

HEALTH CHECK FOR YOUR AIR COMPRESSOR

If you are having problems with an air compressor such as slow pump-up of the vehicle's air system (as a guide – more than 25% longer than when the vehicle was new) or excessive oil carry over then check the following:

1. Condition of the engine induction system

If the compressor takes its air from the engine intake system, in particular check the condition of the engine induction (intake air) filter. Check also the pipework of the engine induction system and correct any blockage or damage. Problems with the engine induction system can lead to excessive depression (vacuum) at the engine intake and at the compressor inlet leading to a potential increase in oil carry over from the compressor.



Check the condition of the engine air filter

2. Condition of the compressor induction pipe/filter

Check the pipework of the compressor inlet system for any blockage or damage. Correct any problems found. Any restriction in the compressor inlet pipework can lead to a potential increase in oil carry over from the compressor. Any holes or splits in the pipework can lead to contaminated air being sucked into the compressor leading to premature wear. If the compressor uses a separate inlet filter then check the condition of this filter.



Check there is no damage or crushing of the compressor inlet pipe

3. Duty cycle of the air compressor

The duty cycle of an air compressor is the ratio between the average time spent 'on load' (i.e. charging the air brake system) and the average time spent 'off load'. As a rule of thumb this should be less than 50% (i.e. less than 50% of the time on load). If the duty cycle is found to be high then check:

- System leakage – static leakage test
Chock the wheels of the vehicle and make sure there is no danger of it rolling away. Release the parking (hand) brake and, with the engine running, apply and release the foot brake until the compressor cuts in. Charge the air system to maximum pressure (when the compressor cuts out). Switch off the engine and allow the vehicle to stand for two minutes then make a note of the pressures on the cab pressure gauges. Leave the vehicle to stand for 30 minutes and check for any drop in pressure. If there is a drop in pressure in excess of 0.5 bar on any gauge then carry out a physical check for leakage on that part of the system. Correct any leakage found and repeat the test. Beware cab pressure gauges can be unreliable for small pressure changes and if in any doubt connect calibrated pressure gauges to the test points on the vehicle close to the reservoirs. Excessive system leakage will mean that the compressor will have to come on-load more often to replace the air which has leaked from the system.
- Unloader operation
The unloader, which is commonly built into the air dryer but can be a separate valve, controls the cut-in and cut-out of the air compressor and its operation should be checked against the information provided by the vehicle manufacturer.
- Blockage in the compressor delivery – see points 5 and 6

4. Condition of the air dryer exhaust

The condition of the air dryer exhaust is a good indicator of the presence of oil carry over from the compressor. Examine the exhaust from the air dryer (normally an exhaust silencer). If the surface of the exhaust and the surrounding area is covered by a light film of oil and road dirt this is normal. If it is covered with wet glistening oil and there is any sign of oil dripping from the exhaust then there is an oil carry over problem. If there is evidence of oil carry over then also check the exhausts of valves in the brake system to establish if any oil has reached these. If it has they will need to be serviced or replaced to maintain correct function of the braking system. Be sure to drain any oil and water from the air reservoirs.



Normal air dryer exhaust

Exhaust with oil present

Service Instructions

5. Condition of the compressor cylinder head and valve plate

Look for any sign of leakage around the cylinder head and valve plate, particularly the gaskets. Replace any damaged gaskets. If you consider that the compressor is slow to charge the air system then there may be carbon blocking the cylinder head and/or delivery pipe (see point 6). If this is the case remove the cylinder head and valve plate and check for the presence of carbon. If there is significant carbon present then the compressor should be replaced as it is difficult to effectively remove these carbon deposits. It is important that the condition of the delivery pipe is checked (see point 6).



Carbon build up on valve plate

6. Condition of the compressor delivery pipe and beyond

Blockage of the compressor delivery pipe can lead to slow charging of the air systems, high compressor duty cycle and overheating of the air compressor leading to more carbon being generated. Blockages in the pipe will be worse at bends and so may be difficult to see. Blowing shop air down a delivery pipe is not an effective way of determining if the pipe is blocked. If in doubt, and particularly if carbon has been found in the cylinder head, replace the delivery pipe as chemical cleaning of the pipe is rarely satisfactory. If the delivery pipe is found to be blocked then there is a chance that there are carbon deposits in the air dryer – strip down and check.



Carbon build up in an air dryer

7. Condition of the engine oil and coolant

Ensure that the engine oil has been changed in accordance with the engine/vehicle manufacturer's recommendations. The use of contaminated oil (e.g. oil used beyond its recommended life) or oil of the wrong grade can lead to premature wear in the engine and air compressor. Check also that the engine's crankcase breather is not blocked as this will build up pressure in the compressor crankcase increasing oil carry over. Check that the concentration of anti-freeze in the engine coolant is in line with the engine/vehicle manufacturer's recommendations. If the concentration is low then the boiling point of the coolant is lowered which can lead to localised boiling within the compressor cylinder head. If this happens then the coolant flow will be reduced or stopped leading to a worsening of the situation. Overheating of the cylinder head can lead to rapid carbon formation (see points 5 and 6).

8. Attachment of the compressor drive gear

If the pump up time for the air system is excessive check that the compressor drive gear is correctly attached to the compressor crankshaft and does not slip (modern compressors rely on the fit between the crankshaft and the gear and do not have a drive key). Check that the nut or bolt connecting the gear to the shaft is tightened to the correct torque and, if a bolt, check that the bolt does not bottom in the hole in the crankshaft. If the gear has been found to slip and the compressor crankshaft is damaged then, when fitting the new compressor, check the fit of the gear in case it is worn (use of engineer's blue is advisable).



Unworn gear



Worn gear

For more information about oil carry over testing see Knorr-Bremse document Y037387-EN-000.

Remember to use only genuine Knorr-Bremse spares when servicing your Knorr-Bremse compressors

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