

## Reconditioning LW\*\*/200KW (250) wind turbines

Reconditioning of these wind turbines will be done according to Dutch MEP standards.

1. The wind turbine will be overhauled as prescribed by Dutch Ministry of Economic Affairs as part of regulations for MEP subsidy.
  - a. Tower:
    - i. Tower is inspected and where necessary repairs have been done inside and outside tower;
    - ii. Inspection of security lines and connections,
    - iii. Inspection of outside steps, correct bend steps.
    - iv. Inspection of tower connection box
  - b. Nacelle:
    - i. Chassis;
      1. Physical inspection of chassis and bolt connections, correct oxidation where necessary
      2. Physical inspection of sub chassis, attach a new layer of paint against corrosion
      3. Optical and physical inspection of rubber mountings of sub chassis for anti-vibrating system (low noise versions only)
      4. Attached a new layer of paint on the cover of the nacelle
    - ii. Yawing system;
      1. Physical and optical inspection of main cogwheel on wear, where necessary smoothed teeth to assure less wear during operation
      2. Opening of complete main cogwheel for cleaning and inspection of bearing, cleaned and new greased, complete new separator for ball bearings installed including dust protection.
      3. Overhaul of yawing gearbox, all bearings replaced, flexible connection inspected and adjusted.
      4. Inspection and new insulation (thermal injection under high pressure) added to the 0,5KW yawing engine
      5. Filled with new Castrol gearbox oil as prescribed by Lagerweij.
      6. Inspected and checked for proper operation of the cable twist system.
    - iii. Generator;
      1. Complete overhauling of generator, new bearings, windings cleaned and insulation attached (thermal injection under high pressure)
      2. Checked for resistance of windings and checked for proper operation
      3. Flexible coupling of generator inspected and renewed.
      4. Greased bearings as prescribed by Lagerweij.
    - iv. Main gearbox;
      1. Completely overhauled, new bearings placed.

Details of payments:  
Eko Energija d.o.o. Banja Luka  
Četinjska 1  
78000 Banja Luka BiH

Volksbank a.d. Banja Luka  
Jevrejska 71  
78000 Banja Luka BiH

SWIFT: VBBABA2  
IBAN: BA3567241000315016

2. Optical and physical check of all cogwheels on wear and where necessary corrected. Cogwheels and axes are remounted with specifications as prescribed by Lagerweij.
  3. Main axle checked for hair cracks with use of Dye-spray.
  4. Physical and optical check of gearbox brakes system for correct operation.
  5. Resistance of (oil filled) gearbox is adjusted as usual for proper operation at low wind speeds.
  6. Physical and optical check on back-run brakes system
  7. Filled with new Castrol gearbox oil as prescribed by Lagerweij.
  8. All closing parts of gearbox smoothed to assure leak free operation.
- v. Rotor; (optional, depending on current agreement)
1. Completely overhauled
    - a. 2 New main bearings placed at each blade axle
    - b. 2 New Teflon bearings placed at each centrifugal axle
    - c. Shock absorbers tested for proper operation
    - d. Springs adjusted to dimensions as specified by Lagerweij
    - e. Blade angle system completely adjusted to factory settings, blade angle adjusted to 6,7 degrees
    - f. All covers checked for leakage or holes
    - g. Rotor balanced as specified by Lagerweij with blades attached and numbered (under clinical conditions)
    - h. Rotor physically tested for proper operation of blade angle system and blade angle brakes system
    - i. Note: During first 500hrs. of operation final power adjustments need to be made to the rotor blades system (>12m/s max 200KW (250KW) output) by adjusting the springs and/or blade angle system.
- vi. Blades; (optional depending on current agreement)
1. Completely leaned, repaired and repainted
  2. Holes due to wear repaired
  3. Optical inspection of complete outer surface
  4. Attached an anti-corrosion layer for protection with 2-component paint
  5. Attached a wear protection at the 'ly' side of the blades
- vii. Control housing, chassis housing and connection points and instruments
1. Main control housing
    - a. Physical and optical inspected
    - b. Cleaned for dust
    - c. All connection points checked and cleaned from any corrosion

- d. All relays contactors checked for proper operation, cleaned for oxidation
  - e. All fuses checked and replaced if necessary
  - f. All capacitors checked for proper operation and replaced when necessary
  - g. All transformers inspected and checked for resistance and proper operation
  - h. Mutator checked for proper operation
  - i. Transducer checked and adjusted
  - j. PLC inspected and checked for proper operation
  - k. Latest software in Eeproms loaded
2. Chassis housing
- a. Physical and optical inspected
  - b. Cleaned for dust
  - c. All connection points checked and cleaned from any corrosion
  - d. PLC inspected and checked for proper operation
3. Instruments
- a. Wind vane checked for proper operation, bearing replaced (needs final adjusting during installation of the wind turbine)
  - b. Anemometer checked for proper operation
  - c. Imbalance switch checked for proper operation
  - d. Rotations sensor checked for proper operation
  - e. Cable twist system checked for proper operation

CEO

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Banja Luka 12-05-2015

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