



SURFACE VEHICLE STANDARD

J2608™

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(R) Off Throttle Steering and Obstacle Avoidance Capabilities of Personal Watercraft

RATIONALE

Alignment with Section 16 of ISO 13590:2022. Most changes in this document are verbiage and document layout for increased clarification. There are some minor technical changes to align with ISO standards. The title was amended to account for the alternative braking system.

1. SCOPE

This SAE Standard establishes a uniform test procedure and performance requirements for off throttle steering and obstacle avoidance capabilities of personal watercraft.

Personal watercrafts intended to be operated by a single operator who either stands or kneels in a tray located behind a moveable handlepole are exempted from this SAE Standard.

This SAE Standard does not apply to outboard powered personal watercraft and jet powered surfboards.

2. REFERENCES

There are no referenced publications specified herein.

3. DEFINITIONS

3.1 ADVANCE

Distance travelled along an extension of a previous straight line course measured from the completion of steer input.

3.2 APEX MARKER

Test triangle marker closest to the turn markers.

3.3 ENTRANCE CHUTE

Area of the test course between the gate markers and the turn markers.

3.4 GATE MARKER

Marker at the beginning of the entrance chute.

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3.5 PERSONAL WATERCRAFT

A watercraft intended for sports and leisure purposes of less than 4 m in length, which uses a propulsion engine having a water jet pump as its primary source of propulsion and designed to be operated by a person or persons sitting, standing, or kneeling on the watercraft, rather than in the confines of the hull.

NOTE: The measurement methodology for the length of hull is defined in ISO 8666.

3.6 TEST TRIANGLE

Area outlined by markers that the personal watercraft is not meant to enter during the test.

3.7 TRANSFER

Perpendicular distance from an extension of a previously straight line course.

3.8 TURN MARKER

Marker at the end of the entrance chute.

4. PERFORMANCE REQUIREMENT

- 4.1 The personal watercraft shall have off throttle steering capabilities or obstacle avoidance capabilities when the personal watercraft is underway and making way that comply with the following performance requirements when tested per either the remote data access method or the physical test course method. Both methods are detailed in the following sections.
- 4.2 The personal watercraft shall run the course a minimum of three times meeting all of the specified tolerances for both left and right turns at each of the two specified test speeds and exceed the perpendicular transfer distance specified for each advance distance in Table 2 regardless of user control adjustments available on the original equipment personal watercraft.
- 4.3 Tests and documentation shall confirm:
 - a. that all portions of the personal watercraft exceed the transfer distance specified for each advance distance throughout each test and/or remain outside the designated test triangle, or
 - b. the personal watercraft comes to a halt prior to reaching the apex marker.
- 4.4 Actuation of an independent brake control throughout the testing procedure is acceptable if the brake control is operable without the operator removing their hands from the handlebar.

5. TEST REQUIREMENTS

5.1 Test Equipment

5.1.1 Speed Measuring Equipment

Capable of displaying kilometers per hour (km/h) with an accuracy of ± 2 km/h.

5.1.2 Anemometers

Capable of measuring wind speed in km/h with an accuracy of ± 4 km/h.

- 5.1.3 Position measuring equipment capable of measuring the position and course of the personal watercraft within ± 30 cm with a data sampling rate of not less than 10 samples per second.

- 5.1.4 Forward thrust throttle release indicator capable of indicating the time of release within ± 30 cm of the personal watercraft's forward motion.
- 5.1.5 Steering control turn indicator capable of indicating the end of steering input within ± 30 cm of the personal watercraft's forward motion.

5.2 Test Course - Remote Data Access Method

- 5.2.1 The remote data test course shall be arranged as the entrance chute shown in Figure 1. The test course is used as a reference point for the test operator to release the forward thrust throttle and initiate the start of the turn. The actual course of the personal watercraft shall be determined based on measurements of the personal watercraft position at the point of forward thrust throttle release, completion of steer input, and completion of the test run.
- 5.2.2 The distance between the gate marker and the turn marker shall be in accordance with Table 1, with a tolerance of ± 30 cm. These distances are the equivalent of the distance travelled in 1/2 second at the specified test speeds. If the test personal watercraft is unable to achieve the 80 km/h test speed, it shall be tested at the highest achievable speed listed in Table 2. The width of the entrance chute shall be no greater than 60 cm (± 0 cm) wider than the widest portion of the personal watercraft being tested.

Table 1 - Length of entrance chute

Test Speed km/h	Distance Between Gate and Turn Markers m
48	6.7
56	7.8
64	8.9
72	10.1
80	11.2

Table 2 - Advance distance length (m) of entrance chute

Speed (km/h)	Transfer (m) 0	Transfer (m) 1.0	Transfer (m) 2.0	Transfer (m) 3.0	Transfer (m) 4.0
48	17.7	20.1	22.3	24.7	26.8
56	22.3	24.7	26.8	29.2	31.4
64	26.8	29.2	31.4	33.8	36.0
72	31.4	33.8	36.0	39.0	40.2
80	35.7	37.8	40.2	42.4	44.6

- 5.2.3 The longitudinal advance and perpendicular transfer distances, defining the virtual test triangle/test fail zone similar to that of Figure 1 from the point of the handlebar reaching the hard over full lock position (i.e., gate marker) shall be in accordance with Table 2. The personal watercraft position, advance A axis versus transfer T axis, shall be recorded throughout the test run with the position measuring equipment in a manner similar to the illustration in Figure 1. The advance distances of each line of Table 1 are proportional to the specified test speeds. The personal watercraft shall be tested at 48 km/h and the highest achievable speed listed in Table 2.

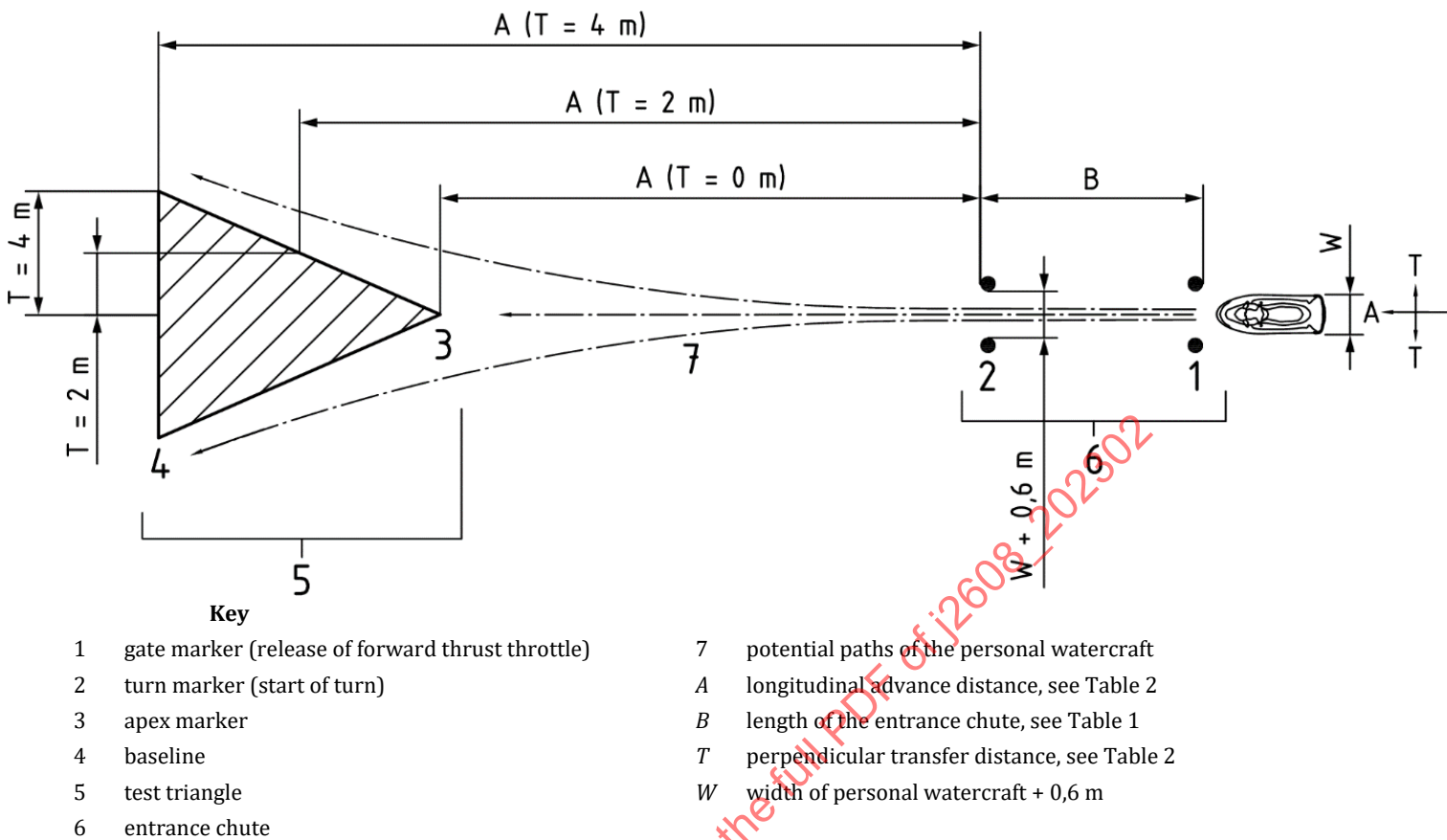


Figure 1 - Remote data course for recording advance/transfer distances

5.2.4 Data shall be plotted as advance and transfer coordinates.

5.2.5 The personal watercraft's original specifications shall be used with a minimum of 1/2 tank of fuel filled and the required safety equipment. The total payload, including the operator, shall not exceed 113 kg.

5.3 Test Course - Physical Test Course Method

5.3.1 A physical test course layout as shown in Figure 2 can also be used. The course shall be constructed with a rigid frame or equivalent, located a minimum of 1.3 m below the water surface, and securely anchored to reduce drifting of the course markers. The test triangle shall be positioned such that the apex marker is located on the centerline of the entrance chute and the base of the triangle is perpendicular to the centerline of the entrance chute.