Utility Process Equipment Standard

# STEAM

## SCOPE

**The document must be used as follows:**

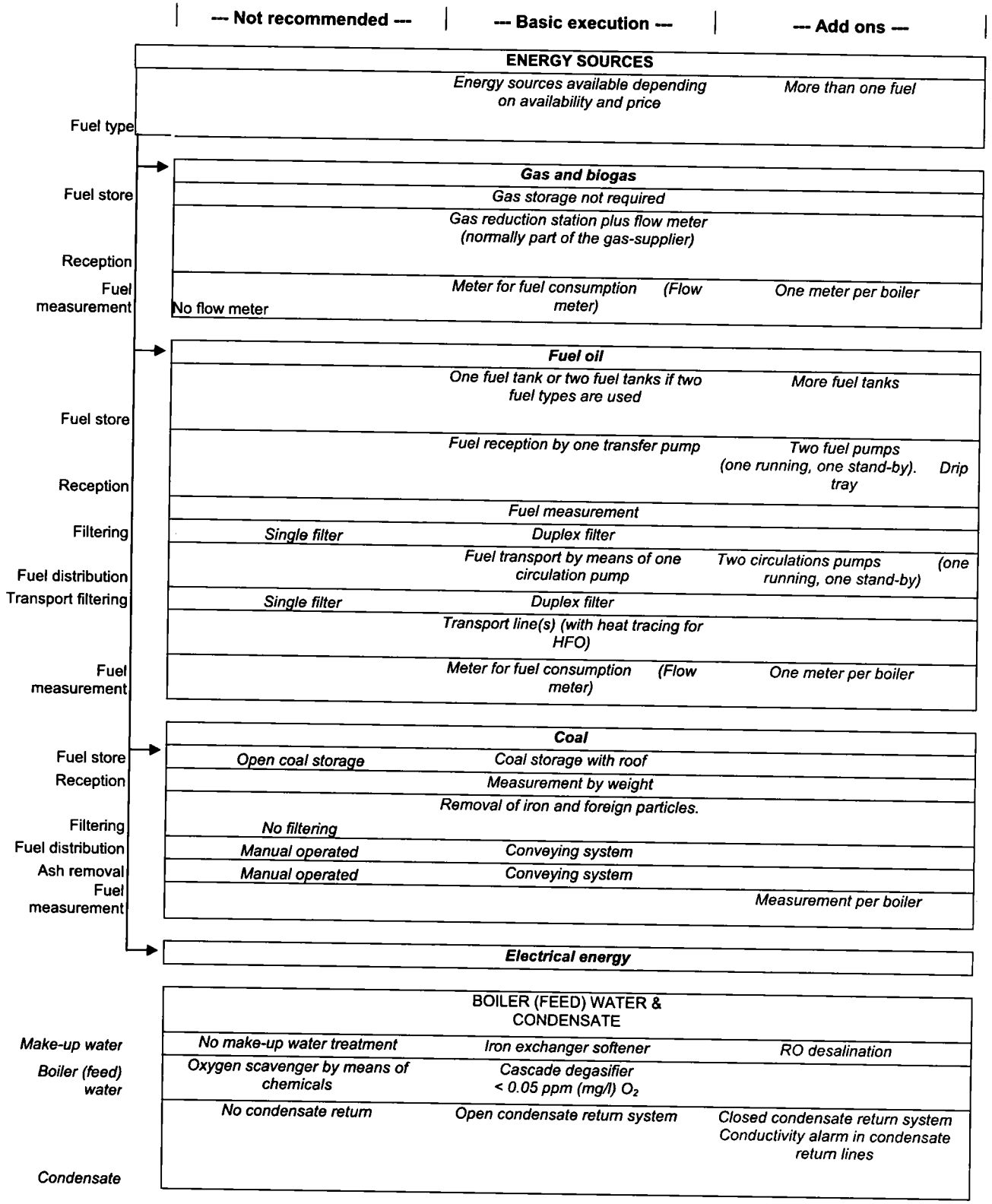
**For specification of new equipment, the conditions mentioned are mandatory and fully applicable.**

**For existing equipment the specified conditions serve as a guideline/reference when undertaking a modification (major and minor).**

## CONTENTS

# 1. INTRODUCTION

## 1.1 QUICK FLOW



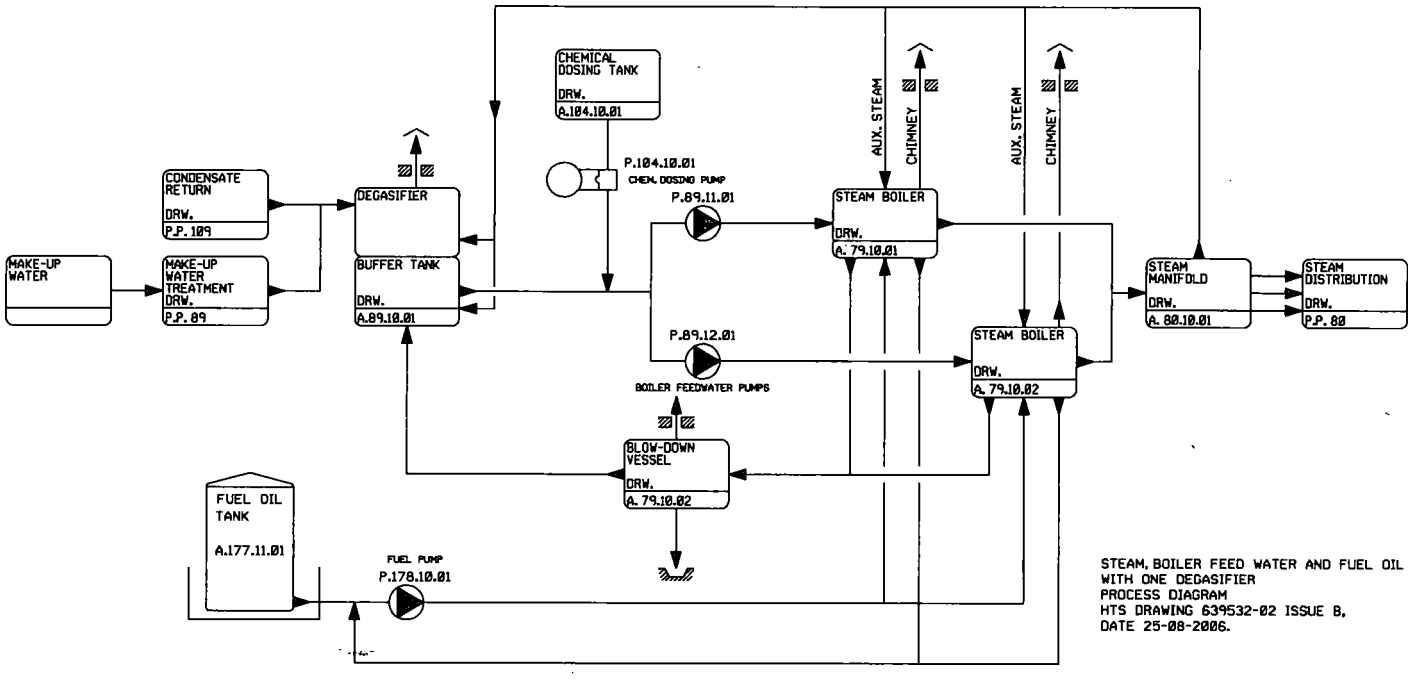
| | STEAM GENERATION | | |
|---|---|---|---|
| Boiler | *Water tube boiler* | *Three pass fire tube boiler with one fire tube* | *Economizer* |
| Number of boilers | *One boiler suitable for peak consumption* | *At least two boilers together suitable for peak consumption* | *One boiler spare* |
| Blow down (top) | | *Manual conductivity measurement and TDS control* | *Automatic conductivity measurement and TDS control* |
| Blow down (bottom) | | *Manual open/close valve at bottom* | *Automatic control (time based)* |
| Blow down tank | | *Standard blow down tank* | *Waste heat recovery* |
| Burner | | *Standard burner* | *Dual fuel burner*<br>*Biogas burner* |
| Combustion air ventilator | | *Mechanical controlled combustion air flow* | *Frequency controlled ventilator* |
| | | | *Efficiency measurements* |

| | FLUE GAS | |
|---|---|---|
| Flue gas | *Chimney secured with ropes* | *Free standing chimney* |
| Insulation | *Not insulated* | *Partly or completely insulated (depending on fuel type and safety requirements)* |

| | STEAM DISTRIBUTION | | |
|---|---|---|---|
| Steam distribution | *One pipe* | *Steam manifold* | |
| Steam measurement | | *No flow measurement* | *Flow measurement* |
| | | *All piping and accessories insulated* | |

| | UMCS | |
|---|---|---|
| UMCS | *No Utility monitoring system* | *Utility Monitoring system* |

## 1.2 PROCESS FLOW DIAGRAM




## 1.3 STARTING POINTS

Common requirements for the steam to the distribution grid of the brewery are:

| | | |
|---|---|---|
| Maximum design pressure | : | 12 barg |
| Normal operating conditions | : | 10 barg, saturated steam |
| Steam pressure fluctuations | : | +/- 0.5 bar. |
| Moisture in saturated steam | : | < 0.5% |

### 1.3.1 SPECIFICATION QUALITY STEAM

See Auxiliary Material Standard

## 2. ENERGY SOURCES

The following energy sources can be used

- Natural gas
- Light fuel oil (LFO)
- Heavy fuel oil (HFO)
- Coal
- Biogas (alternative)
- Electrical energy

The choice of fuel type depends on the following local circumstances:

- Availability and cost
- Reliability of supply
- Regulations and legislation with regards to emissions

Advantages and disadvantages of the various fuel types are indicated in the table below.

| **Natural Gas** | |
|---|---|
| Advantages:<br>▪ Clean<br>▪ Easy to handle<br>▪ Sulphur content is very low to nil<br>▪ High efficiency<br>▪ Lower maintenance costs | Disadvantages:<br>▪ Storage not possible<br>▪ Depending on reliability of the delivery a second source of energy could be required |
| **Heavy fuel oil (HFO)** | |
| Advantages:<br>▪ Commonly used.<br>▪ Easy storage<br>▪ Reception by rail, ship or truck | Disadvantages:<br>▪ Heating required for suction heater, transport piping and atomising<br>▪ Pollution<br>▪ Higher emissions ($NO_x$, $SO_x$)<br>▪ Fuel oil reception and storage should meet relevant standards<br>▪ More frequent cleaning of the fire tubes of the boiler(s) |
| **Light fuel oil (LFO)** | |
| Advantages:<br>▪ Commonly used.<br>▪ Easy storage<br>▪ Reception by rail, ship or truck<br>▪ Less emissions than HFO<br>▪ No heating required (compared with HFO) | Disadvantages:<br>▪ More expensive than HFO<br>▪ fuel oil reception and storage should meet relevant standards<br>▪ Higher emissions ($NO_x$, $SO_x$) compared with natural gas |
| **Coal** | |
| Advantages:<br>▪ Cheap (if available)<br>▪ Easy storage<br>▪ Reception by rail, ship or truck. | Disadvantages:<br>▪ Pollution<br>▪ Higher emissions ($NO_x$, $SO_x$)<br>▪ Ash storage<br>▪ Dust explosion risk<br>▪ Lower efficiency<br>▪ Higher maintenance costs |
| **Biogas** | |
| Advantages:<br>▪ If available from WWTP, free of charge | Disadvantages:<br>▪ Higher emissions (SOx) |

| Electrical Energy | |
|---|---|
| Advantages:<br>▪ Clean (No emissions and pollutions on the brewery premises)<br>▪ Less maintenance costs | Disadvantages:<br>▪ Not commonly applied.<br>▪ Expensive in consumption (only interesting in case of low electric energy prices.<br>▪ Very sensitive for water quality. |

## 2.1 BASIC

### 2.1.1 NATURAL GAS

The gas supplier supplies natural gas directly. Depending of the supply pressure a pressure reducing station is required.

Storage of natural gas is not applied.

Precautions (gas detection) are needed for the gas installation/distribution system to reduce the risk of fire and explosions.

A gas flow meter with pressure and temperature compensation is applied to measure the total consumption of gas in $Nm^3/hr$

### 2.1.2 FUEL OIL (HFO & LFO)

The unloading station can either be equipped with or without an unloading pump depending on the availability of unloading pumps on the road tanker.
The unloading pump must be equipped with a suction filter.

Depending on the viscosity of the fuel-oil (HFO), tracing must be applied for the unloading hoses and for the filling line to the fuel tank.

An unloading station must be designed (and equipped with sufficient means) to prevent soil and (ground) water pollution and should meet local regulations like:
- Dripping trays;
- Collection pit with sealed layer;
- Sewer to be equipped with oil skimmer;

Fuel oil reception measurement can be done by a weight bridge or with a flow meter/counter.
A flow meter/counter is preferred.
In case the fuel road tankers are not equipped with a calibrated (sufficiently accurate) fuel-oil meter/counter the fuel unloading station must be equipped with such a meter.

The fuel-oil storage capacity depends on the reliability of the deliveries of fuel.
*Reliable delivery:* If the delivery time (time between ordering and delivery) is known beforehand. Based on this known delivery time the minimum required storage capacity (including a safety margin, which has to be discussed with the customer) can be calculated.
*Unreliable delivery:* If the delivery time is not known beforehand. The required storage capacity has to be calculated on the basis of: risk of production stagnation, investment cost, and capital cost of the stored fuel quantity.

The basic option will be one fuel-oil storage tank.

Fuel storage can take place either above and/or underground. Above ground fuel storage is preferred.

The design of fuel oil reception and storage should meet relevant standards, for example:
- API 650;
- PGS 29;
- BS 2654;

The design of the fuel storage and handling shall meet the following SHE instruction:
- Fuel intake and above ground storage tanks Good Practice
- Fuel intake and under ground storage Good Practice.

Depending on the viscosity of the fuel oil and the ambient conditions bottom heating may be required. In cases with lower viscosity and higher ambient temperatures only suction heating may be sufficient. Additional measures are required to reduce the risk of pollution (of soil and groundwater).
Tank-filling lines to the fuel tanks can be traced either electrically or by means of steam.

A ring line is applied between the boiler and the fuel storage tank, a day tank near the boiler is normally not applied. For light fuel/diesel a day tank is installed in case of the use of diesel generator

To prevent vapour formation (for light oil) due to high temperatures (caused by pumping) and to ensure a fixed fuel flow to the oil heater (to guarantee a steady heavy fuel-oil temperature) a pressure controlled ring line with a return line to the storage tanks must be installed.

### 2.1.3 Coal

The reception of the coal takes place by rail, ship or truck.
The coal is stored in open compartments with roof. Attention has to be paid to prevent glowing (auto combustion) and dust explosion of the coal (by means of spraying water over the coal).
Depending on the ambient conditions freezing of wet coal must be avoided.

The distribution of the coal takes place to the day bunkers by means of covered transport belts. The iron parts in the coal must be removed by means of magnets. Other foreign materials like big pieces of concrete are caught on a coarse screen. Coal crushers are applied depending on the size of coal supplied.

The consumption measuring of consumed coal is based on received and stored quantity.

### 2.1.4 Biogas

Biogas can be available in case an an-aerobic wastewater treatment plant is present at the brewery.
The amount of biogas can only supply approximately 8 % of the brewery heat requirement. A mixture between biogas and a second fuel is imperative.

### 2.1.5 Electrical energy

Electrically heated boilers are only applied in countries with low cost electricity for example generated by hydropower or nuclear power plants.
An example is the Democratic Republic of Congo (hydro power).

## 2.2 Add on

Depending on local availability and cost of fuel types a choice must be made. When two or more fuel types are available a dual fuel burner allows a choice (during operation) for the alternative fuel to use.

### 2.2.1 Gas

One gas flow meter per boiler for $Nm^3/hr$ and total consumption is applied.

### 2.2.2 FUEL OIL

Two or more fuel oil storage tanks depending on project requirements and maximum practical size. Each fuel-oil storage tank must be equipped with one electronic level indicator (with local and remote read-out) and one direct float indicator.

Two reception transfer pumps. Each transfer pump executed with its own filter or one duplex filter for both pumps. Unloading hoses must be equipped with dry-break couplings (couplings specially designed to prevent oil spillages during disconnecting).

Two circulating pumps (one running and one stand-by) with one duplex filter to ensure an uninterrupted flow

Each boiler will be equipped with a fuel oil meter/counter or in case each boiler is provided with its own circulation line with two meters/counters (one in each supply- and one in each return line).

### 2.2.3 COAL

Each boiler its own coal consumption measurement.

### 2.2.4 BIOGAS

Biogas must be dried and removed from sulphur pending on local circumstances. A minimum supply pressure to the burner is required.

A biogas buffer may be necessary.

### 2.2.5 ELECTRICAL ENERGY

NO ADD-ONS

# 3. BOILER (FEED) WATER AND CONDENSATE

## 3.1 BASIC

### 3.1.1 MAKE-UP WATER

According ASME standards, the make-up water shall meet the following specification for fire tube boilers from 0.5 to 20 bar(g):

| | | | |
|---|---|---|---|
| Observation | : | | clear, free of smell and colour |
| pH | : | > | 7.0 [ ] |
| Hardness | : | < | 0.1 °dH |
| Iron | : | < | 0.1 mg/l |
| Silicate | : | < | 5.0 mg/l1 |
| Copper | : | < | 0.1 mg/l |
| Oil | : | < | 1 mg/l |
| $KMnO_4$-consumption | : | < | 25 mg/l |

The total hardness shall be maximum: 0.05 °dH after softening.

The capacity of the make up water treatment must be based on a minimum of 50% condensate return and 100 % peak load of the boiler plant.

### 3.1.2 BOILER FEED WATER

Boiler feed water treatment consists of the following process steps:

1. Removing of mainly oxygen and partly carbon dioxide in the cascade degasifier.
2. Chemical dosing (caustic, phosphate) for pH correction and avoiding scaling in the boiler after the degasifier.

The boiler feed water shall meet the following specification:

| | | |
|---|---|---|
| pH minimum | : | 8.3 [ ] |
| Total hardness | : | < 0.1 °dH |
| Oxygen | : | < 0.05 mg/l |
| Iron | : | < 0.1 mg/l |
| Copper | : | < 0.1 mg/l |
| Bound carbon dioxide (C02) | : | < 25 mg/l |
| $KMnO_4$-consupmtion maximum | : | < 30 mg/l |
| Oil maximum | : | <1 mg/l |

Supplier standards prevail.

The minimum number of feed water pumps must be one per boiler and one stand-by pump.

The minimum mean temperature difference between the water inlet and degasified water outlet must be 15 °C below working temperature of the degasifier (105 °C).

Carry-over of chemicals in the moisture in the steam (max 0.5% moisture) occurs. These chemicals may come into contact with final product (kegs) and can cause contamination. Therefore non volatile, food grade chemicals must be used for dosing in make-up and boiler (feed) water or dedicated boiler / steam-steam generator. See steam and boiler feed water utility material (HMESC: 02.31.01.105).

### 3.1.3 BOILER WATER

The boiler water shall meet the following specification:

| | | | |
|---|---|---|---|
| pH | : | 10 – 12 | |
| Conductivity at 25 °C | : | < 10,000 | µS/cm |
| P-value | : | 1 – 15 | mg/l |
| Silicate (SiO2) | : | < 70 + 7p | mg/l |
| Phosphate ($PO_4^{3-}$) | : | 10 – 20 | mg/l |
| Sulphite ($SO_3^{2-}$) | : | 10 – 20 | mg/l |

The boiler water quality must be maintained by the following actions:

1. Chemical dosing as described under boiler feed water
2. Manual blow down from the bottom of the boiler to remove boiler water and sludge based on water quality analysis.

A blow down tank to separate flash steam from the blown down water.

### 3.1.4 CONDENSATE

Condensate shall meet the following specification:

| | | | |
|---|---|---|---|
| Total hardness | : | < 0.1 | °D |
| Iron | : | < 0.1 | mg/l |
| Copper | : | < 0.05 | mg/l |
| Bound carbon dioxide (C02) | : | 0 | mmol/l desirable |
| Total salt content | : | < 10 | mg/l |

At least 80% condensate has to be returned from the steam consumers.
With current fuel prices a condensate return system is feasible, for breweries with a capacity above 500,000 hl/y.
For smaller breweries it has to be decided during engineering if a condensate return system is feasible.

Condensate piping system and, when applicable, the condensate/-mixing tank are to be made from stainless steel to avoid corrosion by carbonic acid.

In case of one degasifier the condensate goes directly into the degasifier.

In case of two or more degasifiers the condensate goes into a condensate/-mixing tank.
In this tank the condensate is mixed with the boiler make up water.

Open condensate systems will be used.

## 3.2 ADD ON

### 3.2.1 MAKE-UP WATER

The capacity of the make up water treatment must be based on 100 % peak load of the boiler plant without condensate return.

Heat recovery blow down tank in order to heat up make up water.

Application of a Reversed Osmosis (RO) installation to produce make-up water.
The advantage is less blow down water (energy and chemicals saving). The feasibility must be calculated for each case.

### 3.2.2 Boiler feed water

No add-ons

### 3.2.3 Boiler water

No add-ons

### 3.2.4 Condensate

Conductivity measurement with an alarm in the condensate return (to detect caustic leakages and wort leakages) from brew house and bottling hall are recommended.

Closed condensate system (No flash steam losses).

# 4. STEAM GENERATION

## 4.1 BASIC

### 4.1.1 FIRE TUBE BOILERS

Commonly the three-pass fire tube boiler type is applied because of the following reasons:
- The large water content has a damping effect on steam pressure- and boiler water level fluctuations due to changing loads.
- Less sensitive for boiler water quality.

Preferably a maximum production of 45 (kg steam/h)/$m^2$ heated surface.

Three-pass fire tube boilers can be executed with one fire tube or with two fire tubes per steam boiler. Two fire tubes could result in uneven material stress and eventually material failure.
Preference is given to boilers with one fire tube.

At least two boilers will be installed.
The total installed boiler capacity must suitable to meet the peak steam consumption.
Preferably equally sized boilers.

### 4.1.2 BURNERS

The type of applied burner depends on the type of fuel and the local emission requirements.
The emissions requirements can be related to $NO_x$ , $SO_2$, dust and soot and are depending on local regulations. In case no local regulations exist, the customer will decide upon standards.

## 4.2 ADD ON

### 4.2.1 FIRE TUBE BOILERS

In case an economiser is installed the level of the boiler water must be controlled continuously by means of three-way control valve in order to guarantee minimum flow over the economiser.
Feasibility to be decided.

The installed boiler capacity must suitable to meet the peak steam consumption, with equally sized boilers and one boiler spare.

Automatic blow down from the upper water level in the boiler with automatic blow down based on conductivity to remove TDS (total dissolved solids) continuously or intermittently.

Blow down from the bottom of the boiler to remove sludge based on time.

Heat recovery from the blow down water by means of a heat exchanger to heat up the make up water before the degasifier.

### 4.2.2 BURNER

Dual fuel burner when various types of fuels need to be applied.

Biogas burner to be applied in case of an anaerobic waste water treatment plant. Feasibility to be decided.

Frequency controlled combustion air fan and automatic control of fuel/air ratio in relation to $O_2$ concentration and possible CO concentration.

### 4.2.3 EFFICIENCY MEASUREMENTS

To determine the efficiency of the boiler the following measurements are required:

- Oxygen measurement of the flue gas combined with fuel analysis.
- $CO_2$ measurement of the flue gas
- Flue gas temperature
- Combustion air inlet temperature
- Fuel consumption meter
- Steam flow meter

The above measurement can be realised with:

- $CO_2$ and $O_2$ measurement by means of Bacharach Fyrite Gas Analyser.
- An electronic flue gas analyser.

### 4.2.4 HOT STAND-BY METHOD OF BOILERS

Each boiler is kept hot stand-by by means of a steam heated coil inside the boiler.

## 5. FLUE GAS

### 5.1 BASIC

The material to be used depends on the fuel quality and the ambient air conditions.

| *Carbon steel* | *Corten steel* | *Stainless steel* |
|---|---|---|
| Fuel with low sulphur content less than 0.1%. | In non-coastal areas.<br>Fuel with sulphur content lower than 0.5% in combination with an economiser. Without economiser higher sulphur concentrations are allowed | For coastal areas (316L).<br>With sulphur content higher than 0.5 % a stainless steel chimney in combination with a stainless steel economiser is advisable. |

The height of the chimney depends on the local conditions and regulations. In case no local regulations exist then the minimum height must be at least 20 m.

The free standing chimney is preferred (no mechanical coupling between roof and chimney). The strength of the chimney shall be calculated based on the maximum wind force and earthquake requirements.

Due to air flow around the chimney vibrations can occur. These vibrations can either be avoided by means of a spiral around the chimney or reduced by means of a damper in top of the chimney.
To be proposed by the supplier.

Insulation of the chimney is not mandatory and depends on the fuel specifications and local regulations.

### 5.2 ADD ON

No add-ons

## 6. STEAM DISTRIBUTION

### 6.1 BASIC

Basic will be a steam manifold.

### 6.2 ADD ON

Steam flow meters for each main consumer on the manifold.
Steam flow meters for each boiler.

## 7. UMCS

### 7.1 BASIC

The minimum requirements for BCS (brewery comparison system) are:

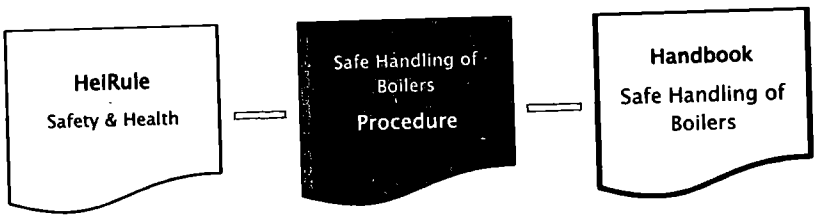
- Fuel consumption of the boiler plant (fuel intake).

### 7.2 ADD ON

If a Utility Monitoring System is applied, the following signals should be considered:

| Type of indication | Signals |
|---|---|
| Alarm | All alarms<br>To be specified by the supplier like:<br>General alarm<br>Steam pressure too low<br>High level in condensate<br>etc. |
| Pressure | Steam pressure boiler …<br>Steam pressure distribution |
| Flow | Boiler feed water<br>Steam flow per boiler<br>Natural gas per boiler<br>Biogas per boiler<br>Oil flow per boiler<br>Steam flow total |
| Temperature | Temperature make-up water<br>Temperature boiler feed water<br>Temperature boiler water<br>Temperature steam<br>Temperature condensate<br>Temperature flue gas |
| In operation | Boiler plant in operation |
| Consumption | Electricity consumption boiler plant<br>Fuel consumption per boiler |

# Global Safety Standard
# Safe Handling of Boilers

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*REVISION HISTORY*

| Issue | Change description | Status | Author | Date |
|---|---|---|---|---|
| 1 | First issue of procedure | Final | Dietmar Laske | Jan 2017 |
| 2 | Update to new template, no changes in content and no changes in requirements | Final | | September 2018 |
| 3 | Interlock of gas pipeline and draining of condensate | Final | Dietmar Laske | Feb 2021 |

*INTRODUCTION & OBJECTIVE*

The objective of this procedure is to assure technical and organisational compliance of steam and super-heated water boilers and to mitigate safety and environmental risks related to this equipment.

Mandatory is to:

- Implement this procedure by using the handbook "Safe Handling of Boilers";
- Implement all the necessary countermeasures to mitigate the identified risks.

*SCOPE*

This Global Supply Chain Error! Reference source not found.~~Safety Procedure~~ is mandatory for all HEINEKEN Operating Companies fully financially consolidated as published in the latest Annual Report HK N.V.
In case some of the requirements specified by local legislation are stricter, these stricter requirements need to be enforced.

In scope are all steam and super-heated water boilers including all piping, safety relief valves and accessories.

*DEFINITIONS*

The following definitions apply:

| Term | Definition |
|---|---|
| **PSM** | Process safety management. A framework for managing the integrity of operating systems by applying good design principles, engineering and operating practices to prevent and control incidents with the potential of unwanted release of hazardous substances or energy. Such incidents can cause toxic effects, fire or explosion and could ultimately result in serious injuries, fatalities, property damage, loss of production and environmental impact |
| **Boiler** | Pressure vessel used to generate steam or hot water, heating by means of electrical power, natural gas, bio-gas, bio-mass, coal or oil. All accessories like steam generators, condensate return systems, pipework, valves, pumps, etc. are considered as part of the equipment. Also included is piping for distribution of steam or super-heated water, up to the point of use (main valve of equipment) of steam and super-heated water, and piping and equipment for distribution of fuel up to the point of the burner/furnace. |
| **MOC** | Management of Change. A method to control the impact of changes in equipment and machinery, processes and procedures and organization on health, safety and environment |
| **Bowtie** | The bowtie gives a visual overview of all threats and consequences for potential events or known events inside Heineken and outside. The Heineken boiler bowtie is based on Hazop studies, the boiler checklist all P&IDs are developed by the Centre of Excellence Process Safety Management |
| **HAZOP** | Hazard and Operability Study. HAZOP is a formally structured risk assessment method. During a HAZOP each element of a system is systematically investigated on how parameters can deviate from the intended design conditions to create hazards and operability problems |
| **P&ID** | Piping and Instrument Diagram. Schematic drawing of process installation. A piping and instrumentation diagram/drawing is a diagram in the process industry which shows the piping and vessels in the process flow, together with the instrumentation and control devices |
| **Logbook** | A logbook is a (physical or digital) record of important events in the management, operation, maintenance and inspection of complex, safety critical equipment |
| **Process safety critical equipment** | For safety reasons critical process equipment, identified as such based on the flow chart in Appendix B of the procedure Process Safety Critical Equipment HMESC 01.40.01.727 |
| **PSM events** | Accidents, incidents and near misses related to PSM like unwanted loss of containment, alarms, fires, etc. |

| | |
|---|---|
| **Accredited third party** | Conformity assessment body as mentioned in PED 2014/68/EU |
| **PPE** | Personal Protection Equipment |

*PROCEDURE / STEPS*

The responsibilities are shown in the RACI in the process flow as shown in Appendix A. For each step in the process flow a description is given in chapters 5.1 and 5.2. In case of outsourcing of the equipment the requirements of this procedure have to be fulfilled as well.

### *General responsibilities*

The Production Unit Manager is responsible for the following activities:

- Assign a process owner and assign a qualified boiler operator;
- Identification of boilers including all piping, safety appendages and accessories;
- Minimize the risks for safety and environment;
- Comply to applicable Heineken Utility Process Equipment Standard Steam HMESC 01.30.71.210 & Process safety critical equipment, HMESC 01.40.01.727;
- Comply to local regulations.

### *Safe Handling of Boilers*

Step 1: Assign a process owner and qualified boiler operator

A process owner has to be assigned, responsible for implementation and roll out of this procedure and a qualified boiler operator has to be assigned. Local legislation can require specific trained or licensed boiler operators. The boiler operator is responsible for executing (a part of) the maintenance and inspection program according to SOP's.

Step 2: Identification of all boilers and their accessories

All boilers and accompanying accessories and piping up to the point of use of steam and/or super-heated water AND fuel supply lines and equipment have to be identified and recorded in the Heineken Process safety critical equipment dashboard, according to HMESC 01.40.01.727 Process safety critical equipment.

Step 3: Preventive measures

Based on the (pre-use) conformity assessment (see HMESC 01.40.01.727 Process safety critical equipment) preventive safety measures must be implemented. The following preventive measures can be applied, based on the risk assessment:

- Technical engineering measures;
    - Gas guarding;
    - Water level;
    - High pressure;
    - Explosive gas mixture burner;
    - Gasket replacement of manholes;
    - Water quality (make-up, condensate, feed and boiler water);
    - Ignition sources on the outside of the boiler shall be omitted and comply with Explosion Protection Document requirements;

- Direct draining of condensate (water, gas, etc.) without safety measures is not allowed. Draining shall only be done under strict controlled circumstances taking safety measures, at least, the following:
  - No ignition sources
  - SOP that describes LOTO procedure, step-by-step opening of draining valves, and use of portable monitoring device calibrated;
  - Gas guarding system
- Dead traps in gas pipelines where liquid condensate can be trapped shall be identified and omitted;

- Organisational safety measures;
  - Bowtie survey for boilers completed, action plan setup for gaps and mandatory barriers put in place
  - Fuel quality checks are in place (composition, moisture content, LHV)
  - Training of boiler operators;
  - Marking;
  - Maintenance and inspection program;
  - Alarm interventions (and draining activities)
  - Use of PPE;
  - Emergency preparedness and response;
  - Shut down, hibernation and start-up;
  - Access of boilers.

***Technical engineering measures (safety devices)***

*Gas guarding*

In case of natural gas, LNG, LPG, propane or butane or bio-gas fuelled boiler burners and gas generators, LEL detection must be applied according to Gas guarding systems HMESC 99.04.07.210, within the boiler room. An interlock of the gas guarding system and main gas supply line shall be put in place to assure blockage of the gas supply in case gas emission is detected by the gas guarding system. Similar LEL detection shall be applied in case of LNG, LPG, propane or butane is used as a fuel.

*Water level*

- Water level detection: two independent means of detection of the water level inside of the boiler vessel, including high and low water level alarm setting. The burner must be switched off at low water alarm level;
- Lowest water level: 100 mm above highest heating point of fire tubes;
- One feed water pump per boiler and one stand-by pump.

*High pressure*

- Pressure control switches (normal + maximum). The normal pressure control switches off the burner if the pressure comes above a set pressure. The maximum pressure switch is activated if the normal burner control does not work and stops the burner.

*Safety relief valves*

- Safety relief valves should be designed according to design rules.

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***Technical engineering measures (safety devices)***

*Gas guarding*

In case of natural gas, LNG, LPG, propane or butane or bio-gas fuelled boiler burners and gas generators, LEL detection must be applied according to Gas guarding systems HMESC 99.04.07.210, within the boiler room. An interlock of the gas guarding system and main gas supply line shall be put in place to assure blockage of the gas supply in case gas emission is detected by the gas guarding system. Similar LEL detection shall be applied in case of LNG, LPG, propane or butane is used as a fuel.

*Water level*

- Water level detection: two independent means of detection of the water level inside of the boiler vessel, including high and low water level alarm setting. The burner must be switched off at low water alarm level;
- Lowest water level: 100 mm above highest heating point of fire tubes;
- One feed water pump per boiler and one stand-by pump.

*High pressure*

- Pressure control switches (normal + maximum). The normal pressure control switches off the burner if the pressure comes above a set pressure. The maximum pressure switch is activated if the normal burner control does not work and stops the burner.

*Safety relief valves*

- Safety relief valves should be designed according to design rules.

- If the maximum pressure switch also does not work, the safety relief valves should open and blow off the steam when the design pressure of the boiler is reached. Per boiler, at least two safety relief valves must be present. Also, steam or super-heated water piping for distribution from boiler to point of use should be equipped with a safety relief valve if a pressure reducer is installed. This is to prevent over pressure on equipment with al lower designed maximum operating pressure when the pressure reducer is failing;
- Safety relief valves must be oriented in a safe direction (outside work space) so that an occasional blow off does not affect persons (exposure to steam, super-heated water, natural gas). Super-heated water should be discharged in a blow off tank. Blow off of fuel gas may not create an increased explosion hazard or fire hazard, the blow off area must be marked as an EX Zone, according to "Safe working in areas with explosive atmospheres (ATEX)" HMESC 01.40.01.807);
- Diameter of the safety blow off piping must be large enough to ensure proper relief, therefore design according to design rules from the PED Directive and applicable harmonized standards.

*Explosive gas mixture burner chamber*

The engineering standards of safety controls on burners to prevent an explosive gas mixture in the burner chamber are:

- Correct sequence of ignition. The correct sequence of ignition steps is:
    1. Air purging. Purging with air before start of the burner, so the fan is blowing fresh air in the fire tube during 1-3 minutes before ignition;
    2. Back to minimum air flow;
    3. Ignition start flame;
    4. Start flame detection ignition main flame;
    5. Main flame detection;
    6. Ignition main flame.
- Flame scanner;
- Rapid shut off valves in the gas train (in case of gas fuelled boilers only);
- Limit switches of the fuel and air valves;
- Pressure or flow switches (low and high) on fuel and air supply.

If ignition of gas in the burner fails, the boiler should be purged with air according to the agreed procedure to prevent an explosive gas mixture.

*Water quality*

The quality of boiler-, condensate-, feed-, and make-up water must be guaranteed. This can be done by installing inline analysers of water quality which indicate conductivity and/or pH. If this is not possible, water samples have to be taken each shift to determine the water quality. See also the preventive maintenance and inspection program. Check out the Utility Process Equipment Standard Steam, HMESC 01.30.71.210 for water quality standards.

***Organizational safety measures***

Fuel quality checks

The quality of the applied fuel should comply with the design specification of the burners. Certificates or (in line) fuel quality measurement system should be in place, indicating the composition, moisture content and LHV of the fuel. The fuel supplier shall inform the Production Unit (PU) in case the quality is deviating

from the agreed specifications so the PU can take countermeasures. In case a supplier is not able to provide information about the quality, an OpCo can decide to perform quality checks themselves.

In case a Production Unit is producing biogas, which is utilised in the boiler, than the PU itself should monitor the biogas quality ($CH_4$, $H_2S$ and moist) online and in case of deviations take action.

*Training of boiler operators*

The Production unit manager has to assign boiler operators. The boiler operator must be trained and well experienced in the job. Experience and training requirements should be added to the skill matrix of the OpCo. Less experienced operators can only work under supervision of an experienced and fully trained boiler operator. Minimum training required is boiler operator training from the manufacturer of the boiler, including safety during operation, use of PPE, etc.

*Marking*

All locations with potential exposure to steam, super-heated water, gas or oil shall be marked properly with warning signs (e.g. ISO 14726). All equipment shall be labelled with media coding, flow directions and colours. The following applies:

- Boilers vessels and piping must be provided with sign indicating the medium inside;
- Flow direction must be indicated on piping and pumps;
- "No smoking - no open fire" signs in areas where flammable gas or oil releases are possible;
- The boiler room entrance should be marked with signs preventing unauthorized personnel entering the area;
- Escape routes, fire-fighting material and assembly points shall be present and clearly indicated

*Maintenance and inspection program*

A preventive maintenance and inspection program must be implemented, as described in Appendix B. SOP's must be in place according to manufacturers' recommendations for periodical maintenance and inspections, done by the boiler operator. SOP's must at least cover all actions to be executed by the boiler operator as mentioned in table 1, Appendix B. Any decrease of the maintenance and inspection regime is seen as a substantial change. The Management of Change (safety) HMESC 01.40.01.708 procedure has to be applied.

Results of preventive maintenance, repairs and inspections are being recorded in the boilers' logbook (digital or physical). The logbook will remain with the boiler for the entire lifetime. During maintenance and inspection a safe workplace is assured by applying Safe Interventions (incl. LOTO), HMESC 01.40.01.702, Confined Space, HMESC 01.40.01.712 and Safe Work Permit, HMESC 01.40.01.313;

*PSM Events*

All accidents, incidents and LOPC's will be recorded in the boilers' logbook, investigated and shared within Heineken organisation as defined in Process safety critical equipment, HMESC 01.40.01.727. To ensure proper follow up on alarms, SOP's must be in place for alarm interventions, needed when safety controls are activated. The activation of a safety control must be investigated and reported according to Process safety critical equipment HMESC 01.40.01.727 (Lagging performance indicator). This is applicable for:

- Low or high water level alarm;
- Safety relief valve activated;
- Rapid shut off valve activated;
- No flame detected;
- LEL detection.

*Use of PPE*

Personal Protective Equipment (PPE) must be used to prevent against remaining risks, such as heated surfaces, exposure to steam and/or hot water (> 60 °C), exposure to dirt and soot. Examples of PPE to be used are:

- Safety glasses;
- (Thermal resistant) gloves;
- Face shields;
- Coverall;
- Bump cap or helmet;
- Long sleeves;
- Respiratory protection.

The use of PPE must be described in the SOP's. Employees and contractors should be adequately trained in the proper use of PPE.

*Emergency preparedness and response*

Scenario's describing the risks of boiler explosions and fire shall be included in the local emergency preparedness and response plan. Fire-fighting equipment emergency exits and escape routes must be present and available in boiler rooms. See Emergency Preparedness and Response procedure, HMESC 01.40.01.311.

*Shutdown, hibernation and start-up*

SOP's must be in place describing a safe and controlled shutdown, hibernation and start-up of the boiler.

*Access of boilers*

Boilers are defined as a confined space. Due to maintenance, repairs and inspections, it is possible that the boiler itself has to be entered. In such occasions, the procedure Confined spaces HMESC 01.40.01.712 must be applied. During maintenance and inspections, the procedure Safe interventions (incl. LOTO), HMESC 01.40.01.702 is applicable.

Step 4 Check effectiveness of preventive measures

After preventive measures have been implemented, it should checked whether the result of the implemented safety measure is according to expectations. If not, corrective actions must be taken. This analysis can lead to additional corrective actions. All corrective actions have to be recorded in the logbook.

*IMPLEMENTATION SCHEDULE*

This procedure and requirements will be applicable:

1. For existing boilers 1 year after issuing this procedure;
2. For CAPEX projects, greenfield and brownfield sites, with a planned delivery date after the issuing date, the requirements of this procedure are applicable from the start-up of the boiler(-s).

*VERIFICATION*

The following documents have to be present in case of internal or external verification:

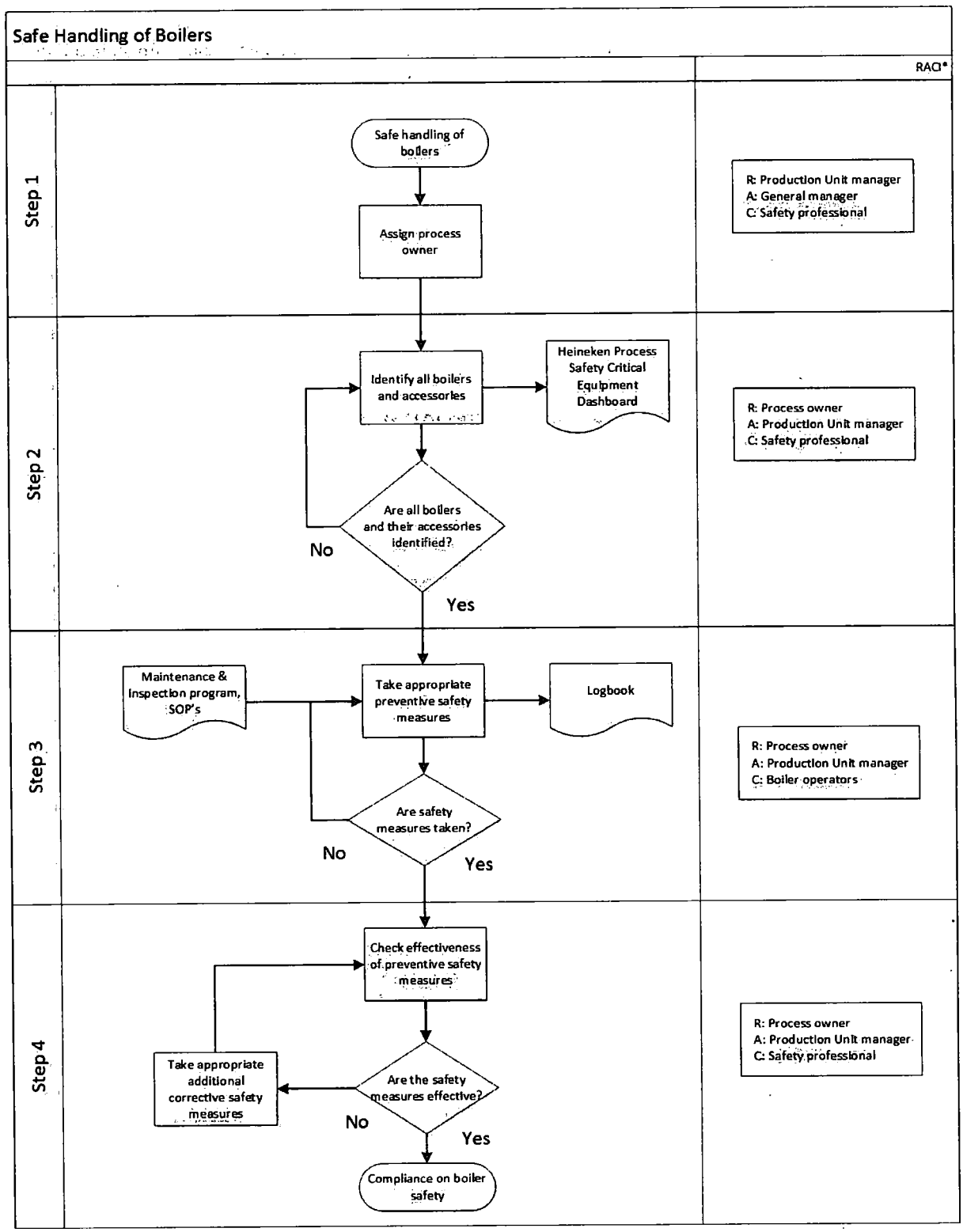
- Heineken process safety critical equipment dashboard;
- Boiler logbook;
- SOP's;
- All inspection reports (Accredited third party inspections, NDT inspections, burner inspections etc.).

These documents have to be kept by the unit for the entire lifetime of the boiler.

*REFERENCES TO OTHER DOCUMENTS*

- PED Directive 2014/68/EU;
- Utility Process Equipment Standard Steam, HMESC 01.30.71.210;
- Process safety critical equipment, HMESC 01.40.01.727;
- Gas guarding systems HMESC 99.04.07.210;
- Safe working in areas with explosive atmospheres (ATEX), HMESC 01.40.01.807;
- Management of Change (safety), HMESC 01.40.01.708;
- Bowtie - Hazard Operability (HAZOP), HMESC 01.40.01.706;
- Risk Assessment, HMESC 01.40.01.312;
- Confined Space, HMESC 01.40.01.712;
- Safe Work Permit, HMESC 01.40.01.313;
- Safe interventions (incl. LOTO), HMESC 01.40.01.702;
- Emergency Preparedness and Response procedure, HMESC 01.40.01.311.

*APPENDIX A – FLOW CHART SAFE HANDLING OF BOILERS*



*APPENDIX B - PREVENTIVE MAINTENANCE AND INSPECTION PROGRAM*

The preventive maintenance and inspection program should at least cover the following items:

*Periodical inspection*
All boilers and their accessories must be inspected periodically by a Heineken approved accredited third party, according to the frequency as defined in the procedure Process safety critical equipment, HMESC 01.40.01.727.

*Water level*
Check of water level detection daily.

*High pressure*
Once per week the maximum pressure switch needs to be checked to make sure it works.
The safety relief valves can corrode, so they may not open when needed. Therefore, the safety relief valves need to be tested and calibrated at least once per 2 years.

*Explosive gas mixture burner chamber*
The organisational safety controls to prevent an explosive gas mixture in the burner chamber are:
- Testing the flame scanner weekly;
- In case of gas fired burners, the two rapid shut off valves in the gas train must be leak tested once per 2 years;
- The proper position of the limit switches of the fuel and air flow must be checked once per 2 years;
- Pressure or flow switches (low and high) on fuel and air supply must be checked once per 2 years.

*Gasket replacement of manholes*
When manholes are being opened, gaskets must be replaced before closure. Instructions of gasket replacements of manholes must be available, considering:
- Applying the correct gaskets (like for like);
- Only new gaskets to be applied, no re-using of old gaskets;
- Location of gaskets;
- Fixation of bolts of manhole by using a torque wrench;
- Storage according to guidelines of the manufacturer;
- Gaskets must be free of asbestos.

*Water quality*
Boiler water, boiler feed water, make-up water and condensate must meet the requirements set in Utility Process Equipment Standard Steam, HMESC 01.30.71.210.
Regular blow downs are needed on a daily basis to remove sediment and to prevent scaling of surfaces.
Blow downs are needed on:
- Mobrey's;
- Water level gauges;
- Pressure switch header;
- Boiler bottom & surface.

*Fuel quality*

The fuel quality must meet the design specification of the combustion system. To be proved either by certificates provided at delivery or by inline measurement.

- Composition
- Moisture content
- LHV

| Overview of preventive maintenance and inspection* | | | |
|---|---|---|---|
| **Control** | **Action** | **Frequency** | **Responsibility** |
| Water level | Check of correct working of water level detection, according to SOP | Daily | Boiler operator |
| | Purging water level gauges, according to SOP | Daily | Boiler operator |
| | Mobrey purging, according to SOP | Daily | Boiler operator |
| Water quality | Check boiler water composition, according to SOP (See Utility Process Equipment Standard Steam, HMESC 01.30.71.210 for water quality specifications) | Each shift | Boiler operator |
| Steam pressure | Testing of maximum pressure switch, according to SOP | Weekly | Boiler operator |
| | Blow down of pressure switch header, according to SOP | Daily | Boiler operator |
| | Testing and calibration of safety relief valve | Once per 2 years | Accredited third party |
| Fuel quality | Check at delivery (certificates/inline measurement) | Each delivery / inline measurement | |
| Explosive gas mixture burner chamber | Testing flame scanner, according to SOP | Weekly | Boiler operator |
| | Leak testing rapid shut off valves | Once per 2 years | Accredited third party |
| | Check proper position of fuel and air valves | Once per 2 years | Accredited third party |
| | Check of correct working of fuel and air pressure switches | Once per 2 years | Accredited third party |
| Flue gas temperature | Check temperature, according to SOP | Monthly | Boiler operator |
| Smoke tubes | Cleaning smoke tubes, according to SOP | In case flue gas temperature is >20 °C to high | Boiler operator |
| Gasket replacement | Replace gaskets when manholes were opened, according to SOP | When manholes were opened | Boiler operator |

** minimal frequency, can be increased, based on requirements of manufacturer or local legislation*

**Boiler Safety Checklist**

| Nr. | Top Event | Checklist | Reference | Answer | Evidence | Překlad | Of. překlad |
|---|---|---|---|---|---|---|---|
| 1 | Boiler explosion | Is the design pressure of the boiler, manifold & piping higher than the working pressure? | EN 12953 - Shell boilers. Check supplier for design specifications or CE declaration of conformity | Not Applicable | | Je maximální konstrukční tlak kotle a rozvodů vyšší, než pracovní tlak? | Je konstrukční tlak kotle, rozvodů & potrubí vyšší než pracovní tlak? |
| 2 | Boiler explosion | Is a third party approval of the boiler available? | List of NOBO's | Not Applicable | | Je k dispozici certifikát akreditované třetí strany ke kotli. | Je ke kotli k dispozici souhlas třetí osoby? |
| 3 | Boiler explosion, release of steam / hot water | Has a conformity assessment conducted against the PED directive 2014/68/EG? | Pressure Equipment Directive 2014/68 | Not Applicable | | | Bylo provedeno posouzení shody dle směrnice PED 2014/68/EG? |
| 4 | Boiler explosion | Is a hard wired pressure control loop installed? | | Not Applicable | | Je instalována pevná kabelová tlaková smyčka? | Je instalována pevně zapojená kontrolní smyčka tlaku? |
| 5 | Boiler explosion | Is the boiler equipped with a pressure transmitter? | | Not Applicable | | Je kotel vybaven převaděčem tlaku | Je kotel vybaven tlakovým čidlem? |
| 6 | Boiler explosion | Is the pressure transmitter subject to the maintenance & inspection program? | | Not Applicable | | Je převaděč tlaku v programu údržby a kontroly? (CILT, profylax) | Podléhá tlakové čidlo programu údržby a kontroly? |
| 7 | Boiler explosion | Is the boiler equipped with a pressure switch? | 01.40.01.728 Safe handling of boilers, recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | | Je kotel vybaven tlakovým spínačem ? | Je kotel vybaven tlakovým spínačem? |
| 8 | Boiler explosion | Is the pressure switch SIL 1 or 2 classified? | 01.40.01.728 Safe handling of boilers, recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available. IEC 61508 (Functional safety of electrical / electronic / programmable electronic safety related systems), IEC 61511 (Safety instrumented systems for the process industry sector) | Not Applicable | | Je tlakový snímač označen SIL 1 nebo 2 | Je tlakový spínač klasifikován SIL 1 nebo 2? |
| 9 | Boiler explosion | Is the pressure switch subject to the maintenance & inspection program? | 01.40.01.728 Safe handling of boilers, recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | | Je tlakový snímač v programu údržby a kontroly (CILT, profylax) | Podléhá tlakový spínač programu údržby a kontroly? |
| 10 | Boiler explosion, release of steam / hot water | Is a safety relief valve installed on the boiler and the deareator, meeting the requiremetns of ISO 4126? | ISO 4126 | Not Applicable | | Je na kotli a odvzdušňovači umístěn pojišťovací ventil, který splňuje požadavky ISO 4126? | Je na kotli a deaerátoru instalován bezpečnostní pojistný ventil, který splňuje požadavky ISO 4126? |
| 11 | Boiler explosion, release of steam / hot water | Are all safety relief valve subject to the maintenance & inspection program? | 01.40.01.728 Safe handling of boilers, recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | | Jsou všechny pojišťovací ventily v programu údržby a kontroly? (CILT, profylax) | Podléhají všechny bezpečnostní pojistné ventily programu údržby a kontroly? |

| | | | | | |
|---|---|---|---|---|---|
| 24 | Boiler explosion | Is the low water level transmitter classified as SIL 1 or 2? | IEC 61508 (Functional safety of electrical / electronic / programmable electronic safety related systems); IEC 61511(Safety instrumented systems for the process industry sector); | Not Applicable | Je hladinové čidlo pro nízkou hladinu klasifikováno SIL 1 nebo 2? |
| 25 | Boiler explosion | Is the low water level transmitter subject to the maintenance & inspection program? | 01.40.01.728 Safe handling of boilers, recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je snímač nízké hladiny vody klasifikován jako SIL 1 nebo 2?<br>Podléhá hladinové čidlo pro nízkou hladinu programu údržby a kontroly? |
| 26 | Boiler explosion | Does the boiler water meet the requirements as defined in 01.30.71.210 Utility Process Equipment Standard Steam? | 01.30.71.210 Utility Process Equipme | Not Applicable | Je snímač nízké hladiny vody v programu údržby a kontroly?<br>Splňuje kotelní voda požadavky definované ve standardu 01.30.71.210 Utility Process Equipment Standard Steam? |
| 27 | Boiler explosion | Is boiler water treatment applied based on boiler water sample analysis? | 01.30.71.210 Utility Process Equipme | Not Applicable | Splňuje voda v kotli požadavky stanovené v normě 01.30.71.210 pro zpracovatelská zařízení pro užitkovou páru?<br>Upravuje se kotelní voda na základě výsledků rozborů z laboratoře? |
| 28 | Boiler explosion | Is the feed water meeting the requirements as defined in 01.30.71.210 Utility Process Equipment Standard Steam? | 01.30.71.210 Utility Process Equipme | Not Applicable | Vychází úprava vody v kotli z analýzy vzorků?<br>Splňuje napájecí voda požadavky definované ve standardu 01.30.71.210 Utility Process Equipment Standard Steam? |
| 29 | Boiler explosion | Is the boiler regularly purged and blown down? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Splňuje přiváděná voda požadavky stanovené v normě 01.30.71.210 pro užitkovou páru?<br>Je pravidelně prováděn odluh, odkal?<br>Je kotel pravidelně odvzdušňován? |
| 30 | Boiler explosion | Is the boiler equipped with a deareator with a working pressure below design pressure? | Check supplier for design specifications or CE declaration of conformity | Not Applicable | Je kotel vybaven odvzdušňovačem s pracovním tlakem nižším, než je konstrukční tlak?<br>Je kotel vybaven deareátorem s pracovním tlakem pod konstrukčním tlakem? |
| 31 | Boiler explosion | Is the feed water filtered before entering the deareator? | | Not Applicable | Je přiváděná voda filtrována před vstupem do deaerátoru?<br>Filtruje se napájecí voda před nap. nádrží? |
| 32 | Boiler explosion | Is chemical dosing applied based on feed water sample analysis? | 01.30.71.210 Utility Process Equipme | Not Applicable | Je dávkování chemie nastaveno podle rozboru napájecí vody?<br>Vychází chemické dávkování v kotli z analýzy přiváděné vody? |
| 33 | Boiler explosion | Is make up water treatment applied based on make up water sample analysis? | 01.30.71.210 Utility Process Equipme | Not Applicable | Nastavuje se úpravna vody podle rozboru upravené vody?<br>Vychází úprava doplňované vody z analýzy vzorků doplňované vody? |
| 34 | Boiler explosion | Is condensate water treatment applied based on condensate water sample analysis? | 01.30.71.210 Utility Process Equipme | Not Applicable | Upravuje se kondenzát podle rozboru kondenzátu?<br>Vychází úprava kondenzované vody z analýzy vzorků kondenzované vody? |
| 35 | Boiler explosion | Is the boiler subject to the maintenance & inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je kotel v CILTech?<br>Podléhá kotel programu údržby a kontroly? |

| | | | | | | |
|---|---|---|---|---|---|---|
| 49 | Boiler explosion, Internal fuel explosion | Is fire detection yearly calibrated? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je detekce požáru (kouře) každý rok kalibrována? | Jsou detektory požáru každoročně kalibrovány? |
| 50 | Boiler explosion, Internal fuel explosion | Are automatic fire extinguishers subject to a maintenace & inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je automatická detekce požáru v systému inspekce a údržby | Podléhají automatické hasicí přístroje programu údržby a kontroly? |
| 51 | Boiler explosion, Internal fuel explosion | Is a emergency alarm procedure present and implemented? | | Not Applicable | Existuje je zaveden postup v případě požáru (požární řád) | Existuje a je zaveden postup poplachu pro případ nouze? |
| 52 | Boiler explosion, Internal fuel explosion | Are emergency drills organized on a regular basis? | Local safety training matrix | Not Applicable | Jsou pravidelně organizovány nácviky na řešení mimořádných situací | Jsou pravidelně organizována cvičení pro případ nouze? |
| 53 | Boiler explosion, Internal fuel explosion | Are evacuation drills organized on a regular basis? | Local safety training matrix | Not Applicable | Jsou pravidelně organizovány nácviky evakuace | Je pravidelně organizován nácvik evakuace? |
| 54 | Boiler explosion, Internal fuel explosion, release of steam / hot water | Can first aid be provided by the first aid squad or medical assistance from the municipality? | | Yes | Může být zajištěna první pomoc jednotkou první pomoci, nebo obecní záchranou jednotkou? | Lze první pomoc poskytnout složkami první pomoci nebo zdravotnické pomoci v obci? |
| 55 | Boiler explosion, Internal fuel explosion, steam or release of steam / hot water | Are trainings and drills organized on a regular basis for all members of the first aid squad, based on the scenario "Boiler explosion"? | Local safety training matrix | Yes | Jsou pravidelná školení a nácviky pro scénář výbuchu kotle? | Organizují se pravidelně školení a cvičení pro všechny členy složek první pomoci, na základě scénáře „výbuchu kotle"? |
| 56 | Boiler explosion | Can fire fighting equipment (hydrants, fire fighting truck, other equipment) be applied in case of fire? | | Yes | Může být využito protipožární zařízení v případě požáru? | Lze v případě požáru nasadit hasící zařízení (hydranty, požární vozidla, a další zařízení)? |
| 57 | Boiler explosion, Internal fuel explosion | Is fire fighting equipment subject to the maintenance & inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Yes | Je protipožární zařízení pravidelně kontrolováno (CILT, profylax) | Podléhá požární zařízení programu údržby a kontroly? |
| 58 | Boiler explosion, Internal fuel explosion | Is a municipal fire brigade able to assist within 15 min after raising the alarm? | | Yes | Je dojezd hasičů pod 15 minut od spuštění alarmu? | Je schopen místní hasičský sbor zasáhnout do patnácti minut od spuštění poplachu? |
| 59 | Boiler explosion, Internal fuel explosion | Is the boiler room meeting the building construction requirements? | | Not Applicable | Splňuje kotelna kostrukční požadavky? | Splňuje kotelna požadavky na stavební konstrukce? |
| 60 | Boiler explosion, Internal fuel explosion | Is the design room book applied in the design of the boiler room? | | Not Applicable | | Používá se při návrhu kotelny konstrukční příručka? |
| 61 | Boiler explosion, Internal fuel explosion | Is the insurance company performing regular audits? | | Not Applicable | Provádí pojišťovna pravidelné audity? | Provádí pojišťovna pravidelné kontroly? |

| | | | | | | |
|---|---|---|---|---|---|---|
| 77 | Internal fuel explosion | Are biogas and natural gas supply lines separated by design? | | Not Applicable | Je přívod plynu a bioplynu oddělený? | Jsou přívody bioplynu a zemního plynu konstrukčně odděleny? |
| 78 | Internal fuel explosion | Is a back pressure valve installed on the biogas supply line? | | Not Applicable | Je na přívodu bioplynu zpětná klapka? | Je na přívodu bioplynu instalován zpětný tlakový ventil? |
| 79 | Internal fuel explosion | Is a flame arrestor installed in the biogas line? | | Not Applicable | Je na přívodu bioplynu instalován omezovač plamene? | Je v potrubí bioplynu instalován zhášeč plamene? |
| 80 | Internal fuel explosion | Is the flame arrestor subject to maintenance & inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je omezovač zaveden do CILT/Profylax? | Podléhá zhášeč plamene programu údržby kontroly? |
| 81 | Internal fuel explosion | Is a start-up procedure implemented to check the correct position of the valves? | | Not Applicable | Je v SOP na najíždění kotle zavedene kontrola správné polohy klapek/ventilů? | Je zaveden spouštěcí postup ke kontrole správné polohy ventilů? |
| 82 | Internal fuel explosion | Is the correct fuel / air mixture continously measured? | | Not Applicable | Měří se průběžně (nepřetržitě) správný poměr plynu/vzduchu? | Je neustále měřena správný směsný poměr paliva / vzduchu? |
| 83 | Internal fuel explosion | Is the correct valve position and combustion air flow monitored? | | Not Applicable | Je monitorována správná pozice klapek/ventilů a tah spalin? | Je monitorována správná poloha ventilu a přívod spalovacího vzduchu? |
| 84 | Internal fuel explosion | Is the pressure switch in the fuel supply line subject to a maintenance & inspection program? | | Not Applicable | Je tlakový spínač na přívodu plynu zaveden do CILT/Profylax? | Podléhá tlakový spínač v přívodním palivovém potrubí programu údržby a kontroly? |
| 85 | Internal fuel explosion | Is the pressure switch in the fuel supply line reliable? (SIL category TBD) | | Not Applicable | Je tlakový spínač spolehlivý? (Kategorie SIL se doplní) | Je tlakový spínač v přívodním palivovém potrubí spolehlivý? (SIL kategorie bude doplněna) |
| 86 | Internal fuel explosion | Is a fuel shut off procedure implemented in case of an (internal) fire or explosion? | | Not Applicable | Je implementován postup pro zavření plynu v případě požáru, či exploze? | Je zaveden postup uzavření přívodu paliva pro případ (vnitřního) požáru nebo výbuchu? |
| 87 | Internal fuel explosion | Is the deareator designed according to the PED Directive or ASME codes? | PED Directive or ASME code. Check supplier for design specifications or CE declaration of conformity | Not Applicable | Je napájecí nádrž navržena v souladu s PED směrnicí, nebo ASME kódem? | Je deaerátor konstruován v souladu se směrnicí PED nebo kodexy ASME? |
| 88 | Internal fuel explosion | Is an inspection and test plan applied during commissioning phase? | | Not Applicable | Probíhá kontrola a testování během fáze uvedení do provozu? (Platí pro nově instalovaný kotel???) | Používá se ve fázi uvádění do provozu kontrolní a zkušební plán? |
| 89 | Internal fuel explosion | Is a conformity assessment done on the deareator by a NOBO? | NOBO certificate | Not Applicable | Je provedeno posouzení shody na napájecí nádrži někým z NOBO? (viz řádek 5) | Je na deaerátoru prováděno posuzování shody ze strany NOBO? |
| 90 | Internal fuel explosion | Is a pressure control valve present on the deareator? | | Not Applicable | Je na napájecí nádrži instalován ventil pro regulaci tlaku? | Je na deaerátoru přítomen tlakový kontrolní ventil? |
| 91 | Internal fuel explosion | Is the pressure control valve subject to a maintenance and inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je kontrola ventilu zavedena do CILT/Profylax? | Podléhá tlakový kontrolní ventil programu údržby a kontroly? |

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| 92 | Internal fuel explosion | Is a vacuum breaker installed on the deareator (optional)? | | Not Applicable | Je na napájecí nádrži instalován ??vakuový vypínač?? (nepovinné) | Je na deaerátoru instalován zavzdušňovací ventil (volitelné)? |
| 93 | Internal fuel explosion | Is a independent high level switch installed on the deareator that stops make-up water & condensate supply? | | Not Applicable | Je napájecí nádrž vybavena nezávislým spínačem vysoké hladiny, který odstaví přívod upravené vody/kondenzátu? | Je na deaerátoru instalován nezávislý spínač pro vysokou hladinu, který zastaví přívod přídavné vody & kondenzátu? |
| 94 | Internal fuel explosion | Is the high level switch subject to maintenance & inspection program? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Not Applicable | Je kontrola spínače zavedena do CILT/Profylax? | Podléhá hladinový spínač pro vysokou hladinu programu údržby a kontroly? |
| 95 | Internal fuel explosion | Is collision protection installed to protect piping, vessels and other accessories? | | Not Applicable | Je na potrubí, nádobách a dalším příslušenství instalována ochrana před nárazem do daného zařízení? | Je k ochraně před nárazem instalována ochrana potrubí, nádob a dalšího příslušenství? |
| 96 | Release of steam / hot water | Is collision protection inspected on a regular basis? | Recorded in SAP, Maximo or equivalent MMS, ownership/responsibility is clear, budget is available | Yes | Je ochrana pravidelně kontrolována? | Je pravidelně kontrolována ochrana proti nárazu? |
| 97 | Release of steam / hot water | Is the RFQ on earthquake requirements applied if needed (depending on location)? | | Not Applicable | Nezjistil jsem, co znamená RFQ, ale otázka se zřejmě týká bezpečnosti zařízení při zemětřesení. | Uplatňuje se podle potřeby RFQ u požadavků pro případ zemětřesení (v závislosti na místě)? |
| 98 | Release of steam / hot water | Is cooling installed on water sampling outlets? | | No | Je instalováno chlazení na odběrných místech? | Je na výtoku pro odběr vzorků vody instalováno chlazení? |
| 99 | Release of steam / hot water | Are SOP's implemented on prevention of releases of hot water or steam? | | No | Je vytvořeno SOP pro prevenci vypuštění horké vody/páry? | Je zavedeno SOP k prevenci úniků horké vody nebo páry? |
| 100 | Boiler explosion, Release of steam / hot water | Are competent, trained boiler operators assigned? | Local skill matrix | Yes | Jsou na kotelnu přiřazení kompetentní, zkušení operátoři? | Jsou přiděleni kompetentní proškolení pracovníci obsluhy kotle? |
| 101 | Release of steam / hot water | Are PPE (gloves, face shield, safety shoes) used to prtect against exposure to steam or hot water? | | Yes | Používá se OOPP k ochraně před zasažením horkou vodou/párou? | Používají se k ochraně před expozicí páře nebo horké vodě osobní ochranné prostředky (rukavice, obličejový štít, bezpečnostní obuv)? |
| 102 | Release of steam / hot water | Are all blow offs from safety relief valves situated on a safe location? | | Yes | Jsou svedeny odfuky z poj. ventilů na bezpečné místo? | Odvádí se odfuk z bezpečnostních pojistných ventilů na bezpečné místo? |
| 103 | Release of steam / hot water | Is IP 55 or higher applied in case electrical equipment can be exposed to water or steam? | | Yes | Je použito alespoň IP 55 v místech, kde hrozí zasažní elektrického zařízní vodou, nebo párou? | Používá se pro expozici elektrického zařízení vodě nebo páře norma IP 55 nebo vyšší? |

Yes