## Appendix 2.4      Design Parameter of CHP

**Emissions Level of the Exhaust of CHP in YLEPP**

| Air Pollutant | Emission Level (mg/Nm$^3$) | Ref. from | YLEPP CHP Emission Level (mg/Nm$^3$) (Oxygen Content of 5%) |
|---|---|---|---|
| RSP | 15 | OWTF EIA[1] | 16 |
| NOx (as NO$_2$) | 30 | Engineer [2] | 30 |
| SO$_2$ | 50 | OWTF EIA [1] | 53 |
| NH$_3$ | 8 | EPD BPM [3] | 22 |
| CO | 650 | OWTF EIA[1] | 694 |
| VOCs [4] | 150 | OWTF EIA[1] | 160 |
| HCl | 10 | OWTF EIA[1] | 11 |
| HF | 1 | OWTF EIA[1] | 1 |

Remarks:

[1] The emission level is taken as reference from the approved EIA for Organic Waste Treatment Facilities Phase I (AEIAR-149/2010) and the associated VEP (i.e. Application No. VEP-488/2015). The emission level refers to an oxygen content of 6% and dry basis.

[2] The emission level is estimated by Engineer. The emission level refers to an oxygen content of 5% and dry basis.

[3] The emission level is referenced to "A Guidance Note on the Best Practiable Means for Electricity Works (Coal-fired Plant, Gas-fired Gas Turbine, and Oil-fired Gas Turbine (Peak Lopping Plant)) BPM 7/1 (2018)". The emission level refers to an oxygen content of 15% and dry basis.

[4] VOCs is considered as Non Methane VOCs (NMVOCs).

**Conversation from different oxygen content to 5% oxygen content at CHP**

In accordance with Annex VI of EU Directive 200/76/EC,

Ca, dry, Oa       = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)

| | |
|---|---|
| *Oa:* | *Oxygen concentration of flue gas, dry gas* |
| *Os:* | *Standard oxygen concentration, dry gas* |
| *Ca, dry, Oa:* | *Actual flue gas concentration, dry gas, Oa* |
| *Ca, dry, Os:* | *Actual flue gas concentration, dry gas, Os* |

**Emission level of RSP at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 15

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 15 x (20.9 - 5) / (20.9 - 6)
= 16.01

**Emission level of SO2 at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 50

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 15 x (20.9 - 5) / (20.9 - 6)
= 53.36

**Emission level of NH3 at CHP**

Oa = 5%
Os = 15%
Ca, dry, Os = 8

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 8 x (20.9 - 5) / (20.9 - 15)
= 21.56

**Emission level of CO at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 650

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 650 x (20.9 - 5) / (20.9 - 6)
= 693.62

**Emission level of VOCs at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 150

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 150 x (20.9 - 5) / (20.9 - 6)
= 160.07

**Emission level of HCl at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 10

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 10 x (20.9 - 5) / (20.9 - 6)
= 10.67

**Emission level of HF at CHP**

Oa = 5%
Os = 6%
Ca, dry, Os = 1

Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
= 1 x (20.9 - 5) / (20.9 - 6)
= 1.07

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## Appendix 2.4　　Design Parameter of Ammonia Stripping Units

**Emissions Level of the Exhaust of Ammonia Stripping Units (ASP) in YLEPP**

| Air Pollutant | Emission Level (mg/Nm$^3$) | Ref. from | YLEPP ASP Emission Level (mg/Nm$^3$) (Oxygen Content of 5%) |
|---|---|---|---|
| RSP | 5 | OWTF EIA[1] | 8 |
| NOx (as NO$_2$) | 60 | Engineer [2] | 96 |
| SO$_2$ | 50 | OWTF EIA[1] | 80 |
| NH$_3$ | 10.5 | Engineer [2] | 17 |
| CO | 100 | OWTF EIA[1] | 161 |
| VOCs [3] | 20 | OWTF EIA[1] | 32 |
| HCl | 10 | OWTF EIA[1] | 16 |
| HF | 1 | OWTF EIA[1] | 2 |

Remarks:
[1] The emission level is taken as reference from the approved EIA for Organic Waste Treatment Facilities Phase I (AEIAR-149/2010) and the associated VEP (i.e. Application No. VEP-488/2015). The emission level refers to an oxygen content of 11% and dry basis.

[2] The emission level is estimated by Engineer (with installation of carbon filter with NH$_3$ removal efficiency of 70%). The emission level refers to an oxygen content of 11% and dry basis.
[3] VOCs is considered as Total VOCs.

**Conversation from different oxygen content to 5% oxygen content at ASP**
In accordance with Annex VI of EU Directive 200/76/EC,
Ca, dry, Oa　　　　= Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)

| | | |
|---|---|---|
| Oa: | Oxygen concentration of flue gas, dry gas | =5% |
| Os: | Standard oxygen concentration, dry gas | =11% |
| Ca, dry, Oa: | Actual flue gas concentration, dry gas, Oa | |
| Ca, dry, Os: | Actual flue gas concentration, dry gas, Os | |

**Emission level of RSP at ASP**
　　Ca, dry, Os = 5

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 5 x (20.9 - 5) / (20.9 - 11)
　　　　　= 8.03

**Emission level of NOx at ASP**
　　Ca, dry, Os = 60

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 60 x (20.9 - 5) / (20.9 - 11)
　　　　　= 96.36

**Emission level of SO$_2$ at ASP**
　　Ca, dry, Os = 50

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 50 x (20.9 - 5) / (20.9 - 11)
　　　　　= 80.30

**Emission level of NH$_3$ at ASP**
　　Ca, dry, Os = 10.5

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 21 x (20.9 - 5) / (20.9 - 11)
　　　　　= 16.86

**Emission level of CO at ASP**
　　Ca, dry, Os = 100

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 100 x (20.9 - 5) / (20.9 - 11)
　　　　　= 160.61

**Emission level of VOCs at YLEPP**
　　Ca, dry, Os = 20

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 20 x (20.9 - 5) / (20.9 - 11)
　　　　　= 32.12

**Emission level of HCl at YLEPP**
　　Ca, dry, Os = 10

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 10 x (20.9 - 5) / (20.9 - 11)
　　　　　= 16.06

**Emission level of HF at YLEPP**
　　Ca, dry, Os = 1

　　Ca, dry, Oa = Ca, dry, Os x (20.9 - Oa) / (20.9 - Os)
　　　　　= 1 x (20.9 - 5) / (20.9 - 11)
　　　　　= 1.61

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