



**Possibility of foreign object from engine components such as broken valve caused by engine malfunction.  
Insufficient oil filter (filter does not pick up all oil contaminants)**

**<Insufficient lubrication , Running out of oil slick>**

Insufficient lubrication or momentary loss of lubricating oil, can cause the high speed rotating turbine shaft(180,000rpm) to emit high temperatures (evident in purple temper colour) and thus, branding both the bearing & shaft.

**Cause of bearing metal contact**

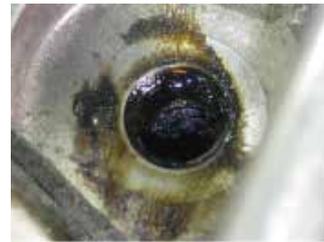
1. Carbon sludge can block union bolt or oil feed pipe (carbon sludge can be caused by fuel heat soak in the back of the exhaust manifold) which then restricts oil flow to the turbocharger
2. Sudden acceleration before oil supply does not complete to turbocharger. **\*\*Please refer the installation note**
3. Blocked up oil strainer. Insufficient oil filter (filter does not pick up all oil contaminants)
4. Low oil pressure due to defective oil pump.
5. Use, viscosity of the bad oil do not match



Normal strainer



Sludge in centre housing oil inlet orifice.



Carbon sludge can block oil inlet



Carbon sludge can block union bolt

**1) Contaminated oil**

Contaminants such as sludge, block oil passages that supply oil to the turbocharger. Shown in the above image, **this can easily block oil feed supply line**. Oil blockage from this would thus cause turbine wheel shaft discolouration from heat, caused by in )



Worn journal bearing



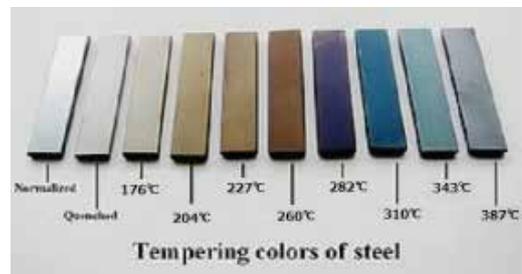
Worn bearing shaft



Worn compressor blades

**2) Insufficient lubrication**

**Insufficient lubrication** or momentary **loss of lubricating oil**, can cause the high speed rotating turbine shaft to emit high temperatures (evident in purple temper colour) and thus, branding both the bearing & shaft



Metal gossan color temperature

## Oil suction from a blow by hose

Excessive piston blow by or high internal crankcase pressure can cause oil leakage from turbocharger compressor or turbine seals.

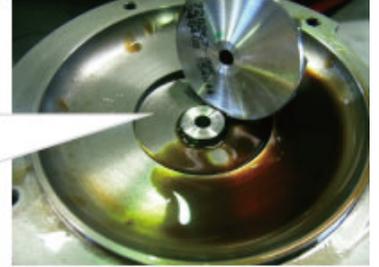
In many cases, there is misrecognition of oil leak from turbocharger \*\*For turcks and buses.

White smoke appears when engine oil burns in combustor.

### Cause of oil suction

- 1.Excessive blowby gas
- 2.Positive Crankcase Ventilation (PCV) valve are blocked.
- 3.Lacking in maintenance of oil separator /PCV

A lot of oil suction from breather hose instantly. The White smoke occurs from exhaust pipe and oil leak. The worst case is lack of out put by wet plug. If oil is stay in compressor housing (refer the picture) or a lot of on intercooler, it is possible to happen.



Oil in compressor housing



## How to check the excessive blowby gas

### Continuous oil leak and white smoke emitted after turbocharger replaced.

- 1.Is there any oil suction from breather?  
\*\* If there are a lot of oil stick to intercooler, there is high possibility for oil suction from breather.
- 2.Have you finished test drive until the temperature for turbocharger is high enough?  
\*\* The turbocharger do not operate correctly without high temperature.
- 3.The oil leak still remains in a muffler?  
\*\*It should burn until oil is burnt out.
- 4.Do you have any uncommon symptoms?  
Engine lacks power or boost/noise  
Excessive shaft clearance/ any heavy rotation of shaft/ turbine wheel rubbed  
The above symptoms do not indicate an actual turbocharger fault.
- 5.In terms of the turbocharger, oil does not leak from its internals due to presence of negative air pressure in a normal operating state.  
Excessive engine crank case pressure can cause positive air pressure into the turbocharger internals and thus cause an

## Example of lacks power or boost

The turbocharger is not defective if the compressor or turbine wheels do not rub, are not bent and no abnormal problems felt if the wheel is spun by finger. Possible cause of lack of power or boost is a non pressurising system. The following conditions ca

### <Engine lacks power or boost>

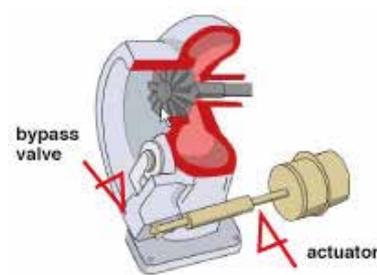
Incorrect actuator pressure adjustment. (Even high boost pressure can cause loss in fuel pressure and loss of acceleration).

Exhaust waste gate bypass valve (a swinging valve) can be siezed open. This causes an exhaust leak and does not allow any rise in boost.

Air cleaner hose/ pips are stuck or crush leak of pressure from boost hose or pipes

Compressor side: air leak caused by mulfunction of relief valve

Direct ignition (mulfunction of electronic)



## About recurrence of malfunction

In spite of changing the reman turbocharger, **the same problem occurs again and repeat it**. Turbocharger is supportive device for engine; the functions/performance are depend on the engine condition or other devices. The typical malfunction of recurrence is lack of oil management.

Inspect oil feed inlet on centre housing, oil feed pipe and union bolt for blockage from oil sludge prior to installing turbocharger. All traces of sludge or foreign contaminants must be cleaned completely. Components that cannot be cleaned must be replac

Strongly recommended to use the oil **15W-40**

Do not use engine flushing oil; We do not recommend for flushing with it. Please use the same grade of engine oil



Piled up oil sludge

## C1 Foreign object damage on compressor wheel

Each parts appearance

Often caused by foreign objects in the compressor inlet duct. So always check intake system for foreign objects from the air cleaner all the way to the compressor housing.

In some instances foreign objects that damage the compressor or turbine wheels, will then cause an imbalance in the shaft. This can then cause metal contact between the bearing and the shaft if the imbalance is present and the turbocharger continues runn

### Check before turbocharger installation



Please check the oil drain pipe/inlet pipe for any filling, dirt, destruction, foreign objects or adhesion of carbon. Please exchange it if necessary. (Please exchange both pipes and union bolts together)

Inspect air cleaner, housing, intake and exhaust piping for foreign objects such as loose bolts, nuts, cloths etc.

### Inspect when installing turbocharger



Replace turbocharger oil inlet and outlet gaskets with new gaskets. Do not use any form of liquid gasket.

### Inspect after turbocharger installation

Since sludge may flow into the turbocharger, do not perform engine clean or flush after the exchange turbocharger is fitted.

## C2 Compressor wheel lock nut missing.

Each parts appearance

Inspect compressor wheel to confirm that the lock nut is still attached to the shaft. If the nut is missing it is essential that the intake and exhaust systems are inspected and that the missing nut is found and removed. Failure to capture the nut can cau

## Check before turbocharger installation



Foreign object damage to impeller. Please confirm whether a impeller lock nut sticks by all means. When there is not it, It is left in an air cleaner or the intake pipe and turbo failure again. It does not become the object of the claim.(Suggest to remove the ribbon when you install it)



## Causes of foreign object in compressor ducting



Foreign object damage on compressor wheel

- 1.Impeller lock nut is left in air cleaner or intake pipe and forced into the compressor wheel of the replacement turbocharger.
- 2.Having left foreign object at the time of turbocharger installation (for example bolts, nuts, washers etc).

## Turbine wheel damage due to a hard object penetrating the blades.

Each parts appearance

Foreign object from oxidised exhaust manifold (such as rust flakes).

In some instances foreign objects that damaged the compressor or turbine wheels, will then cause an imbalance in the shaft. This can then cause metal contact between the bearing and the shaft if the imbalance is present and the turbocharger continues run

## Check before turbocharger installation



Check of PCV valve movement

Causes of foreign object in exhaust ducting

## Causes of foreign object in compressor ducting



Be careful not to allow any foreign objects contaminate the oil inlet, piping or union bolts during installation.

Remaining foreign object

## Exhaust side blade in the case of a ceramic wheel

In the case of an exhaust side broken ceramic wheel blade, please inspect that the broken blade piece is not left remaining in the exhaust somewhere in between the catalytic convertor and the turbocharger exhaust housing, prior to installing the new turbo

## Causes of foreign object in exhaust ducting

1. Foreign object from a worn engine
2. such as worn piston ring, valve guide etc.

### Caution:

Remove the Lock-nut from inside the air cleaner or intake pipe. (In case the turbocharger was failed by same cause, warranty claim is not accepted)

## E. Excessive piston blow by or high internal crankcase pressure can cause oil leakage from turbocharger compressor or turbine seals.

The turbo appearance

The oil which leaked remains in the muffler



It operates until oil is burned out

2. No problem at wheel spin, Clearance of the shaft is reasonable



The above symptoms do not indicate an actual turbocharger fault.

## The simple check method

1. Remove the oil cap, dip stick and blow by hose, white smoke should disappear.
2. At engine idle, blow by hose should be removed. If there is an internal engine problem, oil will come out of the hose and this will mean the cause of the turbocharger oil leak, not the turbo charger itself.

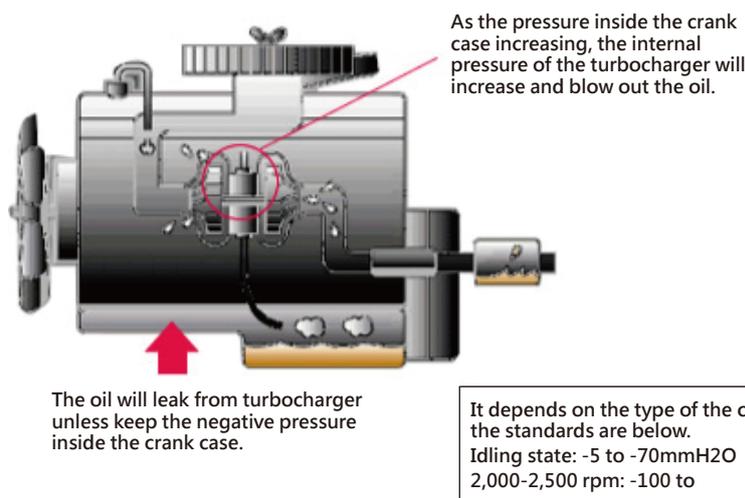


(1) Or when there is condition (2), there is the possibility that piston blow by is high. If the engine is in normal condition, blow by will be drawn into the engine because of negative pressure in the intake manifold and crank case. Therefore the turboch



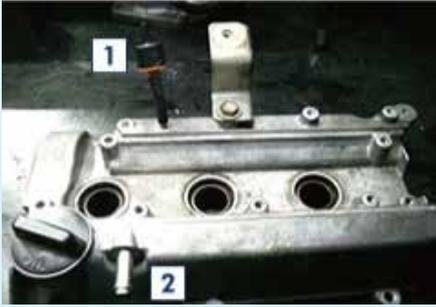
## Possible causes

1. Worn piston ring, valve guide or engine cylinder. Since combustion gas leaks excessively, piston blow by cannot be drawn in if these components are worn. This can be more evident in a vehicle with high mileage.
2. Blow by hose and Positive Crankcase Ventilation (PCV) valve are blocked.

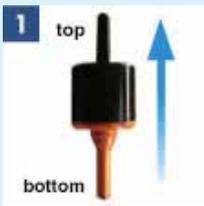


## Confirm PCV hose is fitted correctly into head (tapper or rocker) cover

Head cover



Inside of head cover



### Confirm PCV valve operation

Ensure air does not come out of the upper outlet of the PCV valve, even if air is carried away from the bottom of the PCV valve.

- Clean with brake parts cleaner
- Replace an inoperative PCV valve, even if it appears clean in appearance.



### Confirm air cleaner blow by hose connection is not blocked and fitted correctly to engine cover

It is possible that the inner side of the blow by hose cover connector is blocked up with sludge.

- Confirm passage is not blocked with wire
- If partial blockage is evident, clean out foreign substances with compressed air blower.



### Inspect PCV valve connector fitting

It is possible that the PCV connector passage can block up with sludge.

- Confirm the connector passage is not blocked with wire.
- If partial blockage is evident, clean out foreign substances with compressed air blower.

## Bent wheel blades

The turbo appearance

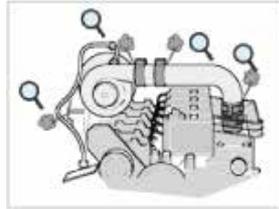
Compressor wheel damage due to soft objects, such as cloth or paper can cause bends in the impeller blades, usually in a direction opposite to rotation.



## Visual appearance of soot.

The turbo appearance

Possibly due to an exhaust gas leak. Suggest replacement of related gaskets and securing all system bolts to the specified torque. This can also cause a lack of engine power or a noisy turbocharger.



Inspect every clamp on each connecting hose.

## Noise, whistling sound

Symptom on the vehicle

Turbocharger originally has the sound with high frequency. It has different sound depends on each turbocharger; loudness and intervals. It is necessary to listen and judge the sound is usual or not.

Please refer the example of noise

- 1.Noise/whistling sound from the joint by air/ exhaust gas leak
- 2.Wheel rub with housing case
- 3.Unusual wind noise by wheel bent

( from TTS )