of wheels, frame, seat, handlebars, or fork during or resulting from this test.

(c) *Ground clearance.* With the pedal horizontal and the pedal crank in its lowest position and any training wheels removed, it shall be possible to tilt the bicycle at least 25° from the vertical without the pedal or any other part (other than tires) contacting the ground plane.

(d) *Toe clearance.* Bicycles not equipped with positive foot-retaining devices (such as toe clips) shall have at least 89 mm (3½ in) clearance between the pedal and the front tire or fender (when turned to any position). The clearance shall be measured forward and parallel to the longitudinal axis of the bicycle from the center of either pedal to the arc swept by the tire or fender, whichever results in the least clearance. (See figure 6 of this part 1512.)

§ 1512.18 Tests and test procedures.

(a) *Sharp edge test.* [Reserved]

(b) [Reserved]

(c) *Protective cap and end-mounted devices test.* (Ref. § 1512.4(i), § 1512.6(d).) Any device suitable for exerting a removal force of at least 67 N (15 lbf) for protective caps and 8.9 N (2.0 lbf) for end caps at any point and in any direction may be used. All protective caps and end-mounted handlebar devices shall be tested to determine that they cannot be removed by application of the specified forces.

(d) *Handbrake loading and performance test:* (Ref. § 1512.5(b)).

(1) *Apparatus.* A spring scale or other suitable device for measuring the specified forces on the handbrake levers and a dry, clean, level, paved surface of adequate length.

(2) *Procedure.* The loading test, § 1512.18(d)(2)(i), and the rocking test, § 1512.18(d)(2)(iii), shall be performed before the performance test, § 1512.18(d)(2)(v), is performed and no adjustments shall be made between these tests.

(i) *Loading test procedure.* The hand levers shall be actuated with a force applied at a point no more than 25 mm (1.0 in) from the open end of the lever. If the hand lever contacts the handlebar (bottoms) before a force of 445 N (100 lbf) is reached, the loading may be

stopped at that point, otherwise the loading shall be increased to at least 445 N (100 lbf).[4] Application of the loading force shall be repeated for a total of 10 times and all brake components shall be inspected.

(ii) *Loading test criteria.* There shall be no visible fractures, failures, misalignments, and clearances not in compliance with applicable parts of § 1512.5.

(iii) *Rocking test procedure.* A weight of at least 68.1 kg (150 lb) shall be placed on the seat; the force required for the hand levers to contact the handlebars or 445 N (100 lbf), as determined in § 1512.18(d)(2), shall be applied to the hand levers;[4] and the bicycle shall be rocked forward and backward over a dry, clean, level, paved surface at least six times and for a distance of at least 76 mm (3 in) in each direction.

(iv) *Rocking test criteria.* There shall be no loosening of the brake pads, pad holders, or cable and hand-lever securing devices or any other functional brake component.

(v) *Performance test procedure.* The following test conditions, unless otherwise specified in this part 1512, shall be followed:

(A) The bicycle shall be ridden over a dry, clean, smooth paved test course free from protruding aggregate. The test course shall provide a coefficient of friction of less then 1.0 and shall have a slope of less than 1 percent.

(B) The wind velocity shall be less than 11 km/h (7 mph).

(C) Only the brake system under test shall be actuated.

(D) The bicycle shall attain the specified ground speed while the rider is in the normal riding position.

(E) The rider shall remain in the normal riding position throughout the test.

(F) The bicycle must be moving in a straight line at the start of brake application.

(G) Corrections for velocity at the initiation of braking may be made. The corrected braking distance shall be computed as follow:

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[4] For hand lever extensions, the loading shall be continued until a force of 445 N (100 lbf) is reached or the hand lever extension is in the same plane as the upper surface of the handlebars or the extension lever contacts the handlebars.

$S_c = (V_s / V_m)^2 S_m$

where:

S_c = Corrected braking distance,
V_s = Specified test velocity.
V_m = Measured test velocity,
S_m = Measured braking distance.

The test run is invalid if at the commencement of the test, the measured test speed of the bicycle is not less than nor greater than the test speed required by this part 1512 by 1.5 km/h (0.9 mph).

(H) Four test runs are required. The stopping distance shall be determined by averaging the results of the four test runs.

(I) The stopping distances specified are based on a rider weight of at least 68.1 kg (150 lb) and a maximum rider and weight combination of 91 kg (200 lb). Greater stopping distances are allowable for heavier riders and test equipment weights at the rate of 0.30 m per 4.5 kg (1.0 ft per 10 lb).

(J) A test run is invalid if front-wheel lockup occurs.

(vi) *Performance test criteria.* The stopping force applied to the hand lever at a point no closer than 25 mm (1.0 in) from the open end shall not exceed 178 N (40 lbf). Bicycles with an equivalent ground speed in excess of 24 km/h (15 mph) (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute)[3] shall stop from an actual test speed of 24 km/h (15 mph) or greater within a distance of 4.57 m (15 ft); when the equivalent ground speed is less than 24 km/h (15 mph) under the same conditions, the bicycle shall stop from an actual test speed of 16 km/h (10 mph) or greater within a distance of 4.57 m (15 ft).

(e) *Footbrake force and performance test.* (Ref. §1512.5(c) (1) and (2)):

(1) *Apparatus.* Suitable devices for exerting and measuring the required forces and a dry, clean, level, paved surface of adequate length.

(2) *Force test.* The braking force shall be measured as the wheel is rotated in a direction of forward motion, and the braking force is measured in a direction tangential to the tire during a steady pull after the wheel completes one-half revolution but before the

[3] See footnote 3 to §1512.5.

wheel completes one revolution. The brake shall be capable of producing a linearly proportional brake force for a gradually applied pedal force from 89 N to 310 N (20 to 70 lbf) and shall not be less than 178 N (40 lbf) for an applied pedal force of 310 N (70 lbf). All data points must fall within plus or minus 20 percent of the brake force, based on the measured brake load using the least square method of obtaining the best straight line curve.

(3) *Performance test.* The procedure of §1512.18(d)(2)(v) shall be followed to test the footbrake performance. The stopping distance shall be less than 4.57 m (15 ft) from an actual test speed of 16 km/h (10 mph). In addition, if the equivalent ground speed of the bicycle is in excess of 24 km/h (15 mph) (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute),[3] the stopping distance shall be 4.57 m (15 ft) from an actual test speed of 24 km/h (15 mph) or greater.

NOTE: No allowance shall be made for rider weight. See §1512.5(d) for additional requirements for bicycles with both handbrakes and footbrakes.

(f) *Sidewalk bicycle footbrake force test.* For sidewalk bicycles, the footbrake force test is the same as for bicycles except; the brake force transmitted to the rear wheel shall continually increase as the pedal force is increased from 44.5 N to 225 N (10 to 50 lbf). The ratio of applied pedal force to braking force shall not be greater than two-to-one.

(g) *Handlebar stem test.* (Ref. §1512.6(b)):

(1) *Procedure.* The handlebar stem shall be tested for strength by applying a force of 2000 N (450 lbf), in a forward direction, for bicycles, or 1000 N (225 lbf) for sidewalk bicycles, at a point in line with the handlbar attachment point and at an angle of 45° from the stem centerline (See fig. 2).

(2) *Criteria.* No visible fractures shall result from this test.

(h) *Handlebar test.* (Ref. §1512.6(e)):

(1) *Stem-to-fork clamp test*—(i) *Procedure.* The handlebar and handlebar stem shall be assembled to the bicycle in accordance with the manufacturer's instructions. The handlebar-fork assembly shall be subjected to a torque applied about the axis of the stem, and

shall then be disassembled and examined for signs of structural damage including cracking, splitting, stripping of threads, bearing damage, and bulging of the stem and fork structures. The handlebar and handlebar stem components shall be inspected for visible signs of galling, gouging, and scoring not due to normal assembly and disassembly operations.

(ii) *Criteria.* There shall be no visible movement between the stem and fork when a torque of 47+3, −0 N–m (35+2, −0 ft=lb) for bicycles and 20+3, −0 N–m (15+2, −0 ft=lb) for sidewalk bicycles is applied to the handlebar about the stem-to-fork axis. There shall be no visible signs of damage to the stem-to-fork assembly or any component part thereof.

(2) *Handlebar strength and clamp test*— (i) *Procedure.* The stem shall be in place on the bicycle or in an equivalent test fixture and secured according to manufacturer's instructions. A load shall be applied equally to each handlebar end in a direction to cause the greatest torque about the handlebar-to-stem clamp; deflection shall be measured along the line of applied force.

(ii) *Criteria.* The handlebars shall support a force of no less than 445 N (100 lbf) or absorb no less than 22.6 J (200 in-lb) of energy through a maximum deflection of no more than 76 mm (3.0 in.); the handlebar clamp shall prevent rotational movement of the handlebars relative to the clamp, and there shall be no visible fractures.

(i) *Pedal slip test.* [Reserved]

(j) *Rim test.* (Ref. §§ 1512.10 and 1512.11(c)):

(1) *Procedure.* Only one wheel need be tested if the front and rear wheel are of identical construction. The wheel to be tested shall be removed from the bicycle and be supported circumferentially around the tire sidewall. A load of 2000 N (450 lbf) shall be applied to the axle and normal to the plane of the wheel for at least 30 seconds. If the wheel hub is offset, the load shall be applied in the direction of the offset.

(2) *Criteria.* The wheel and tire assembly shall be inspected for compliance with the requirements of § 1512.11(a) and shall be remounted on the bicycle according to the manufacturer's instructions and shall turn freely without roughness and shall comply with the requirement of § 1512.11(b).

(3) *Front hub retention test.* (Ref. § 1512.12(c)).

(i) *Procedures.* Front hub locking devices shall be released. When threaded nuts and axles are used, the nuts shall be open at least 360° from a finger tight condition. A separation force of at least 111 N (25 lb) shall be applied to the hub on a line along the slots in the fork ends.

(ii) *Criteria.* The front hub shall not separate from the fork; fenders, mudguards, struts, and brakes shall not be allowed to restrain the separation.

(k) *Fork and frame test.* (Ref. §§ 1512.13 and 1512.14):

(1) *Fork test*—(i) *Procedure.* With the fork stem supported in a 76 mm (3.0 in) vee block and secured by the method illustrated in figure 1 of this part 1512, a load shall be applied at the axle attachment in a direction perpendicular to the centerline of the stem and against the direction of the rake. Load and deflection readings shall be recorded and plotted at the point of loading. The load shall be increased until a deflection of 64 mm (2½ in) is reached.

(ii) *Criteria.* Energy of at least 39.5 J (350 in-lb) shall be absorbed with a deflection in the direction of the force of no more than 64 mm (2½ in.).

(2) *Fork and frame assembly test*—(i) *Procedure.* The fork, or one identical to that tested in accordance with the fork test, § 1512.18(k)(1), shall be replaced on the bicycle in accordance with the manufacturer's instructions; and a load of 890 N (200 lbf), or an energy of at least 39.5 J (350 in-lb), whichever results in the greater force, shall be applied to the fork at the axle attachment point against the direction of the rake in line with the rear wheel axle. The test load shall be counteracted by a force applied at the location of the rear axle during this test.

(ii) *Criteria.* There shall be no visible evidence of fracture and no deformation of frame that significantly limits the steering angle over which the front wheel can be turned.

(l) *Seat adjustment clamps and load test.* (Ref. § 1512.15(c)).

(1) *Procedure.* A force of at least 668 N (150 lbf) shall be applied vertically downward (334 N (75 lbf) for sidewalk

bicycles) to a point within 25 mm (1.0 in.) from either the front or rear of the seat, whichever produces the greatest torque on the seat clamp. After removal of this force, a force of 222 N (50 lbf) shall then be applied horizontally (111 N (25 lbf) for sidewalk bicycles) to a point within 25 mm (1.0 in.) from either the front or rear of the seat, whichever produces the greatest torque on the clamp.

(2) *Criteria.* No movement of the seat with respect to the seat post, or of the seat post with respect to the bicycle frame, shall have resulted from application of the forces specified.

(m) *Reflector mount and alignment test.* (Ref. §1512.16 (c) and (d)):

(1) *Procedure.* A force of 89 N (20 lbf) shall be applied to the reflector mount in at least three directions selected as most likely to affect its alignment. At least one of those directions shall be selected to represent a force that would be expected in lifting the bicycle by grasping the reflector.

(2) *Criteria.* (i) *During test:* The optical axis of the reflector shall remain parallel within 15° to the line or intersection of the ground plane and the center plane of the bicycle defined as a plane containing both wheels and the centerlines of the down tube and seat mast.

(ii) *Post test:* The optical axis of the reflector shall remain parallel within 5° to the line or intersection of the ground plane and the center plane of the bicycle defined as a plane containing both wheels and the centerlines of the down tube and seat mast.

(n) *Reflector test.* (Ref. §1512.16(g)):

(1) *Conditioning.* The following conditioning in the order given shall be performed prior to testing for performance.

(i) *Warpage conditioning.* The reflector shall be held in a preheated oven for at least one hour at 50° ±5 °C (122±5.4 °F). A pedal reflector may be conditioned integrally with its pedal.

(ii) *Mechanical impact conditioning.* The reflector shall be mounted faceup in a manner similar to the way in which it is mounted on the bicycle. A 13 mm (½in.) diameter polished steel ball shall be dropped normal to the center of the face of the reflector from a height of 0.76 m (30 in.). The ball may

be guided by a tube with holes, but not restricted in free fall. Pedal reflectors are exempt from this impact conditioning.

(iii) *Moisture conditioning.* The reflector shall be submerged in tap water in a suitable container. The container shall be pressurized in 17.2 kN/m² (2.5 psi) (equivalent to 1.7 m (5¾ ft.)) of water for 15 minutes and then released.

(2) *Reflector performance test.* (i) Arrangements for the reflector performance test shall be as shown in figure 3 and the distance *D* between the light source and the reflector shall be 30.5 m (100 ft.). The source of illumination shall be a lamp with a 51 mm (2.0 in.) effective diameter and a filament operating at 2,856±10 percent color temperature. The observation point shall be co-located (as close as practicable) with the source of illumination. The reflector shall be mounted with the center of the reflector at the center of rotation and at the same horizontal level as the source of illumination. Photometric measurements shall be made at the observation angles and entrance angles given in tables 1 and 2.

(ii) The observation angle is the angle formed by a line from the point of observation to the center of the reflector with a second line from the center of the reflector to the source of illumination. The entrance angle is the angle between the optical axis of the reflector and a line from the center of the reflector to the source of illumination. The entrance angle shall be designated left, right, up, and down in accordance with the position of the source of illumination with respect to the axis of the reflector as viewed from behind the reflector when the plane of the observation angle is vertical and the receiver is above the source.

(iii) Photometric measurements shall be made either visually or photoelectrically. With either method, the light reflected to the observation point shall be determined. Also, the illumination on the reflector from the source shall be measured.

(iv) For visual measurements a comparison lamp, emitting light similar in spectral quality to the reflector, shall be located adjacent to the reflector (at an angle not to exceed ½°) and arranged so that the candlepower can be

varied from 0.01 to 0.25 to make the intensity duplicate that of the reflector under test. The candlepower of the source of the illumination of the reflector under test shall be known or determined for this test. Means shall be provided to change the intensity of the source of illumination without changing the filament color temperature. The comparison lamp shall be designed to avoid reflection from the source of illumination back in the direction of the observer. It shall be of such size and so diffused that when viewed by the observer (through a 2½× reducing monocular), the candlepower can be readily compared and adjusted to that of the reflector. The observer shall have at least 10 minutes of dark adaption before making observations. For photoelectric measurements, the opening to the photocell shall not be more than ½ inch vertical by 1 inch horizontal.

(v) Reflectors that mount on the bicycle in a fixed rotational position with respect to the bicycle, or the bicycle component on which they are mounted (such as pedals or spokes), shall be tested with a single orientation. Reflectors that do not mount on the bicycle in a fixed rotational position with respect to the bicycle shall be rotated about their axis through 360° to find the minimum candlepower per footcandle for each test point. If the measurement falls below the minimum requirement at any test point, the reflector shall be rotated ±5° about its axis from the angle where the minimum occurs, and the maximum candlepower per footcandle within this angle shall be the measured value.

(vi) Should uncolored reflections from the front surface interfere with photometric readings at any test point the lowest reading and location within 1° above, below, right, and left of the test point shall meet the minimum requirement for the test point.

(vii) A recommended coordinate system for definition of color is the ''Internationale de l'Eclairage (CIE 1931)'' system in the *IES Lighting Handbook,* [5] fifth edition, 1972. In the coordi-

nate system and when illuminated by the source defined in table 4 of this part 1512, a reflector will be considered to be red if its color falls within the region bounded by the red spectrum locus and the lines y0.980–−x and y0.335; a reflector will be considered to be amber if its color falls within the region bounded by the yellow spectrum locus and the lines y0.382, y0.790–0.667x, and y x–−0.120.

(o) Reflective tire and rim test (Ref. § 1512.16(h) and (i)):

(1) *Apparatus.* Arrangements for the reflective intensity measurement shall be as shown in figure 3 of this part 1512. A light projector (having a maximum effective lens diameter of *D*/500, where *D* is the distance from the source to the retroreflective surface being measured) capable of projecting light of uniform intensity shall be used to illuminate the sample. The light falling on the sample shall have a color temperature of 2856°K+*10*% (equivalent to a tungsten filament lamp operated at a color temperature of 2856°K+*10*% having approximately the relative energy distribution given in table 4 of this part 1512). The light reflected from the test surface shall be measured with a photoelectric receiver, the response of which has been corrected for the spectral sensitivity of the average photopic human eye. The dimensions of the active area of the receiver shall be such that no point on the perimeter of the receiver is more than *D*/100 from its center (where *d* is the distance from the receiver to the retroreflective surface). Wheels used for the measurement of retroreflective tires or rims shall have all exposed metallic surfaces, including spokes, masked in flat black so that when measured these surfaces indicate no appreciable reflectance. The tire shall be mounted and fully inflated. Distances shall be measured from the plane of the wheel and the center of the hub. For the tests, the distance *D* between the projector and the center of the wheel and distance *d* between the center of the wheel and the receiver shall each be at least 15 m (50 ft.).

(2) *Procedure*—(i) *Masking.* The reflecting strip to be tested shall be within two concentric circles, the larger of which is no more than 0.02 m (0.79 in.)

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greater in radius than the smaller. While additional reflecting material is permitted outside such boundaries, such additional material shall not be counted in determining the average width of the reflecting strip and shall be masked off with opaque, matte black tape in testing the reflecting material.

(ii) *Orientation.* Every position of the reflecting strip on the rim or the mounted and fully inflated tire to be tested shall be oriented so that the normal to this portion is within 40° of parallel to the axis of rotation of the wheel.

(iii) *Measurement.* Measure the distance *d* from the receiver to the center of the wheel and the minimum distance *r* from the axis of rotation of the wheel to the unmasked portion of the reflective strip. Measure the illumination incident on the reflective strip at uniform intervals of no more than 45° around the wheel, with the receiver oriented in the direction of the incident radiation. The average of such readings will be the mean illumination of the sample *E.* If any one of such readings differs by more than 10 percent from the mean illumination, then a more uniform source must be obtained. Measure the illumination of the receiver due to reflection from the retroreflective surface for each entrance angle and each observation angle given in table 3 of this part 1512. The entrance angle and the observation angle shall be in the same plane. A negative entrance angle (figure 3 of this part 1512) is specified when the entrance angle is small because the location of the receiver with respect to the direction of illumination becomes important for distinguishing between ordinary mirror-like reflection and retroreflection. The illumination incident on the test surface and the receiver shall be measured in the same units on a linear scale. Compute the ratio *A* for each combination of entrance angle and observation angle listed in table 3 as follows:

$$A = [(E_r / E_s)(d^2 / r)]$$

Where:

A = Ratio in meters,
E_r = Illumination incident upon the receiver,
E_s = Illumination incident upon a plane perpendicular to the incident ray at the specimen position (see instructions above in this paragraph (o)(2)(iii) for averaging), measured in the same units as E_r,
d = The distance in meters from the receiver to the center of the wheel,
r = The minimum radius in meters of the boundary circles of the retroreflective strip.

The minimum value of *A* shall be that listed in table 3 of this part 1512 for each combination of entrance angle and observation angle. The plane containing the entrance angle and the plane containing the observation angle shall coincide. In table 3, a positive entrance angle corresponds to the case in which the line of sight to the receiver lies between the line of incidence and the optic axis of the reflector, and a negative entrance angle corresponds to the case in which the line of incidence lies between the line of sight of the receiver and optic axis of the reflector.

(iv) *Criteria.* The ratio A as defined in § 1512.18(o)(2)(iii) shall not be less than:

$$A = 4Cos^2\theta/[1+(\Phi/0.225)^{3/2}]$$

where A is ratio in meters, θ is the entrance angle in degrees, and Φ is the observation angle in degrees.

The criterion applies only for entrance angles from 0° to 40° and observation angles from 0.2° to 1.5°, and performance is not specified beyond this range. The values of A in table 3 are obtained from the above formula by rounding up to two significant figures. Except in cases in which the performance of the reflector is seriously questionable, a reflector with A at least the value given in table 3 at each of the six combinations of entrance and observation angles will be considered to satisfy this criteria.

(p) *Road test.* (Ref. §§ 1512.15(c) and 1512.17(a)):

(1) *Procedure.* The bicycle shall be ridden at least 6.4 km (4.0 mi.) by a rider weighing at least 68.1 kg (150 lb.) with the tires inflated to maximum recommended pressure. Travel shall include riding the bicycle five times over a 30 m (100 ft.) course of wooden cleats fastened to a paved surface. The cleats shall be a full 25 mm (1.0 in.) high by 51 mm (2.0 in.) wide lumber with a 12 mm by 12 mm (½in. by ½ in.) chamfer of 45° on the corners contacting the tires. The cleats shall be spaced every 1.8 m

(6.0 ft.) over the 30 m (100 ft.) course. The bicycle shall be ridden over the cleated course at a speed of at least 24 km/hr (15 mph) with the rider firmly seated.

(2) *Criteria.* The bicycle shall exhibit stable handling, turning, and steering characteristics without difficulty of operation. There shall be no system or component failure of the structure, brakes, or tires and there shall be no loosening or misalignment of the seat, handlebars, controls, or reflectors.

(q) *Sidewalk bicycle proof test.* (Ref. §§ 1512.15(c) and 1512.17(b)):

(1) *Procedure.* The bicycle shall be loaded with weights of 13.6 kg (30 lb.) on the seat surface and 4.5 kg (10 lb.) attached to the end of each handle grip for a total load of 22.7 kg (50 lb.). The bicycle shall be lifted a distance of 0.3 m (1.0 ft.) and dropped (while maintaining an upright position) three times onto a paved surface. Following this and with weight removed, it shall be allowed to fall in any configuration and attitude from an upright position to the paved surface three times on each side.

(r) *Abrasion test for retroreflective rims.* (Ref. § 1512.16(i)):

(1) This test consists of a steel wire cup brush rotating at a constant velocity of 60 rpm that is applied at a force of 2 N (0.45 lbf) to the retroreflective material on one side of a bicycle wheel rim. The rim is rotated about the axle at a linear velocity of 0.23 m/sec (9 in./sec). The test is complete when the wheel has completed 1000 revolutions.

(2) *Apparatus.* Figure 8 of this part 1512 illustrates the following test fixture arrangement that is suitable to perform this abrasion test:

(i) *Test fixture.* The test fixture contains a clamp to hold the axle of a bicycle wheel so that the wheel can rotate freely about the axle. The axis of rotation is capable of being inclined from the vertical to bring that portion of the side of the wheel rim containing the retroreflective material into a horizontal plane as it passes beneath the abrading brush. A drive mechanism to rotate the bicycle wheel contains a means to adjust the rotational velocity to obtain the specified linear velocity measured at a point on the wheel rim on the axis of the abrading brush.

(ii) *Abrader.* The abrader is a cup brush meeting the specification in paragraph (r)(3)(v) of this section. It is mounted in a chuck attached to a motor that rotates about a vertical axis at the specified rotational velocity. A means is provided to apply the rotating cup brush at the specified force against the retroreflective material on the bicycle wheel rim. The axis of the abrading brush is positioned on the mid point in the width of the retroreflective material. The force is produced by deadweights applied to a pan on the axis of the counterbalanced motor/brush assembly.

(3) *Specifications.* (i) The linear velocity of the reflective band on wheel rim shall be 0.23 m/sec (9 in./sec) measured at a point on the axis of the abrading brush.

(ii) The rotational velocity of the abrading brush shall be 60 rpm.

(iii) The force normal to the plane of the retroreflective material at which the abrading brush is to be applied shall be 2 N (0.45 lbf).

(iv) The bicycle wheel shall make 1000 complete revolutions per test.

(v) The abrader shall be a cup brush having bristles that are 0.005 in. (approx. 0.13mm) diameter low carbon steel wire; an outside diameter of 0.5 inch (aprox. .13mm); a wire bristle length of 0.25 inch (approx. 6.4mm); and a cup diameter of 0.405 inch (approx. 10.29mm). [6]

(vi) The abrasion test shall be conducted at an ambient temperature of between 16 °C (60 °F) and 27 °C (80 °F).

(4) *Procedure.* (i) The retroreflective bicycle rim to be tested shall be an unused sample free from grit, grime and grease. Prior to beginning the test, remove, according to instructions supplied with the bicycle, any protective coating or material used to prevent damage in shipping.

(ii) Test the wheel in a suitable test fixture, according to the specifications in paragraph (r)(3) of this section.

(iii) Clamp the wheel by its axle in the test fixture and align the axis of

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[6] For compliance testing the Commission will use a brush meeting this description distributed by Dremel Manufacturing Company, Racine, Wisconsin as Dremel Part No. 442. This brush is manufactured by Weiler Brush Company as No. 26074, MC–10 Wire.

rotation so that the portion of the reflective material below the axis of the abrading brush is horizontal.

(iv) Shape the cup brush by hand to the specified 0.5 (approx. 13mm) diameter. Any stray wire bristles projecting more than 1/32 in. (approx. 1 mm) beyond the tip of the bulk of the bristles should be clipped off. Adjust the position of the brush so that its axis is centered over the mid-point in the width of the retroreflective material.

(v) Adjust the rotational velocity of the bicycle wheel to obtain a linear velocity of 0.23 m/sec (9 in./sec) measured at the mid-point in the width of the retroreflective material. Adjust the force to obtain a force normal to the surface under the brush of 2 N (0.45 lbf).

(vi) Apply the abrading brush to the retroreflective material on the wheel rim, and continue the test for 1000 complete revolutions of the bicycle wheel.

[43 FR 60034, Dec. 22, 1978, as amended at 45 FR 82628, Dec. 16, 1980; 46 FR 3204, Jan. 14, 1981; 68 FR 52691, Sept. 5, 2003]

§ 1512.19 Instructions and labeling.

A bicycle shall have an instruction manual attached to its frame or included with the packaged unit.

(a) The instruction manual shall include at least the following:

(1) Operations and safety instructions describing operation of the brakes and gears, cautions concerning wet weather and night-time operation, and a guide for safe on-and-off road operation.

(2) Assembly instructions for accomplishing complete and proper assembly.

(3) Maintenance instructions for proper maintenance of brakes, control cables, bearing adjustments, wheel adjustments, lubrication, reflectors, tires and handlebar and seat adjustments; should the manufacturer determine that such maintenance is beyond the capability of the consumer, specifics regarding locations where such maintenance service can be obtained shall be included.

(b) A bicycle less than fully assembled and fully adjusted shall have clearly displayed on any promotional display material and on the outside surface of the shipping carton the following: (1) A list of tools necessary to properly accomplish assembly and adjustment, (2) a drawing illustrating the minimum leg-length dimension of a rider and a method of measurement of this dimension.

(c) The minimum leg-length dimension shall be readily understandable and shall be based on allowing no less than one inch of clearance between (1) the top tube of the bicycle and the ground plane and (2) the crotch measurement of the rider. A girl's style frame shall be specified in the same way using a corresponding boys' model as a basis.

(d) [Reserved]

(e) Every bicycle subject to the requirements of this part 1512 shall bear a marking or label that is securely affixed on or to the frame of the bicycle in such a manner that the marking or label cannot be removed without being defaced or destroyed. The marking or label shall identify the name of the manufacturer or private labeler and shall also bear some form of marking from which the manufacturer can identify the month and year of manufacture or from which the private labeler can identify the manufacturer and the month and year of manufacture. For purposes of this paragraph, the term *manufacture* means the completion by the manufacturer of a bicycle of those construction or assembly operations that are performed by the manufacturer before the bicycle is shipped from the manufacturer's place of production for sale to distributors, retailers, or consumers.

[43 FR 60034, Dec. 22, 1978, as amended at 60 FR 62990, Dec. 8, 1995]

§ 1512.20 Separability.

If any section or portion thereof of this part 1512 or its application to any person or circumstance is held invalid, the remainder of the section(s) and its (their) application to other persons or circumstances is not thereby affected.

Subpart B—Policies and Interpretations [Reserved]