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**OPTIONAL SERVICE BULLETIN NO. DAC1-57-01 REV. 1**

SUPERSEDES DAC1-57-01 REV. 0

**I TECHNICAL DETAILS**

**I.1 Category**

Optional.

**I.2 Airplanes Affected**

All DA 20-C1 aircraft.

**I.3 Time of Compliance**

At owner's discretion.

**I.4 Subject**

ATA code: 5700.

**I.5 Reason**

This optional service bulletin provides installation of 2 (two) access panels for maintenance on the aileron roller guides.

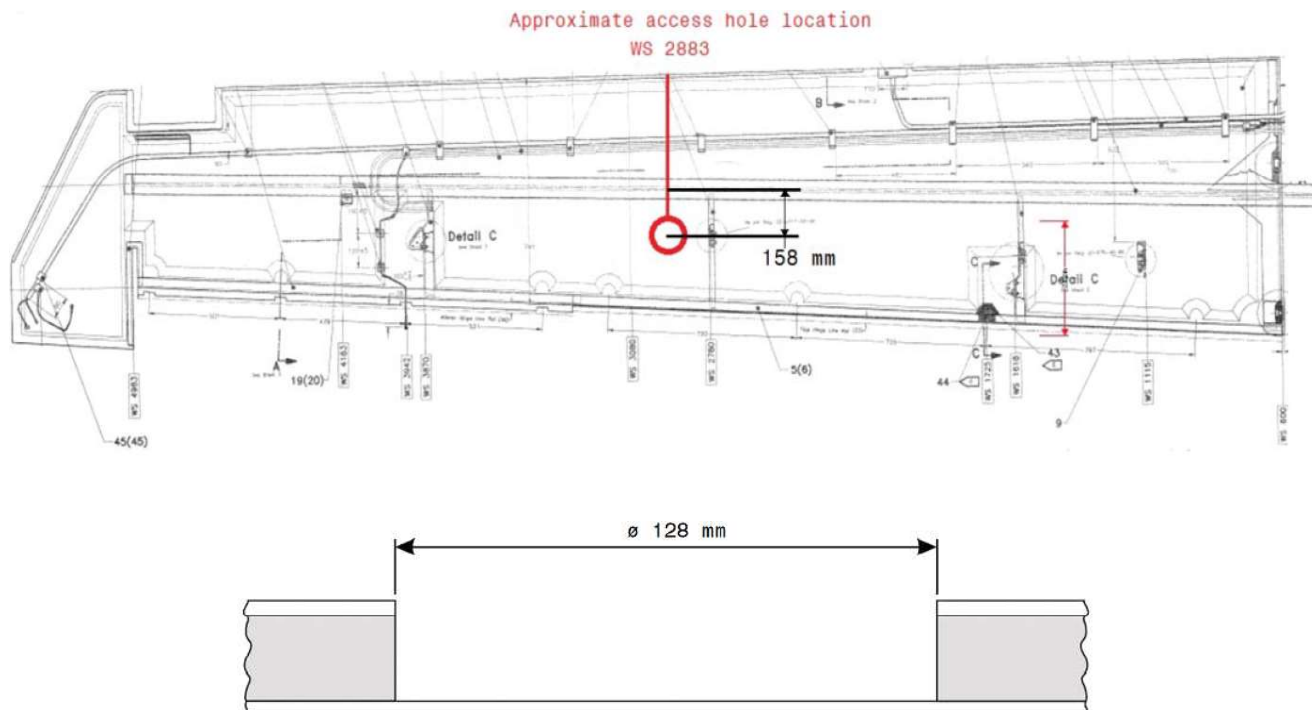
**I.6 Approval**

Engineering data referenced or contained in this service bulletin is approved as part of the type design.

**I.7 Accomplishment/Instructions**

1. Prepare the aircraft for maintenance.
2. Remove the wings and all other components in accordance with the AMM for the convenience of work.
3. Secure the wing upside down.
4. Cut a 128 mm diameter hole, removing only the outer layers and foam core (see figure below).  
Center the hole at WS 2883 and 158 mm aft from the spar centerline.

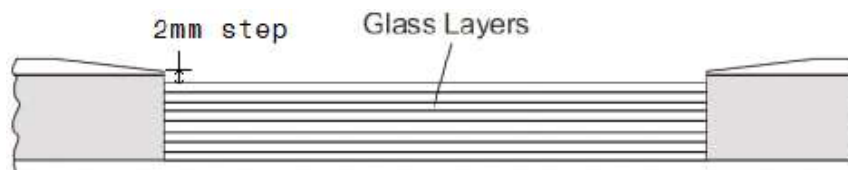
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5. Scarf outer layers 26 mm in all directions around the hole.
6. Prepare inner layers for lamination in accordance with Appendix A.
7. Fill removed hole area using either of the methods outlined below (refer to figure below):
  - Laminate layers of 92125 at  $\pm 45^\circ$  in accordance with Appendix A, until a 2 mm step to the surrounding outer layers exists.

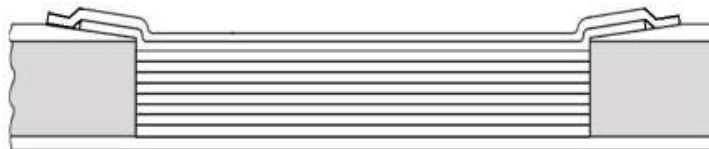
**OR**

- Laminate, cut, shape, and bond fiberglass insert (from 92125) using thickened resin in accordance with Appendix A. Bond insert such that fibers are at  $\pm 45^\circ$ ; maintain a 1-3 mm bond gap all around. Ensure a 2 mm step to the surrounding outer layers exists.



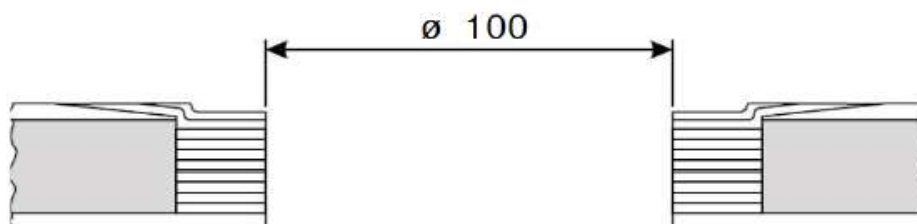
8. Laminate over the created step, and onto the scarfed outer layers in accordance with Appendix A and drawing 22-5715-13-00 (refer to figure below):

- 1 layer of 92125 at  $\pm 45^\circ$  (item 6)
- 1 layer of 92110 at  $0^\circ/90^\circ$  (item 5), where required
- 1 layer of 92110 at  $0^\circ/90^\circ$  (item 5)
- Apply peel ply all over



9. Cover the laminated layers with a non-adhesive plastic (release film) and apply pressure during pre-cure using access door (P/N: 20-0600-01-05) to create flange recess.
10. Pre-cure in accordance with Appendix A.
11. Remove peel ply.
12. Cut a 100 mm diameter circular hole to create the access hole (see figure below).

Center the hole at WS 2883 and 158 mm aft from the spar centerline.



**Note: Take care not to damage the internal wing components.**

13. Using the access door as a template, drill  $\varnothing 5.0$  mm screw holes in the created maintenance access hole flanges.
14. Prepare clickbond nutplate surface for bonding in accordance with Appendix A. Using Hysol adhesive, and the previously drilled holes (step 13), install the clickbond nutplates (CB6009CR08-1) on the inside surface of the lower wing skin.
15. Post-cure the modified area in accordance with Appendix A.
16. Prime and paint as required in accordance with Appendix B.

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17. Clean working area and check for FOD.
18. Re-install all components and systems removed per the AMM.
19. Test all systems in working area for function.
20. Install access door using screws (AN526C832R10).
21. Make necessary entries into aircraft logs.

## **II PLANNING INFORMATION**

### **II.1 Material and Availability**

Description	Qty	P/N
Access door	2	20-0600-01-05
Clickbond nutplate	6	CB6009CR08-1
Screw	6	AN526C832R10
Adhesive	As required	Hysol EA 9359.3
Laminating materials	As required	See Appendix A
The above materials may be ordered as Kit DAC1-57-01.		

### **II.2 Special Tools**

Wing trestles, qty 2, commercial part.

Wing stands, qty 2, commercial part.

### **II.3 Labour Effort**

Approximately 8 hours will be required to accomplish this service bulletin.

*This estimate is for direct labour performed by a technician, and it does not include setup, planning, familiarization, cure time, part fabrication, or tool acquisition.*

### **II.4 Credit**

n. a.

### **II.5 Reference Documents**

DA20-C1 Aircraft Maintenance Manual (AMM), Document # DA201-C1.

DA20-C1 Illustrated Parts Catalog (IPC), Document # DA203-C1.

### **III REMARKS**

1. All work must be done by a certified aircraft service station, or a certified aircraft maintenance mechanic.
2. Completion of all work must be recorded in the logbook.
3. In case of doubt, contact Diamond Aircraft Industries.

## **APPENDIX A**

### **LAMINATING AND BONDING PROCESSES**

#### **I PREPARING SURFACES FOR LAMINATING AND BONDING**

##### **I.1 Introduction**

This process establishes the procedure to prepare surfaces for laminating and bonding.

##### **I.2 Materials and Procedure**

1. There must not be any oil, grease, or other contaminating material in the work area.
2. Silicone adhesives, cleaners, waxes, etc. must not be used on the aircraft unless specified by the manufacturer.
3. If compressed air is used to blow surfaces clean, make sure that no oil exists, or has ever existed in the lines.

**WARNING:** solvents are highly volatile and flammable. Keep away from sources of ignition, and read the manufacturer's material safety data sheet before using.

4. If dirt or grease is present, wash this area with clean carbon tetrachloride or acetone. Use a wipe-on/wipe-off technique. Soak a clean rag with solvent. Wipe the surface once with the rag in one hand, followed immediately by a dry rag in the other hand. If the solvent is allowed to dry on the surface, contaminants may remain.
5. Fingerprints (skin oils) should not be permitted to contaminate the bond surfaces. The use of work gloves is recommended for this reason, and for protection from sharp edges, and slivers.
6. For a full strength bond, the surfaces must be completely abraded with coarse abrasives (50 to 80 grit). A 5" diameter hand held grinder is a very handy tool for such an application. The use of a hard sanding block may be preferred by persons who are not highly skilled in the use of high speed grinders.
7. All dust must be completely removed from the sanded surfaces prior to bonding or laminating. Vacuuming, or blowing off with clean compressed air, are acceptable methods for this operation.
8. Laminate over, or bond only to a pure FRP laminate. All paint, filler, primer etc. must be removed. For best results, one should remove all of the surface resin so that the fibers are exposed (unless otherwise instructed).
9. Abrupt changes in material thickness must be avoided, in order to prevent "stress risers." This is accomplished by chamfering the edges of a repair region.

#### **II PREPARING FABRICS AND CORES FOR LAMINATING**

##### **II.1 Introduction**

The following steps establish the procedure to prepare fabrics and cores for laminating.

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## **II.2 Materials and Procedure**

Only use the materials which have been approved for the repair of the aircraft.

## **II.3 Fabrics**

1. Refer to the repair instructions for the fabric type and lay-up of the repair area.
2. Make sure that the fabric strands have not been broken or damaged, and are free from stains, streaks, and other contaminants. Contaminated fabrics must not be used.
3. The fabric should be cut to size wherever possible, using sharp scissors. While cutting, pay special attention to the ply orientation of the fabrics.
4. Make sure that the cut fabrics do not become damaged or contaminated.

## **II.4 Material Specifications**

WLB No. (German Aviation Standard)	Manufacturer and Type	Material	Weave	Weight per Unit Area [g/m <sup>2</sup> ]	Thickness [mm]	Scarf [mm]
8.4548.60	Interglas 92110	Glass	2/2 twill	163	0.17	7
8.4551.60	Interglas 92125, Porcher 3063	Glass	2/2 twill	280	0.30	12
8.4554.60	Interglas 92140, Porcher 1989	Glass	2/2 twill	390	0.43	18
8.4520.60	Interglas 92145	Glass	Uni-directional	220	0.23	19
8.4525.60	Interglas 92146	Glass	Uni-directional	425	0.43	35
8.3520.80	Interglas 98141, Cramer CCC 452	Carbon	2/2 twill	200	0.30	18
	SGL Sigratex KDU 1034	Carbon	Uni-directional tape	380	0.40	80

## **III RESIN HANDLING**

### **III.1 Introduction**

The following steps establish the procedure for preparing resin.

### **III.2 Materials**

Use only the epoxy resin systems and adhesives which have been approved for the fabrication or repair of the aircraft.

### **III.3 Procedure**

1. Weigh the cut cloths, and determine by ratio the resulting mixed resin weight. The ratio for glass fiber cloth to resin is 100:70, and the ratio for carbon fiber cloth to resin is 100:85.
2. Dispense only as much resin and hardener as you are able to use within the “working life” of the resin, at the measured ambient temperature. A very common average mass is 100 g resin per pot. The dispensing error for the mixing ratio should not be more than 0.5 percent.
3. Mix the components thoroughly for several minutes. Always scrape the stirring utensil surfaces and the sides of the mixing container to ensure mixing of all components.
4. Always thoroughly mix the resin system components before adding fillers or other additives.
5. Note that small batches tend to have greater dispensing and mixing errors than larger batches. Therefore, even more care is required when mixing small batches.
6. Avoid dispensing components into different containers prior to mixing. Best accuracy is obtained by weighing the resin and the hardener into a single mixing pot. Dispensing by weight tends to be more precise than dispensing by volume.
7. Large batches of mixed resin should be poured into flat containers, so that the surface area to volume ratio is increased. This will reduce the risk of an exothermic reaction.
8. Note that the resin on the rollers, brushes, and other tools will also cure. For this reason, clean the tools regularly when lamination is continuing for an extended time. Only use new brushes.
9. Do not permit resin to become contaminated with foreign substances other than the specified additives. Solvents and thinners used to clean the equipment should be dried off before commencing work with the tools.

**WARNING:** curing of resin hardener mix occurs by an exothermic reaction. Therefore, leftover resin may overheat, and is a potential fire hazard.

## **IV RESIN TO HARDENER MIXTURE**

Scheufler L160/H163 (100:28 by Weight)	
Resin L160 (g)	Hardener H163 (g)
50	14
75	21
100	28
125	35
150	42
175	49

Scheufler L285/H286 (100:40 by weight)	
Resin L285 (g)	Hardener H286 (g)
50	20
75	30
100	40
125	50
150	60
175	70



Scheufler L160/H163 (100:28 by Weight)	
Resin L160 (g)	Hardener H163 (g)
200	56

Scheufler L285/H286 (100:40 by weight)	
Resin L285 (g)	Hardener H286 (g)
200	80

## **V LAMINATING**

### **V.1 Introduction**

The following steps establish the procedure for laminating.

Laminating is the process of forming a prescribed stack of layers of fabric, which has been impregnated with resin. The laminate produced becomes the structure of the aircraft, after the resin has hardened and fully cured.

### **V.2 Procedure**

1. Protect the surrounding structure and work area from resin drain-out, splashes, and spillage.
2. Wet the surface on which the lamination is to be performed with a thin coat of mixed resin.
3. Apply the first layer of fabric noting the correct fiber orientation. Trim the edges to the correct size.
4. If there are any dry spots, add more resin to finish the impregnation. Roll, squeegee, and stipple to remove all trapped air.
5. After the excess resin is brought to the surface with the rolling and stippling process, lay down the next layer of fabric, oriented and trimmed as required.
6. Repeat steps 4 and 5 until all of the required layers are in place.
7. Roll and squeegee off the excess resin.
8. Overlay the laminate stack with peel-ply.
9. Vacuum bagging the laminate is preferable, but optional unless it is mandated by factory instructions.

## **VI BONDING OF FIBER REINFORCED PLASTICS**

### **VI.1 Introduction**

The following steps establish the procedure for the bonding of precured fiber reinforced plastic parts.

### **VI.2 Materials**

#### **Resin**

Information is given in Table 1.

#### Resin Filler/Thickener

1) Scotchlite K20 (.19 g/cc)	Microballoons	3M
2) Aerosil	Filler	Stochem
3) Cotton flocks	Cotton fibers	Quarray Hill

### **VI.3 Procedure**

#### **Preparation of Bonding Paste**

Bonding pastes are used primarily for adhesive bonding of precured fiberglass parts. Bonding paste or thickened resin, is a mixture of three types of fillers and mixed resins. Refer to Table 1.

The following combination of thickening fillers shall be used for preparation of bonding paste:

Microballoons + aerosil: maximum 3% by volume.

Cotton fibers: minimum 7% by volume.

Quantity of microballoons and aerosil may be varied to change paste consistency.

The total mix of fillers must not exceed 20% by volume; refer to Table 1 below, for recommended mixture.

### **VII TABLE 1: MIXTURE TABLE**

Material	Weight in Grams								
Mixed Resin	50	100	150	200	250	300	350	400	450
Cotton Flocks	5	10	15	20	25	30	35	40	45
Aerosil	1.5	3	4.5	6	7.5	9	10.5	12	13.5
Microballoons	2	4	6	8	10	12	14	16	18

#### **Joining of Precured Parts**

1. Pre-fit the parts to be bonded to make sure that there is adequate clearance, and mark out the exact bonding area between the parts as necessary for paste application. Note the gap between the parts.
2. Disassemble the pre-fitted parts, and prepare the surface for bonding by removing the peel-ply, or abrading the surface.
3. Prepare bonding paste according to Table 1.
4. Wet all the bonding surfaces with a thin coat of mixed resin (not thickened).
5. Apply the bonding paste with a putty knife or a piping bag. Apply bonding paste to a depth appropriate with the bond gap, as determined by the trial fit. Avoid trapping air by contouring the paste higher in the middle of the joint.
6. Fit the parts, and remove excess bonding paste as it is squeezed out.

7. Immobilize the parts until the pre-cure is complete (approximately 24 hr. at 20 °C, 68 °F).
8. Do not disturb the bonded parts until the full pre-cured duration has been reached.

## **VIII CURING**

### **VIII.1 Introduction**

The following steps establish the procedure for curing a composite repair.

### **VIII.2 Material**

Curing oven, or a temporary enclosure with a heat gun.

### **VIII.3 Procedure**

#### **Precuring**

Temperature: 20-25 °C (68-77 °F)

Time: 24 hr.

#### **Postcuring**

Temperature: 60-65 °C (140-149 °F)

Time: 15 hr.

The post cure may be divided into sections, as long as the total time at the required temperature is at least 15 hours.

1. If you do not have an oven or a warming room, construct a temporary enclosure around the repair area to entrap heat. This can be made of corrugated plastic/cardboard, wood, heavy blankets, etc.
2. Use a heat gun with variable heat control to apply heat to the ambient air around the repair area. Do not point the heat gun directly at the composite material. Ensure that the nozzle of the heat gun is more than 12 inches away from the area being cured. Use a thermocouple probe to measure the surface temperature at the repair. Adjust the heat gun to maintain 60-65 °C (140-149 °F).
3. Measure and record the temperature every 15 minutes for the first hour, and then every hour after that.
4. It is not recommended to leave the repair unattended during the post cure, due to the risk of overheating or fire.

## **IX CONTOURING**

### **IX.1 Introduction**

The following steps establish the procedure for contouring, and the surface preparation necessary for finishing.

### **IX.2 Materials and Procedure**

After initial curing, you have to return the surface of the repair area to the contour of the original one.

#### **Trimming**

If trimming is necessary, mark a trim line on the part.

Trim parts to within 1-2 mm before the trim line using an air powered saw, and then finish to the line using a grinder. Smooth the edges with sand paper.

#### **Contouring**

Sand the surface smooth with sandpaper or a grinder. The use of a hard sanding block may be preferred by persons who are not highly skilled in the use of high speed grinders.

Prior to filling/finishing, the contour of the sanded surface should be slightly lower than the original, and surrounding area.

To prepare the surface for finishing, sand the surface thoroughly with fine sandpaper (220 grit).

Make sure that there is no dirt, grease, or other contaminants in the repair area.

## **APPENDIX B**

### **PAINT**

#### **I FINISHING SCHEMES**

##### **I.1 Introduction**

The following establishes the surface preparation and painting of fiber reinforced plastics.

##### **I.2 Equipment and Materials**

###### **Solvents**

- Pre Kleeno
- Thinner (cleaning solvent)

###### **Primer**

- Primer, hardener, reducer
- Paint
- Diverse paints, hardeners, and reducers as listed below

###### **Sandpaper**

- Diverse types, grit 40-500, supplier: various

###### **Filler**

- Polyester filler
- Epoxy filler

###### **Equipment**

- Respirator
- Refill filters
- Air feed mask
- Coveralls
- Gloves
- Ear protection
- Protective glasses
- Lint free cloth wipes
- Foil

- Tapes
- Spray guns
- Cleaning equipment

### **I.3 Safety Precautions**

EXPLOSION HAZARD - Never mix accelerators and peroxide hardeners directly.

Solvents, and other flammable liquids shall be kept away from fire and other sources of ignition.

Sufficient ventilation shall be supplied when using solvents in confined areas.

Skin contact with solvents shall be avoided. Wash contacted areas thoroughly with soap and water.

Operators shall wear suitable gloves and protective clothing when handling epoxy or polyester fillers.

Smoking, eating, or consuming beverages is not permitted in the paint shop area.

Operators shall wear respirator masks, ear protection, coveralls, protective glasses, and suitable gloves while working in the paint shop area.

For the application of primer and finish paint, an air feed mask is required.

### **I.4 Procedure**

#### **Surface Preparation**

1. All openings and surfaces not to be painted, are to be covered with masking tape or masking paper.
2. Any release agents, if used, shall be removed by cleaning the surface with a special solvent.
3. Sand the surface thoroughly with 220 grit sandpaper.
4. Minor holes are to be filled with polyester filler. For major holes, an epoxy filler is required.
5. The filled part is to be finished with 360 grit sandpaper.

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**Application of Primer**

1. Prepare primer. Mixing ratios as shown in the following tables for R+M paint products:

Epoxy Primer:

Number	Type	Part	Used For
EP 669	Primer	4	FRP parts
PA 897	Activator	1	
UR 40	Reducer fast	1	
UR 50	Reducer normal	1	
UR 60	Reducer slow	1	

Epoxy Primer:

Number	Type	Part	Used For
EP 589	Primer	4	Metal parts
PA 897	Activator	1	
UR 40	Reducer fast	1	
UR 50	Reducer normal	1	
UR 60	Reducer slow	1	

Thick Primer:

2. Prepare primer. Mixing ratios as shown in the following tables for DuPont paint products:

Number	Type	Part	Used For
7704 S	Primer	4	Second coat
7765 S	Activator	1	
7775 S	Alternate activator	1	
7785 S	Alternate activator	1	
779 S	Alternate activator	1	

**NOTE:** always use paint products in accordance with their manufacturer's recommendations.

1. Apply the first coat of primer as required on the clean surface.
2. Apply the second coat of primer after allowing flashing off of the first one.
3. Allow the primer to cure (45 min).
4. After application of primer and curing, the whole part shall be inspected for remaining defects, such as pin holes.

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5. Finish parts by sanding with 360-400 grit sandpaper, depending on the thickness of the primer coat.

**Application of Finish Paint**

1. Prepare paint. Mixing ratios as shown in the following tables:

Paint - DuPont Diamond White:

Number	Type	Part	Used For
AF400	Diamond White Paint	3	Outside of all the exposed FRP parts
13100 S	Activator	1	
13803 S	Accelerator	4 oz/gal	

Paint - R-M Solo Pure Black:

Number	Type	Part	Used For
H 403	Paint	4	Metal parts
DH 46	Hardener slow	1	
DH 42	Hardener fast	1	
UR 40	Reducer fast	1	
UR 50	Reducer normal	1	
UR 60	Reducer slow	1	

Paint - R-M Solo Dark Grey:

Number	Type	Part	Used For
#93924	Paint	4	Instrument panel
DH 46	Hardener slow	1	
DH 42	Hardener fast	1	
UR 40	Reducer fast	1	
UR 50	Reducer normal	1	
UR 60	Reducer slow	1	



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Paint - R-M Solo Flat Grey:

Number	Type	Part	Used For
#80394	Paint	8	Interior
DH 46	Hardener slow	1	
DH 42	Hardener fast	1	
NO REDUCER			

2. Apply two coats of finish paint on the surface of the prepared part.

3. Curing of the finish paint requires at least one hour.

**CAUTION:** application of primer, and finish paint shall be performed in a dust-free environment.

## **II FIRE-RESISTANT PAINT SYSTEM**

### **II.1 Materials (Shelf Life)**

- Fire resistant paint, Courtaulds Aerospace, N56582/T508 (shelf life is 12 monts minimum)
- Distilled water
- Acetone
- Tack cloths
- 280 grit sandpaper
- Transparent top coat, Courtaulds Aerospace,

Base:	9008B0900D	CA8720M0900C
Hardener:	9008B	CA8000B
Thinner:	9008CR	CA8000C2
Shelf life (from shipping date):	24 months	24 months

### **II.2 Application**

Abrade the surface with 280 grit sandpaper, wipe dust free with fully opened tack cloth.

Apply the coating using a splatter spray gun (preferred), brush or roll to a thickness of 250 microns minimum (.010" or 10 mil.).

### **II.3 Drying Times**

The following drying times refer to a normal climate of 23 °C and 50% humidity:

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| a) Dust-free                        | After 2 hours minimum              |
| b) Maskable                         | After 8 hours minimum              |
| c) Recoatable                       | After 4 hours minimum (no maximum) |
| d) Transparent top coat application | After 48 hours minimum             |
| e) Transportable                    | After 8 hours minimum              |
| f) Full cure                        | After 7 days                       |

## **III PROCEDURE. TRANSPARENT TOP COAT**

### **III.1 Preparation of Substrate**

The fire resistant paint must dry thoroughly for at least 24 hours prior to applying the top coat. Remove dust if necessary, using a fully opened tack cloth.

### **III.2 Mixing**

#### **For 9008B0900D**

Mix 2 parts base 9008B0900D, 1 part hardener 9008B, 2 parts 9008CR by weight/volume. The pot life is approximately 2 hours.

Base component should be manually agitated.

#### **For CA8720M0900C**

Mix 3 parts base CA8720M0900C, 1 part hardener CA8000B, 0.5 part CA8000C2 by weight/volume. The pot life is approximately 1 hour.

Ensure all pigmented components are stirred well, and are adequately dispersed.

**NOTE:** use of paint shaker is advised during 10 minutes. Add hardener to base, and stir well, then add reducer while stirring in order to ensure VOC compliance mix by volume as recommended. DO NOT ADJUST VISCOSITY.

### **III.3 Application**

The top coat shall be applied by high pressure spraying.

	<b>9008B0900D</b>	<b>CA8720M0900C</b>
Spray viscosity	(ISO 4)	(ISO 4) 27-40 sec
Tip size	1.5 mm (.060")	1.5 mm (.060")
Pressure	3-5 bar (40-70 PSI)	3-4 bar (40-58 PSI)

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The first top (dry film thickness 25 microns) coat shall be sprayed very thin (mist coat) over the fire resistant paint.

After 30-45 minutes drying time, apply a second thin coat to a total dry film thickness of 60 microns (.002" or 2.3 mil.).

**III.4 Drying Times**

The following drying times refer to a normal climate of 23 °C and 50% humidity:

	<b>9008B0900D*</b>	<b>CA8720M0900C</b>
Dry to tape	10-14 hours	3-4 hours
Full cure	7 days	7 days

\* For aircraft re-painting, a minimum period of 48 hours is recommended before flying.