

DIN EN 16603-35-01:2014-11 (E)

Space engineering - Liquid and electric propulsion for spacecraft; English version
EN 16603-35-01:2014

Contents	Page
Foreword	5
Introduction	6
1 Scope	7
2 Normative references	8
3 Terms, definitions and abbreviated terms	9
3.1 Terms from other standards.....	9
3.2 Abbreviated terms.....	9
4 Liquid propulsion systems for spacecraft	10
4.1 Overview	10
4.2 Functional.....	10
4.2.1 Mission.....	10
4.2.2 Functions	11
4.3 Constraints	11
4.3.1 Accelerations	11
4.3.2 Pressure vessels and pressurized components	12
4.3.3 Induced and environmental temperatures	12
4.3.4 Thermal fluxes	12
4.3.5 Thruster plume effects	12
4.4 Interfaces.....	12
4.5 Design	13
4.5.1 General	13
4.5.2 Selection	14
4.5.3 Sizing	15
4.5.4 Design development	16
4.5.5 Contamination.....	17
4.5.6 Draining	17
4.5.7 Risk of explosion.....	18
4.5.8 Components guidelines.....	18
4.5.9 Filters	20

4.5.10	Pressure vessels.....	20
4.5.11	Propellant tanks	20
4.5.12	Blow-down ratio	22
4.5.13	Flow calibration	22
4.5.14	Thrusters.....	22
4.5.15	Thrust-vector control (TVC).....	23
4.5.16	Pyrotechnic devices	24
4.5.17	Mass imbalance	24
4.5.18	Monitoring and failure detection	24
4.5.19	Ground support equipment (GSE).....	24
4.6	Verification.....	25
4.6.1	General.....	25
4.6.2	Verification by analysis.....	26
4.6.3	Verification by test.....	28
4.6.4	Data exchange for models	33
4.7	Quality factors.....	33
4.7.1	Reliability	33
4.7.2	Production and manufacturing process	33
4.8	Operation and disposal.....	33
4.8.1	General.....	33
4.8.2	Operations on ground	34
4.8.3	Tank operation.....	34
4.8.4	Disposal.....	34
4.9	Supporting documents.....	35
5	Electric propulsion systems for spacecraft	36
5.1	Overview	36
5.2	Functional.....	37
5.2.1	Mission.....	37
5.2.2	Function.....	37
5.2.3	Performance	37
5.3	Constraints	38
5.3.1	General.....	38
5.3.2	Thermal fluxes	38
5.3.3	Thruster plume effects	39
5.3.4	High frequency current loops	39
5.3.5	Electromagnetic compatibility.....	39
5.3.6	Spacecraft charging	39

5.4	Interfaces.....	40
5.4.1	Interface with the spacecraft	40
5.4.2	Interface with the power bus	40
5.5	Design	41
5.5.1	General	41
5.5.2	Selection	42
5.5.3	Sizing	43
5.5.4	Design development	44
5.5.5	Contamination.....	44
5.5.6	Propellant protection	45
5.5.7	Components guidelines.....	45
5.5.8	Propellant management assembly	45
5.5.9	Pressure vessels.....	46
5.5.10	Propellant tanks	47
5.5.11	Blow-down ratio	47
5.5.12	Thrusters.....	47
5.5.13	Thrust-vector control	50
5.5.14	Power supply, control and processing subsystem	50
5.5.15	Electrical design.....	51
5.5.16	Pyrotechnic devices	52
5.5.17	Monitoring and failure detection	52
5.5.18	Ground support equipment (GSE).....	53
5.6	Verification.....	53
5.6.1	General	53
5.6.2	Verification by analysis.....	54
5.6.3	Verification by test.....	55
5.6.4	Data exchange for models	57
5.7	Quality factors.....	57
5.7.1	Reliability	57
5.7.2	Production and manufacturing	57
5.8	Operation and disposal	57
5.9	Supporting documents.....	58
	Bibliography.....	59
	Tables	
	Table 4-1: Component failure modes.....	18