



भारतीय रेल (रेल मंत्रालय)
डीजल रेल इंजन कारखाना
वाराणसी-२२१००४, भारत
INDIAN RAILWAYS (MINISTRY OF RAILWAYS)
DIESEL LOCOMOTIVE WORKS
VARANASI-221004, INDIA



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DESIGN BULLETIN

1. **Design Bulletin no.** DB/01/2015/26,dt.11/05/15
2. **Subject:** Procedure of fitment and matching of turbocharger on HHP engines at Diesel sheds
3. **Background:** Field Failure of HHP turbochargers
4. **Objective:** Defining the procedure of fitment and matching of turbocharger on HHP locomotives at diesel sheds to arrest the failure of HHP turbocharger

1. RANGE OF IMPELLER EYE CLEARANCE OF HHP TURBOCHARGER AFTER COMPLETION OF ASSEMBLY AT TURBO ASSEMBLY SHOP DLW

At 12 O'clock	At 3 & 9 O'clock	At 6 O'clock
0.024" to 0.048"	0.016" to 0.039"	0.012" to 0.025"

SSE/TSC/DLW will fill the Impeller Eye Clearance readings in the attached check sheet no.-1

2. PROCEDURE TO CHECK IMPELLER EYE CLEARANCE DURING FITMENT OF HHP TURBOCHARGER ON ENGINE AT DIESEL SHED

2.1 Impeller Eye Clearance check on Turbo Mounting Stand (1st stage)

- Place the turbocharger on turbo mounting stand. Before lifting the turbocharger from turbo stand with the help of eye bolt & lifting fixture.
- Check Impeller Eye clearance by feeler gauge (after keeping the position of mark on Impeller Blade at 6 O'clock) as per the given table.
- The readings should match to the readings taken during completion of turbo assembly (check sheet no.-1). Fill the Impeller Eye Clearance readings in the attached check sheet no.-2



2.2 Impeller Eye Clearance check in Hung position (2nd stage)

- Place turbo on engine with the guide of Idler Stub Shaft#2 & match the turbo drive gear with turbo idler gear.

- Before removing the lifting fixture from the turbo, apply all bolts in their positions & torque diagonally opposite bolts at less torque value.
- Check Impeller Eye clearance by feeler gauge (after keeping the position of mark on Impeller Blade at 6 O'clock) as per the given table.
- The readings should match to the readings given in check sheet no.-1. Fill the Impeller Eye Clearance readings in the attached check sheet no.-2



2.3 Impeller Eye Clearance check after torquing of all turbo housing mounting bolts (3rd stage)

- With the help of lead piece, maintain backlash 0.006”-0.018” between Turbo Drive Gear and Turbo Idler Gear.
- Check Auxiliary Drive Gear backlash and maintain between 0.010”-0.022”.
- Check Auxiliary Drive Gear thrust 0.133”-0.162”.
- Torque of all turbo housing mounting bolts (i.e. 1/2” bolts at 65 ft.lbs & 3/4” bolts at 175 ft.lbs)
- Impeller Check Eye clearance by feeler gauge after keeping the position of mark on Impeller Blade at 6 O'clock as per the given table.
- The readings should match to the readings taken during completion of turbo assembly. Fill the Impeller Eye Clearance readings in the attached check sheet no.-2.

2.4 Impeller Eye Clearance check after fitment of Air Duct (Right/Left) (4th stage)

- Fitment of right side air duct with crank case & turbo flange.
- Snug bolts at turbo end of air duct.
- Torque bolts at engine end at 65 ft-lbs.
- Remove bolts from turbo end of air duct.
- With gasket in place, confirm that 0.008” feeler gauge will not enter.
- If 0.008” feeler gauge enters, loosen and reposition duct on engines side.
- If necessary, holes in the engine end of duct may be enlarged.
- Torque engine end bolts, repeat flange check.
- Torque turbo flange side bolts at 60 ft-lbs.
- Similar fitment process of left side air duct will be done.
- Check Impeller Eye clearance by feeler gauge after keeping the position of mark on Impeller Blade at 6 O'clock as per the given table.

- The readings should match to the readings taken during completion of turbo assembly. Fill the Impeller Eye Clearance readings in the attached check sheet no.-2.



3. PROCEDURE TO CHECK LOP AT COMPRESSOR BEARING SUPPORT AND LOP ACROSS THE TURBOCHARGER DURING LOAD TESTING

Following parameters must be checked during load testing after first fitment of TSC every 180 days schedule. The parameters are required to match the TSC with the engine:

- First notch lube oil pressure at working temperature must not be less than 12 psi at Compressor Bearing support.
- The pressure drop in lube oil pressure across the LOP turbo in & LOP bearing compressor support should not exceed 34 psi at full load and at full speed. The actual readings must be filled in the attached check sheet no.-3.

Note: If the reading found beyond the above specified range, change the turbocharger and repeat the above procedure. The changed TSC may be used with other engines.

Implementation: Turbo section (HHP)/DLW, All Diesels Sheds holding HHP Locomotives.

DA: Check sheet no.1, 2 &3


11.5.15
Dy.CDE/Eng

Copy to:

1. Dy.CME/Engine,
2. SSE/Turbo(HHP)/DLW
3. All Diesels Sheds holding HHP Locomotives

CHECK SHEET NO.-1
(to be filled by concern shop)

**READINGS OF IMPELLER EYE CLEARANCE TO BE CHECKED BY FEELER
GAUGES AFTER COMPLETION OF HHP TURBOCHARGER ASSEMBLY:**

Turbo Serial No.:

Date of Manufacture:

Date of Dispatch to Diesel field/Zonal Railways:

At 12 O'clock Specified value (0.024" to 0.048")	At 3 & 9 O'clock Specified value (0.016 to 0.039")	At 6 O'clock Specified value (0.012 to 0.025")	Remarks

Signature, Designation and Seal
SSE/Turbo (HHP)/DLW

CHECK SHEET NO.-2
(to be filled by concern shed)

Turbo Serial No.:

Turbo Mounted on locomotive Serial No.:

**READINGS OF IMPELLER EYE CLEARANCE TO BE CHECKED BY FEELER
GAUGES DURING FITMENT OF HHP TURBOCHARGER ON ENGINE**

(I) Impeller Eye Clearance check on Turbo Mounting Stand (1st stage)

At 12 O'clock Specified value (0.024" to 0.048")	At 3 & 9 O'clock Specified value (0.016 to 0.039")	At 6 O'clock Specified value (0.012 to 0.025")	Remarks

(II) Impeller Eye Clearance check in Hung position (2nd stage)

At 12 O'clock Specified value (0.024" to 0.048")	At 3 & 9 O'clock Specified value (0.016 to 0.039")	At 6 O'clock Specified value (0.012 to 0.025")	Remarks

(III) Impeller Eye Clearance check after torquing of all turbo housing mounting bolts (3rd stage)

At 12 O'clock Specified value (0.024" to 0.048")	At 3 & 9 O'clock Specified value (0.016 to 0.039")	At 6 O'clock Specified value (0.012 to 0.025")	Remarks

(IV) Impeller Eye Clearance check after fitment of Air Duct (Right/Left) (4th stage)

At 12 O'clock Specified value (0.024" to 0.048")	At 3 & 9 O'clock Specified value (0.016 to 0.039")	At 6 O'clock Specified value (0.012 to 0.025")	Remarks

Signature, Designation and Seal
SSE/Turbo/Diesel shed

CHECK SHEET NO.-3
(to be filled by concern shed)

Turbo Serial no.:

READINGS OF TURBO LOP IN AT TURBO FILTER, LOP IN AT COMPRESSOR BEARING SUPPORT AND LOP ACROSS THE TURBOCHARGER AFTER FIRST FITMENT DURING ENGINE TESTING AT DIESEL SHED

Sl. No.	Parameters					
1.	Loco no					
2.	Date of fitment on locomotive					
3.	Actual reading at first notch lube oil pressure at Compressor Bearing support at working temperature (Not less than 12 psi)					
4.	Lube oil pressure at turbo in (a)					
5.	Lube oil pressure at bearing compressor support (b)					
6.	Actual lube oil pressure drop across (a-b) (should not exceed 34 psi)					

Signature, Designation and Seal
SSE/Turbo/Diesel shed