

# ISO 15016:2015-04 (E)

## Ships and marine technology - Guidelines for the assessment of speed and power performance by analysis of speed trial data

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
1	Scope .....	1
2	Normative references .....	2
3	Terms and definitions .....	2
4	Symbols and abbreviated terms .....	4
4.1	Symbols .....	4
4.2	Abbreviated terms .....	8
5	Responsibilities .....	8
5.1	Ship builders' responsibilities .....	8
5.2	The Trial Team .....	9
6	Trial preparations .....	9
6.1	Step 1: Installation and Calibration .....	9
6.2	Step 2: S/P trial agenda and pre-trial meeting .....	10
7	Ship's condition .....	11
7.1	Displacement .....	11
7.2	Trim .....	11
7.3	Hull and propeller .....	11
8	Trial boundary conditions .....	11
8.1	Location .....	12
8.2	Wind .....	12
8.3	Sea state .....	12
8.4	Water depth .....	13
8.5	Current .....	14
9	Trial procedures .....	14
9.1	Parameters that shall be recorded .....	14
9.2	Parameters measured during each run .....	14
9.3	Parameters measured at the speed trial site .....	15
9.4	General information .....	15
9.5	Tank test information .....	15
9.6	Scope and conduct of the measurements .....	16
9.6.1	Ship track and speed over ground .....	16
9.6.2	Torque .....	16
9.6.3	Wind .....	16
9.6.4	Water depth .....	16
9.6.5	Waves .....	16
9.6.6	Temperature and density .....	17
9.6.7	Current .....	17
10	Conduct of the trial .....	17
10.1	Initiation .....	17

10.2	Ship's track during trial .....	17
10.3	Run duration and timing .....	18
10.4	Trial direction .....	18
10.5	Steering .....	18
10.6	Approach .....	18
10.7	Number of speed runs .....	18
10.7.1	`Iterative' method .....	18
10.7.2	`Mean of means' method .....	19
11	Data acquisition .....	19
11.1	General data .....	20
11.2	Data on each run .....	20
11.3	Acquisition system .....	21
11.3.1	Minimum data .....	21
11.3.2	System requirements .....	21
11.3.3	Location .....	22
11.4	Manual data collection .....	22
12	Analysis procedure .....	24
12.1	General remarks .....	24
12.2	Description of the analysis procedure .....	24
12.2.1	Resistance data derived from the acquired data .....	25
12.2.2	Evaluation of the acquired data .....	25
12.2.3	Evaluation based on Direct Power Method .....	26
12.2.4	Correction of the measured ship's speed due to the effect of current .....	29
12.2.5	Correction of the ship's speed due to the effects of shallow water .....	30
12.2.6	Correction of the ship's performance due to the effects of displacement .....	30
12.2.7	Conversion of power curve from trial condition to full load/ stipulated condition .....	30
13	Processing of the results .....	30
14	Reporting .....	31
15	Example of speed trial data analysis .....	32
Annex A	(normative) General information and trial log sheet .....	34
Annex B	(normative) Beaufort scale for wind velocity .....	35
Annex C	(normative) Resistance increase due to wind .....	38
Annex D	(normative) Resistance increase due to waves .....	48
Annex E	(normative) Effect of water temperature and water density .....	61
Annex F	(normative) Effect of current .....	62
Annex G	(normative) Effect of shallow water .....	66
Annex H	(normative) Effect of displacement .....	67
Annex I	(normative) Conversion from trial condition to other stipulated load conditions .....	68
Annex J	(normative) Derivation of load variation coefficients .....	70
Annex K	(informative) Analysis of direct power method .....	75
Bibliography	.....	85