

APPENDIX 5 SPECIAL REQUIREMENTS TO COMPONENTS AND PERFORMANCE

1.1 General

It is a general rule that the entire plant is left in the same condition as prior to the services according the Agreement has been completed.

1.2 Safety and health observations

Chemicals brought for inspection purposes must be treated according to the instructions of the chemical supplier or chemical producer and used with the Supplier's own personnel safe and protection equipment.

After completion of the Services set out in the Agreement, the Supplier has to guarantee that all brought chemicals are collected and removed from the property of EVK.

Asbestos is under no circumstances allowed at the EVK.

Materials or operating equipment;

- that require special authorization or exemption from current regulations, or
- require special safety precautions and

may become a part of work performed by the operating and maintenance crew, must be specified in the tender.

1.3 Gas turbine plant

The total performance of the gas turbine plant, consumption data, and basis for dimensioning and operational data cannot be deteriorated because of:

- incomplete fulfilment of the Agreement
- fittings of bad quality components in connection with replacements done by the Supplier
- other actions taken by the supplier.

1.4 Equipment for control, regulation and monitoring (SRO-system)

SRO-equipment at the gas turbine, the steam turbine and boiler must communicate with the overall SRO system, from which the mechanical equipment is controlled, regulated in addition, supervised. This plant philosophy must be kept at any time.

In case of modifications at the SRO system of the gas turbine plant, it is the Supplier alone to see to the fact that necessary adjustment are carried out in the overall SRO- equipment (Any necessary programming of the head SRO system, must be done by EVK

staff). This to avoid that anything is preventing the existing possibilities of control, regulation and supervising of the entire SRO system of EVK.

1.5 Instrumentation

By any replacement in instrumentation /measuring equipment, it is necessary to keep/respect the instrument-measuring (span) and measure parameters in order to insure that the same process value is measured in each operational situation.

If a new brand is used this must be pre accepted by EVK.

Each installed instrument must be accompanied by documents.

It is not accepted that existing instruments are replaced with instruments of lower quality. In this connection, it is important to emphasize the degree of encapsulation/insulation (IP) and that they must function correctly under the environmental conditions following the operation conditions (temperature, vibrations, humidity etc.). Transducers, transmitters and cable connections must be satisfactorily protected against damage.

1.6 Surface treatment

The Supplier must see to the fact that floors and other surfaces are covered properly in order to avoid damages during work completion.

Damages at surfaces caused during completion of the Agreement must be fully repaired by the Supplier according to specification concluded suitable by the Supplier for the specific task.

1.7 Insulation and protection

By dismantling or damaging of insulation or the protection of these, the Supplier must guarantee that everything is left repaired and cleaned as well as ensure that the insulation level has not been reduced.

1.8 Internal noise

1.8.1 General demands

In no point are the sound pressure levels around the machines to exceed the values measured at the time the plant was handed over to EVK.

The accepted maximum sound pressure level is 100 dB (A) re. 20 μ Pa for intermittent noise. Corrections are made for intermittent noise levels by checking that a maximum of 85 dB(A) energy equivalent of sound pressure level for an 8 hour day is not exceeded.

Deviations from noise requirements will primarily be relevant for equipment with intermittent noise emissions such as safety valves and start-up system.

The Supplier is only responsible for the exceeding of noise pressure limits, when the Supplier causes the exceeding.

1.9 Vibrations

1.9.1 Effect on personnel

Machines and systems must in general be designed to prevent health-damaging vibrations. ISO 2631 is applied for valuation.

The above applies to all operating situations.

1.9.2 Effect on machinery and building

Vibrations that can damage parts of the plant or building constructions are not acceptable. The intensity of the vibrations is estimated according to ISO 10816-4 and ISO 10816-1.

For the turbo group with slide bearings, the ISO 7919 must be kept within the following limits of the relative shaft oscillation $S_{(p-p)}$:

	Long-term operations	After overhaul
Steam turbine	< 100 μm	<50 μm
Gas turbine	< 125 μm	< 65 μm
Generator	< 160 μm	< 85 μm

Concerning oscillations in the bearing housing of the turbo group, the vibration level is not to exceed 2,8 mm/ S_{RMS} measured according to ISO 10816-1.

The above applies in all operating situations.

The Supplier is only responsible for the exceeding of vibration limits, when the Supplier causes the exceeding.

1.10 External noise

The external noise from the entire combined heat and power plant must comply with the limit values of the environmental approval by the authority.

The noise limit in the property line towards the industrial area is set at 60 dB (A) per day. The noise limit during nighttime is set at 40 dB (A) for nearest houses in the agricultural zone. The nearest house is located approx. 200 m north of the plant.

The noise limits at night for city houses is 35 dB (A). The nearest city area is located approximately 300m east of the plant.

A maximum noise level of 110 dB (A) re 1 pW has been set for external noise sources including safety valves.

The noise levels are measured or calculated according to the current Danish Environmental Protection Agency's (EPA) instructions for noise levels.

EVK must pay for control measurements carried out by a company approved by EPA in case of noise complaints that are not caused by exceed of noise limits. In cases where exceeds have taken place the Supplier must pay for the measurements as well as create a noise dampening solution and ensure a new measuring.

The Supplier is only responsible for the exceeding of sound pressure limits, when the Supplier causes the exceeding.

1.11 Control measurements

EVK's technician or consultant carries out control measurements of the noise and vibration level.

The emission measurements is paid by EVK. By repetition on control measurements caused by non-compliance of the emission limits, the costs are held by the Supplier.

Prior to measurements both the Supplier and his representative will be informed. The Supplier is this way able to participate and control each measurement.

Respect for above-mentioned limit for external noise must be guaranteed.

1.12 Emissions

1.12.1 Emissions of carbon oxides and carbon monoxide, etc.

The environmental authorities have issued following requirements for the plant:

- CO: max 5 mg/Nm³ (dry flue gas at 15% O₂ and 0C
- NO_x: max 25 mg/Nm³ (dry flue gas at 15% O₂ and 0C

B-Values (as stated in environmental approval by the authority.)

- PM10: 0,08 mg/m³
- SO₂ 0,25 mg/m³
- NO_x 0,125 mg/m³ (calculated as NO₂)

Above-mentioned demands must be kept.

1.12.2 Registration of emissions

The environmental authorities have made demands for continuous registration of the emission of NO_x in the flue gas. Servicing of the installed equipment for this purpose is not included in the scope of this supply.

1.12.3 Control measurements of emissions

EVK's technician or his consultant carries out control measurements of emission.

The emission measurements are paid for by EVK. By repetition on control measurements caused by non-compliance of the emission limits, the costs are held by the supplier.

Prior to measurements, both the Supplier and his representative will be informed. The Supplier is this way able to participate and control each measurement.