

Anti Coincidence Detector (ACD)

Mechanical Parts and Materials List
(MPML)

ACD-MPML-10001

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National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

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Mechanical Parts and Materials List (MPML)**

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1. INTRODUCTION

The purpose of this document is to provide a list of the mechanical parts and materials used for the Gamma-ray Large Area Space Telescope (GLAST) Anticoincidence Detector (ACD). As many of these materials are currently being evaluated and have not been reviewed for compliance with the requirements called out in 303-PG-7120.2.2.A “Mission Assurances Guideline (MAG)”, this document does not constitute approval of these materials. The purpose of this document is to provide a list of the current materials proposed for use on the ACD, as the design matures this document will be updated.

2. LIST OF ACRONYMS

ACD	Anticoincidence Detector
BEA	Base Electronics Assembly
GLAST	Gamma-ray Large Area Space Telescope
GSFC	Goddard Space Flight Center
IAW	In Accordance With
MAG	Mission Assurances Guideline
MPML	Mechanical Parts and Materials List
NASA	National Aeronautics and Space Administration
SOS	Source of Supply
TDA	Tile Detector Assembly
TSA	Tile Shell Assembly

3. APPLICABLE DOCUMENTS AND DRAWINGS

3.1. Applicable Documents:

- 3.1.1. 541-PG-8072.1.2 GSFC Fastener Integrity Document
- 3.1.2. ACD Contamination Control Plan, ACD-SPEC-3007
- 3.1.3. Outgassing Data for Selecting Spacecraft Materials, NASA Reference Publication 1124
- 3.1.4. 303-PG-7120.2.2.A Mission Assurances Guideline (MAG)

4. MECHANICAL FASTENERS

The mechanical fasteners used on the GLAST ACD shall conform to the requirements specified in “541-PG-8072.1.2, GSFC Fastener Integrity Requirements”

(http://msc-docsrv.gsfc.nasa.gov/GDMS_docs/Pgwi500/541-PG-8072.1.2-.pdf).

Furthermore, all metallic fasteners shall be selected from the GSFC Preferred Flight Fastener Inventory (see <http://lmd.gsfc.nasa.gov/fasteners/>). The material choice for all threaded screws and bolts shall be A286 CRES and all threaded nuts, inserts, and nut-plates shall be

silver plated and have a locking feature with the exception of cases where the fasteners are staked. All threaded fasteners greater than size #6 shall be lubricated with Braycote 601, both on the threads and under the head of the fastener. Fasteners that are size #6 and smaller that are to be staked shall not be lubricated.

5. PROPOSED MECHANICAL PARTS & MATERIALS LIST

All parts, materials, and processes used on the GLAST ACD shall conform to the requirements specified in “303-PG-7120.2.2A Mission Assurance Guidelines (MAG) for Tailoring to Needs of GSFC Projects”.

5.1 Shell Assembly – The shell assembly is constructed of composite honeycomb panels joined together at the edges by bonding composite angles to the honeycomb panels. There are eight titanium inserts at the base of the shell which are used to provide an attachment point between the Shell Assembly and the Base Frame. Composite flexures are bonded to the shell to support the TDA’s and titanium flexures are bolted to titanium inserts at the base of the Shell.

Qty	GSFC Part Number	Manufactures Part Number	Description	Material	Condition (1)	SOS (2)
1	2054531		Shell Assembly			
1	2054531		Panel, Top		5	
A/R		Aluminum Honeycomb	Honeycomb core - Shell	Aluminum		
A/R		M46J/EX1522	Facesheets - Shell	Graphite/Epoxy	5	9
A/R		FM-73U	Film Adhesive – Shell	Epoxy		12
A/R		EY3010	Edge Filler – Shell	Syntactic Adhes.	1	13
4	2054532		Panel, Side		5	
A/R		Aluminum Honeycomb	Honeycomb core - Shell	Aluminum		
A/R		M46J/EX1522	Facesheets - Shell	Graphite Epoxy	5	9
A/R		FM-73U	Film Adhesive – Shell	Epoxy		12
A/R		EY3010	Edge Filler – Shell	Syntactic Adhes.	1	13
4	2054533	M46J/EX1522	Corner Support, Top Out	Graphite/Epoxy	5	9
4	2054534	M46J/EX1522	Corner Support, Top In	Graphite/Epoxy	5	9
4	2054535	M46J/EX1522	Corner Support, Side Out	Graphite/Epoxy	5	9
4	2054536	M46J/EX1522	Corner Support, Side In	Graphite/Epoxy	5	9
4	2054537	M46J/EX1522	Doubler, Lower Outside	Graphite/Epoxy	5	9
4	2054538	M46J/EX1522	Doubler, Lower Inside	Graphite/Epoxy	5	9
A/R		EA9309.3NA	Paste Adhesive	Epoxy	1	11
A/R		Tefzel	Fiber Cable	Copolymer		14

			Tiedown			
4	2054526		Inserts - Shell	Ti-6Al-4V	4	
4	2054527		Inserts - Shell	Ti-6Al-4V	4	
340	2054521	T300/EX1522	Flexure, TDA	Fiberglass/Epoxy	5	9
4	2054516		Flexure, Corner - Shell	Ti-6Al-4V		
4	2054517		Flexure, Middle - Shell	Ti-6Al-4V		

(1) This column refers to the specification or condition of the material or any special coatings or processes applied to the material. See Table 2 for the list of material conditions and/or processes.

(2) For the Source of Supply (SOS) see the SOS list in Table 1.

5.2 Tile Detector/Fiber Cable/Wrapping Assembly – The Tile Detector /Fiber

Cable/Wrapping Assembly is made up of the scintillating tile, wave shifting fiber, fiber cables, fiber connectors and all materials used to wrap the TDA's. There are 89 TDA's with fourteen different tile geometries.

Qty	GSFC Part Number	Manufactures Part Number	Description	Material	Condition (1)	SOS (2)
89	2054545		Tile Detector/Fiber Cable/Wrapping Assembly			
89	2054555		Tile Detector Assembly		2	
89	2054560	BC-408	Tile, Scintillating	Polyvinyltoluene	2	1
A/R		BCF-91AMC	Waveshifting Fiber	Plastic		1
65	2054556	Ultem 1000	Connector, WSF	Ultem		15
A/R		BC-600	Clear Optical Cement	Epoxy	1	1
55	2054550	BC-12/Tedlar	Fiber Ribbon	Polymer		
A/R		BCF-98	Clear Fiber	Plastic		1
85?	2054551	Ultem 1000	Connector, Clear Fiber	Ultem		15
194	2054552	Ultem 1000	Terminator, PMT	Ultem		15
194	2054553		Coupling, PMT	Aluminum 6061T6		
126 094		ASTM-A228	Spring, PMT	Music Wire, Steel		
A/R		BC-600	Clear Optical Cement	Epoxy	1	1
A/R			Wrapping - Reflective	Tetratex		7
A/R			Wrapping - Opaque	Tedlar		6
A/R		100DUN-LAN	Black Kapton Tape	Black Kapton XC/966PSA		19
A/R		427	Transfer Film Adhesive	3M Y966		18
			Gasket	Viton		
			Mechanical Hardware			

(1) This column refers to the specification or condition of the material or any special coatings or processes applied to the material. See Table 2 for the list of material conditions and/or processes.

(2) For the Source of Supply (SOS) see the SOS list in Table 1.

5.3 Base Electronics Assembly (BEA) – The BEA is the mechanical support structure for the ACD as well as the housing for the ACD Electronics.

Qty	GSFC Part Number	Manufactures Part Number	Description	Material	Condition (1)	SOS (2)
1	2054590		Base Electronics Assy			
1	2054600		Base Frame Assembly			
4	2054501		Channel	Aluminum 6061T6	3,6	
4	2054502		Fitting, Corner	Aluminum 6061T6	3	
8	2054503		Backplane, Event Board	Aluminum 6061T6	3,6	
8	2054504		Cover, Closeout	Aluminum 6061T6	3,6	
8	2054505		Boss, Threaded	Aluminum 6061T6	3	
8	2054506		Nut, Jam	Aluminum 6061T6	3	
12	2054507		Cover, High Voltage	Aluminum 6061T6	3,6	
194	2054626		Holder, PMT	Aluminum 6061T6	6	
194	2054627		Light Baffle, PMT	Aluminum 6061T6	6	
A/R		Tefzel	Elect. Harness Tiedown	Copolymer		14
80		NAS1352-08	Screw, 8-32, Corner	A-286 CRES		4
264		NAS1352-06	Screw, 6-32, Backplane	A-286 CRES		4
120		NAS1352-04	Screw, 4-40, Event Board	A-286 CRES		4
48		NAS1352-02	Screw, 2-56, HV Cover	A-286 CRES		4
12		NAS1351-4	Screw, _-28, Corner LAT/ACD	A-286 CRES		4
8		NAS1351-4	Screw, _-28, Side LAT/ACD	A-286 CRES		4
28		NAS1351-3	Screw, 10-32, TSA Flexure	A-286 CRES		4
96		NAS1352-04	Screw, 4-40, Bulkhead Connect	A-286 CRES		4
776		NAS1352-02	Screw, 2-56, PMT Holder	A-286 CRES		4
388		NAS1352-02	Screw, 2-56, PMT Dynode	A-286 CRES		4
A/R		601	Thread lubricant	Braycote		16
A/R		5753	Staking Compound	Uralane	1	17
?			HVPS enclosure	Aluminum 6061T6		
?		80KSI	Screw to HVPS	300 CRES		
A/R		Parylene C	Conformal coating	Polymer		18
		5753-40-B Black	PMT Mumetal to housing	Uralane/Polyurethane		21
		Lexan	Grommet	Polycarbonate		
A/R		Nusil CV 2500	PMT Optical Gasket	Silicone		22
		Eccobond 56C	PMT conductive epoxy			
		Unicarp	Spacers, 0.312L, ID, OD	Polycarbonate		23
		Craftech	Screws, 0.25male to female,	Polycarbonate		24
			Screws, 0.25 female to male	Polycarbonate		24
		NAS 1102E02-3	PMT Housing Screws 3/16 flathead, Pilgrim			4,25
		MS51957-2	PMT RN covers and RN enclosure screws 3/16			4, 25
		NAS620C2	PMT flat washers			4,25

(1) This column refers to the specification or condition of the material or any special coatings or processes applied to the material. See Table 2 for the list of material conditions and/or processes.

(2) For the Source of Supply (SOS) see the SOS list in Table 1.

5.4 Micrometeoroid Shield/Thermal Blanket – The Micrometeoroid Shield/Thermal Blanket is made up from the materials in the table below.

Qty	GSFC Part Number	Manufactures Part Number	Description	Material	Condition (1)	SOS (2)
1	2054580		Micrometeoroid Shield/Thermal Blanket			
	2054581		Micrometeoroid Shield			
A/R		AF10	Nextel Woven Fabric 312	Ceramic Fibers		2
A/R		AC-530	Solimide Foam	Polyimide Foam		10
A/R		CS-705	Kevlar KM2 fabric	Kevlar		
1	2054582		Thermal Blanket			
A/R		381	VDA-2 Mylar			18
A/R			Germanium Black Kapton			18
A/R		400	VDA-1 Kapton	Aluminize Kapton		18
A/R			Dacron Netting	Dacron		26
A/R		497	Tape – K102	Polyamide film/ Acrylic ADH		19
A/R		427	Transfer Adhesive	Aluminum foil Tape ADH		18
A/R	2054583		Holdown	Delrin		

(1) This column refers to the specification or condition of the material or any special coatings or processes applied to the material. See Table 2 for the list of material conditions and/or processes.

(2) For the Source of Supply (SOS) see the SOS list in Table 1.

Table 1. List of Sources of Supply

Item #	Source of Supply	Notes
1	Bicron Newbury 12345 Kingsman Road Newbury, OH 44085-9577 http://www.bicron.com/index.htm	
2	3M Ceramic Materials Department 3M Center, Building 207-1W-11 St. Paul, MN 55744-1000	
3	Dupont US Route 23 South DuPont Road Circleville, OH 43113 1-800-237-4357	
4	NASA/GSFC Logistics Management Division Flight Fastener Inventory http://lmd.gsfc.nasa.gov/fasteners/ 301-286-9646	
5	Hexcel 11711 Dublin Blvd Dublin, CA 94568 1-888-577-4360	
6	Dupont Tedlar P.O. Box 88 Sheridan Drive and River Road Buffalo, NY 14207-0088 http://www.dupont.com/tedlar/contact/index.html 1-800-255-8386	
7	Tetratex 1741 Loretta Ave, Feasterville, PA 19053 Phone 215-355-7111, ext. 140 Fax 215-355-6745 http://www.tetratex.com e-mail: info@tetratex.com	
8	DuPont – Zenite Liquid Crystal Polymer EP Technical Service CRP 713 Centre Road Wilmington, DE 19805	

	http://www1.dupont.com/NASApp/dupontcom/jsp/products/prodDetail.jsp?prodID=2370 (800) 441-0575	
9	YLA, Inc. 2970 Bay Vista Court Benicia, CA 94510 http://ylainc.com/	
10	Inspec Foams 101 East Park Blvd., Suite 201 Plano, Texas 75074 USA (972) 516-0702 http://www.inspecfoams.com/	
11	Loctite Aerospace Manufacturing, Sales and Marketing 2850 Willow Pass Road P. O. Box 312 Bay Point, CA 94565-0031 USA Tel: 925-458-8000 Fax: 925-458-8030 http://www.dexteraero.com/	
12	Cytec Fiberite 1300 Revolution Street Havre de Grace, MD 21078 Tel: 410-939-1910 Fax: 410-939-8100 http://www.elainc.com/cytec.htm	
13	Newport Adhesives and Composites 1822 Reynolds Ave. Irvine, CA 92614 Tel: 949-253-5680 Fax: 949-253-5692 http://www.newportad.com/	
14	Click Bond 2151 Lockheed Way Carson City, Nevada 89706-0713 Tel: 702-885-8000 Fax: 702-883-0191	
15	GE Plastics - Polymers GE Plastics Pittsfield, MA Ph: 413-448-5800 http://www.geplastics.com/	

16	Reinhard Oil Company Salt Lake City, Utah Tel: 801-575-6457	
17	Applitec Tel: 978-374-9830	
18	Dunmore 207 Penns Trail Newtown, PA 18940 Tel: 215-968-0442	
19	St'Gobain Performance Plastics 407 East Street New Haven, CT 06511 Tel: 203-777-3631	
20	Special Coating System 5707 West Minnesota Street Indianapolis, Indiana 46241	
21	E.V. Roberts 8500 Stellar Dr. Culver City, CA Tel:310-204-6159	
22	NuSil Silicone Technology 1050 Cindy Lane Caprinteria, CA 93013 805-684-8780	
23	Unicorp Precision Electronic Hardware 291 Cleveland Street Orange, NJ 07050 Phone 973-674-1700, 800-526-1389	
24	Craftech Industries, Inc 8 Dock Street, P.O. Box 636 Hudson, New York 12539 Phone 800-833-5130	
25	Rocket Air Supply	
26	Apex Mill Inc, New York	

Table 2. List of Material Conditions and/or Processes

Condition Number	Material condition and/or process description
1	Seven day air temperature cure
2	Low temperature annealing after bending and/or machining processes.
3	Surface treatment In Accordance With (IAW) Mil-C-5541, Class 1A
4	Anodize to AMS-2488
5	High temperature/high pressure cure
6	Surface treatment IAW, Mil-A-8625, Color Black (Black Anodize)

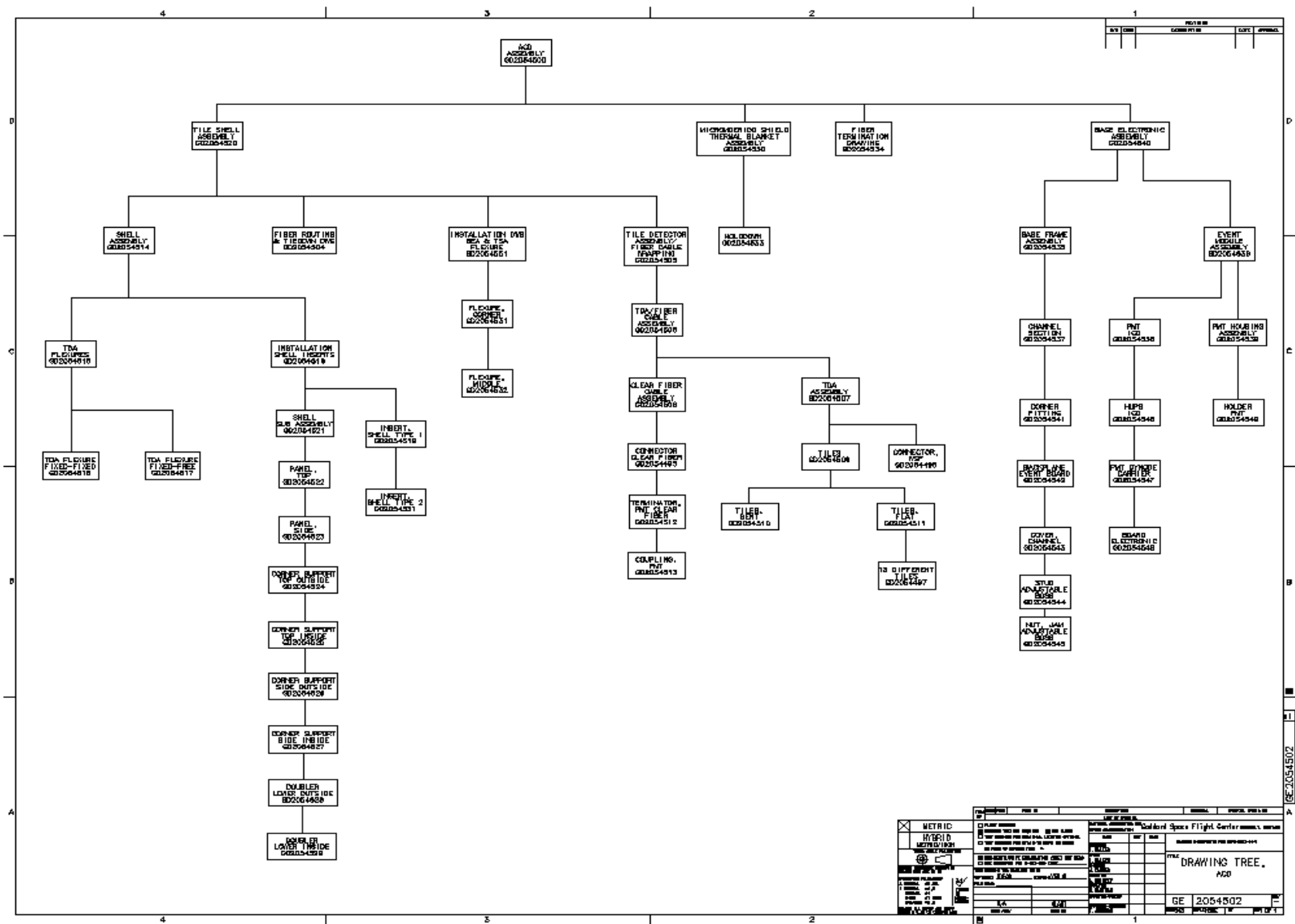


Figure 1. ACD Drawing Tree