The test given in 3.7.1.1 a) shall be conducted with the transmission correctly adjusted in its highest gear.

3.7.1.2 b) The test given in 3.7.1.1 b) shall be conducted with the transmission correctly adjusted in its lowest gear.

3.7.2 *Pedal/crank system kinetic test*

With suitable sections cut from a pair of cranks fitted securely to a test shaft, assemble a pair of pedals to the crank sections. A mass totalling 50 kg shall be suspended from each pedal by means of a spring to minimize oscillation of the load, as shown in Figure 14. The shaft shall then be driven at approximately 100 r.p.m. for a total of 1 000 000 revolutions. After 500 000 revolutions, the pedals shall be turned through 180^{0} if they are provided with two treads.

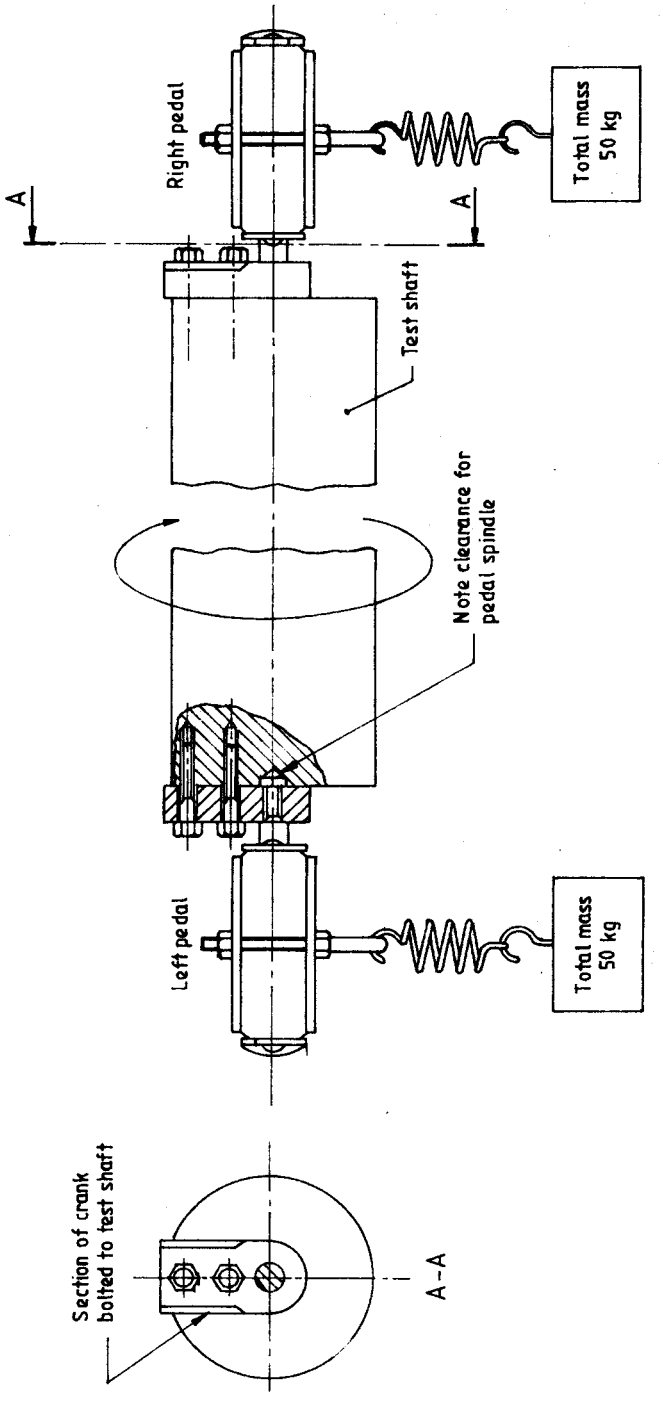


FIGURE 14 - Kinetic test on pedal/crank assembly

3.8 Static load test (saddle and pillar)

With the saddle and saddle-pillar correctly assembled to the frame, and the clamps tightened to the torque recommended for such fasteners, a force of at least 668 N shall be applied vertically downwards at a point within 25 mm from either the front or the rear of the saddle, whichever produces the greater torque on the saddle clamp. After removal of this force, a force of 222 N shall then be applied horizontally to a point within
25 mm from either the front or the rear of the saddle, whichever produces the greater torque on the clamp.

3.9 Road test

Each bicycle selected for the road test shall first be checked and adjusted if necessary to ensure that the steering and wheels rotate freely without slackness, that brakes are adjusted correctly and do not impede wheel rotation. Wheel alignment shall be checked and corrected if necessary and tyres inflated to the recommended pressure. Drive chain adjustment shall be checked and corrected if necessary and any gear control fitted shall be checked for correct and free operation.
The saddle and handlebar positions shall be carefully adjusted to suit the test rider.

The bicycle shall be ridden for at least 1 km by a rider of appropriate weight. (70 kg)

During the test, the bicycle shall be ridden five times over
a 30 m course of wooden strips measuring 50 mm wide x 25 mm high with a 12 mm by 45^0 chamfer on the corners contacting the tyres. The strips shall be spaced every 2 m over the 30 m course. The bicycle shall be ridden over the cleated course at speeds consistent with those indicated in 4.2.4.1.of **SLS 926 : Part 1 : 1991.**

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

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In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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