

DIN EN 16602-70:2016-12 (E)

Space product assurance - Materials, mechanical parts and processes; English
version EN 16602-70:2016

Contents	Page
European foreword	7
1 Scope	8
2 Normative references	9
3 Terms, definitions and abbreviated terms	11
3.1 Terms from other standards	11
3.2 Terms specific to the present standard	11
3.3 Abbreviated terms	12
3.4 Nomenclature	13
4 General requirements	14
4.1 MMPP management requirements.....	14
4.1.1 Overview.....	14
4.1.2 MMPP plan.....	14
4.1.3 MMPP Manager and MPCB	17
4.2 Management and consolidation of the activities.....	18
4.2.1 Overview.....	18
4.2.2 Establishing and processing of lists.....	18
4.2.3 Management of the lists	19
4.2.4 Supplier role and responsibilities.....	20
4.3 Technical constraints.....	21
4.4 Cleanliness and contamination control.....	21
4.5 Safety hazardous mechanical parts and materials.....	21
4.6 Optical, mechanical or electrical GSE hardware	22
4.7 Selection of space materials and processes	22
5 Materials control	23
5.1 Technical criteria for selection of materials	23
5.1.1 General.....	23
5.1.2 Temperature	23
5.1.3 Thermal cycling and thermo optical.....	23
5.1.4 Vacuum	24

5.1.5	Offgassing and toxicity.....	24
5.1.6	Flammability	25
5.1.7	Radiation	25
5.1.8	Electrical charge and discharge.....	25
5.1.9	Corrosion	25
5.1.10	Stress-corrosion.....	26
5.1.11	Fluid compatibility	26
5.1.12	Galvanic compatibility	26
5.1.13	Atomic oxygen	26
5.1.14	Micrometeoroids and debris	27
5.1.15	Moisture absorption and desorption	27
5.1.16	Mechanical contact surface effects: cold welding, fretting, wear	29
5.1.17	Life.....	29
5.1.18	Bacterial and fungus growth	29
5.1.19	Hydrogen embrittlement	29
5.2	Selection.....	30
5.2.1	General.....	30
5.2.2	Constraints	31
5.3	Declared materials list (DML)	31
5.4	Criticality analysis	32
5.4.1	Overview.....	32
5.4.2	Requirements	32
5.5	Evaluation and validation phases	32
5.5.1	General.....	32
5.5.2	Evaluation phase	32
5.5.3	Validation phase	33
5.5.4	Approval phase.....	33
5.5.5	Deviation request.....	33
5.6	Procurement of materials	34
5.6.1	Procurement specifications	34
5.6.2	Incoming inspection procedure.....	34
5.7	Use of materials.....	34
5.7.1	Validation status of materials.....	34
5.7.2	Traceability of materials.....	35
5.7.3	Packaging, storage, removal from storage.....	35
5.7.4	Limited-life materials before implementation	35
5.7.5	Limited-life materials after implementation	35
5.7.6	Materials nonconformances and alerts.....	35

5.7.7	Health and safety.....	35
6	Mechanical parts control	36
6.1	Selection of mechanical parts	36
6.2	Selection.....	36
6.3	Declared mechanical parts list (DMPL)	36
6.4	Criticality analysis	36
6.4.1	Overview.....	36
6.4.2	Requirements	37
6.5	Evaluation and qualification phases	37
6.5.1	General.....	37
6.5.2	Evaluation phase	37
6.5.3	Qualification phase.....	38
6.5.4	Approval phase.....	38
6.5.5	Deviation request.....	38
6.6	Procurement of mechanical parts.....	38
6.6.1	General.....	38
6.6.2	Procurement specification	39
6.6.3	Source inspection.....	39
6.6.4	Incoming inspection procedure.....	39
6.7	Use of mechanical parts.....	39
6.7.1	Qualification status of mechanical parts	39
6.7.2	Traceability of mechanical parts	39
6.7.3	Packaging, storage, removal from storage.....	40
6.7.4	Limited-life mechanical parts or parts subject to wearout	40
6.7.5	Mechanical parts nonconformances and alerts	40
7	Process control	41
7.1	Specifications or procedures	41
7.2	<< deleted >>	41
7.3	Process selection and training	41
7.4	Declared processes list (DPL).....	42
7.5	Criticality analysis.....	42
7.5.1	Overview.....	42
7.5.2	Requirements	42
7.6	Evaluation and verification phase.....	43
7.6.1	General.....	43
7.6.2	Evaluation phase	43
7.6.3	Verification phase.....	43
7.6.4	Approval phase.....	44

7.6.5	Deviation request.....	44
7.7	Use of a process.....	44
7.7.1	Verification status of a process.....	44
7.7.2	Re-verification of a process.....	44
7.7.3	Implementation of a process.....	44
7.7.4	Traceability of processes.....	45
7.7.5	Process nonconformances and alerts.....	45
7.7.6	Mandatory inspection points (MIP).....	45
7.7.7	Packaging, storage, removal from storage.....	45
Annex A (normative)	Declared materials list (DML) - DRD.....	46
A.1	DRD identification.....	46
A.2	Expected response.....	46
Annex B (normative)	Declared mechanical parts list (DMPL) - DRD.....	53
B.1	DRD identification.....	53
B.2	Expected response.....	53
Annex C (normative)	Declared process list (DPL) - DRD.....	59
C.1	DRD identification.....	59
C.2	Expected response.....	59
Annex D (normative)	Request for approval (RFA) - DRD.....	64
D.1	DRD identification.....	64
D.2	Expected response.....	64
Annex E (informative)	Relationship between materials, mechanical parts, processes activities and programme phases.....	68
E.1	Feasibility phase (phase A).....	68
E.2	Preliminary definition phase (phase B).....	68
E.3	Detailed definition and production phase (phase C or D).....	68
E.4	Utilization phase (phase E).....	69
Annex F (informative)	MMPP documents delivery with respect to milestones..	70
Bibliography.....		72

Figures

Figure 4-1: Materials, mechanical parts and processes flow chart.....	15
---	----

Figure A-1 : Example of a realized DML.....	52
---	----

Figure B-1 : Example of a realized DMPL 58

Figure C-1 : Example of realized DPL 63

Figure D-1 : Example of RFA (Page 1 of 2) 66

Figure D-1 : Example of RFA (Page 2 of 2) 67

Tables

Table 4-1: Steps to be taken to get approval for materials, mechanical parts and processes (MMPP)..... 17

Table 5-1: Compatible couples for bimetallic contacts 28

Table A-1 : Material group numbers 47

Table A-2 : Environmental code 49

Table A-3 : Size code 50

Table A-4 : Approval status 51

Table B-1 : Mechanical part group numbers 54

Table B-2 : Environmental code 55

Table B-3 : Approval status 57

Table C-1 : Process group numbers 60

Table C-2 : Approval status..... 62

Table F-1 : MMPP documents delivery w.r.t. milestones 71