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B Bulletin

Turbo
Journal and Ball bearing turbos
Application
Oil features

Garrett® by Honeywell PERFORMANCE
Official EMEA Distributor

Oil Supply & Drainage

Journal bearing turbo

Journal-bearings function similarly to rod or crank bearings in an engine; oil pressure is required to keep components separated. An oil restrictor is generally not needed except for oil-pressure-induced leakage. The recommended oil feed for journal bearing turbochargers is -4AN or hose/tubing with and ID of approximately 0.25 inches.

Be sure to use an oil filter that meets or exceeds the OEM specifications.

Ball bearing turbo

An oil restrictor is recommended for optimal performance with ball bearing turbochargers. Oil pressure of 40 – 50 psi (2.75 – 3.50 bars) at maximum engine speed is recommended to prevent damage to the turbocharger´s internals. In order to achive this pressure, a restrictor with 0.040" (1.00mm) oriffice will normally suffice, but you should always verify the oil pressure entering the turbo after the restrictor in insure that the components are functioning properly.

Recommended oil feed is -3AN or -4AN line or hose/tubing with a similar ID. As always, use an oil filter that meets or exceeds the OEM specifications.

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Oil Inlet

Garrett ball bearing turbocharges require less oil than journal bearing turbos. Therefore an oil inlet restrictor is recommended if you have oil pressure over about 60 psi (4.15 bars). The oil outlet should be plumbed to the oil pan above the oil level (for wet sump systems). Since the oil drain is gravity fed, it is important that the oil outlet points downward, and that the drain tube does not become horizontal or go “uphill” at any point.

To minimize the efects of heat “soak-back”, water-cooled center housings were introduced. The use coolant from the engine to act as a heat sink after engine shutdown, preventing the oil from coking. The water lines utilize a thermal siphon effect to reduce the peak heat “soak-back” temeprature after engine shutdown. The layout of the pipes should minimize peaks and troughs with the (cool) water inlet on the low side. To help this along, it is advantageos to tilt the turbocharger about 20º abous the axis os shaf rotation. *(See TMS&R bulletin 001/11)*

OIL LEAKAGE SHOULD NOT OCCUR ON A PROPERLY FUNCTIONING SYSTEM IF RESTRICTOR IS NOT USED UNLESS THE SYSTEM PRESSURE IS EXCESSIVELY HIGH.

Oil Drain

In general, the larger the oil drain, the better. However, a -10AN is typically sufficient for proper oil drenage, but try not to have an inner diameter smaller thn the drain hole in the housing as this will likely cause the oil to back up in the center housing. Speaking of oil backing up in the center housing , a gravity feed needs to be just that! The oil outlet should follow the direction of gravity +/- 35º when installed in the vehicule on level ground. If a gravity feed is not possible, a scavenge pump should be used to insure that oil flows freely away from the center housing.

Avoid:

- Undulations in the line or extended lengths parallel to ground.
- Draining into oil pan below oil level.
- Dead heading into a component behind the oil pan.
- Area behind the oil pan (windage tray window) where oil sling occurs from crankshaft.

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APENDIX – AN thread

The AN thread is a particular type of fitting used to connect flexible hoses and rigid metal tubing that carry fluid. It is a US military-derived specification stemming from a joint standar agreed upon by the Army and Navy, hence AN. The standar is sometimes mistakenly referred to as “Air Force-Navy”, but it dates back to Worl War Two, before there was a separate US Air Force.

AN sizes range from -2 (dash two) to -32 in regular steps, will each step equating to the OD (outside diameter) of the turbing in 1/16” increments. Therefore a -8 AN size would be equal to ½” OD tube (8 x 1/16 = ½). However, this system does not specify the ID (inside diameter) of the tubing because the tube wall can vary in thickness. Each AN size also uses its own standar thread size.

AN fittings are a flare fitting, using 37º falred tubing to form a metal-metal seal. They are similar to other 37º flared fittings, such as JIC, which is their industrial variant. The two are interchangeable in theory, thogh this is typically not recommended due to the exacting especifications and demands of the aeroespace industry. The differences between them relate to thread class and shape (how tight a fit the threads are), and the metals used.

Note that the 37º AN and 45º SAE fittings and tooling are not interchangeable dus to a different falring angles. Mixing them can cause leakage at the flare.

AN size	**-2**	**-3**	**-4**	**-5**	**-6**	**-8**	**-10**	**-12**	**-16**	**-20**	**-24**	**-28**	**-32**
Tube OD (hose ID)	1/8”	3/16”	1/4”	5/16”	3/8”	1/2”	5/8”	3/4”	1”	1-1/4”	1-1/2”	1-3/4”	2”
SAE thread size	5/16-24	3/8-24	7/16-20	1/2-20	9/16-18	3/4-16	7/8-14	1-1/16-12	1-5/16-12	1-5/16-12	1-7/8-12	2-1/4-12	2-1/2-12
Pipe thread size (NPT)		1/8-27	1/4-18		3/8-18	1/2-14		3/4-14					