



A MEMBER OF THE TAIYUAN HEAVY MACHINERY GROUP (太重集团)

## **Technical Bulletin / Safety Alert**

**Unique ID No:** DES2011-TBSA-08

**Rev:** 1

(This document supersedes all previous versions of DES2011-TBSA-08)

**Subject:** JUG-A-0 UL/UV Diesel Engine System - Inlet Manifolds

**Date:** 11<sup>th</sup> February 2014

**Applicable to:** VLI Diesel Pty Ltd Diesel Engine Systems covered under Design Registration No. MDR 074246 DES, MDR 074246 DES-1 and MDR 114991 DES (JUG-A-0 UL/UV)

**Note:** Minimum PPE required to carry out any inspections contained in this TBSA shall be protective clothing & footwear, safety glasses, hearing protection & any site specific requirements. A JSA or equivalent should be carried out prior to performing these tasks.

### **Introduction:**

In DES2011-TBSA-08 Rev 0, released 10<sup>th</sup> November 2011 (refer Appendix 1), VLI advised guidance for inspection and rectification of issues in relation to JUG-A-0 UL/UV Diesel Engine System air inlet manifolds (Part No. 0102-50002).

To address inlet manifold cracks VLI developed a support bracket (Part No. 0508-60081) to provide support for the air inlet ducting and strangler valve assembly on machines with gear driven superchargers.

Additional support for the flame trap housings was also suggested via the addition of supporting braces to the exterior of the inlet manifold, as an optional installation.

A design review of the inlet manifold was subsequently completed by VLI, and in April 2012 the design was modified to include increased plate thickness and welding improvements in the manufacturing of new components.

VLI have recently been advised of the discovery of further cracked inlet manifolds during routine in-service inspections at a number of NSW and Queensland Coal Mines, leading VLI to review available failure data and inlet manifold design once again.

## **Investigation Results & Discussion:**

A review of available JUG-A-0 UL/UV inlet manifold failure data since 2011 identified a marked decrease in the frequency of reported failures since the introduction of the support bracket at the end of 2011 and the above mentioned product improvements in early 2012.

While there has been a significant reduction in reported failures, the recent escalation of failures due to cracks at weld locations between the main ducting and the flame trap housing ducting has given cause for VLI to further review the existing inlet manifold design.

VLI will now introduce the previously mentioned optional support braces to all new production of inlet manifolds, and recommends installation of these support braces to existing products at the next major service interval, either by modification or exchange.

## **Recommendations for End Users:**

1. Continue to visually inspect all JUG-A-0 air inlet manifolds, conducting soapy water inspections at regular service intervals.
2. Ensure correct and secure installation of air intake strangler support bracket (Part No. 0508-60081).
3. At the next major service interval, the inlet manifold is to be modified or exchanged to include additional supporting braces.

## **Recommendations for VLI:**

1. All new production of inlet manifolds to be manufactured to the latest design revision, including supporting braces for the inlet flame trap housing.
2. All existing stock to be modified to reflect the latest inlet manifold design revision.

## **Future Action:**

VLI will continue to investigate opportunities to develop the design of the inlet manifold with a goal of achieving zero in-service failures between Code D inspections.

## **Supporting Information:**

Refer Appendix 1 for original TBSA issue.

Please ensure this document is circulated to all relevant personnel within your organization.

Should you have any further queries please contact your VLI Representative.

Beresfield Operation  
8 Balook Drive  
Beresfield NSW 2322  
P: +61 2 4964 2300  
F: +61 2 4028 6796

Mackay Operation  
6 Fursden Street  
Glenella QLD 4740  
P: +61 7 4942 7495  
F: +61 7 4942 4944

Emerald Operation  
44 Industrial Drive  
Emerald QLD 4720  
P: +61 7 4987 5011  
F: +61 7 4987 4711

## **APPENDIX 1**

**Unique ID No:** DES2011-TBSA-08

**Rev:** 0

**Subject:** JUG-A-0 UL/UV Diesel Engine System Inlet Manifold – Incident Notification

**Date:** 10<sup>th</sup> November 2011

**Applicable to:** VLI Diesel Pty Ltd Diesel Engine Systems covered under Design Registration No. MDR 074246 DES, MDR 074246 DES-1 and MDR 114991 DES (JUG-A-0 UL/UV)

**Note:** Minimum PPE required to carry out any inspections contained in this TBSA shall be protective clothing & footwear, safety glasses, hearing protection & any site specific requirements. A JSA or equivalent should be carried out prior to performing these tasks.

### **Introduction:**

VLI Diesel Division (VLIDD) advises the recent occurrence of three (3) separate but concurrent issues in relation to JUG-A-0 UL/UV Diesel Engine System air inlet manifolds (Part No. 0102-50002) that were identified at a NSW underground coal mine as follows:

1. Inlet manifolds have been identified with cracks at weld locations between the main ducting and the flametrap housing ducting.
2. Inlet manifold flange to cylinder head joint leaking identified towards the rear of the engine when cold and along the length of the joint when hot.
3. Incorrect Inlet Manifold Mounting Bolts were identified installed to a number of recently produced machines.

The purpose of this TBSA is to bring these issues to the attention of the end user and provide guidance for inspection and rectification.

## Investigation Results & Discussion:

- 1. Inlet Manifold Cracks:** Cracks have been identified within welds between the main ducting and the flametrap housing ducting as shown below in Figure 1. The appearance of the cracks was consistent with fatigue. These cracks have to date only been identified on more recent machines with the gear driven supercharger air inlet configuration (commonly referred to as V3 machines). Machines with the earlier belt driven supercharger air inlet configuration (commonly referred to as V2 machines) have not exhibited this cracking phenomenon, although the inlet manifold component is common to both versions. A comparison of the differences between the general arrangement of the air inlet configurations of the V2 and V3 machines has highlighted the requirement for additional support for the air intake ducting and strangler valve components on V3 machines to reduce the load on the inlet manifold at the flametrap housing. To address this VLIDD has developed a support bracket (Part No. 0508-60081) for the air inlet ducting and strangler valve assembly for V3 machines (machines with gear driven superchargers), as shown in Figure 2. Additional support for the flametrap housing can also be obtained with the addition of supporting braces to the exterior of the inlet manifold, as shown in Figure 3, which would need to be completed by VLIDD in conjunction with a Code D inspection. A more rigorous design review of the air intake assembly support requirements has also commenced.
- 2. Inlet Manifold Flange Joint Leaks:** This issue was reportedly identified on one (1) machine by the CO sensor installed on an underground conveyor belt system, which sets off an alarm when >5ppm CO is detected. Subsequently other machines on the same site were inspected using the soapy water test and an additional two (2) machines were identified with the same issue. Upon disassembly and inspection of the inlet manifold and fixed joint from these machines, the manifolds and gaskets were free from damage and conformed dimensionally to the diesel engine system component tolerances. The root cause for the leaks was not able to be confirmed however it was considered possible that some of the mounting bolts had become thread bound due to holes in the engine head not being fully tapped combined with a flange thickness approaching minimum tolerance. Subsequently three (3) cylinder heads were inspected at VLIDD Rutherford workshop where it was identified that some mounting holes were incompletely tapped to the full depth.
- 3. Incorrect Manifold Mounting Bolts:** A number of recently produced machines have been found to have incorrect mounting bolts installed, being M8 X 25 SS (Stainless Steel) SHCS (Socket Head Cap Screw). The bolts identified on the DES compliance drawing, JHDES-101, are M8 X 25 Grade 10.9 Z/P (Zinc Plated) SHCS. It has come to the attention of VLIDD that M8 X 25 SHCS are only available in Grade 12.9. The stainless steel bolts identified have been replaced. The existing installation torque of 28ft.lb has not changed. The parts manual and VLI inventory management system was also checked to confirm that the correct part number was listed and that there was consistency with the parts identified on the DES drawing. The parts manual displayed the correct part number for the manifold mounting bolts. Some inconsistency was identified with part number identification in the VLI inventory management system, which will be rectified.

## **Recommendations for End Users:**

At the earliest opportunity:

4. Visually inspect all JUG-A-0 air inlet manifolds for crack indications in the welds.
5. Conduct soapy water inspections on all JUG-A-0 air inlet manifolds fixed joints.
6. Inspect all JUG-A-0 air inlet manifold mounting bolts to ensure correct type and size (M8 X 25 SHCS Grade 12.9), and installation torque (28 ft.lb), and replace as necessary.
7. Where inlet manifold cracks or insufficient fixed joint integrity are identified, please contact VLIDD to discuss rectification requirements.
8. Where no crack indications or fixed joint integrity issues are identified, continue to inspect the air inlet manifold weld and fixed joint integrity as per the recommended VLIDD service schedule, obtain and install air intake strangler support bracket (Part No. 0508-60081) at the earliest opportunity. At the next Code D service, the inlet manifold is to be returned to VLIDD for assessment.

## **Recommendations for VLIDD:**

3. Install air intake strangler support bracket (Part No. 0508-60081) to all new production machines and add to equipment parts lists and manuals.
4. Review new build procedures to ensure that only correct inlet manifold mounting bolts can be used on all new production machines.
5. All JUG-A-0 diesel engine cylinder head inlet manifold mounting holes in VLIDD new build and overhaul facilities to be inspected for and tapped to full depth prior to assembly.
6. Ensure no inconsistencies can exist between inlet manifold mounting bolts part numbering identification and stock holding in the VLIDD inventory management system.
7. Review and update VLIDD JUG-A-0 service documents, drawings, parts manuals and inventory system records.

## **Future Action:**

VLIDD have commenced a rigorous design review of the diesel engine system air intake ducting, strangler valve assembly and inlet manifold assembly. On completion of this design review an updated TBSA, with relevant supporting information will be released.

## **Supporting Information:**

Refer attached photographs and images.

Please ensure this document is circulated to all relevant personnel within your organisation.

Should you have any further queries please contact your VLI Diesel Representative.



**Figure 1:** Photographs showing a JUG-A-0 air inlet manifold, highlighting the location at which fatigue cracks have been identified.



**Figure 2:** Photograph showing the support bracket (Part No. 0508-60081) for the air inlet ducting and strangler valve assembly for V3 machines (machines with gear driven superchargers), as installed.



**Figure 3:** Photograph showing the additional supporting braces added to the exterior of the inlet manifold for additional support for the flametrap housing.