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**Performance and measurement method for braking of all-terrain
vehicles**

全地形车制动性能要求及试验方法

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3 Terms and definitions

3.1 control - part operated directly by the driver in order to supply the transmission device with the energy required for braking or for controlling the brake.

3.2 transmission - combination of components between the control and the brake that links their functions.

3.3 service brake system - braking system that decelerates a vehicle in motion.

3.4 combined brake system, CBS - service brake system in which the brakes on all the wheels are actuated by a single control.

3.5 secondary brake system - second service brake system fitted to a vehicle equipped with a combined brake system.

3.6 split service brake system, SSBS - braking system that controls the brakes on all the wheels. Note: the system is actuated by a single control and is made up of two or more sub-systems; failure of any one sub-system, for instance a failure caused by leakage of a hydraulic line, does not affect the function of the other sub-systems.

3.7 engine disconnected - the engine is disconnected from the driven wheels.

3.8 initial brake temperature - temperature of the brake before any braking is applied. Note: where several brakes are actuated together, the temperature of the hottest brake is taken.

3.9 test speed - speed of the vehicle at the moment the driver begins to operate the control.
Note: where the test requires two controls to be operated at the same time, the moment at which the first control begins to be operated is taken.

3.10 wheel lock - condition in which the slip ratio of the wheel is 1.00.

3.11 average control force - average value of the control force while the vehicle speed falls from 80 % to 10 % of the test speed.

3.12 laden - the vehicle carries the maximum payload mass declared by the manufacturer.

3.13 lightly loaded - the lesser of the laden mass and the sum of the kerb mass of the complete vehicle, the driver mass (75 kg) and the mass of the test equipment (15 kg).

3.14 brake system - combination of parts that progressively decelerates or stops a moving vehicle, or holds a stationary vehicle at rest. Note: the system consists of the control, the transmission and the brake, but does not include the engine.

3.15 brake - part of the brake system that produces the force opposing the motion of the vehicle.

3.16 power-assisted braking system - braking system in which one or more energy sources assist the muscular effort of the driver in applying the braking force. Note: a vacuum-assisted braking system with a vacuum booster is an example.

3.17 maximum velocity, V_{max} - highest speed the vehicle can reach in the lightly loaded condition.

4 Structural and functional requirements

4.1.1 The all-terrain vehicle is required to be fitted with braking systems for deceleration, stopping and parking that meet the performance requirements.

4.1.2 The brake friction linings are not to contain asbestos.

4.1.3 With proper lubrication and adjustment, operation of the braking system is to be smooth and free.

4.1.4 The thickness of the friction lining is to be visible without dismantling the brake; where it is not visible, the wear is to be assessable through a device designed for that purpose.

4.1.5 Wear of the friction lining is to be compensated by manual or automatic adjustment, and the brake is to be adjustable to an effective working position before the lining reaches the point at which it needs replacement.

4.1.6 After correct adjustment, the parts of the braking system are not to touch unrelated parts while working.

4.1.7 In a split service brake system, leakage of one hydraulic sub-system is not to affect

the braking capability of the other sub-systems.

4.1.8 Each brake circuit of a hydraulic braking system is to have a reservoir whose minimum capacity is 1.5 times the volume of fluid needed to take up the adjustment of all the friction linings of that circuit from their new position to their wear limit.

4.1.9 The reservoir of a hydraulic braking system is to be designed and made so that its fluid level can be checked easily, and the brake fluid is not to corrode the related parts of the system.

4.1.11 A vehicle fitted with a split service brake system is to carry a red warning lamp. The lamp lights when the ignition switch is turned on and goes out once the function check is complete. It indicates a hydraulic failure occurring with a control force on the control not greater than 90 N, or a master cylinder reservoir level, with the control not operated, below the higher of the minimum level given in the technical documentation of the vehicle and one half of the reservoir capacity. The lamp keeps indicating for as long as the fault is present and the ignition switch is in the on position.

4.1.12 During and after the test, the friction material is not to separate from the shoe, and in the case of a hydraulic brake the brake fluid is not to leak.

4.2.1 A four-wheel all-terrain vehicle (ATV) is to have separately operated front and rear braking systems, or one split braking system, or one combined brake system controlling the brakes on all wheels together with a secondary brake system that may be the parking brake system. The control of the separately operated front brake system is a brake lever on the right handlebar, and the separately operated rear brake system is operated by a foot pedal at the right footrest; on vehicles without a clutch lever a brake lever on the left handlebar may be used. When braking with a hand lever, the hand is not to leave the handlebar. Where a combined brake system is used, the vehicle is to have a secondary brake system, which may be the parking brake system, but whose control and transmission device are not to be the same as those of the service brake.

4.2.1.6 A four-wheel all-terrain vehicle meeting any one of the following conditions is to be fitted with a split service brake system or a combined service brake system operated by a foot pedal, together with a secondary brake system that may be the parking brake system: kerb mass over 350 kg, the battery mass being excluded for electric drive; maximum design speed over 50 km/h; engine cylinder capacity over 50 cubic centimetres; maximum net power output over 4 kW, or maximum continuous rated power over 4 kW for electric drive.

4.2.2 A multi-purpose all-terrain vehicle (UV) and a go-kart are to be fitted with a split service brake system or a combined service brake system operated by a foot pedal, and also with a secondary brake system that may be the parking brake system.

4.3.1 Whatever the speed, the load and the uphill or downhill gradient, the service brake system is to control the vehicle and bring it to a safe, rapid and effective stop, the braking

action being progressive; the vehicle is to be built so that the driver can operate the control easily from the normal driving position without taking both hands off the steering wheel or handlebar.

4.3.2 If the service brake system fails, the secondary brake system is to stop the vehicle within a suitable distance with a progressive action, the driver keeping at least one hand on the steering wheel or handlebar from the normal driving position.

4.3.3 The parking brake system is to lock the working parts by purely mechanical means so that the vehicle stays on an uphill or downhill slope even when the driver has left it; the driver is to be able to operate it from the seat, and it is to have a separate control, distinct from that of the service brake system.

5 Braking system tests and performance requirements

5.1 The braking system tests and performance requirements for category Y four-wheel all-terrain vehicles and category Y go-karts follow Annex A.

5.2.1.1 Performance of the service brake system, the secondary brake system included, is judged from the braking distance and/or the mean fully developed deceleration, measured under the stated conditions at the corresponding initial speed. The test speed is to be within ± 5 km/h of the specified value, and a corrected distance is used where the actual speed departs from the specified one; the document gives the equation for the braking distance at the actual speed, the equation for the corrected braking distance and the equation for the mean fully developed deceleration, with braking distance in metres, vehicle speed in kilometres per hour and a variable fixed by the particular test.

5.2.1.2 The instruments for control force and deceleration are to record both continuously; speed and distance instruments are to be accurate to within 1 %; the braking force instrument is to record the maximum value and the maximum difference during the build-up of braking force, with an accuracy within 5 %.

5.2.1.3 The test area for dynamic braking tests is to be level, clean and dry, with a good coefficient of adhesion and a gradient not greater than 1 %. The test lane width is 2.5 m plus the width of the vehicle. Parking brake tests are run on a plane slope of 18 % gradient that is clean, dry and does not deform under the weight of the test vehicle.

5.2.1.4 Ambient temperature is 4 °C to 45 °C and wind speed does not exceed 5 m/s.

5.2.1.5 Tyres are inflated to the pressure specified by the manufacturer for the rated load condition, the vehicle is set to its normal running condition, tyre wear does not exceed 20 % of the tread depth, the load is distributed as required by the manufacturer and stated in the test report, and removable speed limiters are removed while adjustable ones are set to allow the maximum speed to be reached.

5.2.1.6 The driver mass is 75 kg and the driver keeps the same normal driving position