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Rep. No.: GEN-12-1870-1

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## DET NORSKE VERITAS Survey Report

Eastproject request, on behalf of Tanstarr Europe Ltd, the undersigned Surveyor attended on 2012-11-19 and on 2012-11-26 in F.lli Stamegna (LT – Italy) premises in order to assess the effects of BOR-POWER nano-compound added in lub oil of Diesel Engine CAT s.n. 78Z02123 (360 kw) assembled with generator Caterpillar with max power 320 kw, considered for these tests at 100 % of max. load.

The testing has been carried out following Eastproject procedure/instructions, running the mentioned diesel-generator first without nano-compound for two (2) hours at 100% maximum load (320 kw) noting following engine parameters:

- Diesel consumption: 91.40 lt/h (average of 5 measurements taken)
- Water engine temperature: 91.2 °C (average of 5 gauging taken)
- Smoke emissions (values calculated as for DLGSL 152/06 correction and normalized):
  - o CO<sub>2</sub> = 4.52 mg/Nmc;
  - o CO = 742 mg/Nmc;
  - o NOx = 771 mg/Nmc;
  - o Total powders = 40.873 mg/Nmc.

Then one (1) litre of nano-compound has been added in diesel engine lub oil and following running has been carried out:

- two (2) hours running at 50% of max power;
- three (3) hours running at 75% of max power;
- twenty one (21) hours running at 100 % of max load (320kw).

During running at 100% of max load following engine parameters noted:

- Diesel consumption: 90.82 lt/h (average of last 2 running hours with 5 measurements taken)
- Water engine temperature: 90.6 °C (average of last 2 running hours with 5 gauging taken)
- Smoke emissions (values calculated as for DLGSL 152/06 correction and normalized):
  - o CO<sub>2</sub> = 3.81 mg/Nmc; (-15.0% reduction)
  - o CO = 587 mg/Nmc; (-20.0% reduction)
  - o NOx = 677 mg/Nmc; (-12,0% reduction)
  - o Total powders = 0.387 mg/Nmc. (-99.0% reduction)

Ittri (LT- Italy) on 2012-11-26



Digitally Signed By: Iaccarino, Marcello

Location: DNV Naples, Italy

Signing Date: 2013-01-16

DNV Surveyor  
Marcello Iaccarino

### Relevant Note:

- Diesel engine used not provided by Lambda Sensor and diesel consumption differences not significant;
- Lub oil OMV truck LD SAE 15W-40 used in the Diesel Engine: 38 lt.;
- Diesel quality has been maintained unchanged during total testing as confirmed by F.lli Stamegna;
- Electrical load applied to the generator totally resistive;
- Diesel consumption measurement: based on time taken for 2lt diesel consumed, (measure estimation tolerance: 0.7%);
- Instrumentation used for smoke emissions: Ecocheck s.n. 166 verified calibrated;
- Smoke emissions taken by GHEA s.r.l. as for relevant emission report issued on 2012-12-06;
- Temperature taken as for diesel engine instrument.