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MATERIAL - ADHESIVE - BLOOMINGDALE RUBBER CO.
HT-424 - EVALUATION OF

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A DIVISION OF GENERAL DYNAMICS CORPORATION
(FORT WORTH)

TEST: F-7233
MODEL B-58

REPORT FGT-1957
DATE 22 July 1958

TITLE

MATERIAL - ADHESIVE - BLOOMINGDALE RUBBER CO. - HT-424-

EVALUATION OF -

SUBMITTED UNDER
Contract AF-33(600)-36200

Tests described in this report were conducted between 3-1-58 and 6-15-58.

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MATERIAL - ADHESIVE - BLOOMINGDALE RUBBER CO. - HT-424

EVALUATION OF

PURPOSE

Bloomingdale Rubber Company's HT-424 has been recommended as a second source of FMS-0015(D) adhesive. This adhesive has already been qualified by the Air Force to Military Specification MIL-A-8431. Only those tests listed in Convair Specification FMS-0015(D) which are in addition to or deviate from MIL-A-8431 were required, substantially reducing the amount of testing necessary for qualification of this material. The purpose of this test was to evaluate HT-424 as a second source of Convair Specification FMS-0015(D) adhesive.

SUMMARY

Bloomingdale Rubber Company submitted three batches each of 20 mil and 15 mil thickness HT-424 adhesive for evaluation to Convair Specification FMS-0015(D). The test results show that some batches of HT-424 20 mil adhesive did not conform to the requirements set forth in FMS-0015(D) when tested at the following conditions:

ADHESIVE BATCH NUMBER	TEST CONDITION
2233, 2234, 2235	Creep rupture at 260°F for 192 hrs.
2233	260°F age for 192 hours
2234	Flatwise tension at room temperature

All other tests conducted, including the tests for the 15 mil adhesive (batch numbers 2230, 2231 and 2232) met the requirements of FMS-0015(D). A summary of the test results is shown in Table I.

MATERIAL - ADHESIVE - BLOOMINGDALE RUBBER CO. - HT-424

EVALUATION OF

OBJECT

To determine if Bloomingdale Rubber Company's HT-424 20 mil and 15 mil film adhesives conform to the requirements of Convair Specification FMS-0015(D).

MATERIALS	SOURCE
HT-424 film adhesives FMS-0015 20 mil (batch numbers 2233, 2234, and 2235) FMS-0015-1 15 mil (batch numbers 2230, 2231 and 2232)	Bloomingdale Rubber Co. Chester, Pennsylvania
Aerobond 422 film adhesive FMS-0015 20 mil lot no. 2579	Adhesives Engineering Co. San Carlos, California
Hydraulic Fluid (Oronite 8515) Lubricating Oil	MIL-H-8446 MIL-L-7808C
2024-T3 Alclad aluminum skins 0.064" x 4" x 9"	QQ-A-362a
2024-T3 Alclad aluminum skins 0.040" x 3" x 8"	QQ-A-362a
9 lbs./cu.ft. density; 3/16" cell size. Glass fiber-plastic reinforced honeycomb core 0.500" x 3" x 8" (FMS-0013 Type I)	Hexcel Products Co. Oakland, California

EQUIPMENT

Lap shear creep machine	Convair Shop made
Electrically heated bonding press	" " "
Electrically heated test chamber	" " "

PROCEDURE

All tests required by Convair Specification FMS-0015(D), except the storage tests, were conducted with three batches each of HT-424 20 mil and 15 mil adhesive. The tests conducted are outlined in Table II. Aerobond 422, lot number 2579 (FMS-0015, 20 mil) was used as a control adhesive. Specimen preparation, bonding, immersion, and testing were in accordance with FMS-0015(D). The general procedures are outlined in Table III.

RESULTS:

The physical properties of the adhesives tested are listed in Table IV.

The individual bonded specimen results are listed in Tables V through LXVII. A summary of the test data is given in Table I.

DISCUSSION:

Information was needed as to the suitability of Bloomingdale Rubber Company's HT-424 as a source for FMS-0015 adhesive.

The glass cloth carrier used in HT-424 film adhesive does not conform to the requirements set forth in FMS-0015(D). The type carrier used is comparable to Style 192 of J. P. Stevens & Company, Inc., "Industrial Glass Fabric Specification Guide".

Observation of the lap shear specimens, after testing, indicated that the cloth carrier used in this adhesive may have been a contributing factor in causing many of the specimens to fail at a lower load than was expected. It was noticed that in many cases one or two of the yarns in the cloth carrier was forced out from the edges of the lap shear specimens by the adhesive during cure. This allowed a portion of the bond joint to be void of adhesive and thus reduced the total area bonded. In the case of the lap shear creep specimens, measurements of the actual bonded area (less void) were made after failure occurred. It was found that the actual load on the bonded portion of the lap joint was very close to the maximum load obtained from similar specimens bonded with other adhesives of the same type as HT-424.

Observation of the flatwise tension specimens which failed to meet the requirements of FMS-0015D indicated that the fillets did not appear normal.

It should be noted that only the 20 mil adhesive failed to meet some of the requirements of FMS-0015(D).

Further testing of this adhesive will be done to determine if additional aging of the tape prior to bonding will improve the bond strengths (Ref. Test Request F-7759).

CONCLUSION:

Based on the results contained herein, Bloomingdale Rubber Company's HT-424 20 mil film adhesive tested in accordance with Convair Specification FMS-0015(D) did not conform to the requirements of the following tests: Creep-rupture at 260°F for 192 hours (adhesive batches 2233, 2234, and 2235); shear strength at 260°F after aging for 192 hours at 260°F (adhesive batch 2233); flatwise (pi) tension strength at room temperature (adhesive batch 2234). Results from all other tests conducted, including the tests of the 15 mil adhesive (batches 2230, 2231, and 2232), met the requirements of FMS-0015(D).

TABLE I
EVALUATION OF HT-424 ADHESIVE TO CONVAIR SPECIFICATION FMS-0015(D)
SUMMARY OF TEST RESULTS

TYPE OF TEST	ADHESIVE THICKNESS	BATCH NO.	MINIMUM (PSI)	AVERAGE (PSI)	SPECIFICATION REQUIREMENTS MINIMUM (PSI)	SPECIFICATION REQUIREMENTS AVERAGE (PSI)
Room Temp. Lap Shear	15 mil	2230	2292	2548	2000	2250
	"	2231	2305	2565	"	"
	"	2232	1834	2147	"	"
	"	Retest 2232	2308	2473	"	"
	20 mil	2233	2020	2304	"	"
	"	2234	2200	2486	"	"
	"	2235	2139	2465	"	"
Control	"	2579	2817	2923	"	"
-67°F Lap Shear	15 mil	2230	2835	3084	2000	2250
	"	2231	2613	2891	"	"
	"	2232	2640	2901	"	"
	20 mil	2233	2052	2561	"	"
	"	2234	2390	2855	"	"
	"	2235	2540	2865	"	"
Control	"	2579	3070	3255	"	"
260°F Lap Shear	15 mil	2230	2040	2284	1800	2000
	"	2231	2030	2255	"	"
	"	2232	2150	2334	"	"
	20 mil	2233	1385	1789	"	"
	"	Retest 2233	1935	2037	"	"
	"	2234	1827	2105	"	"
	"	2235	1860	2027	"	"
Control	"	2579	2465	2558	"	"
260°F Age for 192 hrs.	15 mil	2230	1957	2122	1800	2000
	"	2231	1985	2146	"	"
	"	2232	1850	2149	"	"
	20 mil	2233	1515	1896	"	"
	"	Retest 2233	1680	1903	"	"
	"	2234	1810	2050	"	"
	"	2235	1830	2021	"	"
Control	"	2579	2412	2488	"	"

TABLE I - Continued

TYPE TEST	ADHESIVE THICKNESS	ADHESIVE BATCH NO.	FLOW FACTOR MINIMUM	FLOW FACTOR MAXIMUM	SPECIFICATION REQUIREMENTS MINIMUM	SPECIFICATION REQUIREMENTS MAXIMUM
Flow Test (Non aged adhesive)	15 mil	2230	6.64	6.88	5	10
	"	2231	5.71	6.01	5	10
	"	2232	6.34	6.47	5	10
	20 mil	2233	6.55	6.93	5	10
	"	2234	5.33	7.03	5	10
	"	2235	6.24	6.71	5	10
Control	"	2579	7.37	7.86	5	10
Flow Test (Adhesive aged 30 hrs. at Room Temperature)	15 mil	2230	5.72	-	5	-
	"	2231	5.01	-	5	-
	"	2232	5.22	-	5	-
	20 mil	2233	6.15	-	5	-
	"	2234	5.70	-	5	-
	"	2235	6.16	-	5	-
Control	"	2579	6.10	-	5	-

TYPE TEST	ADHESIVE THICKNESS	ADHESIVE BATCH NO.	RESULTS NO. OF SPECIMENS PASSING OR FAILING		SPECIFICATION REQUIREMENTS TIME (HRS.)	SPECIFICATION REQUIREMENTS DEFORMATION (MILS)
192 hr. Creep Rupture @ 260°F.	15 mil	2230	0 Fail	14 Pass	192	15
	"	2231	2 Fail	12 Pass	"	"
	"	Retest 2231	0 Fail	3 Pass	"	"
	"	2232	0 Fail	14 Pass	"	"
	20mil	2233	7 Fail	7 Pass	"	"
	"	Retest 2233	2 Fail	1 Pass	"	"
	"	2234	1 Fail	12 Pass	"	"
	"	Retest 2234	1 Fail	2 Pass	"	"
	"	2235	4 Fail	10 Pass	"	"
	"	Retest 2235	1 Fail	2 Pass	"	"
Control	"	2579	0 Fail	7 Pass	"	"

TABLE I - Continued

TYPE TEST	ADHESIVE BATCH NUMBER		LOAD TO FAILURE MINIMUM (LBS.)	LOAD TO FAILURE AVERAGE (LBS.)	SPECIFICATION REQUIREMENTS MINIMUM (LBS.)	SPECIFICATION REQUIREMENTS AVERAGE (LBS.)
Flatwise Tension (20 mil thickness only)		2233	1460	1777	1950	2100
	Retest	2233	2085	2207	"	"
		2234	1010	1407	"	"
	Retest	2234	1845	1923	"	"
		2235	10 damaged	370 damaged	"	"
	Retest	2235	2125	2200	"	"
		2579	1110 damaged	2338	"	"
	Retest	2579	2980	3117	"	"

TYPE TEST	ADHESIVE THICKNESS	ADHESIVE BATCH NO.	MAXIMUM VOLATILES (%)	SPECIFICATION REQUIREMENT MAXIMUM VOLATILES (%)
Volatiles Determination- tion	15 mil	2230	5	7
	"	2231	6	"
	"	2232	9	"
	" Retest	2232	6	"
	20 mil	2233	7	"
	"	2234	10	"
	" Retest	2234	7	"
	"	2235	9	"
	" Rerun	2235	7	"
	"	2579	7	"

TABLE I - Continued

TYPE TEST	ADHESIVE BATCH NUMBER		LOAD TO FAILURE Min. (psi)	LOAD TO FAILURE Avg. (psi)	SPECIFICATION REQUIREMENTS Min. (psi)	SPECIFICATION REQUIREMENTS Avg. (psi)
Room Temperature Lap shear after immersion in MIL-L-7808C lubricating oil for 7 days.	2230		2555	2748	1650	2100
	2231		2490	2673	"	"
	2232		2302	2559	"	"
	2233		2080	2300	"	"
	2234		1990	2390	"	"
	2235		2129	2416	"	"
Control adhesive	2579		2980	3068	"	"
	2230	Non-immersed controls	2539	2620	2000	2250
	2231		2330	2520	"	"
	2232	"	2572	2681	"	"
	2233	"	2018	2201	"	"
	2234	"	2085	2489	"	"
	2235	"	2150	2389	"	"
Control adhesive	2579	"	2955	3018	"	"
Room Temperature Lap shear after immersion in MIL-H-8446 Hydraulic Fluid (Oronite 8515) for 7 days.	2230		2403	2615	1650	2100
	2231		2625	2746	"	"
	2232		2404	2618	"	"
	2233		1996	2273	"	"
	2234		2125	2388	"	"
	2235		2154	2449	"	"
Control adhesive	2579		2529	2577	"	"
	2230	Non-immersed controls	2559	2639	2000	2250
	2231		2425	2517	"	"
	2232	"	2480	2548	"	"
	2233	"	2110	2290	"	"
	2234	"	2040	2423	"	"
	2235	"	2222	2492	"	"
Control adhesive	2579	"	2471	2578	"	"

TABLE II

FMS-0015(D) TESTS CONDUCTED ON HT-424 TWENTY MIL AND FIFTEEN MIL ADHESIVE AND AEROBOND 422 CONTROL ADHESIVE

I. 20 mil HT-424 and 20 mil Aerobond 422 (Control)

A. Room temperature lap shear
B. -67°F lap shear
C. 260°F lap shear
D. 260°F lap shear after aging 192 hours at 260°F
E. Room temperature lap shear after immersion in MIL-L-7808C lubricating oil for 7 days at room temperature
F. Room temperature lap shear after immersion in MIL-H-8446 (Oronite 8515) hydraulic fluid for 7 days at room temperature
G. Flow test - initial and after aging at room temperature for 30 hours
H. Creep rupture at 260°F for 192 hours
I. Flatwise tension at room temperature
J. Volatiles determination

II. 15 mil HT-424 and 20 mil Aerobond 422 (Control)

A. All tests conducted on the 15 mil adhesive were the same as in "I" above except the flatwise tension tests which were conducted on 20 mil adhesive only.

TABLE III

PREPARATION, BONDING, IMMERSION, AND TESTING OF SPECIMENS

I. Cleaning Procedure for Metal Parts and Honeycomb Core

A. Cleaning procedure for metal parts

1. Remove all dyes and foreign materials by wiping with methyl ethyl ketone.

2. Vapor degrease with stabilized trichloroethylene for 10 minutes.

3. Immerse for 9 to 13 minutes in a solution of the following composition, which is maintained at a temperature of 160°F ± 10°F.

a. tap water - 30 parts by weight
b. sulfuric acid - 10 parts by weight
c. sodium dichromate - 4 parts by weight

4. Immerse in clean flowing tap water, followed by a distilled water spray rinse.

5. Dry at 150°F ± 10°F for 20 minutes.

B. Cleaning procedure for honeycomb core

1. Spray with distilled water, using filtered air.

2. Dry at 150°F ± 10°F for 20 minutes.

3. Vapor degrease in stabilized trichloroethylene for 10 minutes.

4. Air dry for 10 minutes.

II. Procedure for Metal-to-Metal and Honeycomb Core Test Panel Fabrication

A. Procedure for metal-to-metal test panel fabrication

1. Apply one layer of HT-424 adhesive to one bonding surface.

2. Assemble with second bonding surface to form a 0.500" overlap.

3. Assemble on a suitable bonding fixture, with a 0.500"x 9" metal strip over the bonding area.

4. Apply 1/16" thickness of curable rubber over the metal strip.

TABLE III - Continued

B. Procedure for honeycomb core test panel fabrication

1. Apply a layer of HT-424 adhesive to one bonding surface of each metal skin.

2. Place honeycomb core between the .040" metal skins so as to form a sandwich panel of the following dimensions: 3" x 8"

3. Apply two thicknesses of 1/16" curable rubber on the topside of the sandwich panel.

III. Procedure For Bonding Metal-to-Metal and Honeycomb Core Test Panels

A. Bonding conditions for metal-to-metal test panels.

1. Place the assembly in an electrically heated bonding press with the platen temperature at 350°F.

2. Apply 100 psi pressure to the bond area of the test panels.

3. Cure for 35 minutes at 350°F.

B. Bonding conditions for honeycomb core test panels.

1. Place the assembly in an electrically heated bonding press with the platen temperature at 75°F.

2. Apply 100 psi to the bond area of the test panel.

3. Raise the glueline temperature at a uniform heat rise to 235°F ± 15°F and bond for 30 minutes.

4. Raise the glueline temperature at a uniform heat rise to 350°F and cure for 35 minutes.

IV. Procedures For Metal-to-Metal Test Panel Immersion

A. After cutting out controls, immerse the test panels in MIL-H-8446 (Oronite 8515) hydraulic fluid and MIL-L-7808C lubricating oil for seven days at room temperature.

B. Saw the panels into specimens and test within two hours after removal from fluid.

V. Procedure For Testing of Specimens

A. Testing procedure for metal-to-metal test specimens.

1. Cut bonded metal-to-metal panels into 1" wide individual specimens.

TABLE III - Continued

2. Test lap shear specimens in tensile shear, using a load rate of 650 lbs./min. at room temperature; 260oF after 30 minutes at 260°F; -67°F after 30 minutes at -67°F; 260°F after 192 hours at 260°F; and at room temperature after immersion in MIL-L-7808C lubricating oil or MIL-H-8446 hydraulic fluid for 7 days.

3. Subject creep test specimens to a dead load of 1600 psi for 192 hours at 260°F and note glueline deformation.*

B. Testing Procedure For Flatwise Tension Specimens (20 mil thickness adhesive only)

1. Cut three test specimens, each two inches in diameter, from the test panel; examine each for machining damage and reject if such damage occurs. A satisfactory evaluation of test results requires a minimum of two undamaged specimens.

2. Bond each specimen into a pair of lay-up blocks, using a suitable adhesive.

3. Test the bonded specimen to failure at room temperature, with a load rate of 4000 ± 500 lbs./min. The bond or core within the specimen should fail. Any other method of failure below 1950 lbs. shall invalidate the results. Specimen-to-block bonds failing above 1950 pounds shall not invalidate results if average of all specimens is above 2100 pounds.

C. Testing Procedures For Flow Test Specimens

1. Place a specimen of the uncured tape 3.192" diameter, non-aged and aged for 30 hours at room temperature, between two pieces of aluminum foil; apply 25 psi for 10 minutes at 275°F and remove from press. Measure area of cured adhesive and calculate flow factor as outlined in FMS-0015(D) paragraph 4.3.3.**

D. Testing Procedures For Volatile Matter Determination

1. Place a specimen of uncured tape 1.78" x 1.78" in a forced-draft oven at room temperature and heat to 350°F in 25 minutes. Retain at 350°F for 10 minutes and remove. Weigh cured sample and calculate % volatiles as outlined in FMS-0015(D), paragraph 4.3.4.***

*Reference Convair Test Report FTDM-1869

** Flow factor = $\frac{\text{Area in sq. inches of sample after cure}}{\text{Weight in gms of tape plus protective film minus Weight in grams of protective film}}$

*** % Volatiles = $\frac{\text{Weight in gms of specimen before curing minus Weight of specimen after curing X100}}{\text{Weight in gms of specimen after curing}}$

TABLE IV

PHYSICAL CHARACTERISTICS OF HT-424 TWENTY MIL AND FIFTEEN MIL ADHESIVE AND AEROBOND 422 CONTROL ADHESIVE

I.	20 Mil HT-424		20 Mil Aerobond 422 (Control)	
	A. Weight	(lbs./sq ft.)		(lbs./sq. ft.)
	1. Batch 2233	0.174	Lot 2579	0.188
	2. Batch 2234	0.172		
	3. Batch 2235	0.169		
	B. Thickness	(Inches)		(Inches)
	1. Batch 2233	0.022	Lot 2579	0.022
	2. Batch 2234	0.020		
	3. Batch 2235	0.021		
II.	15 Mil HT-424		Aerobond 422 Same as for 20 Mil above. (15 mil Adhesive Not Tested)	
	A. Weight	(lbs./sq ft.)		
	1. Batch 2230	0.133		
	2. Batch 2231	0.139		
	3. Batch 2232	0.137		
	B. Thickness	(Inches)		
	1. Batch 2230	0.016		
	2. Batch 2231	0.016		
	3. Batch 2232	0.016		

TABLE V

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15-LS-R-1-2	.521	95	1280	2457
15-LS-R-1-6	.516	95	1550	3004
15-LS-R-3-3	.517	95	1185	2292
15-LS-R-3-7	.517	95	1255	2427
15-LS-R-5-4	.512	95	1265	2471
15-LS-R-7-1	.493	95	1170	2373
15-LS-R-7-5	.497	95	1305	2626
15-LS-R-9-2	.500	95	1200	2400
15-LS-R-9-6	.515	95	1315	2553
15-LS-R-11-3	.521	95	1280	2457
15-LS-R-11-7	.508	95	1205	2372
15-LS-R-13-4	.501	95	1460	2914
15-LS-R-14-1	.526	95	1405	2671
15-LS-R-14-5	.533	95	1415	2655
Minimum				2292
Average				2548

TABLE VI

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_A-LS-R-17-2	.484	-	1115	2305
15_A-LS-R-17-6	.494	-	1195	2420
15_A-LS-R-19-3	.491	-	1300	2645
15_A-LS-R-19-7	.512	-	1410	2755
15_A-LS-R-21-4	.492	-	1225	2490
15_A-LS-R-23-1	.498	-	1220	2450
15_A-LS-R-23-5	.494	-	1325	2680
15_A-LS-R-25-2	.502	-	1440	2870
15_A-LS-R-25-6	.508	-	1170	2305
15_A-LS-R-27-3	.501	-	1325	2645
15_A-LS-R-27-7	.509	-	1195	2350
15_A-LS-R-29-4	.516	-	1375	2665
15_A-LS-R-31-1	.488	-	1265	2590
15_A-LS-R-31-5	.491	-	1350	2750
Minimum				2305
Average				2565

TABLE VII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_B-LS-R-1-2	.492	10	1095	2226
15_B-LS-R-1-6	.498	10	1035	2078
15_B-LS-R-3-3	.509	10	1060	2083
15_B-LS-R-3-7	.507	10	930	1834
15_B-LS-R-5-4	.519	10	1050	2023
15_B-LS-R-7-1	.486	10	1115	2294
15_B-LS-R-7-5	.489	10	1030	2106
15_B-LS-R-9-2	.496	10	1110	2238
15_B-LS-R-9-6	.503	10	1165	2316
15_B-LS-R-11-3	.508	10	1125	2215
15_B-LS-R-11-7	.517	10	1070	2070
15_B-LS-R-13-4	.505	10	1105	2188
15_B-LS-R-15-1	.510	10	1080	2186
15_B-LS-R-15-5	.512	10	1125	2197
Minimum				1834
Average				2147
		Retest Results		
15_B-LS-R-1-1-R	.501	40	1310	2615
15_B-LS-R-1-3-R	.506	40	1330	2628
15_B-LS-R-1-5-R	.511	40	1215	2378
15_B-LS-R-1-7-R	.510	40	1230	2510
15_B-LS-R-2-2-R	.496	40	1145	2308
15_B-LS-R-2-4-R	.505	40	1210	2396
Minimum				2308
Average				2473

TABLE VIII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_B-LS-R-17-2	.502	-	1060	2110
20_B-LS-R-17-6	.504	-	1105	2190
20_B-LS-R-19-3	.510	-	1150	2255
20_B-LS-R-19-7	.509	-	1190	2340
20_B-LS-R-21-4	.501	-	1300	2595
20_B-LS-R-23-1	.513	-	1170	2280
20_B-LS-R-23-5	.515	-	1205	2340
20_B-LS-R-25-2	.493	-	995	2020
20_B-LS-R-25-6	.504	-	1290	2560
20_B-LS-R-27-3	.521	-	1170	2245
20_B-LS-R-27-7	.507	-	1185	2335
20_B-LS-R-29-4	.491	-	1255	2556
20_B-LS-R-31-1	.504	-	1175	2330
20_B-LS-R-31-5	.529	-	1110	2110
Minimum				2020
Average				2304

TABLE IX

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20 -LS-R-1-3	.518	-	1195	2305
20 -LS-R-3-1	.555	-	1220	2200
20 -LS-R-3-6	.552	-	1335	2420
20 -LS-R-5-4	.528	-	1340	2540
20 -LS-R-7-2	.442	-	1225	2770
20 -LS-R-7-7	.455	-	1200	2640
20 -LS-R-9-5	.525	-	1210	2305
20 -LS-R-11-3	.523	-	1445	2765
20 -LS-R-13-1	.499	-	1260	2525
20 -LS-R-13-6	.500	-	1125	2250
20 -LS-R-14-4	.498	-	1240	2490
20 -LS-R-15-2	.486	-	1115	2295
20 -LS-R-15-7	.503	-	1235	2455
20 -LS-R-16-5	.490	-	1395	2845
Minimum				2200
Average				2486

TABLE X

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20-LS-R-33-2	.489	90	1125	2301
20-LS-R-33-5	.502	95	1080	2151
20-LS-R-34-1	.514	90	1315	2558
20-LS-R-34-4	.535	95	1220	2280
20-LS-R-34-7	.543	90	1330	2449
20-LS-R-35-3	.492	90	1245	2530
20-LS-R-35-6	.488	90	1290	2643
20-LS-R-36-2	.498	90	1440	2892
20-LS-R-36-5	.500	90	1475	2950
20-LS-R-37-1	.500	90	1255	2510
20-LS-R-37-4	.520	95	1270	2442
20-LS-R-37-7	.521	95	1265	2428
20-LS-R-38-3	.533	95	1140	2139
20-LS-R-38-6	.535	95	1195	2234
Minimum				2139
Average				2465

FMS-0015(D) Strength requirements for room temperature lap shear:

2250 PSI Average
2000 PSI Minimum Individual Specimen

TABLE XI

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AS CONTROLS AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
422-LS-R-26-2	.497	100	1425	2867
422-LS-R-26-6	.497	100	1400	2817
422-LS-R-27-3	.497	95	1480	2978
422-LS-R-27-7	.498	95	1440	2892
422-LS-R-28-4	.488	100	1525	3125
422-LS-R-29-1	.469	95	1375	2932
422-LS-R-29-5	.470	95	1340	2851
Minimum				2817
Average				2923

TABLE XII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15-LS-L-1-1	.513	-	1535	2990
15-LS-L-1-5	.516	-	1690	3275
15-LS-L-3-2	.508	-	1540	3030
15-LS-L-3-6	.516	-	1610	3120
15-LS-L-5-3	.512	-	1575	3075
15-LS-L-5-7	.496	-	1585	3195
15-LS-L-7-4	.507	-	1535	3025
15-LS-L-9-1	.515	-	1460	2835
15-LS-L-9-5	.506	-	1500	2965
15-LS-L-11-2	.520	-	1600	3075
15-LS-L-11-6	.512	-	1535	3000
15-LS-L-13-3	.489	-	1695	3465
15-LS-L-13-7	.513	-	1525	2970
15-LS-L-14-4	.529	-	1670	3155
Minimum				2835
Average				3084

TABLE XIII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_A-LS-L-17-1	.485	10	1525	3144
15_A-LS-L-17-5	.493	10	1320	2677
15_A-LS-L-19-2	.541	10	1635	3022
15_A-LS-L-19-6	.543	10	1600	2947
15_A-LS-L-21-3	.483	10	1510	3126
15_A-LS-L-21-7	.488	10	1495	3064
15_A-LS-L-23-4	.500	10	1475	2950
15_A-LS-L-25-1	.509	10	1330	2613
15_A-LS-L-25-5	.512	10	1395	2725
15_A-LS-L-27-2	.520	10	1425	2740
15_A-LS-L-27-6	.523	10	1530	2925
15_A-LS-L-29-3	.531	10	1545	2910
15_A-LS-L-29-7	.528	10	1465	2775
15_A-LS-L-31-4	.510	10	1455	2853
Minimum				2613
Average				2891

TABLE XIV

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_B-LS-L-1-1	.499	50	1470	2946
15_B-LS-L-1-5	.499	50	1400	2806
15_B-LS-L-3-2	.496	50	1410	2843
15_B-LS-L-3-6	.505	50	1625	3218
15_B-LS-L-5-3	.512	50	1560	3047
15_B-LS-L-5-7	.519	50	1370	2640
15_B-LS-L-7-4	.494	50	1435	2905
15_B-LS-L-9-1	.489	50	1365	2791
15_B-LS-L-9-5	.495	50	1430	2889
15_B-LS-L-11-2	.494	50	1505	3047
15_B-LS-L-11-6	.503	50	1540	3062
15_B-LS-L-13-3	.495	50	1355	2737
15_B-LS-L-13-7	.497	50	1435	2887
15_B-LS-L-15-4	.508	50	1515	2982
Minimum				2640
Average				2901

TABLE XV

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_B-LS-L-17-1	.500	30	1235	2470
20_B-LS-L-17-5	.491	30	1340	2729
20_B-LS-L-19-2	.507	30	1270	2505
20_B-LS-L-19-6	.516	30	1325	2568
20_B-LS-L-21-3	.508	30	1210	2382
20_B-LS-L-21-7	.505	30	1440	2851
20_B-LS-L-23-4	.528	30	1335	2519
20_B-LS-L-25-1	.504	30	1285	2550
20_B-LS-L-25-5	.513	30	1205	2349
20_B-LS-L-27-2	.520	30	1300	2500
20_B-LS-L-27-6	.510	30	1285	2520
20_B-LS-L-29-3	.481	30	1335	2776
20_B-LS-L-29-7	.476	30	1465	3078
20_B-LS-L-31-4	.541	30	1110	2052
Minimum				2052
Average				2561

TABLE XVI

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024 - T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_A-LS-L-1-2	.512	-	1580	3085
20_A-LS-L-1-7	.527	-	1260	2390
20_A-LS-L-3-5	.521	-	1530	2935
20_A-LS-L-5-3	.514	-	1675	3260
20_A-LS-L-7-1	.443	-	1335	3015
20_A-LS-L-9-6	.453	-	1430	3155
20_A-LS-L-9-4	.523	-	1410	2695
20_A-LS-L-11-2	.521	-	1370	2630
20_A-LS-L-11-7	.503	-	1290	2525
20_A-LS-L-13-5	.497	-	1285	2585
20_A-LS-L-14-3	.495	-	1395	2820
20_A-LS-L-15-1	.485	-	1370	2825
20_A-LS-L-15-6	.496	-	1460	2945
20_A-LS-L-16-4	.489	-	1515	3100
Minimum				2390
Average				2855

TABLE XVII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024 - T3 ALCLAD ALUMINUM TESTED AT -67°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20-LS-L-33-1	.486	-	1235	2540
20-LS-L-33-4	.499	-	1280	2565
20-LS-L-33-7	.504	-	1295	2570
20-LS-L-34-3	.523	-	1500	2870
20-LS-L-34-6	.511	-	1505	2945
20-LS-L-35-2	.496	-	1720	3465
20-LS-L-35-5	.493	-	1500	3040
20-LS-L-36-1	.501	-	1450	2895
20-LS-L-36-4	.505	-	1645	3255
20-LS-L-36-7	.516	-	1470	2850
20-LS-L-37-3	.509	-	1370	2690
20-LS-L-37-6	.517	-	1580	3055
20-LS-L-38-2	.520	-	1425	2740
20-LS-L-38-5	.502	-	1310	2610
Minimum				2540
Average				2865

FMS-0015(D) Strength requirements for -67°F lap shear:

2250 PSI Agerage
2000 PSI Minimum Individual Specimen

TABLE XVIII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024 -T3 ALCLAD ALUMINUM TESTED AS CONTROLS AT -67°F

Specimen No.	Bond Area ($IN.^2$)	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
422-LS-L-26-1	.484	-	1485	3070
422-LS-L-26-5	.497	-	1585	3190
422-LS-L-27-2	.509	-	1685	3310
422-LS-L-27-6	.504	-	1600	3175
422-LS-L-28-3	.490	-	1695	3460
422-LS-L-28-7	.493	-	1705	3460
422-LS-L-29-4	.476	-	1485	3120
Minimum				3070
Average				3255

TABLE XIX

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15-LS-H-1-3	.517	20	1110	2147
15-LS-H-1-7	.523	20	1205	2304
15-LS-H-3-4	.522	20	1065	2040
15-LS-H-5-1	.505	20	1260	2495
15-LS-H-5-5	.513	20	1190	2320
15-LS-H-7-2	.494	20	1125	2277
15-LS-H-7-6	.507	20	1175	2318
15-LS-H-9-3	.520	20	1235	2375
15-LS-H-9-7	.530	20	1195	2255
15-LS-H-11-4	.520	20	1120	2154
15-LS-H-13-1	.512	20	1155	2256
15-LS-H-13-5	.510	20	1145	2245
15-LS-H-14-2	.553	20	1310	2369
15-LS-H-14-6	.531	20	1285	2420
Minimum				2040
Average				2284

TABLE XX

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_A-LS-H-17-3	.489	-	1065	2180
15_A-LS-H-17-7	.493	-	1125	2280
15_A-LS-H-19-4	.531	-	1220	2300
15_A-LS-H-21-1	.495	-	1215	2455
15_A-LS-H-21-5	.488	-	1060	2170
15_A-LS-H-23-2	.495	-	1040	2100
15_A-LS-H-23-6	.501	-	1035	2065
15_A-LS-H-25-3	.504	-	1180	2340
15_A-LS-H-25-7	.503	-	1020	2030
15_A-LS-H-27-4	.511	-	1120	2190
15_A-LS-H-29-1	.514	-	1180	2295
15_A-LS-H-29-5	.524	-	1305	2490
15_A-LS-H-31-2	.495	-	1175	2375
15_A-LS-H-31-6	.495	-	1135	2295
Minimum				2030
Average				2255

TABLE XXI

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_B-LS-H-1-3	.512	-	1250	2440
15_B-LS-H-1-7	.506	-	1255	2480
15_B-LS-H-3-4	.507	-	1180	2325
15_B-LS-H-5-1	.506	-	1190	2350
15_B-LS-H-5-5	.512	-	1225	2390
15_B-LS-H-7-2	.489	-	1175	2400
15_B-LS-H-7-6	.498	-	1160	2330
15_B-LS-H-9-3	.488	-	1105	2265
15_B-LS-H-9-7	.493	-	1060	2150
15_B-LS-H-11-4	.507	-	1120	2210
15_B-LS-H-13-1	.498	-	1210	2430
15_B-LS-H-13-5	.508	-	1230	2420
15_B-LS-H-15-2	.503	-	1150	2285
15_B-LS-H-15-6	.508	-	1115	2195
Minimum				2150
Average				2334

TABLE XXII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT 424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024 -T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_B-LS-H-17-3	.494	100	835	1690
20_B-LS-H-17-7	.493	100	925	1876
20_B-LS-H-19-4	.501	100	980	1956
20_B-LS-H-21-1	.493	100	940	1907
20_B-LS-H-21-5	.499	100	885	1774
20_B-LS-H-23-2	.526	100	915	1740
20_B-LS-H-23-6	.516	100	920	1783
20_B-LS-H-25-3	.488	100	935	1916
20_B-LS-H-25-7	.486	100	910	1872
20_B-LS-H-27-4	.516	100	980	1899
20_B-LS-H-29-1	.478	100	835	1747
20_B-LS-H-29-5	.487	95	875	1797
20_B-LS-H-31-2	.503	95	855	1700
20_B-LS-H-31-6	.538	100	745	1385
Minimum				1385
Average				1789
Retest Results				
20_B-LS-H-5-1-R	.506	-	980	1935
20_B-LS-H-5-3-R	.510	-	1090	2135
20_B-LS-H-5-5-R	.505	-	1030	2040
Minimum				1935
Average				2037

TABLE XXIII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_A-LS-H-1-4	.515	20	1145	2223
20_A-LS-H-3-2	.561	20	1025	1827
20_A-LS-H-3-7	.553	20	1030	1863
20_A-LS-H-5-5	.540	20	1160	2148
20_A-LS-H-7-3	.557	20	1060	1903
20_A-LS-H-9-1	.526	20	1150	2186
20_A-LS-H-9-6	.529	20	1045	1975
20_A-LS-H-11-4	.528	20	1270	2405
20_A-LS-H-13-2	.508	20	1140	2244
20_A-LS-H-14-5	.505	20	1020	2020
20_A-LS-H-15-3	.503	20	1050	2087
20_A-LS-H-16-1	.500	20	1025	2050
20_A-LS-H-16-6	.499	20	1030	2064
Minimum				1827
Average				2105

TABLE XXIV

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20-LS-H-15-1	.536	20	1020	1903
20-LS-H-15-3	.527	20	1125	2135
20-LS-H-15-5	.520	20	1030	1981
20-LS-H-15-7	.517	20	1120	2166
20-LS-H-17-2	.524	20	1040	1985
20-LS-H-17-4	.540	20	1020	1889
20-LS-H-17-6	.516	20	960	1860
20-LS-H-19-1	.560	20	1160	2071
20-LS-H-19-3	.556	20	1180	2122
20-LS-H-19-5	.538	20	1150	2138
20-LS-H-19-7	.539	20	1125	2087
20-LS-H-21-2	.554	20	1070	1931
20-LS-H-21-4	.552	20	1090	1975
20-LS-H-21-6	.542	20	1160	2140
Minimum				1860
Average				2027

FMS-0015(D) strength requirements for 260°F lap shear:

2000 psi average
1800 psi minimum individual specimen

TABLE XXV

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM TESTED AS CONTROLS AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
422-LS-H-26-3	.507	10	1250	2465
422-LS-H-26-7	.499	10	1290	2585
422-LS-H-27-4	.507	10	1255	2475
422-LS-H-28-1	.496	10	1230	2480
422-LS-H-28-5	.504	10	1385	2748
422-LS-H-29-2	.475	10	1220	2568
422-LS-H-29-6	.483	10	1250	2588
Minimum				2465
Average				2558

TABLE XXVI

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424- ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
15-A-H-39-1	.523	-	1125	2151
15-A-H-39-2	.528	-	1200	2273
15-A-H-39-3	.533	-	1105	2073
15-A-H-39-4	.539	-	1055	1957
15-A-H-39-5	.533	-	1240	2326
15-A-H-39-5	.538	-	1110	2063
15-A-H-39-7	.522	-	1250	2395
15-A-H-40-1	.496	-	1000	2016
15-A-H-40-2	.501	-	1000	1996
15-A-H-40-3	.507	-	1115	2199
15-A-H-40-4	.506	-	1060	2095
15-A-H-40-5	.508	-	1010	1988
15-A-H-40-6	.509	-	1045	2053
15-A-H-40-7	.509	-	1080	2122
Minimum				1957
Average				2122

TABLE XXVII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_A-A-H-17-4	.495	-	1005	2030
15_A-A-H-19-1	.536	-	1165	2175
15_A-A-H-19-5	.542	-	1200	2215
15_A-A-H-21-2	.495	-	1140	2305
15_A-A-H-21-6	.500	-	1075	2150
15_A-A-H-23-3	.500	-	1125	2250
15_A-A-H-23-7	.488	-	1060	2170
15_A-A-H-25-4	.519	-	1030	1985
15_A-A-H-27-1	.511	-	1060	2075
15_A-A-H-27-5	.504	-	1150	2280
15_A-A-H-29-2	.517	-	1120	2165
15_A-A-H-29-6	.522	-	1155	2215
15_A-A-H-31-3	.490	-	980	2000
15_A-A-H-31-7	.482	-	980	2035
Minimum				1985
Average				2146

TABLE XXVIII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15_B-A-H-1-4	.496	-	1005	2025
15_B-A-H-3-1	.502	-	930	1850
15_B-A-H-3-5	.501	-	1085	2165
15_B-A-H-5-2	.507	-	1095	2160
15_B-A-H-5-6	.509	-	1150	2260
15_B-A-H-7-3	.495	-	1065	2150
15_B-A-H-7-7	.496	-	1110	2240
15_B-A-H-9-4	.491	-	1115	2270
15_B-A-H-11-1	.486	-	1100	2265
15_B-A-H-11-5	.507	-	1070	2110
15_B-A-H-13-2	.506	-	1090	2155
15_B-A-H-13-6	.504	-	1115	2215
15_B-A-H-15-3	.516	-	1105	2140
15_B-A-H-15-7	.504	-	1050	2085
Minimum				1850
Average				2149

TABLE XXIX

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_B-A-H-17-4	.506	-	1010	1995
20_B-A-H-19-1	.502	-	995	1905
20_B-A-H-19-5	.509	-	1020	2005
20_B-A-H-21-2	.500	-	1050	2100
20_B-A-H-21-6	.503	-	910	1810
20_B-A-H-23-3	.515	-	970	1885
20_B-A-H-23-7	.511	-	1155	2260
20_B-A-H-25-4	.510	-	900	1765
20_B-A-H-27-1	.501	-	950	1895
20_B-A-H-27-5	.515	-	990	1925
20_B-A-H-29-2	.480	-	930	1935
20_B-A-H-29-6	.492	-	950	1930
20_B-A-H-31-3	.519	-	840	1620
20_B-A-H-31-7	.534	-	810	1515
Minimum				1515
Average				1896
	RETEST RESULTS			
20_B-A-H-6-1-R	.518	-	870	1680
20_B-A-H-6-3-R	.520	-	1120	2154
20_B-A-H-6-5-R	.512	-	960	1875
Minimum				1680
Average				1903

TABLE XXX

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_A-A-H-1-1	.506	-	1155	2285
20_A-A-H-1-6	.505	-	1030	2040
20_A-A-H-3-4	.446	-	1125	2520
20_A-A-H-5-2	.516	-	1145	2220
20_A-A-H-5-7	.540	-	1165	2155
20_A-A-H-7-5	.465	-	940	2020
20_A-A-H-9-3	.525	-	960	1830
20_A-A-H-11-1	.524	-	930	1810
20_A-A-H-11-6	.520	-	1015	1950
20_A-A-H-13-4	.517	-	1000	1935
20_A-A-H-14-2	.495	-	925	1870
20_A-A-H-14-7	.497	-	930	1870
20_A-A-H-15-5	.497	-	1045	2100
20_A-A-H-16-3	.497	-	1060	2135
Minimum				1810
Average				2050

TABLE XXXI

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20-A-H-33-3	.501	-	975	1945
20-A-H-33-6	.507	-	970	1915
20-A-H-34-2	.527	-	1115	2115
20-A-H-34-5	.512	-	995	1945
20-A-H-35-1	.492	-	1130	2295
20-A-H-35-4	.492	-	900	1830
20-A-H-35-7	.490	-	1060	2165
20-A-H-36-3	.499	-	1150	2305
20-A-H-36-6	.517	-	1150	2225
20-A-H-37-2	.509	-	990	1945
20-A-H-37-5	.521	-	990	1900
20-A-H-38-1	.527	-	1000	1900
20-A-H-38-4	.520	-	1030	1980
20-A-H-38-7	.515	-	945	1835
Minimum				1830
Average				2021

FMS-0015(D) strength requirements for 260°F age test:

2000 psi average
1800 psi minimum individual specimen

TABLE XXXII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM, AGED FOR 192 HOURS AT 260°F AND TESTED AS CONTROLS AT 260°F

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
422-A-H-31-1	.514	20	1240	2412
422-A-H-31-2	.506	20	1275	2520
422-A-H-31-3	.509	20	1260	2475
422-A-H-31-4	.507	20	1265	2495
422-A-H-31-5	.507	20	1260	2485
422-A-H-31-6	.505	20	1245	2465
422-A-H-31-7	.505	20	1295	2564
Minimum				2412
Average				2488

TABLE XXXIII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15-7-R-4-7	.492	100	1335	2715
15-7-R-4-3	.491	100	1375	2800
15-7-R-4-4	.489	100	1360	2780
15-7-R-4-5	.485	100	1325	2730
15-7-R-4-6	.477	100	1280	2685
15-7-R-8-2	.482	100	1360	2820
15-7-R-8-3	.504	100	1350	2680
15-7-R-8-4	.503	100	1370	2725
15-7-R-8-5	.500	100	1565	3130
15-7-R-8-6	.485	100	1265	2610
15-7-R-12-2	.494	100	1545	3130
15-7-R-12-3	.512	100	1355	2645
15-7-R-12-4	.502	100	1325	2640
15-7-R-12-5	.505	100	1300	2575
15-7-R-12-6	.509	100	1300	2555
Minimum				2555
Average				2748
NON-IMMERSED CONTROLS				
15-7-R-4-1	.502	50	1325	2639
15-7-R-4-7	.491	50	1288	2623
15-7-R-8-1	.496	50	1328	2677
15-7-R-8-7	.498	50	1283	2576
15-7-R-12-1	.503	50	1340	2664
15-7-R-12-7	.516	50	1310	2539
Minimum				2539
Average				2620

TABLE XXXIV

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15A-7-R-18-2	.490	100	1360	2775
15A-7-R-18-3	.504	100	1380	2740
15A-7-R-18-4	.502	100	1405	2800
15A-7-R-18-5	.505	100	1365	2705
15A-7-R-18-6	.510	100	1410	2765
15A-7-R-22-2	.492	100	1315	2675
15A-7-R-22-3	.492	100	1290	2620
15A-7-R-22-4	.492	100	1325	2695
15A-7-R-22-5	.497	100	1240	2495
15A-7-R-22-6	.494	100	1230	2490
15A-7-R-26-2	.504	100	1310	2600
15A-7-R-26-3	.504	100	1325	2630
15A-7-R-26-4	.513	100	1285	2505
15A-7-R-26-5	.486	100	1395	2870
15A-7-R-26-6	.503	100	1375	2735
Minimum				2490
Average				2673
NON-IMMERSED CONTROLS				
15A-7-R-18-1	.478	-	1285	2690
15A-7-R-18-7	.493	-	1225	2485
15A-7-R-22-1	.494	-	1225	2480
15A-7-R-22-7	.505	-	1175	2330
15A-7-R-26-1	.491	-	1285	2615
15A-7-R-26-7	.505	-	1275	2525
Mimimum				2330
Average				2520

TABLE XXXV

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
15B-7-R-2-2	.477	100	1215	2547
15B-7-R-2-3	.477	100	1255	2631
15B-7-R-2-4	.475	100	1195	2516
15B-7-R-2-5	.474	100	1200	2532
15B-7-R-2-6	.476	100	1185	2490
15B-7-R-6-2	.492	100	1345	2734
15B-7-R-6-3	.493	100	1205	2444
15B-7-R-6-4	.496	100	1260	2540
15B-7-R-6-5	.494	100	1250	2530
15B-7-R-6-6	.493	100	1135	2302
15B-7-R-10-2	.478	100	1205	2521
15B-7-R-10-3	.477	100	1270	2662
15B-7-R-10-4	.477	100	1250	2621
15B-7-R-10-5	.483	100	1240	2567
15B-7-R-10-6	.489	100	1345	2751
Minimum				2302
Average				2559
NON-IMMERSED CONTROLS				
15B-7-R-2-1	.485	50	1295	2670
15B-7-R-2-7	.484	50	1245	2572
15B-7-R-6-1	.500	50	1310	2620
15B-7-R-6-7	.500	50	1375	2750
15B-7-R-10-1	.481	50	1315	2734
15B-7-R-10-7	.489	50	1340	2740
Minimum				2572
Average				2681

TABLE XXXVI

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No	Bond Area (In.2)	Cohesive Failure (%)	Load To Failure (Lbs.)	Load To Failure (PSI)
20_B-7-R-18-2	.489	-	1170	2393
20_B-7-R-18-3	.495	-	1135	2293
20_B-7-R-18-4	.505	-	1085	2149
20_B-7-R-18-5	.500	-	1125	2250
20_B-7-R-18-6	.504	-	1145	2272
20_B-7-R-20-2	.497	-	1070	2153
20_B-7-R-20-3	.499	-	1050	2104
20_B-7-R-20-4	.504	-	1190	2361
20_B-7-R-20-5	.502	-	1370	2729
20_B-7-R-20-6	.515	-	1345	2612
20_B-7-R-22-2	.491	-	1195	2434
20_B-7-R-22-3	.491	-	1075	2189
20_B-7-R-22-4	.488	-	1210	2480
20_B-7-R-22-5	.485	-	1145	2361
20_B-7-R-22-6	.488	-	1015	2080
Minimum				2080
Average				2300
NON-IMMERSED CONTROLS				
20_B-7-R-18-1	.490	90	1080	2204
20_B-7-R-18-7	.498	90	1135	2279
20_B-7-R-20-1	.499	90	1075	2154
20_B-7-R-20-7	.495	95	1085	2192
20_B-7-R-22-1	.493	95	995	2018
20_B-7-R-22-7	.505	95	1190	2356
Minimum				2018
Average				2201

TABLE XXXVII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
20A-7-R-4-2	.499	100	1330	2665
20A-7-R-4-3	.500	100	1295	2590
20A-7-R-4-4	.506	100	1250	2470
20A-7-R-4-5	.508	100	1150	2265
20A-7-R-4-6	.510	100	1015	1990
20A-7-R-8-2	.471	100	1230	2610
20A-7-R-8-3	.475	100	1145	2410
20A-7-R-8-4	.480	100	1270	2645
20A-7-R-8-5	.486	100	1320	2715
20A-7-R-8-6	.486	100	1200	2470
20A-7-R-12-2	.538	100	1160	2155
20A-7-R-12-3	.540	100	1075	1990
20A-7-R-12-4	.538	100	1190	2210
20A-7-R-12-5	.544	100	1385	2545
20A-7-R-12-6	.543	100	1150	2120
Minimum				1990
Average				2390
NON-IMMERSED CONTROLS				
20A-7-R-4-1	.492	-	1350	2745
20A-7-R-4-7	.501	-	1120	2235
20A-7-R-8-1	.457	-	1390	3040
20A-7-R-8-7	.489	-	1220	2495
20A-7-R-12-1	.518	-	1080	2085
20A-7-R-12-7	.503	-	1175	2335
Minimum				2085
Average				2489

TABLE XXXVIII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
20-7-R-18-2	.506	-	1415	2796
20-7-R-18-3	.505	-	1205	2386
20-7-R-18-4	.511	-	1300	2534
20-7-R-18-5	.513	-	1210	2368
20-7-R-18-6	.512	-	1350	2637
20-7-R-22-2	.514	-	1240	2413
20-7-R-22-3	.518	-	1250	2413
20-7-R-22-4	.508	-	1180	2323
20-7-R-22-5	.506	-	1185	2342
20-7-R-22-6	.504	-	1135	2252
20-7-R-24-2	.498	-	1060	2129
20-7-R-24-3	.510	-	1160	2275
20-7-R-24-4	.512	-	1215	2373
20-7-R-24-5	.514	-	1245	2422
20-7-R-24-6	.515	-	1325	2573
Minimum				2129
Average				2416
NON-IMMERSED CONTROLS				
20-7-R-18-1	.491	90	1155	2352
20-7-R-18-7	.505	90	1375	2723
20-7-R-22-1	.501	90	1255	2505
20-7-R-22-7	.493	90	1060	2150
20-7-R-24-1	.487	95	1135	2331
20-7-R-24-7	.513	90	1165	2272
Miminum				2150
Average				2389

FMS-0015(D) Strength Requirements for Immersion Test:

2100 psi average
1650 psi minimum individual specimen

TABLE XXXIX

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-L-7808C LUBRICATING OIL AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE AS CONTROLS

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (Lbs)	Load To Failure (PSI)
422-7-R-30-2	.441	[illegible]	1370	3105
422-7-R-30-3	.442	[illegible]	1375	3110
422-7-R-30-4	.440	[illegible]	1360	3090
422-7-R-30-5	.443	[illegible]	1320	2980
422-7-R-30-6	.437	[illegible]	1335	3055
Minimum				2980
Average				3068
NON-IMMERSED CONTROLS				
422-7-R-30-1	.445	85	1315	2955
422-7-R-30-7	.440	90	1355	3080
Minimum				2955
Average				3018

TABLE XL

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
15-8-R-2-2	.513	20	1325	2583
15-8-R-2-3	.510	20	1335	2618
15-8-R-2-4	.508	20	1430	2815
15-8-R-2-5	.515	20	1505	2922
15-8-R-2-6	.505	20	1350	2673
15-8-R-6-2	.506	20	1350	2668
15-8-R-6-3	.507	20	1315	2594
15-8-R-6-4	.505	20	1330	2634
15-8-R-6-5	.510	20	1375	2696
15-8-R-6-6	.524	20	1395	2662
15-8-R-10-2	.532	20	1280	2406
15-8-R-10-3	.546	20	1320	2418
15-8-R-10-4	.539	20	1295	2403
15-8-R-10-5	.534	20	1325	2481
15-8-R-10-6	.548	20	1450	2646
Minimum				2403
Average				2615
NON-IMMERSED CONTROLS				
15-8-R-2-1	.502	60	1300	2590
15-8-R-2-7	.513	60	1350	2632
15-8-R-6-1	.501	60	1360	2715
15-8-R-6-7	.510	60	1392	2729
15-8-R-10-1	.522	60	1336	2559
15-8-R-10-7	.523	60	1364	2608
Minimum				2559
Average				2639

TABLE XLI

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
15_A-8-R-20-2	.497	95	1375	2767
15_A-8-R-20-3	.498	95	1370	2751
15_A-8-R-20-4	.496	95	1380	2782
15_A-8-R-20-5	.497	95	1375	2767
15_A-8-R-20-6	.487	95	1325	2721
15_A-8-R-24-2	.495	95	1420	2869
15_A-8-R-24-3	.496	95	1385	2792
15_A-8-R-24-4	.503	95	1335	2654
15_A-8-R-24-5	.510	95	1365	2677
15_A-8-R-24-6	.501	95	1315	2625
15_A-8-R-28-2	.487	95	1310	2690
15_A-8-R-28-3	.488	95	1345	2756
15_A-8-R-28-4	.499	95	1350	2705
15_A-8-R-28-5	.502	95	1425	2839
15_A-8-R-28-6	.499	95	1395	2796
Minimum				2625
Average				2746
NON-IMMERSED CONTROLS				
15_A-8-R-20-1	.500	-	1250	2500
15_A-8-R-20-7	.500	-	1265	2530
15_A-8-R-24-1	.505	-	1225	2425
15_A-8-R-24-7	.496	-	1220	2460
15_A-8-R-28-1	.481	-	1180	2455
15_A-8-R-28-7	.499	-	1365	2735
Minimum				2425
Average				2517

TABLE XLII

LAP SHEAR STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
15B-8-R-4-2	.494	95	1340	2713
15B-8-R-4-3	.490	100	1345	2745
15B-8-R-4-4	.489	100	1320	2699
15B-8-R-4-5	.487	95	1270	2608
15B-8-R-4-6	.490	100	1290	2633
15B-8-R-8-2	.497	100	1330	2676
15B-8-R-8-3	.495	100	1320	2667
15B-8-R-8-4	.499	100	1305	2615
15B-8-R-8-5	.499	100	1315	2635
15B-8-R-8-6	.498	100	1360	2731
15B-8-R-12-2	.487	100	1170	2404
15B-8-R-12-3	.494	100	1245	2520
15B-8-R-12-4	.495	100	1250	2525
15B-8-R-12-5	.497	100	1325	2666
15B-8-R-12-6	.500	100	1215	2430
Minimum				2404
Average				2618
NON-IMMERSED CONTROLS				
15B-8-R-4-1	.496	10	1280	2581
15B-8-R-4-7	.497	10	1280	2575
15B-8-R-8-1	.496	10	1230	2480
15B-8-R-8-7	.503	10	1330	2644
15B-8-R-12-1	.498	10	1255	2520
15B-8-R-12-7	.503	10	1250	2485
Minimum				2480
Average				2548

TABLE XLIII

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.2)	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
20_B-8-R-24-2	.513	-	1085	2115
20_B-8-R-24-3	.509	-	1110	2181
20_B-8-R-24-4	.510	-	1080	2118
20_B-8-R-24-5	.506	-	1115	2204
20_B-8-R-24-6	.506	-	1010	1996
20_B-8-R-26-2	.522	-	1105	2117
20_B-8-R-26-3	.520	-	1270	2442
20_B-8-R-26-4	.518	-	1165	2249
20_B-8-R-26-5	.521	-	1340	2572
20_B-8-R-26-6	.514	-	1260	2451
20_B-8-R-28-2	.504	-	1180	2341
20_B-8-R-28-3	.503	-	1290	2565
20_B-8-R-28-4	.511	-	1095	2143
20_B-8-R-28-5	.510	-	1175	2304
20_B-8-R-28-6	.521	-	1200	2303
Minimum				1996
Average				2273
NON-IMMERSED CONTROLS				
20_B-8-R-24-1	.495	95	1115	2253
20_B-8-R-24-7	.500	95	1055	2110
20_B-8-R-26-1	.480	95	1190	2479
20_B-8-R-26-7	.472	95	1185	2511
20_B-8-R-28-1	.521	90	1120	2150
20_B-8-R-28-7	.514	90	1150	2237
Minimum				2110
Average				2290

TABLE XLIV

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
20_A-8-R-2-2	.497	100	1140	2295
20_A-8-R-2-3	.504	100	1155	2290
20_A-8-R-2-4	.506	100	1270	2510
20_A-8-R-2-5	.512	100	1195	2335
20_A-8-R-2-6	.505	100	1410	2790
20_A-8-R-6-2	.512	100	1400	2735
20_A-8-R-6-3	.519	100	1285	2475
20_A-8-R-6-4	.517	100	1180	2280
20_A-8-R-6-5	.526	100	1220	2320
20_A-8-R-6-6	.524	100	1235	2355
20_A-8-R-10-2	.503	100	1150	2285
20_A-8-R-10-3	.502	100	1100	2190
20_A-8-R-10-4	.502	100	1155	2300
20_A-8-R-10-5	.503	100	1070	2125
20_A-8-R-10-6	.502	100	1275	2540
Minimum				2125
Average				2388
NON-IMMERSED CONTROLS				
20_A-8-R-2-1	.498	-	1140	2290
20_A-8-R-2-7	.501	-	1315	2625
20_A-8-R-6-1	.504	-	1370	2720
20_A-8-R-6-7	.502	-	1025	2040
20_A-8-R-10-1	.498	-	1300	2610
20_A-8-R-10-7	.501	-	1130	2255
Minimum				2040
Average				2423

TABLE XLV

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
20-8-R-16-2	.543	-	1305	2403
20-8-R-16-3	.553	-	1230	2224
20-8-R-16-4	.557	-	1200	2154
20-8-R-16-5	.556	-	1225	2203
20-8-R-16-6	.555	-	1205	2171
20-8-R-20-2	.502	-	1280	2550
20-8-R-20-3	.510	-	1155	2265
20-8-R-20-4	.502	-	1180	2351
20-8-R-20-5	.508	-	1350	2657
20-8-R-20-6	.497	-	1185	2384
20-8-R-23-2	.545	-	1501	2754
20-8-R-23-3	.543	-	1445	2661
20-8-R-23-4	.540	-	1500	2778
20-8-R-23-5	.535	-	1500	2804
20-8-R-23-6	.538	-	1280	2379
Minimum				2154
Average				2449
NON-IMMERSED CONTROLS				
20-8-R-16-1	.539	95	1270	2356
20-8-R-16-7	.546	90	1245	2280
20-8-R-20-1	.495	90	1215	2455
20-8-R-20-7	.495	95	1100	2222
20-8-R-23-1	.545	90	1445	2651
20-8-R-23-7	.534	85	1595	2987
Minimum				2222
Average				2492

FMS-0015(D) Strength Requirements for Immersion Test:

2100 psi average
1650 psi minimum individual specimen

TABLE XLVI

LAP SHEAR STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM, IMMERSED FOR 7 DAYS IN MIL-H-8446 HYDRAULIC FLUID AT ROOM TEMPERATURE, AND TESTED AS CONTROLS AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Cohesive Failure (%)	Load To Failure (lbs.)	Load To Failure (PSI)
422-8-R-25-2	.524	95	1325	2529
422-8-R-25-3	.525	95	1355	2581
422-8-R-25-4	.524	95	1350	2576
422-8-R-25-5	.527	95	1365	2590
422-8-R-25-6	.529	95	1380	2609
Minimum				2529
Average				2577
NON-IMMERSED CONTROLS				
422-8-R-25-1	.520	95	1285	2471
422-8-R-25-7	.529	95	1420	2684
Minimum				2471
Average				2578

TABLE XLVII

CREEP-RUPTURE STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, BONDED 2024 T-3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness
15-C-H-1-4	.522	*	0	8
15-C-H-3-1	.510	*	0	6
15-C-H-3-5	.515	*	0	7
15-C-H-5-2	.519	*	0	7
15-C-H-5-6	.507	*	0	8
15-C-H-7-3	.499	*	0	7
15-C-H-7-7	.495	*	0	6
15-C-H-9-4	.499	*	0	8
15-C-H-11-1	.495	*	0	6
15-C-H-11-5	-	Void Test		
15-C-H-13-2	.507	*	0	7
15-C-H-13-6	.506	*	0	8
15-C-H-14-3	.505	*	0	8
15-C-H-14-7	.504	*	0	7

*Passed 192 hours with no failure.

TABLE XLVIII

CREEP-RUPTURE STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness
15_A-C-H-30-1	.498	17.7	-	8
15_A-C-H-30-2	.502	*	0	7
15_A-C-H-30-3	.503	*	0	6
15_A-C-H-30-4	.506	*	0	7
15_A-C-H-30-5	.509	*	0	7
15_A-C-H-30-6	.511	*	0	8
15_A-C-H-30-7	.512	*	0	7
15_A-C-H-32-1	.501	*	0	7
15_A-C-H-32-2	.503	*	0	6
15_A-C-H-32-3	.507	*	0	8
15_A-C-H-32-4	.509	*	0	7
15_A-C-H-32-5	.509	173.8	-	7
15_A-C-H-32-6	.509	*	0	6
15_A-C-H-32-7	.511	*	0	8
RETEST RESULTS				
15_A-C-H-1-2-R	.516	*	0	-
15_A-C-H-2-3-Rq	.500	*	0	-
15_A-C-H-2-6-R	.510	*	0	-

*Passed 192 hours with no failure.

TABLE XLIX

CREEP-RUPTURE STRENGTH OF FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness
15_B-C-H-14-1	.498	*	0	7
15_B-C-H-14-2	.498	*	0	7
15_B-C-H-14-3	.501	*	0	7
15_B-C-H-14-4	.500	*	0	8
15_B-C-H-14-5	.500	*	0	7
15_B-C-H-14-6	.501	*	0	6
15_B-C-H-14-7	.503	*	0	7
15_B-C-H-16-1	.511	*	0	7
15_B-C-H-16-2	.513	*	0	8
15_B-C-H-16-3	.513	*	0	7
15_B-C-H-16-4	.512	*	0	7
15_B-C-H-16-5	.513	*	0	6
15_B-C-H-16-6	.515	*	0	7
15_B-C-H-16-7	.512	*	0	6

*Passed 192 hours with no failure.

TABLE L

CREEP-RUPTURE STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.	Deformation (Mils)	Glueline Thickness
20_B-C-H-30-1	.487	*	0	-
20_B-C-H-30-2	.495	153.1	-	-
20_B-C-H-30-3	.496	*	-	-
20_B-C-H-30-4	.504	*	0	-
20_B-C-H-30-5	.506	148.4	-	-
20_B-C-H-30-6	.508	136.9	-	-
20_B-C-H-30-7	.512	*	0	-
20_B-C-H-32-1	.500	137.8	-	-
20_B-C-H-32-2	.506	*	0	-
20_B-C-H-32-3	.508	1.4	-	-
20_B-C-H-32-4	.510	1.4	-	-
20_B-C-H-32-5	.508	34.3	-	-
20_B-C-H-32-6	.508	*	0	-
20_B-C-H-32-7	.504	*	0	-
		RETEST RESULTS		
20_B-C-H-5-4-R	.517	*	0	-
20_B-C-H-6-2-R	.523	82.5	-	-
20_B-C-H-6-6-R	.517	139.4	-	-

*Passed 192 hours with no failure.

TABLE LI

CREEP-RUPTURE STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness (Mils)
20_A-C-H-1-5	.525	*	0	6
20_A-C-H-3-3	.551	*	0	6
20_A-C-H-5-1	.509	*	0	5
20_A-C-H-5-6	.538	*	0	5
20_A-C-H-7-4	-	Void Test		
20_A-C-H-9-2	.523	*	0	5
20_A-C-H-9-7	.533	*	0	5
20_A-C-H-11-5	.529	*	0	6
20_A-C-H-13-3	.511	*	0	5
20_A-C-H-14-1	.510	*	0	4
20_A-C-H-14-6	.505	*	0	5
20_A-C-H-15-4	.502	*	0	5
20_A-C-H-16-2	.507	*	0	5
20_A-C-H-16-7	.509	4.1	-	5
		RETEST RESULTS		
20_A-C-H-6-4-R	-	*	0	-
20_A-C-H-8-3-R	.507	31.5	-	-
20_A-C-H-8-5-R	.514	*	0	-

*Passed 192 hours with no failure.

TABLE LII

CREEP-RUPTURE STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness (Mils)
20-C-H-15-2	.501	151.2	-	7
20-C-H-15-4	.498	86.2	-	8
20-C-H-15-6	.503	*	0	9
20-C-H-17-1	.502	*	0	7
20-C-H-17-3	.507	*	0	8
20-C-H-17-5	.505	166.0	-	7
20-C-H-17-7	.498	185.1	-	7
20-C-H-19-2	.500	*	0	8
20-C-H-19-4	.509	*	0	7
20-C-H-19-6	.494	*	0	7
20-C-H-21-1	.495	*	0	8
20-C-H-21-3	.500	*	0	7
20-C-H-21-5	.493	*	0	7
20-C-H-21-7	.503	*	0	7
RETEST RESULTS				
20-C-H-7-1-R	.500	*	0	-
20-C-H-7-3-R	.515	*	0	-
20-C-H-7-2-R	.509	145.4	-	-

*Passed 192 hours with no failure.

FMS-0015(D) Creep-Rupture Strength Requirements:

15 mil deformation, maximum

TABLE LIII

CREEP-RUPTURE STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM, TESTED AS CONTROLS AT 260°F AND 1600 PSI FOR 192 HOURS

Specimen No.	Bond Area (In.^{2})	Time To Failure (Hrs.)	Deformation (Mils)	Glueline Thickness (Mils)
422-C-H-26-4	.500	*	0	5
422-C-H-27-1	.502	*	0	5
422-C-H-27-5	.504	*	0	5
422-C-H-28-2	.503	*	0	6
422-C-H-28-6	.501	*	0	5
422-C-H-29-3	.481	*	0	5
422-C-H-29-7	.483	*	0	5

* Passed 192 hours with no failure.

TABLE LIV

FLATWISE TENSION STRENGTH OF TWENTY MIL THICKNESS HT-424 AHDESIVE, BATCH NUMBER 2233, BONDED 2024-T3 ALCLAD ALUMINUM SKINS AND GLASS FIBER-PLASTIC HONEYCOMB CORE (FMS-9013, TYPE I) TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Load To Failure (Lbs.)	Type Failure
20_B-PT-R-1	3.14	1545	Bond
20_B-PT-R-2	3.14	2325	Bond
20_B-PT-R-3	3.14	1460	Bond
Minimum		1460	
Average		1777	
		RETEST RESULTS	
20_B-PT-R-1-R	3.14	2250	Bond
20_B-PT-R-2-R	3.14	2285	Bond
20_B-PT-R-3-R	3.14	2085	Bond
Minimum		2085	
Average		2207	

TABLE LV

FLATWISE TENSION STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, BONDED 2024-T3 ALCLAD ALUMINUM SKINS AND GLASS FIBER-PLASTIC HONEYCOMB CORE (FMS-0013, TYPE I) TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Load To Failure (Lbs.)	Type Failure
20_A-PT-R-1	3.14	2050	Bond
20_A-PT-R-2	3.14	1010	Bond
20_A-PT-R-3	3.14	1160	Bond
Minimum		1010	
Average		1407	
RETEST RESULTS			
20_A-PT-R-1-R	3.14	Mistested	
20_A-PT-R-2-R	3.14	1845	Bond
20_A-PT-R-3-R	3.14	2000	Bond
Minimum		1845	
Average		1923	

TABLE LVI

FLATWISE TENSION STRENGTH OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, BONDED 2024-T3 ALCLAD ALUMINUM SKINS AND GLASS FIBER-PLASTIC HONEYCOMB CORE (FMS-0013, TYPE I) TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Load To Failure (Lbs.)	Type Failure
20-PT-R-1	3.14	10	Bond
20-PT-R-2	3.14	910	Bond
20-PT-R-3	3.14	190	Bond
Minimum		10	
Average		370	
		RETEST RESULTS	
20-PT-R-1-R	3.14	2315	Bond
20-PT-R-2-R	3.14	2160	Bond
20-PT-R-3-R	3.14	2125	Cup
Minimum		2125	
Average		2200	

FMS-0015(D) **Flatwise Tension Strength Requirements:**

2100 lbs. average
1950 lbs. minimum individual specimen

TABLE LVII

FLATWISE TENSION STRENGTH OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, BONDED 2024-T3 ALCLAD ALUMINUM SKINS AND GLASS FIBER-PLASTIC HONEYCOMB CORE **(FMS-0013, TYPE I)**
TESTED AT ROOM TEMPERATURE

Specimen No.	Bond Area (In.^{2})	Load To Failure (Lbs.)	Type Failure
422-PT-R-1	3.14	1110 **Damaged**	Bond
422-PT-R-2	3.14	2905	Bond
422-PT-R-3	3.14	3000	Bond
Minimum		**1110**	
Average		2338	
		RETEST RESULTS	
422-PT-R-1-R	3.14	3370	Bond
422-PT-R-2-R	3.14	3000	Bond
422-PT-R-3-R	3.14	2980	Bond
Minimum		2980	
Average		3117	

TABLE LVIII

FLOW TEST RESULTS FOR FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2230, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area ($In.^2$)	Flow Factor ($In.^2/gm$)
Adhesive - Tested Immediately		
15-F-R-S-0	22.23	6.64
15-F-R-E-0	23.05	6.88
Adhesive - Aged 30 hours at room temperature prior to bonding		
15-F-R-S-30	19.17	5.72
15-F-R-E-30	20.35	6.07

TABLE LIX

FLOW TEST RESULTS FOR FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2231, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area (In.^{2})	Flow Factor (In.^{2}/gm)
Adhesive - Tested immediately		
15_A-F-R-S-0	19.99	5.71
15_A-F-R-E-0	21.05	6.01
Adhesive - Aged 30 hours at room temperature prior to bonding		
15_A-F-R-S-30	17.64	5.04
15_A-F-R-E-30	17.52	5.01

TABLE LX

FLOW TEST RESULTS FOR FIFTEEN MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2232, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area (In.^{2})	Flow Factor (In.^{2}/gm)
Adhesive - Tested Immediately		
15_B-F-R-S-0	21.99	6.34
15_B-F-R-E-0	22.46	6.47
Adhesive - Aged 30 hours at room temperature prior to bonding		
15_B-F-R-S-30	18.11	5.22
15_B-F-R-E-30	18.82	5.42

TABLE LXI

FLOW TEST RESULTS FOR TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2233, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area (In.^{2})	Flow Factor (In.^{2}/gm)
Adhesive - Tested immediately		
20_B-F-R-S-0	30.34	6.93
20_B-F-R-E-0	28.69	6.55
Adhesive - Aged 30 hours at room temperature prior to bonding		
20_B-F-R-S-30	26.93	6.15
20_B-F-R-E-30	29.52	6.74

TABLE LXII

FLOW TEST RESULTS OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2234, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area (In.^{2})	Flow Factor (In.^{2}/gm)
Adhesive tested immediately		
20_A-F-R-S-0	23.17	5.33
20_A-F-R-E-0	30.58	7.03
Adhesive aged 30 hours at room temperature prior to bonding		
20_A-F-R-S-30	24.81	5.70
20_A-F-R-E-30	27.40	6.30

TABLE LXIII

FLOW TEST RESULTS OF TWENTY MIL THICKNESS HT-424 ADHESIVE, BATCH NUMBER 2235, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE

Specimen No.	Flow Area (In.^{2})	Flow Factor (In.^{2}/gm)
Adhesive tested immediately		
20-F-R-S-0	26.58	6.24
20-F-R-E-0	28.58	6.71

FMS-0015(D) Flow Test Requirements For Non-Aged Adhesive:

10 in.^{2}/gm maximum flow factor

5 in.^{2}/gm minimum flow factor

Adhesive aged 30 hours at room temperature prior to bonding		
20-F-R-S-30	26.23	6.16
20-F-R-E-30	26.34	6.18

FMS-0015(D) Flow Test Requirements For Adhesive Aged 30 Hours at Room Temperature:

5 in.^{2}/gm minimum flow factor

TABLE LXIV

FLOW TEST RESULTS OF TWENTY MIL THICKNESS AEROBOND 422 ADHESIVE, LOT NUMBER 2579, TESTED IMMEDIATELY AND AFTER AGING FOR 30 HOURS AT ROOM TEMPERATURE **AS CONTROLS**

Specimen No.	Flow Area ($In.^2$)	Flow Factor ($In.^2/gm$)
Adhesive tested immediately		
422-F-R-S-0	37.28	7.86
422-F-R-E-0	34.93	7.37
Adhesive aged 30 hours at room temperature **prior to bonding**		
422-F-R-S-30	31.16	6.57
422-F-R-E-30	28.93	6.10

TABLE LXV

VOLATILES DETERMINATION RESULTS FOR FIFTEEN MIL THICKNESS HT-424 ADHESIVE

Specimen No.	Volatiles (%)
Batch Number 2230	
15-S-1	4
15-S-2	3
15-E-1	4
15-E-2	5
Batch Number 2231	
15_A-S-1	5
15_A-S-2	5
15_A-E-1	6
15_A-E-2	5
Batch Number 2232	
15_B-S-1	6
15_B-S-2	9
15_B-E-1	8
15_B-E-2	8
Retest Results for Batch Number 2232	
15_B-S-1-R	6
15_B-S-2-R	6
15_B-E-1-R	6
15_B-E-2-R	6

TABLE LXVI

VOLATILES DETERMINATION RESULTS FOR TWENTY MIL THICKNESS HT-424 ADHESIVE

SPECIMEN NO.	VOLATILES (%)
Batch Number 2233	
20_B-S-1	7
20_B-S-2	7
20_B-E-1	6
20_B-E-2	5
Batch Number 2234	
20_A-S-1	9
20_A-S-2	9
20_A-E-1	10
20_A-E-2	9
Retest Results of Batch Number 2234	
20_A-S-1-R	7
20_A-S-2-R	7
20_A-E-1-R	6
20_A-E-2-R	6
Batch Number 2235	
20-S-1	8
20-S-2	8
20-E-1	8
20-E-2	9
Retest Results of Batch 2235	
20-S-1	7
20-S-2	7
20-E-1	7
20-E-2	7

FMS-0015(D) Volatiles Determination Requirements: 7% Maximum % Volatiles

TABLE LXVII

VOLATILES DETERMINATION RESULTS FOR TWENTY MIL THICKNESS AEROBOND 422 CONTROL ADHESIVE, LOT NUMBER 2579

Specimen No.	Volatiles (%)
422-S-1	7
422-S-2	5
422-E-1	6
422-E-2	5

APPENDIX I

REFERENCES

Convair Specification	FMS-0013(B)
Convair Specification	FMS-0015(D)
Convair Test Request	F-7759
Convair Test Report	FTDM-1869
Military Specification	MIL-A-8431
Military Specification	MIL-H-8446
Military Specification	MIL-O-7808C
Federal Specification	QQ-A-362a
J. P. Stevens & Co., Inc.	"Industrial Glass Fabric Specification Guide"