



Number: FS-2012-05

Date: November 19, 2012

Model: All Hybrid Buses & 35'/40' Buses With ISL Engine

Approved:

Robert L. Birdwell, Executive Director
Quality Control & Field Service

Subject: Exhaust System Flex Pipe Change

Because the original flex pipe can fail prematurely, we recommend replacing the flex pipe as soon as possible.

We will be sending you one 01-70763-000 12" flex pipe to replace the original flex pipe on each Hybrid bus and/or 35' or 40' bus with an ISL engine.

We will also be sending you an Exhaust Bellows Alignment Tube, (Gillig Part Number 01-71059T000), to ensure the exhaust pipes are properly aligned for this change.

The procedure to replace this flex pipe and a print of the alignment tool are attached to this bulletin.

You can file a warranty claim for up to one hour per bus to make this change.

We would like you to fill out the attached form and return it to Vy Vu, in Gillig Field Service, (vvu@gillig.com).

We will issue an RGA with the pipes and tool requiring that they be returned to us in a timely manner.

RLB:rlb

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FIELD SERVICE BULLETIN

For replacement of Red Silicone (Linkeo) exhaust bellows with All Metal (Tru-Flex) exhaust bellows on 2010 Emissions year engine equipped buses

Note: Read entire bulletin before beginning work

Bellows and Alignment Tool Part Numbers:

29' ISL Diesel	Bellows P/N	01-70942-000 (12.25")
35'/40' ISL Diesel	Bellows P/N	01-70763-000 (12")
29'/35'/40' ISB Diesel Hybrid	Bellows P/N	01-70763-000 (12")
29'/35'/40' ISL-G CNG	Bellows P/N	01-70763-000 (12")
All Applications	Alignment Tool P/N	01-71059T000

NOTE: IDENTIFY THE 12.25" ALL METAL BELLOWS FROM THE GILLIG PART NUMBER AND RED DOT MARKED ON THE BELLOWS. NOT TO BE USED FOR 12" APPLICATIONS.

Background: This bulletin defines how to replace the red silicone exhaust bellows with metal bellows. To ensure proper bellows alignment, the procedure uses an alignment tool to ensure the correct alignment of the mating exhaust pipes to the bellows.



Red Silicone Bellows (Linkeo)



All Metal Bellows (Tru-Flex)

V-Band Clamp Installation Procedure:

Bellows replacement and alignment will require removal/installation of V-Band clamps. Use the following procedure for proper V-Band clamp installation.

Before installing a new clamp or re-using an existing clamp, check for the following. If any of these problems are found, replace the clamp.

- T-Bolt bent or damaged
- T-Bolt thread damaged or stripped
- T-Bolt nut loose. The T-Bolt nut is a prevailing torque nut and should not turn freely
- Any signs of damage or distortion to the clamp

Installation Notes

- Do not apply anti seize to the T-Bolt, nut or clamping surfaces.
- DO NOT use an air impact wrench to install clamp.
- Recommended installation speed of the T-Bolt nut is 100-200 rpm. Do not exceed 500 rpm.
- Before installing a clamp, make sure the flanges are properly aligned. The clamp should not be required to force or pull the connection into alignment. A forced connection can result in a leaking joint or premature failure.
- Cover open pipes to prevent debris entering the turbo or exhaust piping.

V-Band Clamp installation: For use with new clamps and reinstalling used clamps.

1. Make sure the flange and clamping surfaces are clean, dry and free of any contaminants
2. If the flanges are not already assembled, place the clamp over one of the flanges, and then assemble the flanges.
3. If the flanges are already assembled, open the clamp by removing the nut and remove the bolt from one end of the clamp. Widen the clamp by hand just enough to allow the clamp to slip over the joint. Be sure to not over-extend the clamp. Then reassemble the bolt into the clamp and install the nut back onto the T-Bolt.
4. Tighten the clamp to approximately 5-6 ft-lb. While tightening, gently tap around the perimeter of the clamp to ensure proper seating of the clamp on the flange.

5. Torque the clamp using a torque wrench to 13+/- 0.5 ft-lb.
6. Inspect clamp after assembly to ensure proper alignment of the flanges. Verify the two clamp band loops are not touching.
7. Once installed and torqued to 13 ft-lb DO NOT re-torque to 13 ft-lb. The clamp design accounts for a drop in torque of up to 50% after initial engine run. If checked, a torqued clamp on an engine that has been run should fall between 6 and 13 ft-lb. If torque is below 6 ft-lb, re-torque to 6-7 ft-lb.

Note: Torque Check and Re-torqueing of installed clamps.

- **Do not re-torque an installed clamp to 13ft-lb.** 13 ft-lb torque is only used when installing a new clamp or re-installing a used clamp that was removed for servicing. 13ft-lb is used to allow for the initial seating of the clamp at installation.
- Torque of previously installed clamps to be a minimum of 6 ft-lb. Check torque by setting torque wrench to 6 ft-lb. If 6 ft-lb is reached without nut movement, torque is correct. If nut moves before reaching 6 ft-lb, torque nut to 6-7 ft-lb. (Note: An installed clamp is a clamp that was torqued to 13 ft-lb at installation and has not been removed or loosened.)

Bellows Replacement and Alignment Procedure:

Note: Settee hatch removal is not required to remove the red silicone bellows and is not required to use the alignment tool to check the alignment, if the alignment of the exhaust piping is correct per alignment tool, the all metal bellows can be installed without settee hatch removal. Hatch removal is only required if the adjustment to the exhaust piping is required.

Before servicing the bus, change the "SELECT IGNITION" switch from "FRONT" to "ENGINE KILL/OFF" in the rear run box. Make sure that the exhaust bellows is cool enough to work on.

1. Remove the existing red silicone exhaust bellows from the bus by loosening the two V-Band clamps.

FIGURE 1. ISB DIESEL HYBRID ENGINE



FIGURE 2. ISL DIESEL ENGINE

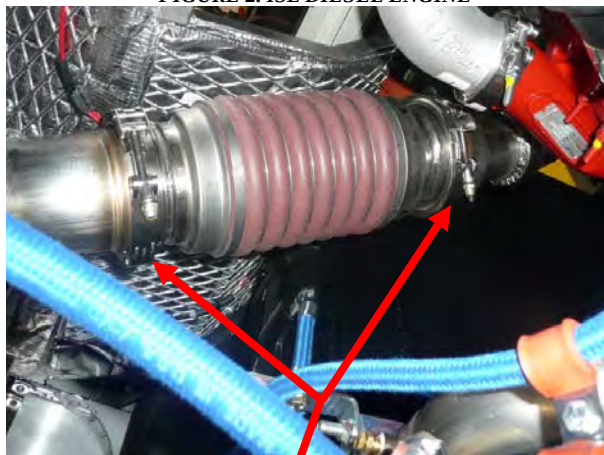


FIGURE 3. ISL-G CNG ENGINE



LOOSEN V-BAND CLAMPS
SHOWN TO REMOVE THE
EXISTING BELLOWS
(CLAMP LOCATION "C")

2. Insert the alignment tool between the turbo outlet pipe & muffler inlet pipe (as shown below), tighten the bottom V-Band clamp to approximately 6 ft-lb and align the other end of the tool with muffler inlet pipe.
NOTE: DO NOT FORCE THE ALIGNMENT TOOL TO FIT.



FIGURE 4.



3. Then tighten the upper V-Band clamp to approximately 6 ft-lb.

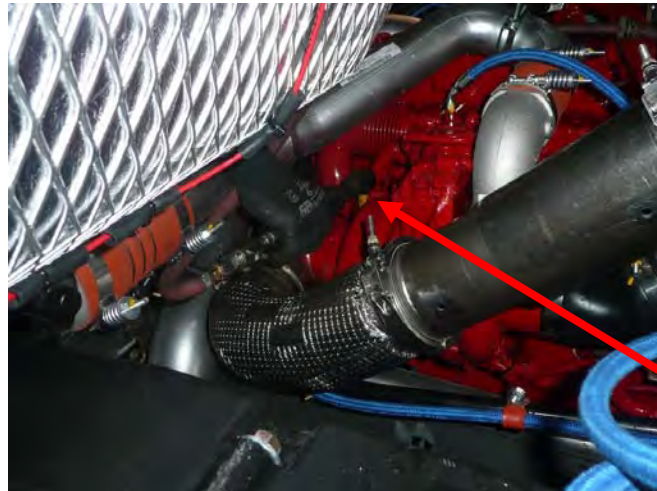


FIGURE 6.

If alignment tool fits between the pipes with V-Band clamps installed to approximately 6 ft-lb, remove the alignment tool and install new all metal bellows (jump to step 9).

If alignment tool does not fit then continue to step 4.

4. To access the turbo outlet pipe V-Band clamps, remove the settee hatch from inside the bus.
5. Loosen both Cummins cast turbo outlet elbow V-Band clamp and exhaust turbo outlet pipe V-Band clamp through the settee hatch access.



LOOSE V-BAND CLAMPS
THROUGH SETTEE HATCH

FIGURE 7.

VIEW FROM
SETTEE HATCH

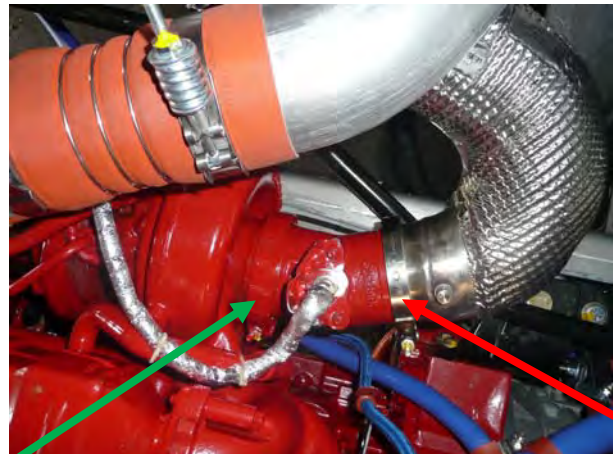


FIGURES 8 & 9. ISB DIESEL HYBRID ENGINE SHOWN

CAST ELBOW AT TURBO
OUTLET V-BAND CLAMP
(CLAMP LOCATION "A")

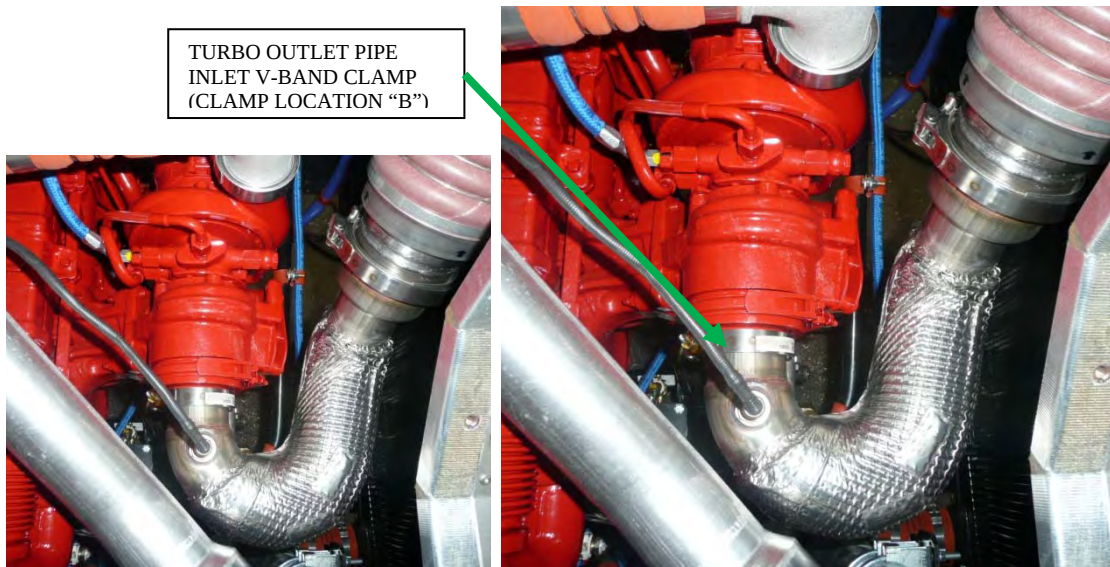


FIGURE 10 & 11. ISL ENGINE SHOWN



TURBO OUTLET
PIPE INLET
V-BAND CLAMP
(CLAMP
LOCATION "B")





FIGURES 12 & 13. ISL-G CNG ENGINE SHOWN

6. Loosen the V-Band & U clamps on exhaust muffler inlet pipe. Loosening the clamps will allow the pipes to move into alignment.

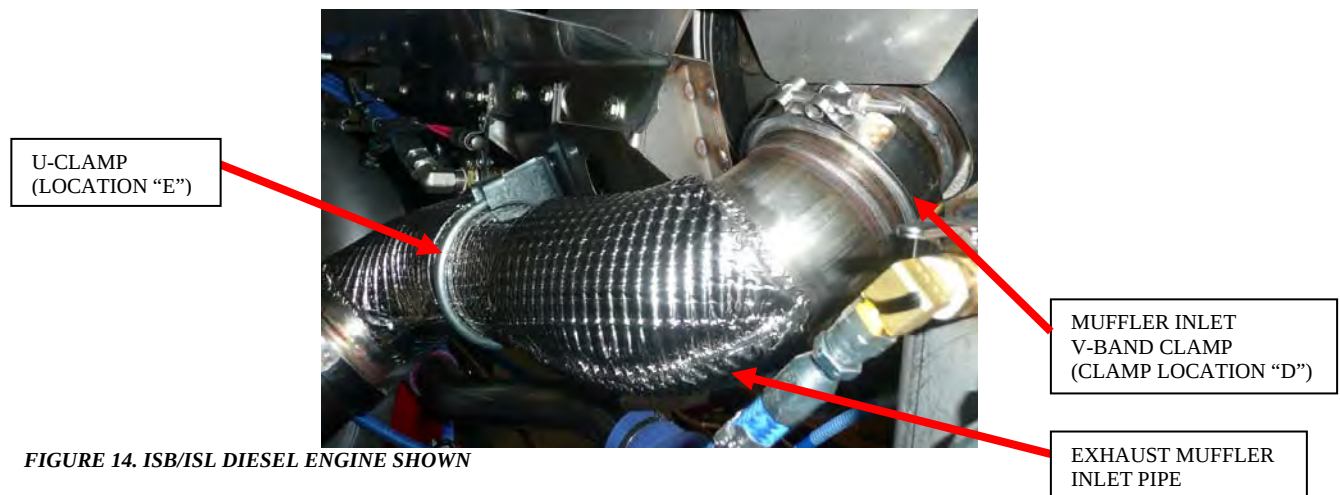


FIGURE 14. ISB/ISL DIESEL ENGINE SHOWN

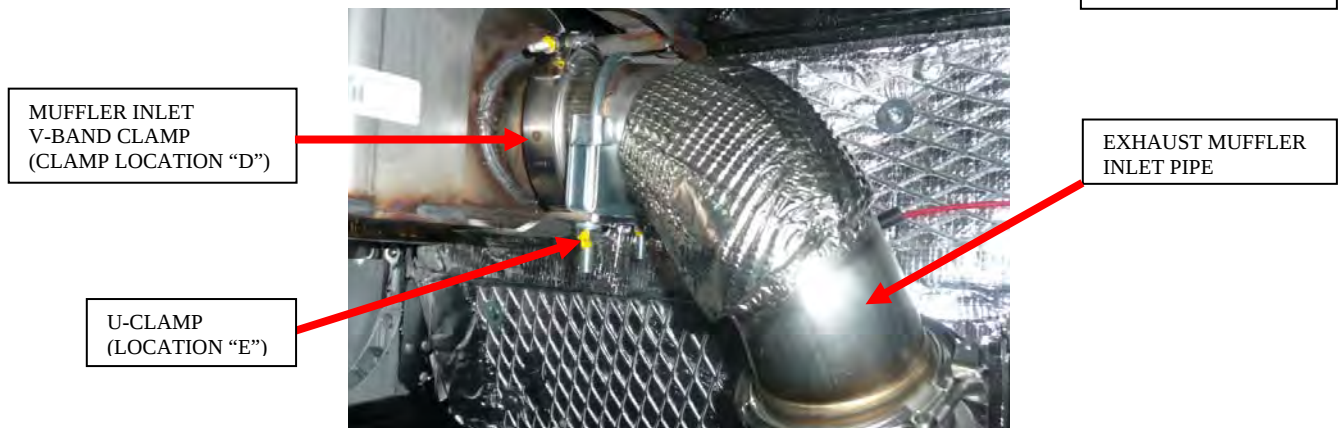


FIGURE 15. ISL-G CNG ENGINE SHOWN

7. Align the pipes with alignment tool & torque all clamps to 13+/- 0.5 ft-lb in the following order:

- CAST TURBO OUTLET ELBOW V-BAND CLAMP *LOCATION "A", SEE FIGURES:
8 & 9 FOR ISB on page 4
10 & 11 FOR ISL on page 4
12 & 13 FOR ISL-G on page 5*
- EXHAUST TURBO OUTLET PIPE V-BAND CLAMP *LOCATION "B", SEE FIGURES:
8 & 9 FOR ISB on page 4
10 & 11 FOR ISL on page 4
N/A for ISL-G*
- ALIGNMENT TOOL UPPER & LOWER V-BAND CLAMPS *LOCATION "C", SEE FIGURE 16 BELOW*
- MUFFLER INLET PIPE V-BAND CLAMP *LOCATION "D", SEE FIGURES:
14 FOR ISB on page 5
14 FOR ISL on page 5
15 FOR ISL-G on page 5*
- MUFFLER INLET PIPE U-CLAMP *LOCATION "E", SEE FIGURES:
14 FOR ISB on page 5
14 FOR ISL on page 5
15 FOR ISL-G on page 5*

Clamp Part Numbers:

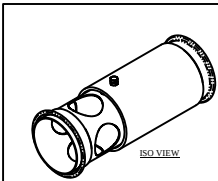
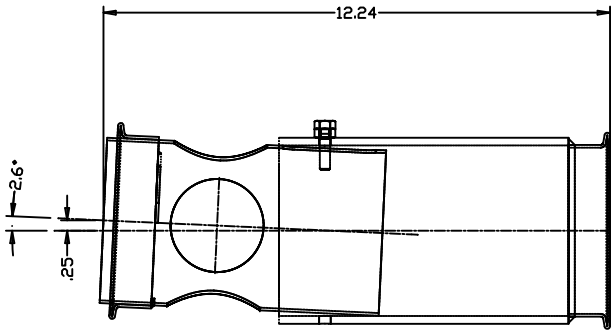
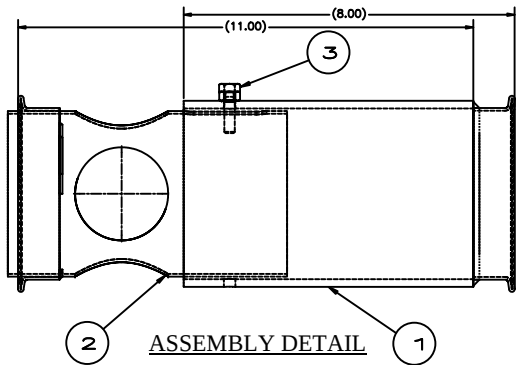
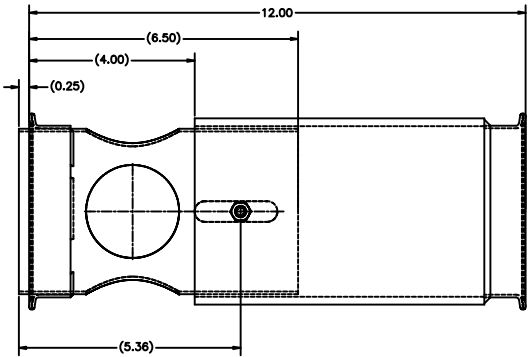
Engine Model	Clamp Location				
	A – Cast Elbow at Turbo Outlet	B – Turbo Outlet Pipe Inlet	C – Bellows Inlet/Outlet	D - Muffler Inlet	E - U-Clamp
ISL Diesel	Cummins P/N 102408	53-28193-003	01-58451-000	53-28193-003	54-00029-002
ISB Diesel Hybrid	Cummins P/N 102408	53-28193-005	01-58451-000	53-28193-003	54-00029-002
ISL-G CNG	N/A	53-28193-006	01-58451-000	53-28193-003	54-00029-002



FIGURE 16.

8. After torquing all the clamps to 13+/- 0.5 ft-lb, remove the alignment tool by loosening upper & lower V-Band clamps.
9. Insert new all metal exhaust bellows between the turbo outlet pipe & muffler inlet pipe noting the flow direction labeled on the bellows, and then torque bellows V-Band clamps to 13+/- 0.5 ft-lb.
10. After completing the installation:
 - Confirm the exhaust bellows is not damaged or interfering with surrounding components.
 - Start the engine and check for exhaust leaks.
 - Reinstall the settee hatch (if removed).

REVISIONS					
SYN	DWN	ZONE	DESCRIPTION	REL.	DATE
A	GPS		RELEASED FOR FILED SERVICE	92658	10/25/12
B	GPS		UPDATED VIEWS OF ITEM	NO 92658	10/28/12



3	1/4-20 UNC HEX BOLT, 1.00" LENGTH	1
2	01-71058-001 TUBE-EXH BELLOWS ALIGNMENT ADAPTER	1
1	01-71058-000 TUBE-EXH BELLOWS ALIGNMENT, BASE TUBE	1
ITEM NO DESCRIPTION		
WELD PER GILIG-10600 CLASS		
CLEAN/PRIE PER GIL MFG STD 438.003		
MARK PART V/PN PER GIL. IS 8370.002		
GILIG GILIG LLC HAYWARD, CA		
PROPERTY OF GILIG LLC. THE DRAWING AND THE INFORMATION CONTAINED THEREIN ARE THE PROPERTY OF GILIG LLC. NO REPRODUCTION OR DISSEMINATION OF THE CONTENT OF THIS DRAWING OR ANY PORTION THEREOF FOR ANY PURPOSE MUST BE APPROVED IN WRITING BY GILIG LLC.		
REMOVE ALL BURRS, BREAK SHARP EDGES		
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE IN INCHES		
DECIMALS ANGULAR		
1/16" .0005" 1/32" .0005" 1/64" .0005" 1/32" .0005" 1/64" .0005"		
3RD ANGLE		
TITLE: TUBE ASM-EXH BELLOWS ALIGNMENT TOOL		
12.00-12.25 INCH LG EXHAUST BELLOWS		
DWN GPS DATE 10/25/12		
CHOR'S INIT: DATE		
APPR'S INIT: DATE		
DRG REL. 92658		
Dwg SCALE 1/3 = 1.0		
SIZE DOCUMENT NO. 01-71059T000		
STD NO 302		