

## T-041 Inspection Limits and Repair

### Combustion Liner

<b>Engine Application(s):</b>	250-C28B, C28C 250-C30, C30G, C30G/2, C30M, C30P, C30S																											
<b>Subject:</b>	Inspection and Rework Procedure for E6899081, E23066675, E23064570 and E23008614 Hastelloy X Combustion Liner Assembly																											
<b>Compliance:</b>	Any time Combustion Liner Assembly is accessed during repair or overhaul. For E6899081 installed on C28B or C28C, it is highly recommended to refer to T-046 for modification to P/N E23008614.																											
<b>Revisions:</b>	<table><tr><td>N/C</td><td>Dated: 08/21/97</td><td>Initial release.</td></tr><tr><td>A</td><td>Dated: 01/29/01</td><td>Updated format.</td></tr><tr><td>B</td><td>Dated: 11/06/02</td><td>Updated format. Added E23066675 and reference to T-046 for Series III. Clarified various repair limits and added plugweld material.</td></tr><tr><td>C</td><td>Dated: 11/29/04</td><td>Added section for weld repair of fuel nozzle ferrule.</td></tr><tr><td>D</td><td>Dated: 05/06/05</td><td>Added P/N E23008614</td></tr><tr><td>E</td><td>Dated: 07/19/05</td><td>Added P/N E23064570</td></tr><tr><td>F</td><td>Dated: 11/15/05</td><td>Changed AMS 5784 to AMS 5798. Added repair limit for fuel nozzle ferrule into chart.</td></tr><tr><td>G</td><td>Dated: 09/03/09</td><td>Updated EXTEX to TIMKEN.</td></tr><tr><td>H</td><td>Dated: 2/04/16</td><td>Updated Timken to EXTEX Engineered Products.</td></tr></table>	N/C	Dated: 08/21/97	Initial release.	A	Dated: 01/29/01	Updated format.	B	Dated: 11/06/02	Updated format. Added E23066675 and reference to T-046 for Series III. Clarified various repair limits and added plugweld material.	C	Dated: 11/29/04	Added section for weld repair of fuel nozzle ferrule.	D	Dated: 05/06/05	Added P/N E23008614	E	Dated: 07/19/05	Added P/N E23064570	F	Dated: 11/15/05	Changed AMS 5784 to AMS 5798. Added repair limit for fuel nozzle ferrule into chart.	G	Dated: 09/03/09	Updated EXTEX to TIMKEN.	H	Dated: 2/04/16	Updated Timken to EXTEX Engineered Products.
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#### REASON:

To provide inspection limits and repair for the subject part numbers.

#### DESCRIPTION:

This document contains instructions and procedures necessary to establish serviceability and repair of the  
subject combustion liners.

#### APPROVAL:

Technical aspects are FAA Approved.

#### WEIGHT AND BALANCE:

Not Affected.

#### PREREQUISITES:

None.

#### ACCOMPLISHMENT INSTRUCTIONS:

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E6899081, E23066675, E23008614, E23064570  
Hastelloy X Combustion Liner Assembly

**I. Cleaning Method**

Part	Cleaning Method	Remarks
Combustion Liner Assembly	Alkaline Liquid Bath	Per approved standard practices
	Grit Blast	Aluminum Oxide 240 per approved standard practices

**II. NDT Method**

Part	Inspection Method	Remarks
Combustion Liner Assembly	FPI	Per approved water-washable technique, e.g., ASTM E 1417 Method A, AMS 2647 or equiv.

E6899081, E23066675, E23008614, E23064570  
Hastelloy X Combustion Liner Assembly

**III. Inspection and Repair**

**A. Cracks (ref. Figure 1)**

\*Weld with AMS 5798 Hastelloy X weld rod; 0.035-0.062 inch diameter. Use Argon torch gas flow of 20-40 cfm, Argon Backup of 10-40 cfm, and 20-60 amp current.

Plugs shall be fabricated from AMS 5536 of an appropriate thickness.

Location	Service Limit	Repair Limit	Corrective Action
Pulled or broken spot welds at liner step.	None allowed.	None.	Plugweld repair* or replace. Drill 3/16 in. dia. hole through outer section then press sections together and plugweld. Grind weld material only if it locks or restricts airflow.
Handling damage, out of round.	None allowed.	Unable to straighten to concentricity limits.	Straighten and reform or replace.

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Location	Service Limit	Repair Limit	Corrective Action
Handling damage-dented.	None allowed.	Unable to straighten to concentricity limits or dent causes thin-out of metal.	Straighten and reform dents in allowable areas indicated on Figure 1 or replace.
Localized high temperature distortion Indicated by warping of liner surface (normally accompanied by discoloration)	Areas A and B: Localized areas of max. 1 in. dia. with a max. depth of 0.100in. Area C: General warpage not to exceed 0.100 depth with localized areas of max. 1 in. dia. With a max. depth of 0.100 in.	None.	Repair or replace.
Localized high temperature distortion indicated by warping of liner inner surface Figure 1, Area C.)	Max. of 3/16 in. deep over 1 in. dia. With the remaining allowable area showing warpage with a depth not to exceed 0.100 in. (See Figure 1) In NO case may any warpage block off any individual aft louvers. This requirement maybe determined by viewing the louvers from the airflow exit end of the liner. Access louvers from the airflow exit end of the liner.	None.	Repair or replace.
Burning in area of relief slots	Max. of 1/16 in. on rear edge, or both corners burned max. of ¼ in. along relief slot.	None.	Repair or replace.
Cracks on outside of liner (FPI).	None allowed	None.	Weld repair* or replace. Crack must be completely welded. Weld material must not obstruct cooling air passage.
Crack in tab end inside liner (FPI)	Max of ¼ in. length and limited to one crack per tab.	None.	Weld repair* or replace.

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Location	Service Limit	Repair Limit	Corrective Action
Cracks at two adjacent relief slots (FPI)	No more than one pair of relief cracks may join. Ruptured material shall not protrude into flow path. There shall be no evidence of cracking or deterioration on weld/braze joint of a cracked tube.	None.	Weld repair* or replace
Crack in relief slot at combustion liner steps (FPI) have cracks extended.	Crack may show at root but no more than 12 slots may be greater than ¼ in.	None.	Weld repair* or replace. Grind weld material only if it blocks or restricts airflow.
Crack in double lip area (FPI).	None allowed.	None.	Weld repair* or replace. Surfaces between lips must be free of weld material.
Crack in igniter or fuel nozzle ferrule and dome attaching weld (FPI).	None allowed.	None.	Weld repair* or replace. Max. width of weld 0.080 in.
Wear on fuel nozzle ferrule lands.	Max of 0.965 in.	Repair if worn beyond service limits.	Weld repair* per Section B on page 5.
Louvers bent closed.	None allowed.	None.	Straighten and reform or replace.
Burned louvers.	None allowed.	None.	Repair or replace.
Cracks in expansion slots.	5/8 in long maximum.	Cracks through outer band width are repairable.	Weld repair* or replace. Surfaces between lips must be free of weld material.
Cracks in deflector plate relief slots	One crack per slot, 0.1875 in. max	None.	Weld repair* or replace.

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### B. Weld Repair for Fuel Nozzle Ferrule

- 1.) Weld build ID of Ferrule using AMS 5798 Weld Rod.
- 2.) Stress relieve at 1000°F for 1 hour.
- 3.) Machine Ferrule ID to 0.947 – 0.942.
- 4.) FPI inspect.
- 5.) EDM 10 vertical slots equally spaced to a depth of 0.018 – 0.023 and a width of 0.148 – 0.150.
- 6.) FPI inspect.
- 7.) Dimensionally inspect.

### MATERIAL INFORMATION:

None.

