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Guidelines for Design, Manufacture, Inspection and Testing of Electronic Enclosures

A standard developed by IPC

Association Connecting Electronics Industries

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Guidelines for Design, Manufacture, Inspection and Testing of Electronic Enclosures Assembly

Developed by the Requirements for Structural Enclosure Task Group (7-31j) of the Product Assurance Committee (7-30) of IPC

Users of this publication are encouraged to participate in the development of future revisions.

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Table of Contents

1 PREFACE 1
1.1 Scope 1
1.2 Purpose 1
1.3 Applicability 1
1.4 Classification 1
1.5 Measurement Units and Applications 2
1.6 Terms and Definitions 2
1.6.1 Supplier 2
1.7 Health and Safety 2

2 APPLICABLE DOCUMENTS 2
2.1 Department of Defense 2
2.2 U.S. Federal Standards 4
2.3 Telcordia 4
2.4 TIA 4
2.5 NASA 4
2.6 ISTA 4
2.7 IPC 4
2.8 SAE International 4
2.9 IEC 5
2.10 American Society of Mechanical Engineers 5
2.11 ASTM 5

3 ENGINEERING DESIGN 5
3.1 General 5
3.1.1 Engineering Drawings 6
3.1.2 Content of Assembly Drawings 6
3.1.3 Bill of Materials (BOM)/Parts Lists (PL) 7
3.1.4 General Design Considerations 7
3.2 Selection of Parts, Materials and Tools 11
3.2.1 Standard Parts and Materials 11
3.2.2 Non-Standard Parts and Materials 11
3.3 General Fastening 12

4 MATERIALS AND PROCESSES – METALS 12
4.1 Alloy Selection 12
4.2 Aluminum Alloys 12
4.2.1 Form 12
4.2.2 Alloys 12
4.2.3 Temper 12
4.3 Steel 12
4.3.1 Carbon Steel 12
4.3.2 Stainless Steel 13
4.4 Other Metals 14
4.5 Castings 14
4.5.1 General 14
4.5.2 Casting Drawings 14
4.6 Machined Metal (Hog-Out Construction) 18
4.6.1 Hog-Out of Thick Plate Stock (>6 inches) 18
4.7 Welding 18
4.7.1 Arc Welding 18
4.7.2 Resistance Welding (RW) 20
4.7.3 Other Welding Processes 21
4.7.4 Deciphering Weld Symbols 21
4.7.5 Classification of Welds 21
4.7.6 Procedure and Personnel Qualification 21
4.7.7 Post Weld Cleaning 22
4.7.8 In-Process and Final Visual Inspection of Welds 22
4.8 Brazing 22
4.8.1 Types of Brazing 23
4.8.2 Braze Procedure Qualification and/or Brazing Personnel Qualification 23
4.8.3 In-Process and Final Visual Inspection of Brazing 23

5 MATERIALS AND PROCESSES – NON-METALS 24
5.1 Selection and Application 24
5.1.1 Composition and Processing 24
5.1.2 Compatibility 24
5.2 Special Considerations 24
5.2.1 Chlorinated Fluorocarbons (CFCs) 24
5.2.2 Shelf-Life Limitations 24
5.3 Polymer Materials 24
5.3.1 Application 24
5.3.2 Part Design Considerations 24
5.3.3 Molded Plastic Enclosures 26
5.4 Elastomers 26
5.4.1 Application 26
5.4.2 Cured Elastomers 26
5.4.3 Non-Cured Elastomers 26
5.4.4 Silicone Elastomers 26
5.5 Foamed Plastics 26
5.5.1 Application 26
5.5.2 Outgassing and Flammability 26
5.5.3 Special Considerations 26
5.6 Plastics 26
5.7 Insulation Materials 26

5.7.1 Arc and Tracking Resistance 27
5.7.2 Laminated Plastics 27
5.7.3 Molded Thermosetting Plastics 27
5.7.4 Thermoplastics 27
5.7.5 Classes and Definitions of Insulating Materials 27
5.8 Lubricants 28
5.8.1 Application 28
5.8.2 Application Documents 28
5.8.3 Lubricant 28
5.9 Other Materials 28
5.9.1 Adhesives 28
5.9.2 Silicone 28
5.9.3 Coatings 28
5.9.4 Encapsulants 28
5.9.5 Sealing Materials 29
5.9.6 Cleaning Prior to Application 29
5.9.7 Special Considerations 29

6 MATERIALS NOT RECOMMENDED FOR USE 29
6.1 Toxic Pyrolytic Materials 30
6.2 Flammable Materials 30
6.3 Fragile or Brittle Materials 30
6.4 Mercury 30
6.5 Asbestos 30
6.6 Polychlorinated Biphenyls (PCB) 30
6.7 Polyvinyl Chloride (PVC) 30
6.8 Cadmium and Cadmium Plating 31
6.9 Other Non-Recommended Materials 31

7 MATERIALS AND PROCESSES – COMPOSITES 31
7.1 Introduction 31
7.1.1 Unique Issues for Composites 31
7.2 Limitations of Composites 33
7.3 Material System and Selection 33
7.3.1 Thermoset Resins 33
7.3.2 Thermoplastic Resins 33
7.3.3 Constituent Materials 34
7.4 Design Parameters 34
7.5 Fabrication Considerations 35
7.5.1 Cure and Consolidation Processes 35
7.5.2 Vacuum Bag Molding 35
7.5.3 Oven Cure 35
7.5.4 Autoclave Curing Processing 35
7.5.5 Press Molding 36
7.5.6 Integrally Heated Tooling 36
7.5.7 Pultrusion Die Cure and Consolidation 36
7.5.8 Resin Transfer Molding (RTM) 36
7.5.9 Thermoforming 37

8 FINAL FINISHES 38
8.1 Wash Primer 38
8.2 Chromate Conversion Coating (MIL-DTL-5541, MIL-DTL-81706) 38
8.2.1 Type I – Hexavalent Chromium 38
8.2.2 Type II – Non-Hexavalent 38
8.3 Annodization 39
8.4 Materials 39
8.4.1 Epoxies 39
8.4.2 Urethanes 39
8.4.3 Acrylics 39
8.4.4 Alkyds 39
8.4.5 Vinyls 39
8.5 Color 39
8.5.1 Federal Standard Colors 39
8.5.2 Customer Defined 39
8.5.3 Color Tolerance Sets 40
8.5.4 CIELAB Values 40
8.5.5 Specular Gloss (ASTM D 523) 40

9 NUCLEAR, BIOLOGICAL and CHEMICAL CONTAMINATION SURVIVABILITY 40

10 CORROSION CONTROL 40
10.1 Selection of Metals in Direct Contact 40
10.2 Corrosion-Resisting Metals 41
10.3 The Do's of Equipment Design 41
10.4 The Don'ts of Equipment Design 42

11 BONDING 43
11.1 Purposes of Bonding 43
11.2 Resistance Criteria 44
11.3 Direct Bonds 44
11.3.1 Contact Resistance 45
11.4 Direct Bonding Techniques 48
11.4.1 Welding 48
11.4.2 Brazing 48
11.4.3 Soft Solder 48
11.4.4 Bolts 49
11.4.5 Rivets 49
11.4.6 Conductive Adhesive 51
11.5 Indirect Bonds 51
11.5.1 Resistance 51
11.6 Surface Preparation 51
11.6.1 Solid Materials 51
11.6.2 Organic Compounds 51

11.6.3 Plating and Inorganic Finish 52
11.6.4 Corrosion By-Products 52
11.7 Completion of the Bond 52
11.8 Bond Corrosion 52
11.8.1 Chemical Basis of Corrosion 53
11.9 Workmanship 55

12 Backplanes 55
12.1 Definition 55
12.2 Function Within the Enclosure 55
12.3 Types 56
12.3.1 Passive Backplanes 56
12.3.2 Active Backplanes 56
12.4 Common Technologies Used on Backplanes 56
12.4.1 I/O Connectors 56
12.5 Design Considerations 56
12.6 Assembly Considerations 57
12.6.1 Tooling 57
12.6.2 Press Alignment and Set-Up Parameters 57
12.6.3 Inspection and Testing Considerations 57

13 Cable and Wire Harness Assemblies 58
13.1 Connector Selection 58
13.1.1 Common Connector Definitions 58
13.1.2 Top Level Considerations 59
13.1.3 Connector Overview 60
13.1.4 Connector Types 60
13.1.5 Shells 60
13.1.6 Inserts 64
13.1.7 Contacts 65
13.1.8 Coupling Mechanism 66
13.1.9 Rear Accessories 68
13.1.10 Example of Connector Part Numbering 69
13.2 Wiring Selection 69
13.2.1 Conductor Degradation 69
13.2.2 Aluminum Wire 70
13.2.3 Insulation Compatibility with Sealing and Servicing 70
13.2.4 Wire Size and De-Rating 70
13.2.5 Wire and Cable Identification 70
13.2.6 Wire for Electromagnetic Interference (EMI) 72
13.3 Service Life 72
13.4 Accessibility 72
13.5 Manufacturing Processes 72
13.6 Maintenance and Repair 72
13.7 Smoke and Fire Hazards 72
13.8 Cable and Wire Harness Installation 72
13.8.1 Arrangement and Harnessing 73
13.8.2 Bundle and Group Size 73
13.8.3 Dead Ending 73
13.8.4 Splicing 73
13.8.5 Routing 74
13.8.6 Stress Relief and Mechanical Support 74
13.8.7 Slack in Cable and Wiring 74
13.8.8 Inspection and Maintenance 75
13.8.9 Protection and Support 75
13.8.10 Bend Radius 76
13.8.11 Drip Loop 76
13.8.12 Routing Near Moving Parts or Controls 76
13.8.13 Routing Near Fluid Lines 76
13.8.14 Ground Return 76
13.8.15 Shielded Wire Grounding 77
13.8.16 Multiple Grounds 77
13.8.17 Connectors 77
13.8.18 Terminal Lugs 78
13.8.19 Terminal Boards and Terminal Junction Modules 78
13.8.20 Wiring Mockup 79
13.8.21 Flexible Wiring 79
13.8.22 Wire Connections and Terminals 79
13.8.23 Spare Terminals 79
13.8.24 Electrical Tape 79
13.8.25 Sleeving 79
13.8.26 Straps/Clamps 80
13.8.27 Lacing Cord 80
13.9 Fiber Optic Cables 80
13.9.1 Design 80
13.9.2 Reliability and Quality 81
13.9.3 Splicing 81
13.10 Wire Marking Methods 83
13.10.1 Hot Stamp Marking 83
13.10.2 Inkjet Marking 83
13.10.3 Dot Matrix Marking 83
13.10.4 Laser Marking 83
13.10.5 Hand Ink Pen Marking 84
13.10.6 Label Marking 84
13.10.7 Heat Shrink Sleeve 84
13.10.8 Thermal Marking 84
13.10.9 Fundamental Marking Principals 84
13.11 Content of Engineering Drawings for Cable and/or Wire Harnesses 84

14 GASKETS 87
14.1 Conductive Elastomer EMI Gaskets 87

15 FASTENERS 90
15.1 Bolts/Threaded Fasteners 90
15.1.1 Clamping Force 90
15.1.2 Considerations for Threaded Fasteners 90
15.1.3 Threads 91
15.1.4 Bolt Head and Screw Head Styles 92
15.1.5 Drawing Requirements for Threaded Fasteners 92
15.1.6 Fastener Materials 94
15.1.7 Fastener Platings, Coatings and Finishes 95
15.1.8 Thread Lubricants 97
15.1.9 Fastener Corrosion 97
15.1.10 Fastener Locking Methods 98
15.1.11 Washers 103
15.1.12 Inserts 104
15.1.13 Counterfeit Fasteners 106
15.2 Torque 109
15.2.1 Scope 109
15.2.2 Definitions 109
15.2.3 Standard Torque Values 110
15.2.4 Nonstandard Torque Values 113
15.2.5 Torque Tolerances 113
15.2.6 Prevailing Torque 113
15.2.7 Lubricants 113
15.2.8 Manufacturer's Suggested Torque 113
15.2.9 Basic Torque Determination 113
15.2.10 Basic Torque Equations 114
15.3 Rivets/Lockbolts/Rivnuts 116
15.3.1 Rivets 116
15.3.2 Lock Bolts 120
15.3.3 Rivnuts 122
15.3.4 General Guidelines for Selecting Rivets and Lock Bolts 123

16 LAMINATED BUS BARS 124
16.1 Capacitance 125
16.2 Inductance 125
16.3 Current 125
16.4 Impedance 125
16.5 Voltage Drop 126
16.6 Interconnections 126
16.7 Standard Formulas for Basic Electrical Properties of Power Distribution Systems 126
16.8 Sample Calculations for 100 Amp Systems 127
16.9 Electrical Performance Comparison Chart 127
16.10 Impedance Comparison Chart 128
16.11 Bus Bar Characteristics 128
16.12 Insulation Materials 129
16.13 IGBT Laminated Bus Bar Application 129

17 ASSEMBLY 130
17.1 Handling 130
17.1.1 Electrostatic Discharge (ESD) Control Program 130
17.1.2 Foreign Object Debris (FOD) 130
17.2 Adhesives and Adhesive Bonding 132
17.2.1 One Part Silicone 132
17.2.2 Seal Types and Their Function 132
17.2.3 Preparation of Metallic and Inorganic Surfaces 132
17.2.4 Alkaline Cleaning 133
17.2.5 Preparation of Plastic Surfaces 133
17.2.6 Preparation of Silicone Surfaces 133
17.2.7 Primer Application 133
17.2.8 Adhesive/Sealant Application 133
17.2.9 Fastener Overcoat Seal 134
17.2.10 Cure 134
17.2.11 Two-Part Epoxy 134
17.2.12 Preparation of Metallic and Ceramic Surfaces 134
17.2.13 Preparation of Plastic Surfaces 135
17.2.14 Preparation of Rubber Surfaces 135
17.2.15 Application of Adhesive to Bond Surfaces 135
17.3 Soldering 135
17.4 Crimping, Cabling and Harnessing 135
17.5 Torquing 135
17.5.1 Proper Torque Tool Selection 135
17.5.2 Three Stage Torquing 136
17.5.3 Over-Torqued Fasteners 136
17.5.4 Post-Torquing Material Application 137
17.5.5 General Torquing Practices 137
17.5.6 Inspection 139
17.6 Riveting 139
17.7 Marking 139
17.7.1 Marking Requirements 139

18 VERIFICATION AND VALIDATION (V&V) 140
18.1 Introduction 140
18.1.1 Verification 144
18.1.2 Validation 144
18.2 Environmental Tests 144
18.2.1 Salt Atmosphere (Corrosion) (Salt Spray) (MIL-STD-202, Test Method 101) 144

18.2.2 Salt Fog (MIL-STD-810, Test Method 509) 145
18.2.3 Acidic Atmosphere (MIL-STD-810, Test Method 518) 145
18.2.4 Humidity – Component (MIL-STD-202, Test Method 103) 145
18.2.5 Humidity – Enclosure (MIL-STD-810, Test Method 507) 145
18.2.6 Immersion – Seal Effectiveness (MIL-STD-202, Test Method 104) 146
18.2.7 Immersion – Operation (MIL-STD-810, Test Method 512) 146
18.2.8 Seal (MIL-STD-202, Test Method 112) 146
18.2.9 Barometric Pressure (Reduced) (MIL-STD-202, Test Method 105) 147
18.2.10 Low Pressure (Altitude) (MIL-STD-810, Test Method 500) 147
18.2.11 Moisture Resistance (MIL-STD-202, Test Method 106) 147
18.2.12 Low Temperature (MIL-STD-810, Test Method 502) 147
18.2.13 High Temperature (MIL-STD-810, Test Method 501) 147
18.2.14 Thermal Shock (MIL-STD-202, Test Method 107) 148
18.2.15 Temperature Shock (MIL-STD-810, Test Method 503) 148
18.2.16 Life at Elevated Ambient Temperature (MIL-STD-202, Test Method 108) 148
18.2.17 Explosion (MIL-STD-202, Test Method 109) 148
18.2.18 Explosive Atmosphere (MIL-STD-810, Test Method 511) 148
18.2.19 Sand and Dust (MIL-STD-202, Test Method 110) 148
18.2.20 Sand and Dust (MIL-STD-810, Test Method 510) 149
18.2.21 Flammability 149
18.2.22 Fungus (MIL-STD-810, Test Method 508, RTCA DO-160 Section 13) 149
18.2.23 Contamination by Fluids (MIL-STD-810, Test Method 504) 150
18.2.24 Solar Radiation (Sunshine) (MIL-STD-810, Test Method 505) 151
18.2.25 Rain (MIL-STD-810, Test Method 506) 151
18.2.26 Icing/Freezing Rain (MIL-STD-810, Test Method 521) 151
18.2.27 Freeze/Thaw (MIL-STD-810, Test Method 524) 151
18.2.28 UV Aging of Polymeric Outdoor Enclosure Materials (GR-487, Section R3-25) 152
18.2.29 HALT Testing 152
18.2.30 HASS Testing 152
18.3 Physical Characteristics Tests 152
18.3.1 Vibration 152
18.3.2 Random Drop (MIL-STD-202, Test Method 203) 154
18.3.3 Shock 154
18.3.4 Life (Rotational) (MIL-STD-202, Test Method 206) 156
18.3.5 Radiographic Inspection (X-ray) (MIL-STD-202, Test Method 209) 157
18.3.6 Terminal Strength (MIL-STD-202, Test Method 211) 157
18.3.7 Acceleration 157
18.3.8 Temperature, Humidity, Vibration and Altitude (MIL-STD-810, Test Method 520) 157
18.3.9 Vibro-Acoustic/Temperature (MIL-STD-810, Test Method 523) 157
18.3.10 Hydrostatic, Flow and Pressure Test 158
18.4 Electrical Characteristics Tests 158
18.4.1 Continuity Test (IPC/WHMA-A-620) 158
18.4.2 Shorts Test (IPC/WHMA-A-620) 158
18.4.3 Dielectric Withstanding Voltage (MIL-STD-202, Test Method 301 and IPC/WHMA-A-620) 158
18.4.4 Insulation Resistance Test (MIL-STD-202, Test Method 302 and IPC/WHMA-A-620) 159
18.4.5 Voltage Standing Wave Ratio (VSWR) Test (IPC/WHMA-A-620) 159
18.4.6 Insertion Loss Test (MIL-STD-220 and IPC/WHMA-A-620) 159
18.4.7 Characteristic Impedance Test (IPC/WHMA-A-620) 159
18.4.8 Resistance Temperature Characteristic (MIL-STD-202, Test Method 304) 159
18.4.9 Contact Resistance (MIL-STD-202, Test Method 307) 159
18.4.10 Full-Load/Burn-In Test 160
18.4.11 Operating/Functional Testing 160
18.5 Electromagnetic Interference (EMI) Testing 160
18.5.1 Conducted Emissions, Power Leads, 30 Hz to 10 KHz (MIL-STD-461, CE101) 160
18.5.2 Conducted Emissions, Power Leads, 10 KHz to 10 MHz (MIL-STD-461, CE102) 160
18.5.3 Conducted Emissions, Antenna Terminal, 10 KHz to 40 GHz (MIL-STD-461, CE106) 160

18.5.4 Conducted Susceptibility, Power Leads, 30 Hz to 150 KHz (MIL-STD-461, CS101) 161
18.5.5 Conducted Susceptibility, Antenna Port, Intermodulation, 15 KHz to 10 GHz (MIL-STD-461, CS103) 161
18.5.6 Conducted Susceptibility, Antenna Port, Rejection of Undesired Signals, 30 Hz to 20 GHz (MIL-STD-461, CS104) 161
18.5.7 Conducted Susceptibility, Antenna Port, Cross Modulation, 30 Hz to 20 GHz (MIL-STD-461, CS105) 161
18.5.8 Conducted Susceptibility, Transients, Power Leads (MIL-STD-461, CS106) 161
18.5.9 Conducted Susceptibility, Structure Current, 60 Hz to 100 KHz (MIL-STD-461, CS109) 161
18.5.10 Conducted Susceptibility, Bulk Cable Injection, 10 KHz to 200 MHz (MIL-STD-461, CS114) 161
18.5.11 Conducted Susceptibility, Bulk Cable Injection, Excitation (MIL-STD-461, CS115) 162
18.5.12 Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 KHz to 100 MHz (MIL-STD-461, CS116) 162
18.5.13 Radiated Emissions, Magnetic Field, 30 Hz to 100 KHz (MIL-STD-461, RE101) 162
18.5.14 Radiated Emissions, Electric Field, 10 KHz to 18GHz (MIL-STD-461, RE102) 162
18.5.15 Radiated Emissions, Antenna, Spurious and Harmonic Outputs, 10 KHz to 40 GHz (MIL-STD-461, RE103) 162
18.5.16 Radiated Susceptibility, Magnetic Field, 30 Hz to 100 KHz (MIL-STD-461, RS101) 163
18.5.17 Radiated Susceptibility, Electric Field, 2 MHz to 40 GKHz (MIL-STD-461, RS103) 163
18.5.18 Radiated Susceptibility, Transient Electromagnetic Field (MIL-STD-461, RS105) 163
18.6 Noise Testing (MIL-STD-1474 and MIL-STD-810) 163
18.6.1 Noise Testing (MIL-STD-1474) 163
18.6.2 Acoustic Noise (MIL-STD-810, Test Method 515) 164
18.7 Fiber Optic Testing 164
18.7.1 Visual Inspection of Fiber Optic Components (MIL-STD-2042-6, Test Method 6A1) 165
18.7.2 Cable Attenuation Test (MIL-STD-2042-6, Test Method 6B1) 165
18.7.3 Cable Assembly Link Loss Test (MIL-STD-2042-6, Test Method 6C1) 165
18.7.4 Cable Continuity Test (MIL-STD-2042-6, Test Method 6D1) 165
18.7.5 Cable Topology End-to-End Attenuation Test (MIL-STD-2042-6, Test Method 6E1) 165
18.7.6 Measurement Quality Jumper Selection Test (MIL-STD-2042-6, Test Method 6F1) 165
18.7.7 Heavy Duty Connector Mechanical Pull Test (MIL-STD-2042-6, Test Method 6G1) 165
18.7.8 BOF Cable Ball Bearing Test (MIL-STD-2042-6, Test Method 6H1) 165
18.7.9 BOF Cable Pressurization Test (MIL-STD-2042-6, Test Method 6I1) 165
18.7.10 BOF Tube Seal Verification Test (MIL-STD-2042-6, Test Method 6J1) 165
18.7.11 Cable Assembly Return Loss Test (MIL-STD-2042-6, Test Method 6K1) 165
18.7.12 Cable Topology End-to-End Return Loss Test (MIL-STD-2042-6, Test Method 6L1) 165
18.8 Environmental Stress Screening (ESS) (MIL-HDBK-344) 166
18.9 Visual and Mechanical Inspection and Testing 166
18.9.1 Visual Inspection 166
18.9.2 Dimensional Inspection 167

Figures

Figure 4-1 Casting Views 14
Figure 4-2 Chain vs. Baseline Dimensioning 15
Figure 4-3 False Tolerances 16
Figure 4-4 Adequate Stock Allowance 16
Figure 4-5 Effect of Accuracy Due to Different Mold Pieces 17
Figure 4-6 The Structure of the Welding Symbol 21
Figure 8-1 Annodized Cross-Section 39
Figure 8-2 CIELAB Values 40
Figure 11-1 Effects of Poor Bonding on the Performance of a Power Line Filter 44
Figure 11-2 Current Flow Through Two Configurations of a Direct Bond 45
Figure 11-3 Contact Surfaces at a Bond Interface 45
Figure 11-4 Mechanical Load on Bond Resistance 47
Figure 11-5 Nomograph of Torque to Bolt Size 50
Figure 11-6 Rivet Bond Path 50
Figure 11-7 Poor Rivet Joint 50
Figure 11-8 Basic Corrosion 53

Figure 13-1 Box Build with Multiple Connectors 58
Figure 13-2 Box Build with Multiple Connectors 58
Figure 13-3 Common Connection Make Up 60
Figure 13-4 Assembled Connector Cut Away 60
Figure 13-5 Circular Connectors 60
Figure 13-6 Rectangular Connectors 61
Figure 13-7 Hermetically Sealed Connectors 61
Figure 13-8 Special Application Connector 61
Figure 13-9 Connector Shells 61
Figure 13-10 Aluminum Shell 63
Figure 13-11 Brass Shell 63
Figure 13-12 Composite Shell 63
Figure 13-13 Titanium Shell 63
Figure 13-14 Stainless Steel Shell 63
Figure 13-15 Nickel Aluminum Bronze Shell 63
Figure 13-16 Example of an Assembled Socket Insert 64
Figure 13-17 Example of Standard Circular Plan Forms ... 64
Figure 13-18 Contact Options 65
Figure 13-19 Circular Connection with Mixed Contacts 65
Figure 13-20 Circular Connector with Pintail Contacts 65
Figure 13-21 Circular Connector with Power Contacts 66
Figure 13-22 Fiber Optic 66
Figure 13-23 Circular Connector with Quadrax Contacts .. 66
Figure 13-24 Dynamic Contact 66
Figure 13-25 Static Contact 66
Figure 13-26 Bayonet Pin Connector 67
Figure 13-27 Threaded Coupling 67
Figure 13-28 Anti Rotation – Vibration Resistant Connector 67
Figure 13-29 Reverse Bayonet Connector 67
Figure 13-30 Quick Release/Break Away Connector 67
Figure 13-31 Push/Pull Type Connector 68
Figure 13-32 Example of Push/Pull Receptacle 68
Figure 13-33 Common Example of Cable Grommet Nut ... 68
Figure 13-34 Strain Relief Clamp 68
Figure 13-35 Quick Clamp 68
Figure 13-36 Braid Trap 68
Figure 13-37 Integral Back Shell 69
Figure 13-38 Example of Connector Part Numbering 69
Figure 13-39 An Optical Fiber Breakout Cable 80
Figure 13-40 Fiber Optic Splices 81
Figure 13-41 Mechanical Fiber Optic Splice 82
Figure 13-42 Fusion Fiber Optic Splice 82
Figure 13-43 Quick Termination Fiber Optic Connector 82
Figure 14-1 Typical EMI Gasket Cross Sectional Profiles 89
Figure 15-1 Threaded Fasteners 90
Figure 15-2 Bolt Head and Screw Head Styles 93
Figure 15-3 Locknut with Nylon Insert 93
Figure 15-4 Lock Screw 93
Figure 15-5 Locking Helical-Coil 93
Figure 15-6 Split-Beam Locknut 98
Figure 15-7 Deformed-Thread Locknut 99
Figure 15-8 Nylon Pellet Locknut 99
Figure 15-9 250 Degree F Self-Locking Elements for External Threads 100
Figure 15-10 Locking Collar 100
Figure 15-11 Castellated Nut 100
Figure 15-12 Jam Nut 101
Figure 15-13 Serrated-Face Nut 101
Figure 15-14 Lock Wiring 101
Figure 15-15 Tapered Thread 102
Figure 15-16 Nut Plate 102
Figure 15-17 Types of Belleville Washers 103
Figure 15-18 Combinations of Belleville Washers 103
Figure 15-19 Helical Spring Washers 103
Figure 15-20 Tooth Lock Washers 104
Figure 15-21 Self-Aligning Nut 104
Figure 15-22 Wire Thread Insert Installation 105
Figure 15-23 Wire Thread Insert Types 105
Figure 15-24 Self-Tapping Inserts 105
Figure 15-25 Solid Bushing 105
Figure 15-26 Plastic Expandable Insert 106
Figure 15-27 Molded in Place Insert 106
Figure 15-28 Ultrasonic Inserts 106
Figure 15-29 United States Standard Rivet Heads 117
Figure 15-30 Pull-Mandrel Rivet 117
Figure 15-31 Threaded-Stem Rivets 117
Figure 15-32 Drive-Pin Rivets 118
Figure 15-33 Compression Tubular Rivet 118
Figure 15-34 Semi-Tubular Rivet 118
Figure 15-35 Full Tubular Rivet 118
Figure 15-36 Semi Tubular Rivet 119
Figure 15-37 Split (Bifurcated) Rivet 119
Figure 15-38 Cherry Buck Rivet 119
Figure 15-39 Cherry Rivet Installation 119
Figure 15-40 Huck Blind Rivets 120
Figure 15-41 Pop Rivet Installation 120
Figure 15-42 Jo-Bolt 121
Figure 15-43 Hi-Lok Installation 121
Figure 15-44 Installed Huckbolt Fastener 122
Figure 15-45 Taper-Lok Installation 122
Figure 15-46 Rivnut Installation 122
Figure 15-47 Hi-Shear Installation 123
Figure 16-1 Comparison of Wire Harness versus Laminated Bus Bar Design 124
Figure 16-2 Examples of Laminated Bus Bar Designs .. 124
Figure 16-3 Standard Formulas for Basic Electrical Properties of Power Distribution Systems .. 126

Figure 16-4 Sample Calculations for 100 Amp Systems 127
Figure 16-5 Electrical Comparison Chart 127
Figure 16-6 Impedance Comparison Chart 128
Figure 16-7 Example IGBT Laminated Bus Bar Application 129
Figure 17-1 Typical Rectangular Torquing Sequence 136
Figure 17-2 Typical Circular Torquing Sequence 136
Figure 17-3 Fastener Torque-Striping 137
Figure 17-4 Torque Staking 137
Figure 17-5 Torque Staking 137

Tables

Table 3-1 Typical Values of Emissivity 9
Table 3-2 Correction Factor for Altitude 10
Table 4-1 Wrought Aluminum Alloy Designation System 12
Table 4-2 Casting Tolerance 18
Table 4-3 AWS Welding Processes and Letter Designation 19
Table 11-1 DC Resistance of Direct Bonds Between Selected Metals 46
Table 11-2 Standard Electromotive Series 53
Table 11-3 Galvanic Series of Common Metals and Alloys in Seawater 54
Table 13-1 Keyway Designs 62
Table 13-2 Common Plating Finishes 64
Table 13-3 Wire and Cable De-rating Requirements 71
Table 13-4 Wire Size Color Code 71
Table 14-1 EMI Gasket Material Characteristics 88
Table 15-1 Pre-load Variation Produced by Different Methods of Tightening a Fastener (from Bossard Catalog) 91
Table 15-2 Minimum Thread Engagement 94
Table 15-3 Summary of Fastener Materials 95
Table 15-4 Summary of Fastener Materials 96
Table 15-5 Sample of Manufacturer's Fastener Head Marking 107
Table 15-6 ASTM Identification Markings 108
Table 15-7 Typical Torque Values for Selected Fasteners 111
Table 15-8 Aluminum and Other Rivet Materials 116
Table 15-9 Cherry Rivet Materials 120
Table 15-10 Standard Rivnut Fastener Materials and Finishes 123
Table 16-1 Relationship between Bus Bar Size and Current 128
Table 16-2 Insulation Materials 129
Table 17-1 One-Part Silicone Cure Time 134
Table 17-2 Preferred Sizes of Rectangular Nameplates 140
Table 18-1 Verification & Validation (V&V) (Inspection/ Testing) for Enclosure Assemblies 141
Table 18-2 RTCA DO-160 Table of Contents 144
Table 18-3 Fungi Susceptibility of Materials 150
Table 18-4 Steady-State Noise Categories 164

Guidelines for Design, Manufacture, Inspection and Testing of Electronic Enclosures

1 PREFACE

1.1 Scope This document has been written to assist the designers, manufacturers and end users of electronic enclosures of electrical and electronic equipment to understand the best practices to meet requirements, ensuring the reliability and function of the end item assembly for its intended design life.

An electronic enclosure, for the purpose of this document, is defined as a chassis, box, top level assembly, high level assembly (HLA), functional unit, drawer, cabinet, or other designation forming a top level system assembly. An enclosure typically consists of a combination of printed board assemblies (PBAs), cable and wire harness assemblies and other electronics and/or mechanical components, and is typically tested as a functional unit. The enclosure includes the necessary mechanical and structural elements to protect and integrate the assembly into a finished system. Enclosures are often modular components or sub-systems of larger systems, designed for replacement in the end-use environment.

1.2 Purpose This handbook provides guidelines for the design, manufacture, inspection and test for electronic enclosures. It is not enough to understand the properties of the various components, materials and processes; the user should understand what is to be achieved by the set of selected components, materials and processes within the end use environment and how to verify that the desired results have been realized.

This document is intended to be used as a reference only. It is the responsibility of the user to determine the suitability, via appropriate testing, of the selected electronic enclosure and application method for a particular end use application. An electronic enclosure may have several functions depending on the type of application. The most common are:

a. To protect the electronic assembly from the end use environment, such as vibration, shock and other movements detrimental to electronic assemblies

b. To incorporate into the end use environment.

1.3 Applicability This handbook covers high reliability type end item equipment, such as Aerospace, Defense, Medical, Telecom, etc. Not all specialized technologies are covered in this handbook.

This handbook is for guidance only and cannot be cited as a requirement. If it is, the supplier does not have to comply.

The use of words like, ‘‘must,’’ ‘‘should’’ and ‘‘shall’’ have no special meaning in this guideline. They do not indicate a binding criterion.

1.4 Classification This standard recognizes that electrical and electronic assemblies are subject to classifications by intended end-item use. Three general end-product classes have been established to reflect differences in producibility, complexity, functional performance requirements and verification (inspection/test) frequency. It should be recognized that there may be overlaps of equipment between classes.

The product class should be stated in the procurement documentation package.

CLASS 1 General Electronic Products
Includes products suitable for applications where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Service Electronic Products
Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically the end-use environment would not cause failures.

CLASS 3 High Performance Electronic Products
Includes products where continued high performance or performance-on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment should function when required such as life support or other critical systems.