**Supply Of Laboratory Equipment – Axial steam turbine and steam generator**

This specification is intended to cover the supply of laboratory equipment: Axial steam turbine and steam generator including - delivery properly packed for transport, complete erection, final check‐up, testing at site, successful commissioning, conducting performance tests at site, instructional materials (Czech or English).

**Annex to Tender Documentation – Technical specification**

**Steam Generator module**

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| 1. **Steam Generator module** | Should consist of steam generator, condenser, burner, feed water pump. |
|  | Should have sensors for the measurement of temperature of feed water, generated steam, cooling water in condenser (at inlet and outlet) |
|  | Should have sensors for the measurement of pressure of generated steam and pressure in condenser |
|  | Should have sensors for the measurement of flow rate of feed water, cooling water and fuel gas |
|  | Should have capability for measurements and experiments aimed at:  influence of different burner settings  analysis of the exhaust gases  saturation temperature and pressure of the steam  quality of the steam  specific characteristic values of a steam boiler  efficiency of a steam generator |
|  | Should have computer linked (temperature, pressure and flow rate) sensors and software for their data acquisition and display. |
| **1.1 Burner** | Should have safety sensors detecting excessive steam generator pressure, condenser pressure, failure of burner connected to lock-out of burner |
| **1.2 Steam generator** | Gas burner for LPG, max LPG consumption 1 kg/hour |
|  | Steam produced at min. 2200C, 8 bar |
|  | Steam rate min. 7 kg per hour |

**Axial steam turbine module**

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| 1. **Axial steam turbine module** | Should consist of steam turbine, condenser, brake, steam and water connections. |
|  | Should have sensors for the measurement of inlet steam pressure and pressure in condenser. |
|  | Should have sensors for the measurement of steam inlet temperature, temperature of condensation and cooling water temperature (at inlet and outlet). |
|  | Should have sensors for the measurement of flow rate of cooling water. |
|  | Should have system for the measurement of turbine output and turbine speed of rotation. |
|  | Should have computer linked (temperature, pressure and flow rate) sensors and software for their data acquisition and display. |
|  | Should have capability for measurements and experiments aimed at:  thermal efficiency of the turbine compared to the theoretical efficiency  turbine output at different settings |
|  | Should have safety sensors detecting turbine over speed and condenser overpressure |
| **2.1 Steam turbine** | axial flow impulse, power min. 50 W, powered by the steam from steam generator |

The total dimensions of the laboratory equipment must not exceed 1900 mm in height, 3000 mm in width and 600 mm in depth. The total dimensions of each module (Steam generator, Steam axial turbine) must not exceed 1900 mm in height, 1500 mm in width and 600 mm in depth. The total weight of the laboratory equipment must not exceed 200 kg.