

# ASTEROIDS

Dry Cleaning System of Turbochargers

## Technical Information

### Physical Data

Appearance:	Brown color, solid natural granules
Size:	1.3 – 1.7 mm (new tolerance)
Corrosive action:	None
Packaging:	Bags of 25 kg
Special risks and safety advice:	None

### Applications

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. Due to 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.

### Principles

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 (293 K) above the mean temperature.

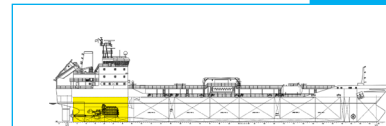
For a turbocharger with several gas inlets, the inlets should be cleaned one after the other. On engines with several turbochargers, these should be cleaned one after the other. The gas inlet temperature before the turbine must not exceed 580–590°C (853–863 K) to prevent severe burning of the ASTEROIDS 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.

### Installations of Asteroids Cleaning System

1. Before each gas inlet, an adequately dimensioned pipe flange must be selected and installed in the exhaust gas line (welded or cast eye).
2. Manufacture containers (the same number as gas inlets) as shown in the following drawing (welded assemblies).
3. Mount the fittings, such as valves and the like.
4. The container must be mounted with the strap provided for this purpose at an easily accessible location, with the cock or gate valve positioned at least 300 mm above the corresponding pipe flange in the exhaust gas line. The maximum distance between the cock or gate valve and the pipe flange/exhaust gas line should be 1 meter.
5. Arrange the compressed-air pipe to the container.

#### USAGE AREAS



Fire Side Treatment

#### PACKAGING



#### APPROVALS



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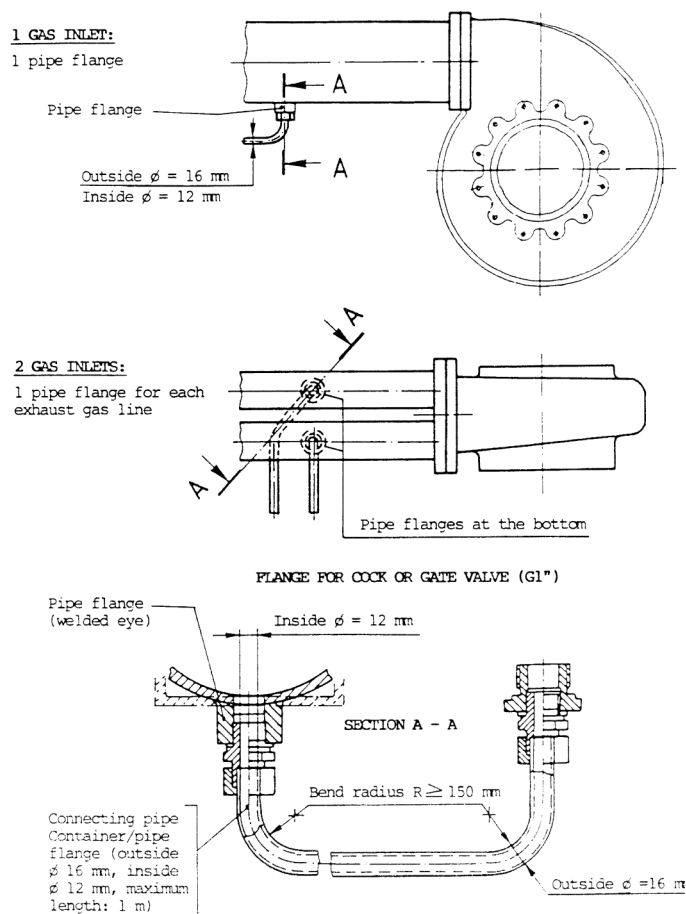
## Suggested Cleaning System with Uniservice Asteroids

### Cleaning Procedures

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

1. Close the safety valve and tighten the valve cap.
2. Open the cock/gate valve.
3. Open the compressed-air stop valve to blow out any possible deposits and/or condensate in the connecting pipe. Close the compressed-air stop valve after about 3 minutes.
4. Close the cock/gate valve.
5. Open the safety valve to relieve the exhaust gas pressure in the container, then close the safety valve.
6. Remove the valve cap and fill the container with the quantity of ASTEROIDS product specified in the table on the next page.
7. Check if the safety valve is closed. If necessary, reduce the engine output so that the gas temperature before the turbine is  $< 590^{\circ}\text{C}$  (863 K).
8. Open the cock/gate valve.
9. Open the compressed-air stop valve to blow in the previously filled-in ASTEROIDS. Close the compressed-air stop valve after 1 to 1.5 minutes.
10. Close the cock/gate valve.
11. Open the safety valve to relieve the exhaust gas pressure in the container, then close the safety valve.

This procedure (items 1 to 11) must be repeated for any further turbocharger. Cleaning should then be repeated at periodic intervals of every 24 to 50 hours of operation.



### Warning

During the dry cleaning of the turbine, it is possible that a small portion of blown-in ASTEROIDS may escape through the chimney in a singed condition.

### General Regulation

- ▶ The gas inlet temperature before the turbine must not exceed  $580\text{--}590^{\circ}\text{C}$  (853–863 K).
- ▶ The boost pressure should be over 0.5 bar.
- ▶ The drain openings in the gas outlet casing must remain closed during dry cleaning.
- ▶ The mean 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 stabilized 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 treated mechanically only. Hence, the use of ASTEROIDS is perfectly safe and harmless. ASTEROIDS are now produced with an improved particle size tolerance of  $\varnothing 1.3$  to  $\varnothing 1.7$  mm.

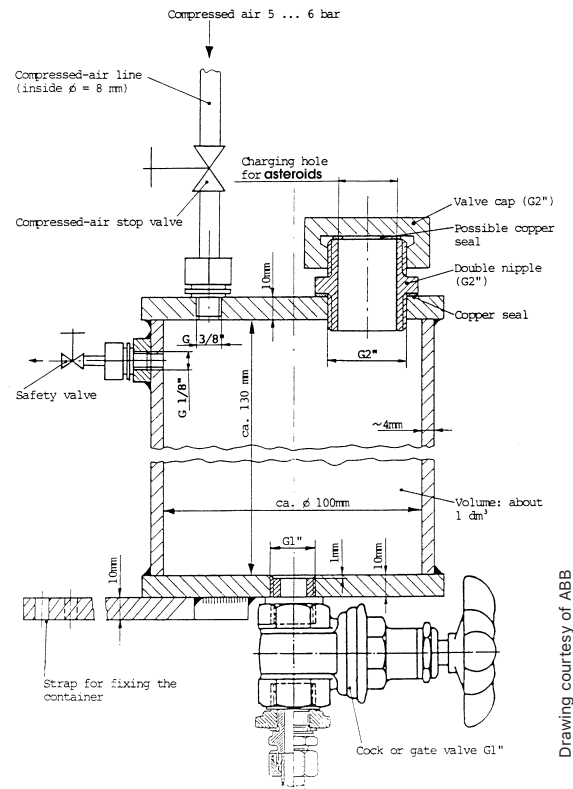
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## Uniservice Asteroids Dosing Equipment



Container		Diameter mm	Height mm
Size	Volume dm <sup>3</sup>		
I	~ 1	~ 100	~ 130
II	~ 3	~ 150	~ 170
III	~ 5	~ 180	~ 200



Drawing courtesy of ABB

Suggested quantity of asteroids (in dm<sup>3</sup>) per turbocharger or per gas inlet and the number and size of containers required in each case

VIR VIC	QUANTITY OF SOLIDS IN dm <sup>3</sup> PER TURBOCHARG AND CLEANING	1 GAS INLET			2 GAS INLET			3 GAS INLET			4 GAS INLET		
		CONTAINER		SOLID dm <sup>3</sup>	CONTAINER		SOLID dm <sup>3</sup>	CONTAINER		SOLID dm <sup>3</sup>	CONTAINER		SOLID dm <sup>3</sup>
		SIZE	NUMBER		SIZE	NUMBER		SIZE	NUMBER		SIZE	NUMBER	
160/161 184"	0,2...0,1	I	1	1x0,5	I	2	each 0,15	I	3	each 0,1	I	4	each 0,1
200/201 214"	0,3...0,4	I	1	1x0,4	I	2	each 0,2	I	3	each 0,15	I	4	each 0,1
250/251 254"	0,4...0,6	I	1	1x0,6	I	2	each 0,3	I	3	each 0,2	I	4	each 0,15
320/321 304"	0,6...1,0	II	1	1x1,0	I	2	each 0,5	I	3	each 0,35	I	4	each 0,25
400/401 354"	1,0...1,6	II	1	1x1,6	II	2	each 0,8	I	3	each 0,55	I	4	each 0,4
500/501 454"	1,6...2,0	II	1	1x2,0	II	2	each 1,0	I	3	each 0,7	I	4	each 0,5
630/631 564"	2,0...2,4	II	1	1x2,4	II	2	each 1,2	II	3	each 0,8	I	4	each 0,6
714" 750/751 900"	2,4...2,8	III	1	1x2,8	II	2	each 1,4	II	3	each 0,9	I	4	each 0,7

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

REMARK: 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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## Health Safety and Environment (HSE)

Uniservice Unisafe Srl have carefully developed their products to minimize the safety risks and environmental impact of using their products. However, Uniservice advises that, prior to using its products, users should read in detail the accompanying Safety Data Sheet and ensure that its products are applied within the required HSE regulations of the country in which the user operates. Best practice and safety requirements should be followed which will likely include method statements and risk assessments, together with any specific requirements of the user's own company HSE requirements.

## Important Notice


While the descriptions, designs, data and information contained herein are presented in good faith and believed to be accurate, this information is provided for your guidance only. Because many factors may affect processing or application/use, we recommend that you do a test to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including warranties of merchantability or fitness for a particular purpose, are made regarding products described or designs, data or information set forth, or that the products, designs, data or information may be used without infringing the intellectual property rights of others. In no case shall the descriptions, information, data or designs provided be considered a part of our terms and conditions of sale. Further, you expressly understand and agree that the descriptions, designs, data and information furnished by Uniservice Unisafe Srl hereunder are given gratis, and Uniservice Unisafe Srl assumes no obligation or liability for the description, designs, data and information given or results obtained, all such being given and accepted at your risk. Product images are for reference purposes only.

## Contact


For further information, please contact your local Uniservice Unisafe sales representative or get in touch with us:

**Uniservice Unisafe** SRL

Marine Chemicals Division

 Via al S.N.S. della Guardia 58a

Genoa 16162 Italy

 (+39) 010 711 395

 (+39) 010 713 120

 [www.uniservicemarine.com](http://www.uniservicemarine.com)