STANDARD OVERHAUL PRACTICES MANUAL

REMOVAL OF FAYING SURFACE SEALED METAL FITTINGS FROM COMPOSITE STRUCTURES

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To: All holders of REMOVAL OF FAYING SURFACE SEALED METAL FITTINGS FROM COMPOSITE STRUCTURES 20-10-08.

Attached is the current revision to this STANDARD OVERHAUL PRACTICES MANUAL

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Location of Change	Description of Change
	NO HIGHLIGHTS

STANDARD OVERHAUL PRACTICES MANUAL

Subject/Page	Date	Subject/Page	Date	Subject/Page	Date
TITLE PAGE					
O 1	Jul 01/2009				
2	BLANK				
20-10-08 TRANSMITTAL LETTER					
O 1	Jul 01/2009				
2	BLANK				
20-10-08 HIGHLIGHTS					
O 1	Jul 01/2009				
2	BLANK				
20-10-08 EFFECTIVE PAGES					
1	Jul 01/2009				
2	BLANK				
20-10-08 CONTENTS					
1	Nov 01/2006				
2	BLANK				
20-10-08 REVISION RECORD					
1	Jul 01/2005				
2	Jul 01/2005				
20-10-08 RECORD OF TEMPORARY REVISIONS					
1	Jul 01/2005				
2	Jul 01/2005				
20-10-08 INTRODUCTION					
1	Jul 01/2005				
2	BLANK				
20-10-08 SUBJECT					
1	Nov 01/2006				
2	Nov 01/2006				
3	Nov 01/2006				
4	BLANK				

A = Added, R = Revised, D = Deleted, O = Overflow

TABLE OF CONTENTS

Paragraph Title	Page
REMOVAL OF FAYING SURFACE SEALED METAL FITTINGS FROM COMPOSITE STRUCTURES	1
INTRODUCTION	1
SCOPE	1
EQUIPMENT AND MATERIALS	1
COLD METHOD	2
HOT METHOD	2

All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

Revision		Filed		Revision		Filed	
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Temporary Revision		Inserted		Removed	
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INTRODUCTION

1. General

A. The instructions in this manual tell how to do standard shop procedures during maintenance functions from simple checks and replacement to complete shop-type repair.

B. This manual is divided into separate sections:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) Effective Pages

(5) Contents

(6) Revision Record

(7) Record of Temporary Revisions

(8) Introduction

(9) Procedures

C. Refer to SOPM 20-00-00 for a definition of standard industry practices, vendor names and addresses, and an explanation of the True Position Dimensioning symbols used.

D. The data is general. It is not about all situations or specific installations. Use it as a guide to help you write minimum standards.

E. If the component overhaul instructions are different from the data in this subject, use the component overhaul instructions.

REMOVAL OF FAYING SURFACE SEALED METAL FITTINGS FROM COMPOSITE STRUCTURES

1. INTRODUCTION

A. The data in this subject comes from Boeing Process Document D6-53900 (which supersedes D6-53225 and D6-48597).

B. The data is general. It is not about all situations or specific installations. Use it as a guide to help you write minimum standards.

2. SCOPE

A. This subject gives two procedures for removal of metal fittings which are attached to composite structures with sealant. If the overhaul instructions are different, use the overhaul instructions.

3. EQUIPMENT AND MATERIALS

NOTE: Equivalent substitutes may be used.

A. Cold Method

(1) Liquid nitrogen, in dispensing canister

(2) Piccolo tube – Perforated nitrogen dispersal tube to attach to liquid nitrogen dispensing hose. Perforations should be within center 50% of total length of tube and located in a straight line ±15 degrees through one wall only. Length of tube is dependent on size of containment box required

(3) Polyurethane foam or styrofoam sheeting, 2 inches thick

(4) Digital thermocouple thermometer – Usable to at least -300°F, capable of measuring two temperature inputs (Keithley Model 871, V80164)

(5) Chromel - alumel thermocouples (2), with at least 6-foot leads, having plugs compatible with digital thermometer.

(6) Pinning rods – 6 inches long by 1/8 inch diameter, each with slightly rounded point at one end. (Quantity as needed.)

(7) Adhesive tape, aluminum foil pressure sensitive – One inch wide (Scotch 425, V76381) (Ref SOPM 20-60-04)

(8) Duct tape – 2 inches wide

(9) Adhesive, silicone, one-part – General Electric RTV 106, V01139 (Ref SOPM 20-60-04)

(10) Wrenching tool, with steel dwelling sized to fit in metal fitting bearing to be used to wrench fitting from structure

(11) Sealant cutter or scraper, wooden or plastic

B. Hot Method

(1) Digital thermocouple thermometer – Usable to at least +260°F, capable of measuring two temperature inputs.

(2) Thermocouples (2), having plugs compatible with digital thermometer.

(3) Adhesive tape, aluminum foil pressure sensitive – Scotch 425, V76381 (Ref SOPM 20-60-04).

(4) Hot air gun or other heat source capable of heating to at least 250°F.

(5) Wrenching tool.

(6) Sealant cutter or scraper, wooden or plastic.

4. COLD METHOD

NOTE: This method is optional to hot method (Paragraph 5.) for all installations except those using BMS 5-95, where the hot method shall be used.

A. Using sealant cutter or scraper, remove sealant accessible over fasteners and in fillets.

B. Using appropriate removal tools, remove all fasteners joining fitting to the structure.

C. Cut polyurethane foam or styrofoam sheets to make an insulating box around fitting to be removed. Use silicone adhesive and duct tape as necessary to assemble and mount box on the structure. Use pinning rods to hold front cover of the insulating box during the freezing operation by piercing through front cover to the sidewalls. (Pinning rods are used to facilitate removal of box front cover during the procedure.)

D. Mount two thermocouples onto metal fitting closest to faying surface which is sealed; locate them at opposite upper and lower ends of fitting. Secure thermocouples to fitting with aluminum tape. Run thermocouple leads outside box and connect to digital thermometer.

E. Insert piccolo tube horizontally through hole in upper half of one sidewall of box. Push tube through and embed tip in opposite sidewall, so it is positioned horizontally in the upper half of the box interior. Position tube with perforations downward, toward fitting.

F. Fit front cover to the insulating box and fasten in place with pinning rods, pierced through the front cover into the sidewalls.

CAUTION: LIQUID NITROGEN (-320°F) WILL CAUSE FROSTBITE OR FREEZING OF SKIN TISSUES UPON CONTACT. APPROPRIATE PROTECTIVE CLOTHING (GLOVES, FACE SHIELD, RUBBER APRON) SHALL BE WORN WHILE WORKING WITH LIQUID NITROGEN AND HANDLING CHILLED PARTS.

G. With digital thermometer operating, feed liquid nitrogen into insulating box through piccolo tube until both temperature measurements are -200°F or colder.

H. For large fittings, where one of box dimensions exceeds 12 inches, continue to feed liquid nitrogen into insulating box for an additional five minutes after both temperatures have reached -200°F.

I. Shut off liquid nitrogen feed and wait about 15 seconds to allow drainage of residual liquid nitrogen. Then remove front cover of box.

J. Immediately stress fitting by wrenching it with the wrenching tool fitted in bearings. For long fittings, wrench from either end of fitting, instead of middle, to obtain maximum peel strain.

CAUTION: DO NOT USE A HAMMER ON, OR HIT THE FITTING OR TOOL IN ANY WAY, TO PREVENT UNNECESSARY STRUCTURAL DAMAGE.

K. After the fitting is removed, let it cool before you touch it again.

5. HOT METHOD

CAUTION: DO NOT RAP, HAMMER, OR STRIKE FITTING OR TOOL IN ANY WAY, TO AVOID UNNECESSARY STRUCTURE DAMAGE.

NOTE: This method is now the preferred procedure for all installations. It shall be used for fittings bonded with BMS 5-95 sealant.

A. Using sealant cutter or scraper, remove as much sealant as possible from fitting exterior, around fasteners and in fillets.

B. Using appropriate removal tools, remove all fasteners joining fitting to the structure.

C. Mount two thermocouples onto metal fitting closest to faying surface which is sealed; locate them at opposite ends of fitting. Secure thermocouples to fitting with aluminum tape. Connect thermocouple leads to digital thermometer.

D. With digital thermometer operating, heat the fitting with a hot air gun until both temperature measurements are 240-260°F. Keep the fitting in this temperature range for at least 15 minutes.

CAUTION: INSULATED GLOVES AND EQUIVALENT PROTECTION MUST BE USED TO PREVENT INJURY FROM HEATED SURFACES.

E. Immediately stress the fitting with a wrenching device. Apply a torque to the fitting to peel it away from the substrate. For long fittings, it is better to wrench from one end of fitting, not the middle, to get the maximum peel strain.

CAUTION: DO NOT USE A HAMMER ON, OR HIT THE FITTING OR TOOL IN ANY WAY, TO PREVENT UNNECESSARY STRUCTURAL DAMAGE.

F. After the fitting is removed, let it cool before you touch it again.