

ISO 5305:2024-01 (E)

Noise measurements for UAS (unmanned aircraft systems)

Contents

Page

Foreword.....	v
Introduction.....	vi
1 Scope.....	1
2 Normative reference documents.....	1
3 Terms and definitions.....	1
4 Abbreviated terms.....	5
5 Instrumentation.....	5
5.1 General.....	5
5.2 Calibration.....	5
6 General requirements.....	5
6.1 General.....	5
6.2 Requirements of acoustic far-field condition.....	6
6.3 Requirements of position of UAS to reduce aerodynamic flow effect.....	6
6.4 Requirements of position control.....	6
6.4.1 General.....	6
6.4.2 Requirement of position accuracy.....	6
6.4.3 Requirement of speed accuracy.....	7
6.5 Requirements of background noise.....	7
7 Anechoic chamber tests.....	7
7.1 General.....	7
7.2 Requirements of anechoic chamber.....	8
7.2.1 Size.....	8
7.2.2 Anechoic chamber qualification.....	8
7.3 Measurement configurations.....	8
7.3.1 General.....	8
7.3.2 Hover and yaw: 4-microphone approach.....	10
7.3.3 Hover and yaw: multiple microphone approach.....	12
7.3.4 Take-off and landing.....	13
7.3.5 Cruise flight.....	15
8 Anechoic wind tunnel tests.....	16
8.1 General.....	16
8.2 Requirements of anechoic wind tunnel.....	16
8.2.1 General.....	16
8.2.2 Wind tunnel test configurations.....	16
8.2.3 Refraction correction.....	17
8.2.4 Microphone clearance distance.....	17
8.2.5 Anechoic chamber size.....	17
8.3 Measurement configurations.....	17
8.3.1 General.....	17
8.3.2 Take-off and landing.....	18
8.3.3 Cruise flight.....	20
9 Outdoor tests.....	22
9.1 General.....	22
9.2 Recommendations of the test site.....	23
9.3 Recommendations and requirements of the meteorological conditions.....	24

9.4	Microphone configuration and layout	24
9.4.1	Microphone configuration	24
9.4.2	Microphone layout	24
9.5	Measurement corrections and limitations	25
9.6	Measurement procedures	26
9.6.1	General	26
9.6.2	Hover and yaw	26
9.6.3	Take-off and landing	26
9.6.4	Cruise flight	27
10	Uncertainties	27
10.1	General	27
10.2	Uncertainty sources and requirements	27
10.3	Evaluation of the uncertainty	28
11	Information to report	29
11.1	Test methods	29
11.2	Selected noise metrics	29
11.3	UAS under test	29
11.4	Test environment	29
11.5	Data acquisition system	29
11.6	Measurement	30
11.7	Results	30
Annex A	(Informative) Examples of the procedures to compute noise metrics from the recorded sound pressure signals	31
Annex B	(Informative) Numerical examination of the acoustic far-field condition	34
Annex C	(Informative) Measurement of far-field condition for a UAS propeller noise	38
Annex D	(Informative) An example of adjusting the UAS location to realize different equivalent observer angles	40
Annex E	(Informative) The effect of using windscreen for UAS propeller noise measurements	41
Annex F	(Informative) Examples of ground-board mounted microphone configurations	43
Annex G	(Informative) Uncertainty analysis example of a UAS noise measurement	45
Bibliography	48