

## MAN B&W Diesel

MAN B&W Diesel A/S • Denmark

**Biofriendly Corporation** 622 Terrado Drive Monrovia, CA 91016 USA

Att: Mr Michael Carroll

2100/CXR/BDN/37831-2005

14 November 2005

#### Letter of No Objection for fuel additive **Green Plus Combustion Catalyst**

Dear Mr Carroll

Based on 4000 hours of testing of Green Plus Combustion Catalyst with supervision of MAN B&W and inspection of engine condition at the start and end of tests, MAN B&W Diesel A/S has no objection to use the Green Plus Combustion Catalyst on a two-stroke engine.

The Green Plus Combustion Catalyst has been used on the "Maersk Arun" equipped with a 7S50MC for more than 4000 hours of operation. Through the inspection by MAN B&W, it was concluded that the product does not have any harmful effect on engine components or the performance of the engine.

As fuel additives are neither produced nor sold by MAN B&W, MAN B&W cannot be kept responsible for any damage to engines or engine components that may be caused by the use of a fuel additive.

> Best regards, MAN B&W Diesel A/S

Charlotte Regard

HEAD OFFICE (& postal address) MAN B&W Diesel A/S Teglholmsgade 41 2450 Copenhagen SV Denmark Phone: +45 33 85 11 00 Fax: +45 33 85 10 30 manbw@dk.manbw.com www.manbw.com

DIESEL SERVICE Teglholmsgade 41 2450 Copenhagen SV Denmark Phone: +45 33 85 11 00 Fax: +45 33 85 10 49 diesel-service@dk.manbw.com

PRODUCTION Teglholmsgade 35 2450 Copenhagen SV Denmark Phone: +45 33 85 11 00 Fax: +45 33 85 10 17 manufacturing/cph@dk.manbw.com

FORWARDING & RECEIVING MAN B&W Diesel A/S Teglholmsgade 35 2450 Copenhagen SV Denmark Phone: +45 33 85 11 00 Fax: +45 33 85 10 16

Denmark Reg. No.: 39661314

MAN B&W Diesel - a member of the MAN Group



| REPORT          |                                 |                       |            |  |  |  |  |  |
|-----------------|---------------------------------|-----------------------|------------|--|--|--|--|--|
| Name of Vessel: | MAERSK ARUN                     | IMO No:               | 9175779    |  |  |  |  |  |
| Name of Yard:   | China Shipbuilding Corp.        | Hull No:              | 678        |  |  |  |  |  |
| Engine Type:    | 7S50MC                          | Sea Trial:            | 199 03 01  |  |  |  |  |  |
| Visit by:       | GSM 2300                        | Service Center:       | Copenhagen |  |  |  |  |  |
| Engine Builder: | НІТАСНІ                         | Engine No:            | 3776       |  |  |  |  |  |
| Order No:       | 40 003 320                      | Run. hours:           | 32906      |  |  |  |  |  |
| Place:          | Varna, Bulgarian                |                       |            |  |  |  |  |  |
| Period:         | 2005 09 17                      |                       |            |  |  |  |  |  |
| Owner:          | The Maersk Company Co Ltd       |                       |            |  |  |  |  |  |
| Requested by:   | Biofriendly Corp.               |                       |            |  |  |  |  |  |
| Reason:         | Inspection after running with 0 | Green Plus fuel Addit | ive        |  |  |  |  |  |
| Keywords:       |                                 |                       |            |  |  |  |  |  |

## Summary and conclusion:

As requested our Superintendent Engineer Mr. Georg Magnussen and Mr. Charles Hansard from Green Plus attended the above vessel in Varna, Bulgaria. The reason for the attendance was inspection after running with Green Plus fuel Additive.

The engine is with low piston top land, oblique cut low piston rings, without Alu-coating and without bronze band in the piston skirt. The normal running between piston overhaul is 16000 hours.

The test with green plus have been running for 4778 hours The green plus additive have been added to the fuel at one of transfer pipe in dosages of 50 ppm.

The piston No. 5 was overhauled in connection with end of test with the fuel additive Green Plus from the company Biofrendly. This piston was also overhauled at the start of the test and at that time as now the condition was good with low wear rates for all parts, see details next page and in cylinder condition report.. The scavenge port inspection shows good condition for all units.

2300/GSM/AXN/34856 2005-10-21

M/V MAERSK ARUN 7S50MC IMO 9175779 Varna, Bulgarien 2005 09 17

The cylinder oil is from the company Selenia with the name MECO 5070. At present this oil is not on our list, but confirmation test is running on other engines and the present cylinder condition indicates that the this cylinder oil is performing well. The cylinder oil consumption is the same as before start of test around 0.9 Based on the good cylinder condition and the oily pistons, the cylinder oil feed rate could be reduced.

Comparing with previous piston overhaul at start of the test, the wear rates for all parts are about the same level, and the carbon build-up is less than before, but there is also shorter time between the overhaul, but after running with Green plus for 4778 hours, the conclusion is that Green Plus fuel additive do not harm the engine.

#### Unit No. 5

Running hours since last piston overhaul: 4778.

Liner hours: 32.906.

Cylinder condition report, page 3.

The piston was in good condition with medium carbon on topland and light carbon on ringland 1. There was a yellow layer of deposit on top of the piston top, but less than at last inspection. All piston rings were in good condition with only small reduction in the tension. The max. piston ring wear was for ring No. 1 and was 1 mm, i. e. 0.2 mm/1000h. There was only small amount of deposit at the back of the rings and a thin layer at the bottom of the ring, grooves No. 1 and 2. There is only little wear for the ring grooves and no burning of piston. Piston skirt without bronze band in good condition. Spare piston was fitted with Daros RM5 Alu-coated top ring the other Riken 47

The liner was in good condition with no machining marks visible. The max. wear was found at top of liner in ring 2, top dead centre and was 0.22 mm, i. e. 0.007 mm/1000h from new and the same as since last overhaul, as seen below.. Wear edge at ring 1 in TDC was ground away.

The Exhaust valve and Cylinder cover were in good condition.

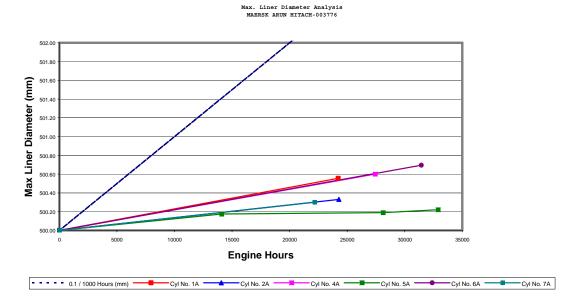
#### Scavenge port inspection.

The inspection from exhaust side shows good condition for all units as seen on the picture, all are more or less alike, but with different running hours as seen on page 4. All piston rings were in good condition and with shape as seen on page 4. All liners were with machining marks slightly visible in the inspected area, at manoeuvring side and the max. wear for all liners as seen below.

3/6



M/V MAERSK ARUN 7S50MC IMO 9175779 Varna, Bulgarien 2005 09 17



2300/GSM/AXN/34856 2005-10-20

Georg Magnussen

#### M/V MAERSK ARUN 7S50MC IMO 9175779 Varna, Bulgarien 2005 09 17

|  |   |   |  | C  |  | Co  |  | D  |  |   |  |                                   |   |                  |
|--|---|---|--|--|--|---|--|--|--|---|--|-----------------------------------|---|------------------|
|  |   |   |  | -  |  | er Coi  |  |  |  |   |  |                                   | [m]   |                  |
|  | Maersk A  |   |  |  | 1  | Eng. bu   |  |  | Eng. no.   |   | 1  | Checked                           |   | SM230            |
| No. of cyl.:   | 7   | Eng. ty   | уре  | S50MC  | Eng. hrs   | 8.1   | 32906  | Date (yy                                   | /mmdd):  | 050918  | Inspect  | ted unit                          | no.:  | 5a               |
| Voyage info  |   |   |  |  |  |   |  | Lat. a.                                    |  |   |  | 1                                 |   |                  |
| Weeks pr. port   |   | 1   |  |  |  | f MCR):   |  |  | rt load co   |   | RPM  | Lub. typ                          | e Hai   | ns Jense         |
| Cyl. oil consun  | · · ·   | 24 hrs):  | 3(   | 00   | at load  | %0:   | 85   | Cyl. oi                                    | il type  | Selenia   | Meco507  | 70                                |   |                  |
| Cylinder liner   |   |   |  |  |  |   |  |  |  |   |  |                                   |   |                  |
| Liner hours:   | 32906   | Insulatio   | on pipe (Y   |  | N  | PC ring   |  | N  |  | naterial  |  | LLOY-C                            | 2   |                  |
| Drawing no.:   |   |   |  |  | e type   | Semi Co   | oled   |  | Liner co   |   | Slim M   |                                   |   |                  |
| Producer/Mark  | <u> </u>  |   |  |  | r type   | Normal  |  |  |  | ned (Y/I  | Ľ  | N                                 |   |                  |
| Cyl. cover tight   | tened (Y/   | N):   | N  | Temp. b  | etween l   | iner and i  | measuring  | g tool (°(                                 | <u>_):</u>   |   | Shims (1   | nm):                              | 1   | 15               |
| Measuring<br>point   | 0   | 1   | 2  | 3  | 4  | 5   | 6  | 7  | 8  | 9   | 10   | 11                                | A1<br>(Additional)  | A2<br>(Additions |
| Depth (mm)   | 5   | 15  | 43   | 69   | 91   | 315   | 555  | 790  | 1030   | 1275  | 1515   | 2200                              |   |                  |
| Diameter F-A   | 500.00  | 500.16  |  | 500.20   | 100.0  |   |  | 500.07                                     | 500.09   | 500.08  | 500.08   |                                   |   |                  |
| (mm) E-M   | 500.00  | 500.18  | 500.22   | 500.20   |  |   |  | 500.10                                     |  | 500.12  | 500.13   |                                   |   |                  |
|  |   |   |  |  |  |   |  |  |  |   |  |                                   |   |                  |
| E  | E   |   | 7///   | 777  |  | 1111  | $\overline{\lambda}$   |  |  |   | <del>,,,,,,</del> ,  | ~                                 |   |                  |
|  |   |   | Kill   |  | /////  |   |  |  | /////  |   |  | //                                | VIII  | 1110             |
| F  | A   |   | 024  | 5  |  | 6   | 7  | 8  |  | 9   | 10   | )                                 | 11  | 1                |
|  |   |   | 1 3  | All m<br>Pos.  |  | oints are define middle of  |  |  |  |   |  | inder cover                       | ÷   |                  |
| A: Aft<br>Liner<br>remarks   | F: Fore<br>Measuri  | 1   | calibrate  | Pos.<br>Pos.<br>d by set i   |  | e middle of<br>g point 0  |  | úr ports.<br>ding part be                  | elow the bot   | tom piston :  | ring at BDC  |                                   |   |                  |
| Liner<br>remarks   | Measuri   | bng tool  |  | Pos.<br>d by set i   | measurin   | g point 0   | to 0   | ding part be                               |  |   |  |                                   | Bro   | skon             |
| Liner<br>remarks<br><b>Piston rings</b>  | Measuri<br>Base n   | bng tool  | Соа  | Pos.   | measurin<br>Pro  | g point 0<br>ofile  | to 0<br>Manufa   |  | Lock   | type  | CL gr  | ooves                             | 10000   | oken             |
| Liner<br>remarks<br><b>Piston rings</b><br>Ring 1  | Measuri<br>Base n<br>RIK47  | bng tool  | Coa<br>No  | Pos.<br>d by set i   | measurin<br>Pro<br>Straight  | g point 0<br>ofile  | to 0<br>Manuf<br>Riken   | ding part be                               | Lock<br>Oblique  | type<br>R   | CL gr<br>No  |                                   | No  | oken             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2   | Measuril<br>Base n<br>RIK47<br>RIK47  | bng tool  | Coa<br>No<br>No  | Pos.<br>d by set i   | measurin<br>Pro<br>Straight<br>Straight  | g point 0<br>ofile  | to 0<br>Manuf<br>Riken<br>Riken  | ding part be                               | Lock<br>Oblique<br>Oblique   | type<br>R<br>L  | CL gr<br>No<br>No  |                                   | No<br>No  | ken              |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3   | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47   | bng tool  | Coa<br>No<br>No<br>No  | Pos.<br>d by set i   | Pro<br>Straight<br>Straight<br>Straight  | g point 0<br>ofile  | to 0<br>Manufa<br>Riken<br>Riken<br>Riken  | ding part be                               | Lock<br>Oblique<br>Oblique<br>Oblique  | type<br>R<br>L<br>R   | CL gr<br>No<br>No<br>No  |                                   | No<br>No<br>No  | oken             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4   | Measuril<br>Base n<br>RIK47<br>RIK47  | bng tool  | Coa<br>No<br>No  | Pos.<br>d by set i   | measurin<br>Pro<br>Straight<br>Straight  | g point 0<br>ofile  | to 0<br>Manuf<br>Riken<br>Riken  | ding part be                               | Lock<br>Oblique<br>Oblique   | type<br>R<br>L<br>R   | CL gr<br>No<br>No  |                                   | No<br>No  | ken              |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3   | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47   | bng tool  | No<br>No<br>No<br>No   | Pos.<br>d by set r   | Pro<br>Straight<br>Straight<br>Straight  | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>Riken   | acturer                                    | Lock<br>Oblique<br>Oblique<br>Oblique  | type<br>R<br>L<br>R<br>L  | CL gr<br>No<br>No<br>No  |                                   | No<br>No<br>No  | oken             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4   | Measuri<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47   | bng tool<br>naterial<br>Widt  | Coa<br>No<br>No<br>No<br>h of ring   | Pos.<br>d by set r<br>sting  | Pre<br>Straight<br>Straight<br>Straight  | g point 0<br>ofile  | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>Riken   | ding part be                               | Lock<br>Oblique<br>Oblique<br>Oblique  | type<br>R<br>L<br>R<br>L<br>L   | CL gr<br>No<br>No<br>No  |                                   | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4   | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47   | bng tool  | Coa<br>No<br>No<br>No<br>h of ring<br>C  | Pos.<br>d by set i<br>tting<br>(mm)<br>D   | Pro<br>Straight<br>Straight<br>Straight  | g point 0<br>ofile  | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>Riken   | acturer                                    | Lock<br>Oblique<br>Oblique<br>Oblique  | type<br>R<br>L<br>R<br>L<br>L   | CL gr<br>No<br>No<br>No  |                                   | No<br>No<br>No  | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees  | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10   | Widt<br>B<br>90   | Coa<br>No<br>No<br>No<br>h of ring<br>C<br>180   | (mm)<br>D<br>270   | Pra<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359  | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)                            | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>Riken   | acturer                                    | Lock<br>Oblique<br>Oblique<br>Oblique<br>Ring gr<br>F  | type<br>R<br>L<br>R<br>L<br>L<br>Height,  | CL gr<br>No<br>No<br>No<br>H (mm)  | ooves                             | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1  | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A   | Widt<br>B<br>90<br>15.99  | Coa<br>No<br>No<br>No<br>h of ring<br>C  | (mm)<br>D<br>270   | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98   | g point 0<br>ofile<br>Free ring<br>gap "F"                                    | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>Riken   | acturer                                    | Lock<br>Oblique<br>Oblique<br>Oblique<br>Ring gr   | type<br>R<br>L<br>R<br>L<br>L<br>Height,<br>E   | CL gr<br>No<br>No<br>No<br>H (nnm)<br>A  | ooves                             | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees  | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08  | Widt<br>B<br>90   | Coa<br>No<br>No<br>No<br>h of ring<br>C<br>180<br>15.98  | (mm)<br>D<br>270<br>16.01  | Pra<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359  | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00<br>45.00          | to 0<br>Manufa<br>Riken<br>Riken<br>Riken  | acturer                                    | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>F<br>9.80   | type<br>R<br>L<br>R<br>L<br>L<br><b>ooves</b><br>Height,<br>E<br>9.77   | CL gr<br>No<br>No<br>No<br>H (num)<br>A<br>9.79  | M<br>9.80                         | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2  | Measuri<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80  | Widt<br>B<br>90<br>15.99<br>16.50   | Coa<br>No<br>No<br>No<br>h of ring<br>C<br>180<br>15.98<br>16.51   | (mm)<br>D<br>270<br>16.01<br>16.53   | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>16.98<br>16.63                            | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00                   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>E<br>U<br>U<br>TF" to be  | F<br>B<br>measured                         | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br><b>Ring gr</b><br>F<br>9.80<br>9.77  | type<br>R<br>L<br>R<br>L<br>L<br><b>'ooves</b><br>Height,<br>E<br>9.77<br>9.78  | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75   | 000000<br>M<br>9.80<br>9.76       | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 2<br>Ring 3  | Measuril<br>Base n<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71   | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71  | Coa<br>No<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70   | (mm)<br>D<br>270<br>16.01<br>16.69   | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77                               | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00<br>45.00<br>52.00 | to 0<br>Manufa<br>Riken<br>Riken<br>Riken  | F<br>B<br>measured                         | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79  | type<br>R<br>L<br>R<br>L<br>L<br><b>:</b><br><i>cooves</i><br>Height,<br>E<br>9.77<br>9.78<br>9.74  | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73   | M<br>9.80<br>9.76<br>9.75         | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 2<br>Ring 3<br>Ring 4  | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70  | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55   | Coa<br>No<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70   | (mm)<br>D<br>270<br>16.01<br>16.47   | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77                               | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00<br>45.00<br>52.00 | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>E<br>U<br>U<br>TF" to be  | F<br>B<br>measured                         | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79  | type<br>R<br>L<br>R<br>L<br>L<br><b>:</b><br><i>:ooves</i><br>Height,<br>E<br>9.77<br>9.78<br>9.74  | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73   | M<br>9.80<br>9.76<br>9.75         | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la  | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70  | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55   | Coa<br>No<br>No<br>No<br>h of ring<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54                               | (mm)<br>D<br>270<br>16.01<br>16.47   | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77                               | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00<br>45.00<br>52.00 | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>E<br>D<br>C<br>TF" to be<br>before dir                                      | F<br>B<br>measured<br>smantling            | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79  | type<br>R<br>L<br>L<br>Height,<br>E<br>9.77<br>9.78<br>9.74<br>9.82   | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73   | M<br>9.80<br>9.76<br>9.75         | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston  | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70  | Widt<br>B<br>90<br>15.99<br>16.50<br>16.51<br>16.55<br>aul:   | Coa<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778                                    | (mm)<br>D<br>270<br>16.01<br>16.47   | Pro<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77<br>16.61  | g point 0<br>ofile<br>Free ring<br>gap "F"<br>(mm)<br>44.00<br>45.00<br>52.00 | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before dia   | F<br>B<br>measured<br>smantling            | Lock<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>minatio  | type<br>R<br>L<br>L<br>Height,<br>E<br>9.77<br>9.78<br>9.74<br>9.82   | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73   | M<br>9.80<br>9.76<br>9.75         | No<br>No<br>No  |                  |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:  | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70<br>sst overh   | Widt<br>B<br>90<br>15.99<br>16.50<br>16.51<br>16.55<br>aul:   | Coa<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top                        | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69  | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77<br>16.61                                  | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before dia<br>Reason<br>Routine                                | F<br>B<br>measured<br>for exa              | Lock<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>minatio  | type<br>R<br>L<br>L<br>Height,<br>E<br>9.77<br>9.78<br>9.74<br>9.82   | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(If either of t  | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No  | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Y  | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70<br>sst overh   | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:   | Coa<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top                        | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/<br>ton (Y/N                          | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77<br>16.61                                  | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before dia<br>Reason<br>Routine                                | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>minatio  | type<br>R<br>L<br>R<br>L<br>Height,<br>E<br>9.77<br>9.78<br>9.74<br>9.82<br>//  | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test   | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No  | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Y.<br>Max burning 1                                | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.80<br>16.71<br>16.70<br>sst overh<br>309<br>(N):<br>(mm)  | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:<br>N<br>N   | Coa<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top                        | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/<br>ton (Y/N                          | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>E<br>359<br>16.98<br>16.63<br>16.77<br>16.61<br>N):<br>D:                     | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before di<br>Routine<br>Check o                                | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>minatio<br>verhaul<br>ndition  | type<br>R<br>L<br>R<br>L<br>Height,<br>E<br>9.77<br>9.78<br>9.74<br>9.82<br>//  | CL gr<br>No<br>No<br>No<br>H (mm)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(ff either of t<br>must be kep   | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No<br>H   | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Y.<br>Max burning 1                                | Measuri<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.08<br>16.08<br>16.71<br>16.70<br>st overh<br>309<br>/N):<br>(mm)<br>(degree)   | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:<br>N<br>N   | Coa<br>No<br>No<br>No<br>of ring<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top<br>Oros pis | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/N<br>E                                | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>I 6.98<br>16.98<br>16.63<br>16.77<br>16.61<br>N):<br>D:<br>(180") | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before di<br>Reason<br>Routine<br>Check o<br>Liner             | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>uninatio<br>verhaul<br>ndition<br>Piston C   | type<br>R<br>L<br>R<br>L<br>Height,<br>B<br>9.77<br>9.78<br>9.74<br>9.82<br>11<br>12<br>12<br>12<br>12<br>12<br>12<br>12<br>12<br>1       | CL gr<br>No<br>No<br>No<br>H (num)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(If either of t<br>must be kep<br>Piston R  | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No<br>H<br>H<br>Piston S  | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Yr<br>Max burning 1<br>Position 1<br>Max burning 2 | Measuri<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.08<br>16.08<br>16.71<br>16.70<br>st overh<br>309<br>/N):<br>(mm)<br>(degree)   | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:<br>D11<br>N<br>0                                    | Coa<br>No<br>No<br>No<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top                        | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/N<br>E                                | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>I 6.98<br>16.98<br>16.63<br>16.77<br>16.61<br>N):<br>D:<br>(180") | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before dia<br>Routine<br>Check o<br>Liner<br>Cracks            | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>9.85<br>9.85<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0.00<br>0 | type<br>R<br>L<br>R<br>L<br>Height,<br>B<br>9.77<br>9.78<br>9.74<br>9.82<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | CL gr<br>No<br>No<br>No<br>No<br>H (num)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(If either of t<br>must be kep<br>Piston R<br>Broken                          | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No<br>No<br>H<br>H<br>Piston S<br>Leaking                         | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Y)<br>Max burning 1<br>Position 1<br>Max burning 2 | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.08<br>16.71<br>16.70<br>16.70<br>16.71<br>16.70<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.7 | Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:<br>DI1<br>N<br>0                                    | Coa<br>No<br>No<br>No<br>of ring<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top<br>Oros pis | (mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/N<br>E                                | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>I 6.98<br>16.98<br>16.63<br>16.77<br>16.61<br>N):<br>D:<br>(180") | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before di<br>Routine<br>Check o<br>Liner<br>Cracks<br>Scuffing | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.8                       | type<br>R<br>L<br>R<br>L<br>Height,<br>B<br>9.77<br>9.78<br>9.74<br>9.82<br>  | CL gr<br>No<br>No<br>No<br>No<br>H (num)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(If either of t<br>must be kep<br>Piston R<br>Broken<br>Collapsed             | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No<br>No<br>H<br>H<br>Piston S<br>Leaking<br>Scuffing             | 2 mm             |
| Liner<br>remarks<br>Piston rings<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Degrees<br>Ring 1<br>Ring 2<br>Ring 3<br>Ring 4<br>Ring 5<br>Hours since la<br>Piston<br>Crown hours:<br>Bronze ring (Y)<br>Max burning 1<br>Position 1<br>Max burning 3                     | Measuril<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>RIK47<br>A<br>10<br>16.08<br>16.08<br>16.71<br>16.70<br>16.70<br>16.71<br>16.70<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.71<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>16.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.70<br>17.7 | bing tool<br>naterial<br>Widt<br>B<br>90<br>15.99<br>16.50<br>16.71<br>16.55<br>aul:<br>211<br>N<br>0<br>0<br>0 | Coa<br>No<br>No<br>No<br>of ring<br>C<br>180<br>15.98<br>16.51<br>16.70<br>16.54<br>4778<br>High top<br>Oros pis | Pos.<br>d by set 1<br>tting<br>(mm)<br>D<br>270<br>16.01<br>16.53<br>16.69<br>16.47<br>bland (Y/N<br>E | Pro<br>Straight<br>Straight<br>Straight<br>Straight<br>Straight<br>I 6.98<br>16.98<br>16.63<br>16.77<br>16.61<br>N):<br>D:<br>(180") | g point 0   | to 0<br>Manufa<br>Riken<br>Riken<br>Riken<br>"F" to be<br>before di<br>Routine<br>Check o<br>Liner<br>Cracks<br>Scuffing | F<br>B<br>measured<br>smantling<br>for exa | Lock<br>Oblique<br>Oblique<br>Oblique<br>Oblique<br>F<br>9.80<br>9.77<br>9.79<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.85<br>9.8                       | type<br>R<br>L<br>R<br>L<br>Height,<br>B<br>9.77<br>9.78<br>9.74<br>9.82<br>  | CL gr<br>No<br>No<br>No<br>No<br>H (num)<br>A<br>9.79<br>9.75<br>9.73<br>9.81<br>Test<br>(If either of t<br>must be kep<br>Piston R<br>Broken<br>Collapsed<br>Scuffing | M<br>9.80<br>9.76<br>9.75<br>9.82 | No<br>No<br>No<br>No<br>H<br>H<br>Piston S<br>Leaking<br>Scuffing<br>Piston F | 2 mm             |



#### M/V MAERSK ARUN 7S50MC IMO 9175779 Varna, Bulgarien 2005 09 17

|   | Inspect  | ion throug  | h S  | cav    | eng   | ge ]  | Por       | ts      |         |                   |       | ſ    |     |     |
|---|--|---|------|--------|-------|-------|-----------|---------|---------|-------------------|-------|------|-----|-----|
| Vessel:                                 | Maers Arun   | IMO no.:  | 9    | 917579 | 9     |       | Build     | er/no.: |         | Hitachi           | 3776  |      |     |     |
| Number o                                | f cylinders 7 Eng. type: S5  | 0MC Eng. hrs.:                                    | 32.  | 906    | Check | ed by | : G       | SM 23   | 00      | Date (y           | ynnin | ld): | 050 | 918 |
| Weeks pr.                               | port calls: Normal s   | ervice load (% of MC                              | CR): | 7      | '5    |       | MEP       | lubrica | ator ty | pe (Y/N           | ):    | 1    | N   |     |
| Cyl. oil co                             | onsump. (1/24 hrs): 250 at load %  | 6 70 Cyl. oil ty                                  | ype: |        |       |       | Position: |         |         | Exhaust Manoeuvre |       |      |     |     |
|   |  |   |      |        |       |       | 1         | der No  |         |                   |       |      |     |     |
|   | Condition and Symbol<br>Intact - *<br>Burning - BU<br>Leaking oil - LO<br>Leaking water - LW | Engine Part<br>Piston crown                       | *    | *      | *     | *     | *         | *       | *       | 8                 | 9     | 10   | 11  | 12  |
|   | No deposit - *   | Topland   | MC   | MC     | MC    | MC    | MC        | MC      | MC      |                   |       |      |     |     |
| sits                                    | Light deposit - LC   | Ringland 1  | MC   | MC     | MC    | LC    | MC        | LC      | LC      |                   |       |      |     |     |
| Deposits                                | Medium deposit - MC<br>Excessive deposit - EC<br>Polished deposit - PC                       | Ringland 2  | LC   | LC     | 4:    | *     | *         | *       | 11      |                   |       |      |     |     |
|   |  | Ringland 3  | s)e  | *      | *     | *     | *         | ale.    | *       |                   |       |      |     |     |
| ge                                      | Intact - *<br>Colleged - C   | Ring 1  | *    | *      | ÷     | ×     | *         | ale.    | *       |                   |       |      |     |     |
| Ring breakage                           | Collapsed - C<br>Broken opposite ring gap - BO   | Ring 2  | *    | *      | *     | *     | *         | *       | *       |                   |       |      |     |     |
| ıd bu                                   | Broken near gap - BN<br>Several pieces - SP  | Ring 3  | *    | *      | *     | *     | *         | ×.      | *       |                   |       |      |     |     |
| Ri                                      | Entirely missing - M   | Ring 4  | *    | *      | *     | *     | *         | si:     | *       |                   |       |      |     |     |
| ut                                      |  | Ring 1  | *    | *      | *     | *     | *         | ale.    | *       |                   |       |      |     |     |
| Ring movement                           | Loose - *  | Ring 2  | *    | *      | *     | *     | *         | *       | :1:     |                   |       |      |     |     |
| Sluggish - S<br>Sticking - S            | Sluggish - SL<br>Sticking - ST   | Ring 3  | *    | *      | *     | *     | *         | sk:     | *       |                   |       |      |     |     |
| Rin                                     |  | Ring 4  | sic. | *      | *     | *     | *         | sic.    | *       |                   |       |      |     |     |
|   | Clean, smooth - *  | Ring 1  | T/B  | T/B    | T/B   | T/B   | T/B       | si:     | T/B     |                   |       |      |     |     |
|   | Running surface, Black,overall - B<br>Running surface, Black, partly - (B)                   | Ring 2  | T/B  | T/B    | T/B   | *     | *         | *       | T/B     |                   |       |      |     |     |
| uo                                      | Black ring ends > 100 mm - BR<br>Scratches (vertical) - S                                    | Ring 3  | T/B  | T/B    | T/B   | *     | *         | *       | T/B     |                   |       |      |     |     |
| Surface condition                       | Micro-seizures (local) - mz<br>Micro-seizures (all over) - MZ                                | Ring 4  | T/B  | T/B    | T/B   | T/B   | T/B       | *       | T/B     |                   |       |      |     |     |
| ce co                                   | Micro-seizures, still active - MAZ   | -   | *    | *      | *     | *     | *         | 310     | *       |                   |       |      |     |     |
| Surfa                                   | Old MZ - OZ<br>Machining marks still visible - ***   | Piston skirt                                      | *    | *      | *     | *     | *         | *       | *       |                   |       |      |     |     |
|   | Wear-ridges near scav. ports - WR<br>Scuffing - SC   | Piston rod<br>Cylinder liner abv.                 |      |        |       |       |           |         |         |                   |       |      |     |     |
|   | Clover-leaf wear - CL<br>Rings sharp-edged Top/Bot T/B                                       | scav. ports<br>Cylinder liner near<br>scav. ports | *    | *      | *     | *     | *         | *       | *       |                   |       |      |     |     |
| O Too much<br>Slightly dr<br>U Very dry |  | Ring 1  | *    | *      | *     | *     | *         | si:     | *       |                   |       |      |     |     |
|   |  | Ring 2  | *    | *      | *     | *     | *         | si:     | *       |                   |       |      |     |     |
|   | Optimal - *  | Ring 3  | *    | *      | *     | *     | *         | *       | *       |                   |       |      |     |     |
|   | Too much oil - O<br>Slightly dry - D   | Ring 4  | *    | *      | *     | *     | *         | *       | *       |                   |       |      |     |     |
|   | Very dry - DO<br>Black oil - BO  | Piston skirt                                      | at.  | *      | 4:    | *     | *         | *       | *       |                   |       |      |     |     |
|   |  | Piston rod  | *    | *      | *     | ×     | 1:        | *       | *       |                   |       |      |     |     |
|   |  | Cylinder liner                                    | ale. | *      | 4:    | *     | *         | ale:    | *       |                   |       |      |     |     |
| Deposits                                | No Sludge - *<br>Sludge - S  | Scavenge box                                      | s    | s      | s     | s     | s         | s       | s       |                   |       |      |     |     |
| De                                      | Much sludge - MS   | Scav. receiver<br>Flaps and non-return            | s    | s      | s     | s     | S         | s       | s       |                   |       |      |     |     |
|   | Intact - *   | Plaps and non-return<br>valves                    | *    | *      | *     | *     | *         | sk:     | *       |                   |       |      |     |     |
| Running ho                              | ours since last overhaul   |   | 8620 | 7712   | ##### | 5415  | 4778      | 1455    | ######  |                   |       |      |     |     |



M/V MAERSK ARUN 7S50MC IMO 9175779 Varna, Bulgarien 2005 09 17











