DIN EN 16603-33-11:2019-09 (E)

Space engineering - Explosive subsystems and devices; English version EN 16603-33-11:2019

Contents

Page

European Foreword 6

1 Scope 8

2 Normative references 9

3 Terms, definitions and abbreviated terms 11

3.1 Terms defined in other standards 11

3.2 Terms specific to the present standard 11

3.3 Abbreviated terms 15

3.4 Symbols 16

4 Requirements 17

4.1 General 17

4.1.1 Overview 17

4.1.2 Properties 17

4.2 Design 18

4.2.1 General 18

4.2.2 Reliability and confidence 18

4.2.3 Performance 19

4.2.4 Wanted and unwanted response 19

4.2.5 Dimensioning 19

4.3 Mission 21

4.4 Functionality 21

4.5 Safety 22

4.5.1 General 22

4.5.2 Prevention of unintentional function 22

4.6 Survival and operational conditions 24

4.7 Interface requirements 24

4.7.1 Overview 24

4.7.2 Functional 24

4.7.3 Internal 25

4.7.4 External 25

4.8 Mechanical, electrical, and thermal requirements 25
4.8.1 Mechanical 25
4.8.2 Electrical 27
4.8.3 Thermal 30
4.8.4 Status check 31
4.9 Materials 32
4.10 Non-explosive components and equipment 33
4.10.1 Connectors 33
4.10.2 Wiring 33
4.10.3 Shielding 33
4.10.4 Faraday cap 34
4.10.5 Safety cap 34
4.10.6 Power 34
4.10.7 Arm plug receptacle 34
4.10.8 Safe plug 35
4.10.9 Arm plug 35
4.10.10 Test plug 36
4.10.11 Safe and arm device 36
4.10.12 Initiator harness connector 38
4.10.13 Initiator test substitute 38
4.11 Explosive components 38
4.11.1 General 38
4.11.2 Initiators, cartridges, detonators, and packaged charges 40
4.11.3 Integral initiator connectors 45
4.11.4 Transfer devices 46
4.11.5 Safe and arm devices containing explosive 48
4.11.6 Gas generators 48
4.11.7 Shaped charges 49
4.11.8 Expanding tube devices 50
4.11.9 Distribution boxes 52
4.11.10 Explosive delays 53
4.12 Explosively actuated devices 54
4.12.1 General 54
4.12.2 Separation nuts and separation bolts 55
4.12.3 Pullers 56
4.12.4 Pusher 56
4.12.5 Cutters 57

4.12.6 Valves 57
4.13 Items external to the flight equipment 58
4.13.1 GSE 58
4.13.2 Test equipment 58
4.13.3 Launch site 58
4.14 Verification 59
4.14.1 General 59
4.14.2 Inspection 59
4.14.3 Tests 59
4.14.4 Qualification and lot acceptance 61
4.15 Transport, facilities, handling and storage 64
4.15.1 General 64
4.15.2 Transport 64
4.15.3 Facilities 65
4.15.4 Handling 65
4.16 In-service 66
4.16.1 Information feedback 66
4.16.2 Launch site procedures 66
4.16.3 Monitoring 66
4.17 Product assurance 66
4.17.1 General 66
4.17.2 Dependability 67
4.17.3 Assembly, integration and test 67

Annex A (informative) Component qualification test levels 68

Annex B (informative) List of deliverable documents 70

Annex C (informative) Safety Data Sheet (example courtesy of GICAT) 71

Tables

Table 4-1 <<deleted>> 21
Table 4-2 Explosive component colour code 26
Table 4-3 Common requirements for initiator, cartridge, detonator, and packaged charge properties 41
Table 4-4 Requirements for low voltage initiator properties 42
Table 4-5 Requirements for high voltage initiator properties 43
Table 4-6 Requirements for laser initiator properties 43
Table 4-7 Requirements for mechanical initiator properties 44

Table 4-8 Requirements for packaged charge properties 44
Table 4-9 Requirements for through-bulkhead initiators properties.....45
Table 4-10 General requirements for transfer device properties 46
Table 4-11 Requirements for transfer line assembly properties 47
Table 4-12 Common requirements for gas generator 48
Table 4-13 Requirements for shaped charge properties 49
Table 4-14 Requirements for expanding tube device properties 51
Table 4-15 Requirements for distribution box properties.....52
Table 4-16 Requirements for explosive delay properties 53
Table 4-17 General requirements for explosively actuated device properties 54
Table 4-18 Requirements for separation nut and separation bolt properties 55
Table 4-19 Requirements for puller properties.....56
Table 4-20 Requirements for pusher properties 56
Table 4-21 Requirements for cutter properties 57
Table 4-22 Requirements for valve properties 57
Table 4-23 Safety tests.....60
Table 4-24 Reliability methods 61
Table 4-25 Qualification tests 62
Table 4-26 Acceptance tests 63

Table A-1 Component qualification test levels 68
Table A-2 Pyroshocks for launcher and satellites 69
Table B-1 List of deliverable documents to be used in context of this standard 70