

## **Specification of Mobile Evaporation System – Appendix 1 to the Contract Notice**

The Evaporation System consists of more than ten cooperating components. The set of equipment forms an automated line used to recover salt from brines at various concentrations. The devices are mutually synchronised and can operate both in a complete system or independently. The configuration depends on the parameters of the agent processed and the applied chemical process. Certain devices may be omitted, if they are not required by the selected process.

The configuration of system devices for brine is as follows:

- peristaltic pump for brine intake
- buffer tank
- chamber press
- 1st stage evaporators (3 pcs.)
- buffer tanks
- 2nd stage evaporators
- salt mass tank, distillate tank
- fluid dryer
- power generator sets
- fuel tank

Devices composing the system:

### **1. Hydraulic press**

Specification: ANDRITZ filter press with an electrical-and-hydraulic closure designed as gypsum boards used for filtration;

boards and frame format: 800x800 mm; frame size: 800 / 60; dimensions of filter press: length: approx. 6380 mm, width: approx. 1960 mm, height: approx. 1960 mm; press net weight: 6100 kg; filtering area: 43–53 m<sup>2</sup>; filter press capacity: 553–679 l; cake thickness: 30 mm; board material: PP; frame design pressure: 15 bar overpressure; maximum allowable closing pressure for the frame: 385 bar overpressure; oil amount: 70 l; hydraulic unit power: 2.2 kW; voltage: 3 phases, 400V, +/- 5%; frequency: 50Hz, +/- 5%; control voltage: 230V AC, 24V DC; protection of press electrical modules: IP 54, IP 65; noise level: L<sub>pa</sub> < 70 dBA.

Evaluated technical condition: quite good

The press lies on a covered semi-trailer, year of manufacture: 2012; unladen kerb weight: 5440 kg; permissible payload: 29560 kg; maximum permissible load per axle: 78.40 kN; total permissible laden weight: 35000 kg; type: D-651;

Evaluated technical condition: quite good

**2. Veolia E8000 evaporators (3 pcs.) and Veolia R2000 evaporators (2 pcs.) installed on three semi-trailers:**

(the repair proposal specifies defects in three E8000 evaporators; the service department physically moved all the defected parts to Evaporator 1, thus repairing Evaporators 2 and 3)

**Semi-trailer 1** (semi-trailer + 2 E8000 evaporators)

Specification: Truck semi-trailer; year of manufacture: 2012; unladen kerb weight: 5440 kg; permissible payload: 29560 kg; maximum permissible load per axle: 78.40 kN; total permissible laden weight: 35000 kg; type: D-651; variant: E; version: EDT.

Evaluated technical condition: quite good

**Evaporator 1**

Specification: The device is out of order (repair proposal); Operating counter: 2597 mth; the device is installed on a semi-trailer; control system (controller type): Siemens S7; operating module: operator panel; operator panel menu: English/Polish; equipment piping: PP, steel 316; circulation pump – material: steel EN. 1.4563; C&I: digital/analogue measurements; evaporator efficiency: 8000 [l/d] +/- 10%; power absorption (stable operating conditions): 48 [kW] +/- 10%; frequency: 50 [Hz]; required

voltage: 400 [V]; generated heat: 47 [kW]; max. air flow at exchanger E02: 1700 [m<sup>3</sup>/h]; operating capacity of boiling chamber: 578 [l]; power consumption: 0.144 [kWh/l] +/- 10%; operating noise: <80 [dB]; operating temperature: 30–40 [deg. C]; operating pressure: 6–8 [kPa] (absolute); empty evaporator weight: 2950 [kg]; operating weight: 4000 [kg]; protection of control cabinet: IP 54.

Evaluated technical condition: satisfactory

**Evaporator 2**

Specification: Operating counter: 1798 mth; the device is installed on a semi-trailer; control system (controller type): Siemens S7; operating module: operator panel; operator panel menu: English/Polish; equipment piping: PP, steel 316; circulation pump – material: steel EN. 1.4563; C&I: digital/analogue measurements; evaporator efficiency: 8000 [l/d] +/- -10%; power absorption (stable operating conditions): 48 [kW] +/- 10%; frequency: 50 [Hz]; required voltage: 400 [V]; generated heat: 47 [kW]; max. air flow at exchanger E02: 1700 [m<sup>3</sup>/h]; operating capacity of boiling chamber: 578 [l]; power consumption: 0.144 [kWh/l] +/- 10%; operating noise: <80 [dB]; operating temperature: 30–40 [deg. C]; operating pressure: 6–8 [kPa] (absolute); empty evaporator weight: 2950 [kg]; operating weight: 4000 [kg]; protection of control cabinet: IP 54. Evaluated technical condition: good

**Semi-trailer 2** (semi-trailer + 1 E8000 evaporator + 2 plastic tanks)

Specification: Truck semi-trailer; year of manufacture: 2012; unladen kerb weight: 5440 kg; permissible payload: 29560 kg; maximum permissible load per axle: 78.40 kN; total permissible laden weight: 35000 kg; type: D-651; variant: E; version: EDT.

Evaluated technical condition: quite good

### **Evaporator 3**

Specification: Operating counter: 630 mth; the device is installed on a semi-trailer; control system (controller type): Siemens S7; operating module: operator panel; operator panel menu: English/Polish; equipment piping: PP, steel 316; circulation pump – material: steel EN. 1.4563; C&I: digital/analogue measurements; evaporator efficiency: 8000 [l/dj] +/- -10%; power absorption (stable operating conditions): 48 [kW] +/- 10%; frequency: 50 [Hz]; required voltage: 400 [V]; generated heat: 47 [kW]; max. air flow at exchanger E02: 1700 [m3/h]; operating capacity of boiling chamber: 578 [l]; power consumption: 0.144 [kWh/l] +/- 10%; operating noise: <80 [dB]; operating temperature: 30–40 [deg. C]; operating pressure: 6–8 [kPa] (absolute); empty evaporator weight: 2950 [kg]; operating weight: 4000 [kg]; protection of control cabinet: IP 54.

Evaluated technical condition: good

### **Tanks (2 pcs.)**

Specification: Open plastic tank with a valve; capacity: 5m3 Evaluated technical condition: good

### **Semi-trailer 3 (semi-trailer + 2 R2000 evaporators)**

Specification: Truck semi-trailer; year of manufacture: 2012; unladen kerb weight: 5440 kg; permissible payload: 29560 kg; maximum permissible load per axle: 78.40 kN; total permissible laden weight: 35000 kg; type: D-651; variant: E; version: EDT.

Evaluated technical condition: quite good

### **Evaporator 4**

Specification: Operating counter: 3112 mth; the device is installed on a semi-trailer; power supply and control cabinet: yes; control system (controller type): Siemens S7; operating module: operator panel; operator panel menu: English/Polish; equipment piping: PP, steel 316; circulation pump – material: steel EN. 1.4563; C&I: digital/analogue measurements; evaporator efficiency: 2,011 [l/d] +/- 10%; power absorption (stable operating conditions): 10.5 [kW] +/- 10%; frequency: 50 [Hz]; required voltage: 400 [V]; generated heat: 11.1 [kW]; liquid volume in D1: 270 [l]; liquid volume in D02: 150 [l]; required air flow: 7000 [m3/h]; power consumption: 0.125 [kWh/l] +/- 10%; operating noise: <80 [dB]; operating temperature: 30–40 [deg. C]; operating pressure: 6–8 [kPa]

(absolute); empty evaporator weight: 1560 [kg]; operating weight: 1860 [kg]; protection of control cabinet: IP 54

Evaluated technical condition: good

### **Evaporator 5**

Specification: Operating counter: 4630 mth; the device is installed on a semi-trailer; power supply and control cabinet: yes; control system (controller type): Siemens S7; operating module: operator panel; operator panel menu: English/Polish; equipment piping: PP, steel 316;

circulation pump – material: steel EN. 1.4563; C&I: digital/analogue measurements; evaporator efficiency: 2,011 [l/d] +/- 10%; power absorption (stable operating conditions): 10.5 [kW] +/- 10%; frequency: 50 [Hz]; required voltage: 400 [V]; generated heat: 11.1 [kW]; liquid volume in D01: 270 [l]; liquid volume in D02: 150 [l]; required air flow: 7000 [m<sup>3</sup>/h]; power consumption: 0.125 [kWh/l] +/- 10%; operating noise: <80 [dB]; operating temperature: 30–40 [deg. C]; operating pressure: 6–8 [kPa] (absolute); empty evaporator weight: 1560 [kg]; operating weight: 1860 [kg]; protection of control cabinet: IP 54  
Evaluated technical condition: quite good

### 3. Fluid dryer

Specification: The device is used for salt slurry drying; type: SFS-02, in a container housing with a dust extractor and an external stainless-steel supply tank. Evaluated technical condition: quite good

### 4. Power generator sets

**1 x 550 kVA power generator set used for standby, installed in a separated container housing including ventilation, flue gas extraction and fuel supply systems. It forms a complete power supply module.**

**Engine:**

Specification: Model: C15; 6 in-line cylinders; four-stroke engine; operating speed: 1500 rpm; power: 498 kW; cubic capacity: 15.2 l; turbocharged by one turbocharger; direct electronically controlled fuel injection; liquid cooled; framed radiator with a fan; operating counter: 3370 mth  
Evaluated technical condition: good

**Electric generator:**

Specification: LF generator; self-excited; frequency: 50 Hz; output voltage: 400 V; phase voltage: 230 V; power factor: Cos  $\phi$ =0.8; nominal power: 440 kW; poles: 4; bearings: 1; insulation class: H; protection rating: IP23; allowable overspeed: 150%; voltage controller: R450

Evaluated technical condition: good

**2 x 400 kVA power generator set used for standby, installed in a separated container housing including ventilation, flue gas extraction and fuel supply systems. It forms a complete power supply module.**

**Engine:**

Specification: Model: 2206C-E13TAG2; 6 in-line cylinders; four-stroke engine; operating speed: 1500 rpm; power: 368.4 kW; cubic capacity: 12.5 l; turbocharged by one turbocharger; direct electronically controlled fuel injection; liquid cooled; framed radiator with a fan; operating counter: 3925 mth

Evaluated technical condition: good

**Electric generator:**

LF generator; self-excited; frequency: 50 Hz; output

voltage: 400 V; phase voltage: 230 V; power factor:  $\cos \phi = 0.8$ ; nominal power: 320 kW; poles: 4; bearings: 1; insulation class: H; protection rating: IP23; allowable overspeed: 150%; voltage controller: R450

Evaluated technical condition: good

#### **5. Buffer tanks (2 pcs.)**

Specification: Open tank; capacity: 30m<sup>3</sup>; plastic; with a valve. Dimensions: 6m x 2.5m, 2m; structural steel; hydrostatic pressure; maximum liquid level: 1900 mm; agent: brine; brine density: 1.2 g/cm<sup>3</sup>; maximum ambient temperature: +30 deg. C; minimum ambient temperature: -30 deg. C; tank weight: 2700 kg; type: NT-ROK-ND-30/W-PE

Evaluated technical condition: good

#### **6. Diesel fuel tank**

Specification: Usable capacity: 10m<sup>3</sup>; total capacity: 10.3m<sup>3</sup>; maximum filling level: 97%; outer diameter: 1620mm; total length: 6700 mm; total weight: 3000 kg. The tank has a system for self-service fuelling and data recording. Person and vehicle identification by contactless cards. Input voltage: 230V AC; display type: TFT LCD 4.3"; external communication: TCP/IP; membrane keyboard; operating temperature: -20 to +70 deg. C; machine's power consumption: 0.06A.

Evaluated technical condition: good