

# ISO 19683:2017-07 (E)

## Space systems - Design qualification and acceptance tests of small spacecraft and units

---

<b>Contents</b>		<b>Page</b>
Foreword .....		vii
Introduction .....		viii
1	Scope .....	1
2	Normative references .....	2
3	Terms and definitions .....	2
4	Abbreviated terms .....	3
5	General requirements .....	4
5.1	Tailoring .....	4
5.2	Qualification test .....	4
5.3	Acceptance test .....	4
5.4	Proto-flight test .....	4
5.5	Retest .....	4
5.6	Test documentation .....	4
5.6.1	Test plan, specification and procedure .....	5
5.6.2	Test report .....	5
5.6.3	Datasheet for unit test results .....	6
5.7	Test conditions, tolerances and accuracies .....	6
5.8	Functional test .....	6
5.9	Design, verification and testing philosophy .....	6
6	Satellite system tests .....	7
6.1	Test items .....	7
6.2	Test level and duration .....	8
7	Unit tests .....	8
7.1	Test items .....	8
7.2	Test levels and duration .....	14
8	Test requirements .....	17
8.1	Electrical interface .....	17
8.1.1	Purpose of test .....	17
8.1.2	Test facilities and setup as basic requirements .....	18
8.1.3	Test article configuration .....	18
8.1.4	Monitoring during test .....	18
8.1.5	Test levels and duration .....	18
8.1.6	Test conditions and guidelines .....	18
8.2	Functional test .....	18
8.2.1	Purpose of test .....	18
8.2.2	Test facilities and setup as basic requirements .....	18
8.2.3	Test article configuration .....	18
8.2.4	Monitoring during test .....	18
8.2.5	Test levels and duration .....	18
8.2.6	Test conditions and guidelines .....	19
8.3	Mission test .....	19
8.3.1	Purpose of test .....	19

8.3.2	Test facilities and setup as basic requirements .....	19
8.3.3	Test article configuration .....	19
8.3.4	Monitoring during test .....	19
8.3.5	Test levels and duration .....	19
8.3.6	Test conditions and guidelines .....	19
8.4	Total Ionization Dose (TID) test .....	19
8.4.1	Purpose of test .....	19
8.4.2	Test facilities and setup as basic requirements .....	20
8.4.3	Test article configuration .....	20
8.4.4	Monitoring during test .....	20
8.4.5	Test levels and duration .....	20
8.4.6	Test conditions and guidelines .....	20
8.5	Single Event Effect (SEE) test .....	20
8.5.1	Purpose of test .....	20
8.5.2	Test facilities and setup as basic requirements .....	20
8.5.3	Test article configuration .....	20
8.5.4	Monitoring during test .....	21
8.5.5	Test levels and duration .....	21
8.5.6	Test conditions and guidelines .....	21
8.5.7	Test conditions and guidelines .....	21
8.6	Spacecraft Charging Induced Electrostatic Discharge (ESD) test .....	21
8.6.1	Purpose of test .....	21
8.6.2	Test facilities and setup as basic requirements .....	21
8.6.3	Test article configuration .....	22
8.6.4	Monitoring during test .....	22
8.6.5	Test levels and duration .....	22
8.6.6	Test conditions and guidelines .....	22
8.7	Electromagnetic Compatibility (EMC) test .....	22
8.7.1	Purpose of test .....	22
8.7.2	Test facilities and setup as basic requirements .....	22
8.7.3	Test article configuration .....	22
8.7.4	Monitoring during test .....	22
8.7.5	Test levels and duration .....	23
8.7.6	Test conditions and guidelines .....	23
8.8	Deployment test .....	23
8.8.1	Purpose of test .....	23
8.8.2	Test facilities and setup as basic requirements .....	23
8.8.3	Test article configuration .....	23
8.8.4	Monitoring during test .....	23
8.8.5	Test levels and duration .....	23
8.8.6	Test conditions and guidelines .....	23
8.9	Magnetic field test .....	24
8.10	Antenna pattern test .....	24
8.11	Alignment measurement .....	24
8.12	Physical property measurement .....	24
8.13	Launcher/Spacecraft interface test .....	24
8.14	Quasi-static load test .....	24
8.14.1	Purpose of test .....	24
8.14.2	Test facilities and setup as basic requirements .....	24
8.14.3	Test article configuration .....	24
8.14.4	Monitoring during test .....	24
8.14.5	Test levels and duration .....	24
8.14.6	Test conditions and guidelines .....	25
8.15	Modal survey .....	25
8.15.1	Purpose of test .....	25
8.15.2	Test facilities and setup as basic requirements .....	25
8.15.3	Test article configuration .....	25
8.15.4	Monitoring during test .....	25
8.15.5	Test levels and duration .....	25
8.15.6	Test conditions and guidelines .....	25
8.16	Sinusoidal vibration test .....	25

8.16.1	Purpose of test .....	25
8.16.2	Test facilities and setup as basic requirements .....	25
8.16.3	Test article configuration .....	25
8.16.4	Monitoring during test .....	26
8.16.5	Test levels and duration .....	26
8.16.6	Test conditions and guidelines .....	26
8.17	Random vibration test .....	26
8.17.1	Purpose of test .....	26
8.17.2	Test facilities and setup as basic requirements .....	26
8.17.3	Test article configuration .....	26
8.17.4	Monitoring during test .....	26
8.17.5	Test levels and duration .....	26
8.17.6	Test conditions and guidelines .....	26
8.18	Acoustic test .....	27
8.18.1	Purpose of test .....	27
8.18.2	Test facilities and setup as basic requirements .....	27
8.18.3	Test article configuration .....	27
8.18.4	Monitoring during test .....	27
8.18.5	Test levels and duration .....	27
8.18.6	Test conditions and guidelines .....	27
8.19	Shock test .....	27
8.19.1	Purpose of test .....	27
8.19.2	Test facilities and setup as basic requirements .....	27
8.19.3	Test article configuration .....	27
8.19.4	Monitoring during test .....	27
8.19.5	Test levels and duration .....	28
8.19.6	Test conditions and guidelines .....	28
8.20	Thermal balance test .....	28
8.20.1	Purpose of test .....	28
8.20.2	Test facilities and setup as basic requirements .....	28
8.20.3	Test article configuration .....	28
8.20.4	Monitoring during test .....	28
8.20.5	Test levels and duration .....	28
8.20.6	Test conditions and guidelines .....	28
8.21	Thermal vacuum test .....	29
8.21.1	Purpose of test .....	29
8.21.2	Test facilities and setup as basic requirements .....	29
8.21.3	Test article configuration .....	29
8.21.4	Monitoring during test .....	29
8.21.5	Test levels and duration .....	29
8.21.6	Test conditions and guidelines .....	29
8.22	Functional test in vacuum .....	30
8.22.1	Purpose of test .....	30
8.22.2	Test facilities and setup as basic requirements .....	30
8.22.3	Test article configuration .....	30
8.22.4	Monitoring during test .....	30
8.22.5	Test levels and duration .....	30
8.22.6	Test conditions and guidelines .....	30
8.23	Cold/Hot start test .....	30
8.23.1	Purpose of test .....	30
8.23.2	Test facilities and setup as basic requirements .....	30
8.23.3	Test article configuration .....	31
8.23.4	Monitoring during test .....	31
8.23.5	Test levels and duration .....	31
8.23.6	Test conditions and guidelines .....	31
8.24	Thermal cycle functional test .....	31
8.24.1	Purpose of test .....	31
8.24.2	Test facilities and setup as basic requirements .....	31
8.24.3	Test article configuration .....	31
8.24.4	Monitoring during test .....	32
8.24.5	Test levels and duration .....	32
8.24.6	Test conditions and guidelines .....	32

8.25	Thermal cycle endurance test .....	32
8.25.1	Purpose of test .....	32
8.25.2	Test facilities and setup as basic requirements .....	32
8.25.3	Test article configuration .....	32
8.25.4	Monitoring during test .....	32
8.25.5	Test levels and duration .....	33
8.25.6	Test conditions and guidelines .....	33
8.26	Pressure test .....	33
8.27	Leakage test .....	33
8.28	Microvibration test .....	33
8.28.1	Purpose of test .....	33
8.28.2	Test facilities and setup as basic requirements .....	33
8.28.3	Test article configuration .....	33
8.28.4	Monitoring during test .....	33
8.28.5	Test levels and duration .....	33
8.28.6	Test conditions and guidelines .....	34
8.29	Burn-in and wear-in test .....	34
8.30	End-to-end mission simulation .....	34
8.30.1	Purpose of test .....	34
8.30.2	Test facilities and setup as basic requirements .....	34
8.30.3	Test article configuration .....	34
8.30.4	Monitoring during test .....	34
8.30.5	Test levels and duration .....	34
8.30.6	Test conditions and guidelines .....	34
8.31	Bake out and outgas test .....	35
8.31.1	Purpose of test .....	35
8.31.2	Test facilities and setup as basic requirements .....	35
8.31.3	Test article configuration .....	35
8.31.4	Monitoring during test .....	35
8.31.5	Test levels and duration .....	35
8.31.6	Test conditions and guidelines .....	35
8.32	Tailoring and waiver guides .....	36
Annex A (normative) Tailoring and waiver guides .....		37
Annex B (informative) Basis of test levels and duration .....		42
Annex C (informative) Design, verification and testing philosophy for small spacecrafts .....		45
Annex D (informative) Test selection logic flow .....		68
Annex E (informative) Environment stress screening and burn-in .....		80
Annex F (informative) Thermal vacuum or thermal cycle? .....		81
Bibliography .....		84