ASTEROIDS

Organic materials with controlled particle size used for cleaning blades of gas side of exhaust gas turbochargers in modern diesel engines.

FEATURES & BENEFITS

- **Specially formulated organic particle remover that is easy to use**
- **100% fully environmental product**
- **With asteroids it is not necessary to reduce the speed of the engine**
- **There is no risk of corrosion due to acid formation**
- **Cost-effective, increasing the time between maintenance**
- **Decreases downtime and increases the longevity of the equipment**
- **Gives trouble free operation and improves efficiency**

PRODUCT DESCRIPTION

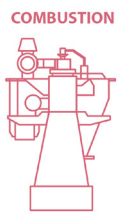
ASTEROIDS are organic materials with controlled particle size used for cleaning blades of gas side of exhaust gas turbochargers in modern diesel engines. The specific structure of ASTEROIDS is such that when injected by means of compressed air upstream in the gas side of the turbine they cause a slight abrasive action, which always keeps the turbine clean.

Once injected into the turbine, the ASTEROIDS burn and disappear into the atmosphere, through the stack without causing any detrimental chemical reaction. The cleaning procedure recommended by most manufacturers until now is cleaning with water. Although that method is efficient, it presents a number of drawbacks, such as reduction of the rpm of the engine during the entire cleaning process, which causes a loss of speed. Furthermore there is always the risk of forming corrosive acids in presence of sulphurous residuals in the discharge duct.

When used regularly, ASTEROIDS increase significantly the time between maintenance services. Obviously, maintaining the turbine in a perfectly clean condition gives trouble free operation and improves its efficiency.

DRY CLEANING SYSTEM OF TURBOCHARGERS WITH ASTEROIDS

Instead of water, dry solid bodies in the form of granules, like ASTEROIDS, are used for cleaning. A certain quantity of them, depending on the turbocharger size, is blown by compressed air into the exhaust gas lines before the gas inlet casing. On account of their hardness and composition (natural solid granules, size 1.3 - 1.7 mm) ASTEROIDS have an excellent mechanical cleaning effect (soft blast). As a rule, a turbine should be cleaned every 24 to 48 hours of operation.



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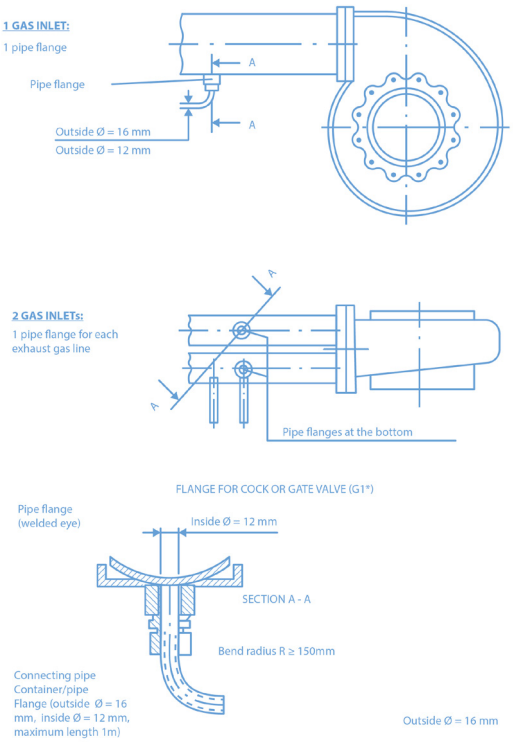
PRINCIPLE

ASTEROIDS are blown by compressed air into the exhaust pipes before the turbocharger. This method of cleaning should be employed every 24 - 48 hours of full load operation. The interval between cleaning operations depends on the degree of contamination and on the increase in exhaust gas temperature after the turbine. Cleaning must be repeated if the gas temperature after the turbine on full load rises to 20°C above the main temperature. For a turbocharger with several gas inlets, the inlets should be cleaned one after the other.

On engines with several turbochargers, these should be cleaned one after the other. The gas inlet temperature before the turbine must not exceed 580°C - 590°C in order to prevent severe burning of the ASTEROIDS before the turbine. Since it is not possible to remove thick coatings with relatively small quantities of ASTEROIDS, this method must be used more frequently. Injection of the ASTEROIDS into the turbine is best performed at high turbocharger speed, to ensure efficient mechanical cleaning.



Suggested cleaning system with ASTEROIDS

INSTALLATION OF ASTEROIDS CLEANING SYSTEM

- Before each gas inlet, an adequately dimensioned pipe flange has to be selected and installed in the exhaust gas line (welded or cast eye).
- Manufacture of containers (same number as gas inlets) as shown in the following drawing (welded assemblies).
- Mount the fittings such as valves and the likes.
- The container has to be mounted with the strap provided for this purpose at an easily accessible location, the cock or gate valve being at least 300 mm above the corresponding pipe flange in the exhaust gas line.
- Maximum distance between cock or gate valve and pipe flange / exhaust gas line: 1 meter.
- Arrange the compressed-air pipe to the container. Mount a connecting pipe (outside diameter: 16 mm, inside diameter: 12 mm, maximum length: 1 meter), preferably of stainless steel and possibly with a bend radius R of at least 150 mm.

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CLEANING PROCEDURES

For engines with several turbochargers, clean one after the other as follows:

1. Close the safety valve, tighten the valve cap. Open the cock / gate valve.
2. Open the compressed-air stop valve. Possible deposits and/or condensate in the connecting pipe are now blown out. Close the compressed-air stop valve after about 3 minutes.
3. Close the cock / gate valve.
4. Open the safety valve. The exhaust gas pressure in the container is thus relieved. Close the safety valve.
5. Remove the valve cap. Fill the container with the quantity of ASTEROIDS product specified in the table on the next page.
6. Check on whether the safety valve is closed. If at all required, reduce the engine output, so the gas temperature before the turbine is <590°C.
7. Open the cock / gate valve.
8. Open the compressed-air stop valve. The previously filled-in asteroids are now blown in. Close the compressed-air stop valve after 1 to 1.5 minutes.
9. Close the cock / gate valve.
10. Open the safety valve. The exhaust gas pressure in the container is thus relieved. Close the safety valve.
11. This procedure (steps 1 to 10) has to be repeated for any further turbocharger.
12. Cleaning should then be repeated at periodical intervals of every 24 to 48 hours of operation.

Attention: It may occur that, during dry cleaning of the turbine, a small part of blown-in ASTEROIDS escapes through the chimney in singed condition.

SUGGESTED QUANTITY OF ASTEROIDS

in kg per turbocharger or per gas inlet and the number and size of containers required in each case

Container		Diameter	Height
Size	Volume		
I	1 kg	100 mm	130 mm
II	3 kg	150 mm	170 mm
III	5 kg	180 mm	200 mm

* For these types of turbochargers not all the gas inlets specified in this table are available.

NOTE: If the solid bodies are blown in before the protection grid, the quantity of solids can be increased by 10 to 20%.

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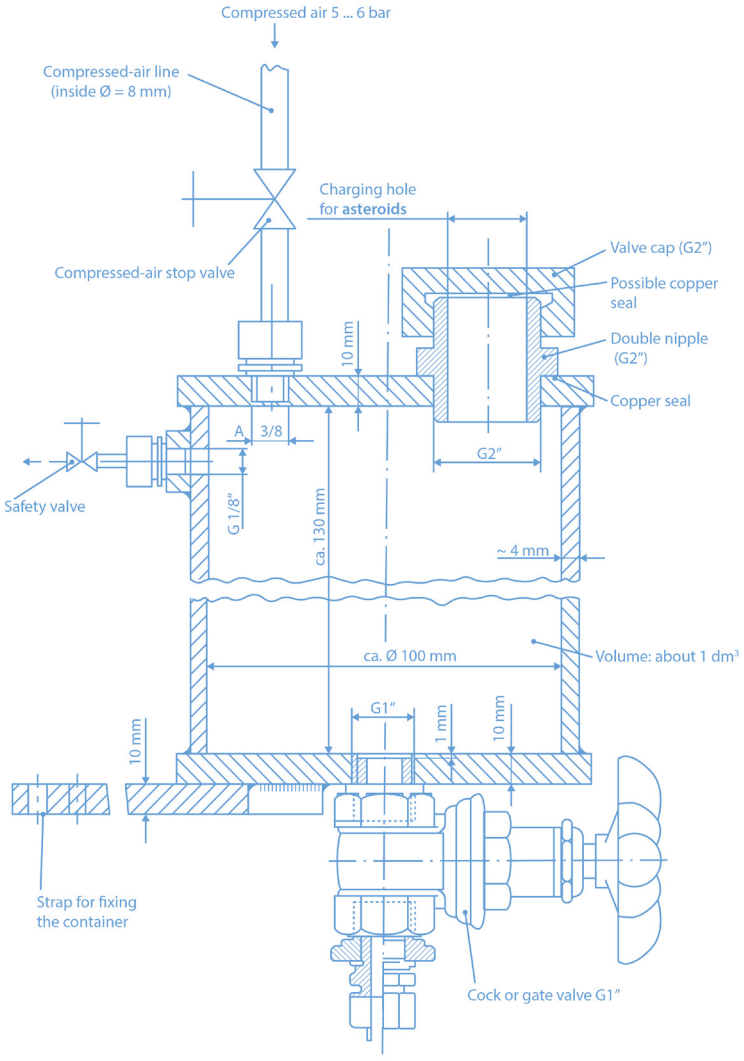
GENERAL REGULATION

- The gas inlet temperature before the turbine must not exceed 580°C - 590°C
- The boost pressure should be over 0.5 bar
- The drain openings in the gas outlet casing must remain closed during dry cleaning
- The main particle size of the cleaning granulate must be between 1.3 and 1.7 mm

ASTEROIDS are produced from hard shells of fruit stones that have been stabilised by drying and degreasing. Ligneous residues and foreign matter such as mineral or metallic particles are eliminated.

ASTEROIDS are the result of many years of practical experience in blending the raw material to achieve a highly homogeneous and efficient product. No chemicals are used in our production process. The raw materials are only treated mechanically. Hence the use of ASTEROIDS is perfectly safe and harmless.

ASTEROIDS is now produced with improved particle size tolerance of 1.3 to 1.7 mm diameter.



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SUGGESTED CLEANING SYSTEM WITH ASTEROIDS

VIR - VIC	Quantity of solids in kg per turbo-charge and cleaning	1 Gas inlet			2 Gas inlet			3 Gas inlet			4 Gas inlet		
		Container		Solid in	Container		Solid in	Container		Solid in	Container		Solid in
		Size	No.	kg	Size	No.	kg	Size	No.	kg	Size	No.	kg
160/161 - 184"	0.1 ... 0.2	I	1	1 X 0.5	I	2	each 0.15	I	3	each 0.1	I	4	each 0.1
200/201 - 214"	0.2 ... 0.4	I	1	1 X 0.4	I	2	each 0.2	I	3	each 0.15	I	4	each 0.15
250/251 - 254"	0.4 ... 0.6	I	1	1 X 0.6	I	2	each 0.3	I	3	each 0.2	I	4	each 0.2
320/321 - 304"	0.6 ... 1.0	II	1	1 X 1.0	I	2	each 0.5	I	3	each 0.35	I	4	each 0.35
400/401 - 354"	1.0 ... 1.6	II	1	1 X 1.6	II	2	each 0.8	I	3	each 0.55	I	4	each 0.55
500/501 - 454"	1.6 ... 2.0	II	1	1 X 2.0	II	2	each 1.0	I	3	each 0.7	I	4	each 0.7
630/631 - 564"	2.0 ... 2.4	II	1	1 X 2.4	II	2	each 1.2	II	3	each 0.8	I	4	each 0.8
714" 750/751 900"	2.4 ... 2.8	III	1	1 X 2.8	II	2	each 1.4	II	3	each 0.9	I	4	each 0.9

STANDARD PACKING

ASTEROIDS are usually available in bags of 25 kg.

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