

TREATMENT BY XADO TECHNOLOGY, CONTRACT OF 10.12.2001

Ship's diesel generator: higher compression and power, quieter separators

M/V «AMATA» · diesel generator No. 3 (6 cylinders) and the heavy fuel oil, diesel fuel and lube oil separators · report by the contractor, signed: M. Kesners

Contract of 10.12.2001 · measurements 13.02.2002 · 04.03.2002 · 07.04.2002

PRODUCT

XADO compound
cylinders were coated with a
purpose-built device · the
compound was poured into the
separator crankcases

TREATED UNIT

Diesel generator No. 3, 6
cylinders
plus one heavy fuel oil, one
diesel fuel and one lube oil
separator

DOCUMENT TYPE

Treatment report
under the contract of
10.12.2001

UNIT	CONDITION AT THE START OF TESTING	WHAT WAS MEASURED
Diesel generator No. 3, 6 cylinders	Cylinder operation unstable: repeat compression readings on the same cylinder diverged, dispersion $D = 3 \text{ kgf/cm}^2$	Compression P_c , indicated pressure P_i , power N_i
Heavy fuel oil separator	Elevated low-frequency vibration in the 15-20 Hz range	Noise level in the crankcase
Diesel fuel separator	In service, baseline noise level in the crankcase	Noise level in the crankcase
Lube oil separator	In service, baseline noise level in the crankcase	Noise level in the crankcase

The units were treated without disassembly, while in service. Measurements taken from developed indicator diagrams: baseline 13.02.2002, control 04.03 and 07.04.2002.

Key results

compression evened out across the cylinders

↑ **2.4-6.7 %**

cylinder compression, 40.1 → 42.0 kgf/cm²

↑ **3.7 %**

indicated cylinder power, 191 → 198 i.h.p.

Compression and cylinder power, diesel generator No. 3

CYLINDER	Pc BEFORE, kgf/cm ²	Pc AFTER, kgf/cm ²	Ni BEFORE, i.h.p.	Ni AFTER, i.h.p.
1	40.4	42.5	193	198
2	41.8	42.8	192	198
3	40.6	41.6	186	195
4	40.6	43.0	191	190
5	38.7	41.3	192	202
6	38.6	40.9	192	202
Unit average	40.1	42.0	191	198

Cylinder indicating: baseline 13.02.2002, control 07.04.2002 — 53 days of operation between the measurements. Compression rose in all six cylinders.

Stability of cylinder operation — repeat compression readings

CYLINDER	BEFORE TREATMENT, kgf/cm ²	AFTER TREATMENT, kgf/cm ²
1	42-45, spread 3	43 , spread 0
2	43-45, spread 2	43 , spread 0
3	44-45, spread 1	43 , spread 0

CYLINDER	BEFORE TREATMENT, kgf/cm ²	AFTER TREATMENT, kgf/cm ²
4	43-45, spread 2	43 , spread 0
5	42-44, spread 2	42 , spread 0
6	40-42, spread 2	42 , spread 0

Compression at the inflection point of the developed indicator diagram, a series of repeat readings for each cylinder: 13.02.2002 and 04.03.2002.

Heavy fuel oil, diesel fuel and lube oil separators

SEPARATOR	BEFORE TREATMENT	AFTER TREATMENT
Heavy fuel oil	Elevated low-frequency vibration 15-20 Hz , high noise level in the crankcase	Per the report: noise level lower by roughly a quarter, low-frequency vibration by several times
Diesel fuel	Baseline noise level in the crankcase	Per the report: noise level roughly halved
Lube oil	Baseline noise level in the crankcase	Per the report: noise level roughly halved

The noise level in the separator crankcases was recorded by acoustic emission; the estimates follow the wording of the report.

Report conclusion

Before treatment, cylinder operation was unstable: repeat compression readings on the same cylinder diverged, and the shape of the developed indicator diagrams differed considerably. The report under the contract of 10.12.2001 records the following: after the cylinder surfaces of the diesel generator were treated by XADO technology, cylinder operation improved substantially and the main sealing problem of the cylinder — piston pair was eliminated; vibration of the cylinder rings ceased, which resulted in the absence of scuffing between the piston rings and the cylinder wall; after treatment all cylinder operating parameters increased, and the indicated cylinder power N_i rose. After treatment the diagrams of a single cylinder were visually indistinguishable — they were identical. It was found expedient to continue the work and to develop a technology for treating the cylinders of marine main engines.

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The results relate to the cylinders of marine diesel generator No. 3 of the M/V «AMATA» and to the heavy fuel oil, diesel fuel and lube oil separators of the same vessel; on other units and duties the figures may differ. The report was drawn up by the contractor for the XADO Baltic Coordination Centre. The original report is published in full and available for download.