

Malta North Waste Treatment Plant: Application for Renewal of IPPC permit IP 0007/13/A



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Cover image from Google Earth (2017)

Introduction

1. The Malta North Waste Management Facility (Malta North) consists of a waste management facility designed for the treatment of municipal wastes. The facility currently includes the following specified activities (or directly associated activities as defined under the IPPC regulations) as specified under IP 07/13/A:

- **Mechanical Treatment Plant (MTP)** receiving a range of municipal and bulky wastes for sorting, baling and temporary storage;
- **Anaerobic Digester Plant (AD)** receiving sorted biodegradable wastes from the MTP as well as animal manure, production of a slurry, and biological hydrolysis and digestion to produce a compost;
- Pipework between the two plant for the transfer of wastes and process water;
- **Wastewater treatment plant**, for treatment of waste waters;
- **Biogas management** through collection of biogas and production of energy using a CHP;
- **Mitigation plant** including biofilters, fast roller shutters and air curtains; and
- **Diesel Generator** to generate electric power in case of electricity failure.

The above facilities are described in detail in the original IPPC application and Environmental Impact Statement, which are to be considered in conjunction with this application for renewal.

2. This plant was first approved through approval of the following development permits:
 - PA/01293/12 *Construction of a mechanical waste treatment plant including weigh-bridge station, administration building, car-parking spaces, external storage spaces, sub-station, wheel wash facility and circulation roads.* Approved in November 2013
 - PA/01294/12 *Construction of biological treatment plant and manure (animal husbandry) treatment plant, including site offices / control rooms and circulation roads.* Approved in April 2013

The above applications were supported by an Environmental Impact Assessment Update on the Master Plan for the Maghtab Environmental Complex. The IPPC permit IP 07/13/A allowed its operation in November 2015.

Scope of the application

3. This application is for renewal of permit for an IPPC activity consisting of the '*Recovery of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment*' as permitted under IP 0007/13/A. No variation is being proposed.
4. The application for renewal includes the following documentation (as annexes), to facilitate review of implementation of permit requirements and operations:
 - Annex 1 - a review of the items in the improvement programme list as per table 1.5.1 of the IPPC permit
 - Annex 2 – Process Flow diagram
 - Annex 3 – Plans
 - Annex 4 – MCP Registration & CHP Documentation
 - Annex 5 – Generators
 - Annex 6 – Best Available Technique (BAT)
 - Annex 7 – Statutory Consultation Process
5. The Environment & Resource Authority conducted the consultation process with statutory consultees as required by the IPPC process. The comments from the consultees and the required feedback from Wasteserv are documented in Annex 7. These included requests for:
 - more detailed plans of the plant and location of fuel tanks, which are provided here as Annex 3; and
 - details and registration of Combined Heat & Power plant and generators which are provided as annexes 4 & 5.
6. A review of the improvement programme indicates that three deliverables have not been implemented on the date stipulated within the permit, and work on these deliverables is still under way given the following constraints:
 - The Environmental Management System has been finalised, and the certification process is under way;
 - The updated Environmental Monitoring Plan which is being discussed for the whole Maghtab Environmental Complex, of which the Malta North facilities are an integral part; and
 - Ongoing discussions with the Water Services Corporation regarding the potential for a sewerage connection for the Maghtab Environmental Complex.

7. During the process of evaluation of the request for renewal of permit, ERA requested that operations at the installation be compared with the *COMMISSION IMPLEMENTING DECISION (EU) 2018/11747 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council*. The response of Wasteserv is provided as Annex 6, together with the queries raised by ERA and the resultant feedback.

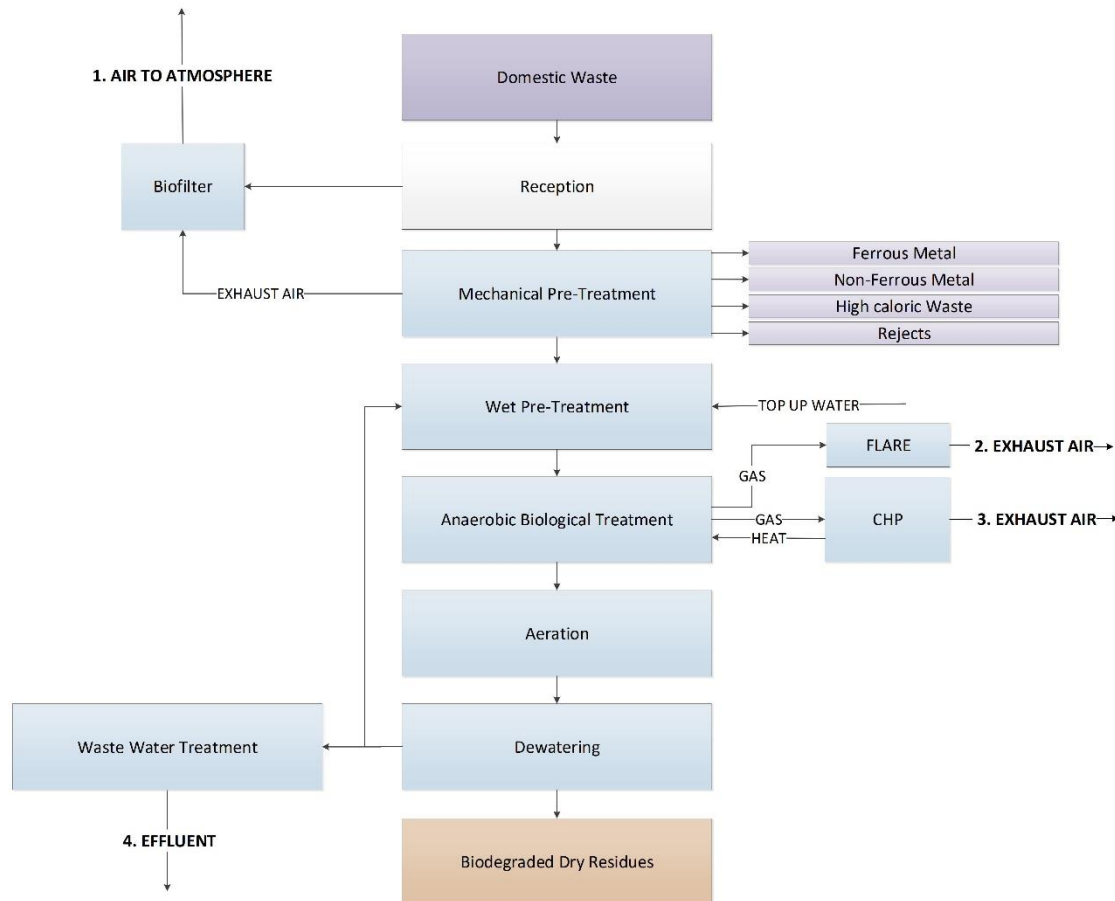
ANNEX 1: Improvement Programme of IP 0004/07/B

Reference	Improvement	Date	Status
1	Submission of an Environment Management System (EMS), as per Conditions 1.3.1 and 1.3.2	Within one year of issue of permit	EMS submitted on 23.07.2019
2	Submission of a Cleaning Plan which identifies the programme for regular cleaning for the entire facility.	Within three months of issue of permit	Submitted.
3	Submission of standard operating procedures indicating actions to be taken in case of failure or breakdown of abatement systems.	Within six months of issue of permit	Submitted during January 2018.
4	Certification by an independent warranted civil engineer or engineer that the pipework connecting the MBT and AD plants and its containment system are leak proof.	Within six months of issue of permit.	Submitted.
5	Operator is to submit for MEPA approval, plans for installation of adequate bunding to all fuel storage tanks, and provision of drip trays for filling area, including time frames for implementation Certification by an independent warranted civil engineer or engineer that the pipes, pumps, valves and flanges forming part of the fuel transfer system are leak proof.	Within six months of issue of permit	Submitted during March 2018.

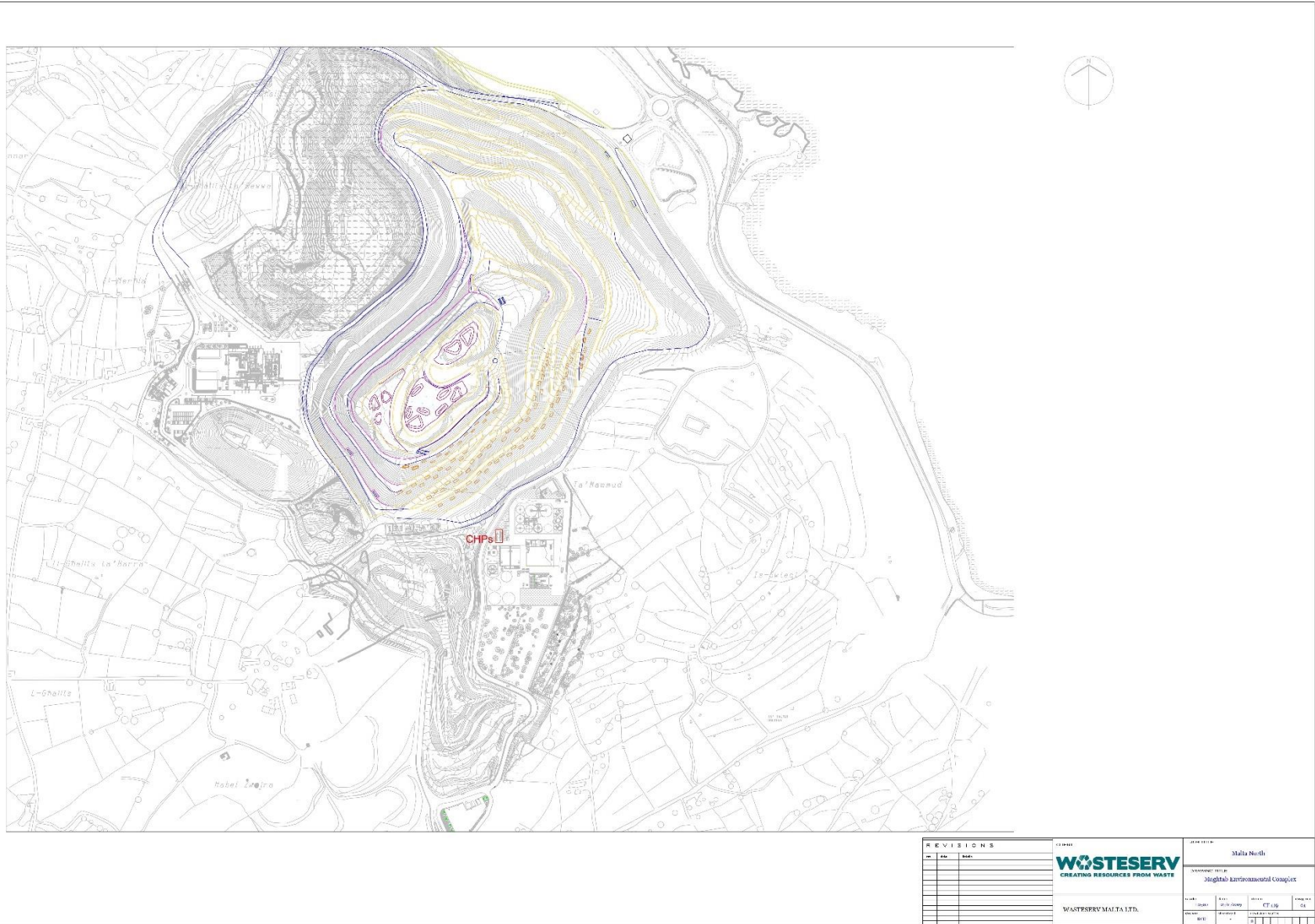
Reference	Improvement	Date	Status
6	<p>Provision of consolidated proposal for monitoring of air, land, groundwater and noise to the satisfaction of the Competent Authority. This shall take into account the original monitoring plan for the Ghallis facilities and its updates.</p> <p>The land and groundwater monitoring proposal shall be submitted in conformity with Articles 16(2) and 22 of the Industrial Emissions Directive, 2010/75/EU.</p> <p>Carrying out monitoring in accordance with the approved consolidated monitoring proposal.</p>	<p>Within two months of issue of permit</p> <p>Within two months of approval of monitoring proposal.</p>	<p>Submitted to ERA as part of the Environmental Monitoring Programme for the Maghtab environmental Programme; currently under discussion with ERA at date of application.</p>
7	<p>To obtain a Sewer Discharge Permit with the Water Services Corporation as per condition 2.6.3.1 of this permit.</p>	<p>Within one year of issue of permit</p>	<p>Surplus water, which is the result output of the Waste Water Treatment Plant, is being disposed by bowser in Ta' Qali Discharge Point. Tests are being done on a monthly basis and communicated to WSC accordingly. Wasteserv is also in discussion with WSC to reach a Voluntary Undertaking between both parties to improve the quality of the effluent.</p> <p>i. The waste waters are generated at the dewatering station where the wet digestate following anerobic digestion is segragated into compost-like material and a liquid. This liquid is treated in a Sequential Batch Reactor (SBR) and directed for further treatment as per above. ii. There is no RO at MN. An application for a water discharge permit was submitted to WSC in 2017.</p>

ANNEX 2: Process Flow Diagram

Malta North Process Flow & Emission Sources

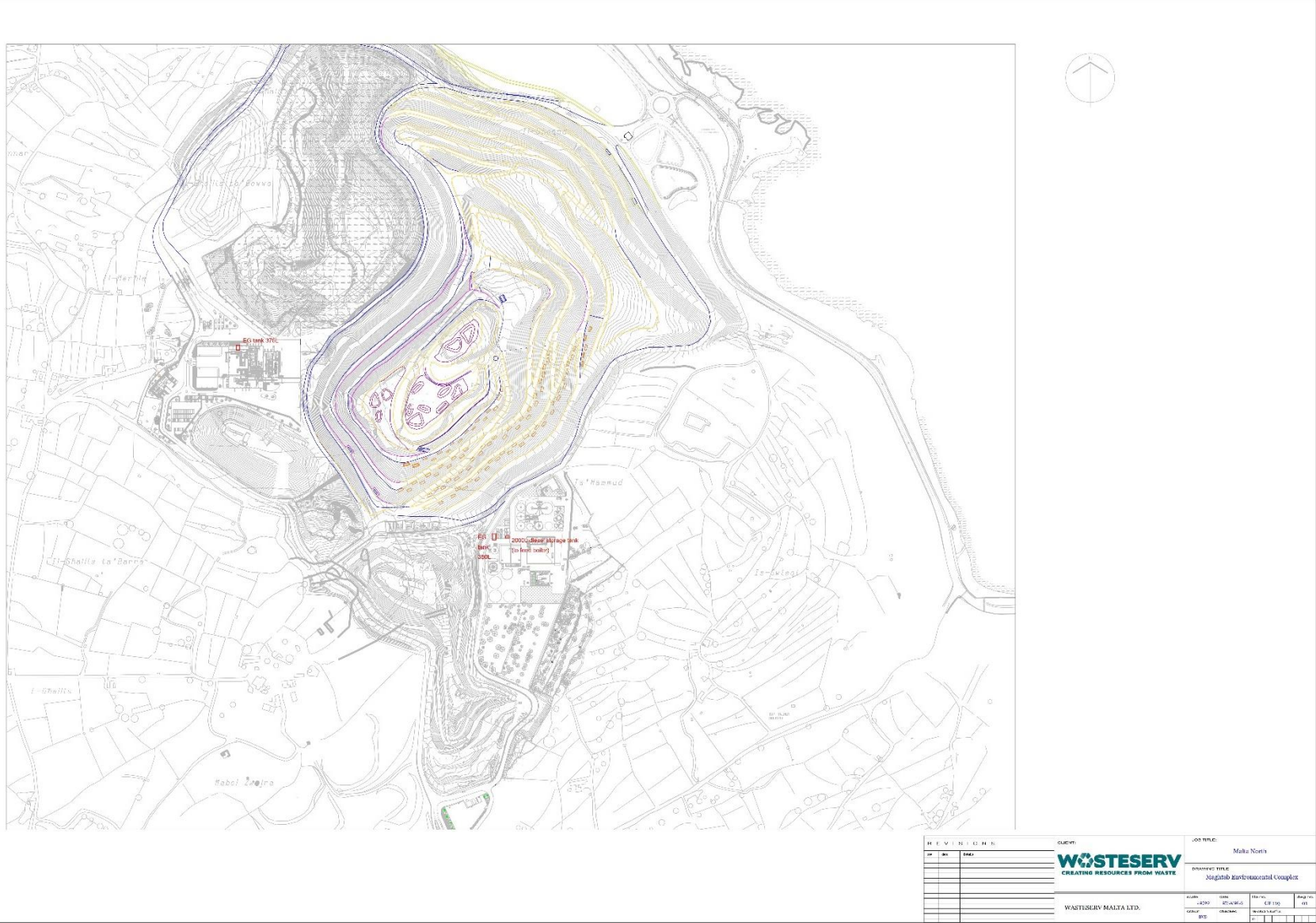


ANNEX 3: Plans



REVISIONS			Project Name	
No.	Date	Description	Mala North	

		Project Name	
		Mala North	
		Prepared by	
		Mighty Environmental Complex	
Date	Rev.	Drawn by	Checked by
20/02/2020	01	CP	GA
Scale			



ANNEX 4: MCP Registration & CHP Documentation

Medium Combustion Plant Registration



Section 1: Applicant Details and Contact Information

1.1. Type of Applicant

Tick the correct option from the below:

- | | | |
|--------------------|-------------------------------------|-------------------|
| Individual | <input type="checkbox"/> | Go To Section 1.2 |
| Registered Company | <input checked="" type="checkbox"/> | Go To Section 1.3 |
| Organisation | <input type="checkbox"/> | Go To Section 1.4 |

1.2. Details of Individual

Provide the below information:

- Name
- Surname
- Address (Line 1)
- Address (Line 2)
- Locality
- Post Code
- ID Card Number
- VAT Number (If Applicable)

Proceed to Section 2.1.

1.3. Company Details

Provide the below information:

Company Name	WasteServ Malta Ltd.
Address (Line 1)	EkoCentre
Address (Line 2)	Triq il-Latmija
Locality	Marsaskala
Post Code	MSK 4613
Telephone Number	2385 8000
VAT Number	16567121
Company Registration Number	C30567

Additionally, provide the below information for the Legal Representative/s of the company:

Name	Tonio
Surname	Montebello
Telephone Number	2385 8000
Mobile Number	/
Email Address	info.ws@wasteservmalta.com

Proceed to Section 2.1.

1.4. Organisation Details

Provide the below information:

Name of Organisation

Type of Organisation

Address (Line 1)

Address (Line 2)

Locality

Post Code

Telephone Number

VAT Number (If Applicable)

Additionally, provide the below information for the legal representative/s for your organisation:

Name

Surname

Telephone Number

Mobile Number

Email Address

Proceed to Section 2.1.

Section 2: Site Details

2.1. Details of Activities on Site

Provide details of the sector of activity of the MCP in the facility in which it is installed together with the associated NACE Code. A link for the list of NACE codes can be found [here](#).

Activity	NACE Code
Treatment and disposal of non-hazardous waste	3821

2.2. Address of Site

Provide the address for the site:

Address (Line 1)	Malta North Waste Treatment Plant
Address (Line 2)	Ta' Hammud within Tal- Maghtab Waste Treatment Waste Management Complex
Post Code	Triq il- Kosta, Maghtab I/o Naxxar

Section 3: Fuels and Combustion Plants

3.1. Medium Combustion Plants (MCP)

List all medium combustion plants in the below table:

Combustion Plant Code	Type of Combustion Plant	Manufacturer	Serial Number
CP1	CHP	MWM	1420906
CP2	CHP	MWM	1420894
CP3			
CP4			
CP5			

Add more rows as required.

3.2. Fuels used by Combustion Plant

Fill in the table below for each fuel tank (including built-in tanks) on site:

Fuel Type	Maximum Tank Capacity	Annual Consumption	Storage Tank Arrangements ¹	Containment Measures	Fill Point Code
Biogas	100	4,05 6,78 5*	Direct connection	N/A	FB1

¹ e.g.: Underground/ In-built etc.

Add more rows as required.

**biogas produced in 2018*

3.3. Additional details.

For each MCP on site Kindly also compile the information requested in Annex 1 below

Section 4: Plans

4.1. Site Plan

Provide a site plan showing the site area and boundaries according to the below specifications. This is to be attached with the application and clearly labelled as **Attachment 1**.

The site plan should:

- Be an A4 or A3 sized plan;
- Be of a scale of 1: 10,000 or 1: 2,500 as appropriate;
- Show all existing development within 250 metres of the boundary site including all roads and buildings;
- Indicate in red the outline of the proposed site including all necessary infrastructure (existing and/or proposed), such as site access roads.

4.2. Site Layout Plan

Provide a site layout plan (in A3 or larger) clearly showing the location of the Medium Combustion Plants on site together with the fuel tanks and stacks. To identify each of the mentioned items, use the below location codes:

- Combustion Plant Codes (e.g. CP1) from Section 3.1
- Fuel Tank Codes (e.g. F1) from Section 3.2
- Fill points Codes (e.g. FB1) from Section 3.2
- Emission Codes (e.g. CP1/1) from Point 16 of the below Annex

This is to be attached with the application and clearly labelled as **Attachment 2**.

Section 5: Declaration

PLEASE READ THE FOLLOWING BEFORE SIGNING - Data Protection Clause

In terms of the Data Protection Acts, 2018 (Act 586 of 2018), we will process any personal and/or sensitive data supplied on/in this application, request or notification form or subsequently supplied by yourself, whether orally or in writing, for all or any of the following:

1. To provide our service to you, including the proper processing of your application, request and/or notice as submitted;
2. To identify you and for the verification of the information provided to our officers;
3. Preventing, detecting and/or prosecuting fraud and any other criminal activity which the Authority is bound to report and/or act upon whilst meeting any other specific legal or regulatory obligations;
4. Establishing, exercising or defending any legal action;
5. Internal management, research and statistics, systems administration, the development and improvement of our services;
6. The protection and promotion of our legitimate interests and the proper conduct of our obligations arising under any law or statutory instrument; and
7. To make public the necessary information as specified in the relevant laws and to fulfil an obligation under law.

You acknowledge that in reviewing this application, the Authority may process, disclose, transfer or share your personal data to its employees; to any other Government Authority or Entity; and to any other third parties in order to comply with applicable Laws, and by signing this form you are giving your consent to the Authority to do so.

Every field on the form is mandatory. Should you fail to fill in any mandatory field, we reserve the right to refuse the application. Should any field be inapplicable to your particular circumstances please mark that field with the letters "N/A".

You have the right to require that we provide you with access to your personal data as well as the right to rectify, or, in appropriate circumstances, erase/edit any inaccurate, incomplete or immaterial personal data which is being processed. However, you are required to inform us immediately of any alterations relating to your personal data which we are processing.

By signing this form, you confirm that you are giving your explicit consent, in terms of the Data Protection Act, on behalf of yourself and all the other persons specified in this form for the Authority to process your respective personal information as outlined above and you confirm that you have brought this Data Protection notice to the attention of these other persons and obtained their respective consents.

We undertake to implement appropriate measures and safeguards for the purpose of protecting the confidentiality, integrity and availability of all data processed.

I the undersigned apply for the Medium Combustion Plant Registration as indicated above, and declare that, to the best of my knowledge, all the information contained in this application and on the submitted supplementary forms and documentation is complete and correct. I also understand that any incomplete, fraudulent or misleading information will annul the application or registration, and may also incur any relevant penalties. I understand that should the Permit in respect of this Application either be granted, refused or dismissed by the Authority, the Authority may in accordance with the Law disclose and/or publish my Personal Data, and for all intents and purposes I am hereby giving my full consent to the Authority to do so. I also declare that I have read the data protection clause above.

Signature

*Name / On
Behalf Of*

Date

FOR OFFICE USE ONLY

Administration Unit Stamp with date:

ERA Permitting Unit Stamp with date:

Assigned Application Number:

EP

Annex 1: Further Submissions for CHP 1

This Annex is to be submitted for **each** MCP and labelled as **AN/XXX²**.

1. Location Code from Section 3.1: **CP1**

2. Rated Thermal Input (MW_{Th}): **1.413**

A Warranted Engineer's declaration/ calculation of the rated thermal input of the combustion plant is to be provided as **AN/CP1/A**.

3. Category:

- Diesel Engine
- Dual Fuel Engine
- Gas Turbine
- Other Engines Kindly Specify: [Gas Combustion Engine](#)
- Other MCP Kindly Specify: [Click or tap here to enter text.](#)

4. Fuel Category:

- Solid Biomass
- Other Solid Fuel
- Gas Oil
- Liquid Fuel other than Gas Oil
- Natural Gas
- Other Fuel other than Natural Gas

5. Fuel Use and Ratio:

	Fuel Category	Fuel Used per Annum	Fuel Ratio (%) – If Applicable
Fuel 1	Other Fuel other than Natural Gas	4,056,784.959*	N/A

² **XXX** is to be replaced by the location code of the combustion plant provided in Point 1 of this Annex.
 *total amount of biogas fed to both CHPs.

Fuel	Choose an item.
2	
Fuel	Choose an item.
3	
Fuel	Choose an item.
4	

Add more rows as required.

6. Annual Fuel Consumption: [4,056,784.959m³ of biogas \(includes also amount referred to second CHP\)](#)

7. Is MCP already installed on site? [Yes](#)

If **No**, Point **8** and **9** are to be left blank.

If **Yes**, Point **10** is to be left blank.

8. Date of Start of the operation of MCP: [01/01/2017](#)

In the case of the date of start of operation being before 20th December 2018, proof of this is required. This is to be provided as **AN/CP/B**.

9. Annual operating hours of the MCP for the last five years and average calculation:

Year	Average Annual Operating Hours
2017	5263
2018	2761

5-year
Rolling
Average

10. Expected annual operating hours: [Click or tap here to enter text.](#)

11. If the MCP is not used (as per average stated in Point 9) or is expected to be not used (as per point 10) for more than 500 hours annually, a signed declaration stating that the combustion plant will not be used for more than 500 hours annually is to be provided as **AN/XXX/C**.

12. Average load in use (%): [100](#)

13. Are emissions currently monitored? **Yes**

If **Yes**, the latest monitoring results are to be provided as **AN/CP/D**.

14. Yearly waste gas flow rate: **N/A**

15. Number of Stacks: **1**

16. Height and Location of Stacks:

In the Emission Code Column, XXX is to be replaced with the Combustion Plant code provided in Point 1.

Stack Number	Emission Code	Stack Height (m)	GIS Coordinates of Stack
1	CP/1	3	35.943999, 14.441829
2			
3			

Add more rows as required.

17. Attachment Summary

Attachment	Provided (Tick if Yes)
A	<input checked="" type="checkbox"/>
B	<input checked="" type="checkbox"/>
C	<input type="checkbox"/>
D	<input checked="" type="checkbox"/>

Further attachments as deemed necessary by applicant are to be listed below and labelled using the same method as described above and using the correct letter.

Attachment	Description
E	
F	
G	
H	

Add more rows as required.

Annex 1: Further Submissions CHP 2

This Annex is to be submitted for **each** MCP and labelled as **AN/XXX³**.

18. Location Code from Section 3.1: **CP2**

19. Rated Thermal Input (MW_{Th}): **2.87**

A Warranted Engineer's declaration/ calculation of the rated thermal input of the combustion plant is to be provided as **AN/CP2/A**.

20. Category:

- Diesel Engine
- Dual Fuel Engine
- Gas Turbine
- Other Engines Kindly Specify: [Gas Combustion Engine](#)
- Other MCP Kindly Specify: [Click or tap here to enter text.](#)

21. Fuel Category:

- Solid Biomass
- Other Solid Fuel
- Gas Oil
- Liquid Fuel other than Gas Oil
- Natural Gas
- Other Fuel other than Natural Gas

22. Fuel Use and Ratio:

Fuel Category	Fuel Used per Annum	Fuel Ratio (%) – If Applicable
---------------	---------------------	--------------------------------

³ **XXX** is to be replaced by the location code of the combustion plant provided in Point 1 of this Annex.

Fuel 1	Other Fuel other than Natural Gas	4,056,784.959*	N/A
Fuel 2	Choose an item.		
Fuel 3	Choose an item.		
Fuel 4	Choose an item.		

Add more rows as required.

*total amount of biogas fed to both CHPs.

23. Annual Fuel Consumption: 4,056,784.959m³ of biogas (includes also amount referred to first CHP)

24. Is MCP already installed on site? Yes

If **No**, Point **8** and **9** are to be left blank.

If **Yes**, Point **10** is to be left blank.

25. Date of Start of the operation of MCP: 01/01/2017

In the case of the date of start of operation being before 20th December 2018, proof of this is required. This is to be provided as **AN/CP/B**.

26. Annual operating hours of the MCP for the last five years and average calculation:

Year	Average Annual Operating Hours
2017	2933
2018	2761

5-year
Rolling
Average

27. Expected annual operating hours: Click or tap here to enter text.

28. If the MCP is not used (as per average stated in Point 9) or is expected to be not used (as per point 10) for more than 500 hours annually, a signed declaration stating that the combustion plant will not be used for more than 500 hours annually is to be provided as **AN/XXX/C**.

29. Average load in use (%): **100**

30. Are emissions currently monitored? **Yes**

If **Yes**, the latest monitoring results are to be provided as **AN/CP/D**.

31. Yearly waste gas flow rate: **N/A**

32. Number of Stacks: **1**

33. Height and Location of Stacks:

In the Emission Code Column, XXX is to be replaced with the Combustion Plant code provided in Point 1.

Stack Number	Emission Code	Stack Height (m)	GIS Coordinates of Stack
1	CP/1	3	35.943999, 14.441829
2	XXX/2		
3	XXX/3		

Add more rows as required.

34. Attachment Summary

Attachment	Provided (Tick if Yes)
A	<input checked="" type="checkbox"/>
B	<input checked="" type="checkbox"/>
C	<input type="checkbox"/>
D	<input checked="" type="checkbox"/>

Further attachments as deemed necessary by applicant are to be listed below and labelled using the same method as described above and using the correct letter.

Attachment	Description
E	
F	
G	
H	

Add more rows as required.

WTP NORTH OF MALTA



Dados técnicos

600 kWel; 400 V, 50 Hz; Biogás

Condições de projeto		Dados do gás de combustão ²⁾		
Temperatura de aspiração / humidade do ar:	[°C] / [%]	30 / 60	Número de metano: [-]	141
Altitude de operação:	[m]	100	Valor calorífico inferior: [kWh/Nm ³]	5,56
Temperatura de refrigeração dos gases de escape:	[°C]	180	Densidade do gás: [kg/Nm ³]	1,25
NO _x Emissão:	[mg/Nm ³ @5%O ₂]	500	Gás padrão: Biogás	
Grupo:				
Motor:	TCG 2016 V 12 C			
Velocidade:	[1/min]	1500	Análise: CO ₂ [Vol%]	40,00
Disposição / número de cilindros:	[-]	V / 12	N ₂ [Vol%]	4,70
Furação / curso / cilindrada:	[mm]/[mm]/[dm ³]	132 / 160 / 26	O ₂ [Vol%]	0,30
Relação de compressão:	[-]	15,0	H ₂ [Vol%]	0,00
Velocidade média do pistão:	[m/s]	8	CO [Vol%]	0,00
Consumo médio de óleo lubrificante a carga completa:	[g/kWh]	0,2	CH ₄ [Vol%]	55,00
Sistema de gestão do motor:	[-]	TEM EVO	C ₂ H ₄ [Vol%]	0,00
			C ₂ H ₆ [Vol%]	0,00
			C ₃ H ₈ [Vol%]	0,00
			C ₄ H ₈ [Vol%]	0,00
			C ₄ H ₁₀ [Vol%]	0,00
			C ₂ H ₁₂ [Vol%]	0,00
			C ₂ H _y [Vol%]	0,00
			H ₂ S [Vol%]	0,00
Alternador:	Marelli MJB 400 LA4			
Tensão / área de tensão / cos Phi:	[V] / [%] / [-]	400 / ±5 / 1		
Velocidade / frequência:	[1/min] / [Hz]	1500 / 50		

Balanco energético:		100	75	50
Carga:	[%]			
Potência eléctrica COP de acordo com ISO 8528-1:	[kW]	600	450	300
Calor da água de refrigeração:	[kW ±8%]	308	245	188
Calor do radiador de BT:	[kW ±8%]	50	31	15
Calor do óleo:	[kW ±8%]			
Calor dos gases do escape a temperatura de refrigeração:	[kW ±8%]	272	224	170
Temperatura dos gases de escape:	[°C]	454	477	504
Massa dos gases de escape húmida:	[kg/h]	3221	2444	1692
Massa do ar de combustão:	[kg/h]	2900	2196	1516
Radiação motor / alternador:	[kW ±8%]	22 / 20	17 / 16	13 / 13
Consumo de combustível:	[kW±5%]	1413	1091	773
eficiência eléctrica / térmica:	[%]	42,5 / 41,0	41,3 / 43,0	38,8 / 46,4
Eficiência total:	[%]	83,5	84,3	85,2

Condições do sistema ¹⁾		
Massa de admissão de ar (incl. ar de combustão) com ΔT = 15K	[kg/h]	16300
Temperatura de aspiração mínima / projeto:	[°C]	20 / 30
Contra-pressão dos gases de escape de / até:	[mbar]	30 / 50
Perda de pressão de aspiração antes do filtro de ar:	[mbar]	5
Linha de regulação de pressão nula seleccionável de / até: ²⁾	[mbar]	20 / 200
Linha de regulação de pré-pressão seleccionável de / até: ²⁾	[bar]	0,5 / 10
Bateria do motor de arranque 24 V, capacidade necessária:	[Ah]	143
Motor de arranque:	[kWel.] / [VDC]	5,4 / 24
Conteúdo de óleo motor / tanque externo:	[dm ³]	100 / 260
Peso vazio motor / grupo:	[kg]	2650 / 6250

Sistema de refrigeração		
Percentagem de glicol circuito de refrig. do motor / de mistura:	[% Vol.]	35 / 35
Conteúdo de água circuito de refrig. do motor / de mistura:	[dm ³]	43 / 5
Valor Kvs- circuito de refrigeração do motor / de mistura:	[m ³ /h]	37 / 10
Circuito de refrig. do motor entrada de água / saída de água:	[°C]	78 / 88
Circuito de refrig. de mistura entrada de água / saída de água:	[°C]	40 / 45
Caudal volúmico da água de refrigeração do motor min / máx:	[m ³ /h]	22 / 37
Caudal volúmico da água circuito de refrig. do motor / de mistura:	[m ³ /h]	28 / 10
Perda de pressão de água circ. de refrig. do motor / de mistura:	[bar]	0,6 / 1,0

Banda de frequência f [Hz]	L _{WA} [dB(A)]																S [m ²]														
	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800		1k	1,25k	1,6k	2k	2,5k	3,15k	4k	5k	6,3k	8k	10k	12,5k	16k	
Ruído do ar ³⁾ L _{WA,Tot} [dB(A)]	86	86	91	91	95	109	107	111	104	108	103	109	101	103	103	100	102	102	101	102	101	107	103	102	108	102	102	96	95	115	81
Ruído dos gas. de esc. ⁴⁾ L _{W,noise} [dB(A)]					118		129		134		129		128		128		128		123		117								134	15,2	

Pwr_C_2.15_2_BI_Dr0

Reservam-se alterações técnicas

b221139, 07.11.2014

WTP NORTH OF MALTA_B



Dados técnicos

1200 kWel; 400 V, 50 Hz; Biogás

Condições de projeto		Dados do gás de combustão ²⁾		
Temperatura de aspiração / humidade do ar:	[°C] / [%]	30 / 60	Número de metano: [-]	141
Altitude de operação:	[m]	100	Valor calorífico inferior: [kWh/Nm ³]	5,56
Temperatura de refrigeração dos gases de escape:	[°C]	180	Densidade do gás: [kg/Nm ³]	1,25
NO _x Emissão:	[mg/Nm ³ @5%O ₂]	500	Gás padrão: Biogás	
Grupo:				
Motor:	TCG2020V12			
Velocidade:	[1/min]	1500	Análise: CO ₂ [Vol%]	40,00
Disposição / número de cilindros:	[-]	V / 12	N ₂ [Vol%]	4,70
Furação / curso / cilindrada:	[mm]/[mm]/[dm ³]	170 / 195 / 53	O ₂ [Vol%]	0,30
Relação de compressão:	[-]	13,5	H ₂ [Vol%]	0,00
Velocidade média do pistão:	[m/s]	9,8	CO [Vol%]	0,00
Consumo médio de óleo lubrificante a carga completa:	[g/kWh]	0,2	CH ₄ [Vol%]	55,00
Sistema de gestão do motor:	[-]	TEM EVO	C ₂ H ₄ [Vol%]	0,00
			C ₂ H ₆ [Vol%]	0,00
			C ₃ H ₆ [Vol%]	0,00
			C ₃ H ₈ [Vol%]	0,00
			C ₄ H ₈ [Vol%]	0,00
			C ₄ H ₁₀ [Vol%]	0,00
			C ₂ H ₁₂ [Vol%]	0,00
			C ₂ H _y [Vol%]	0,00
			H ₂ S [Vol%]	0,00
Alternador:	Marelli MJB 450 LB4			
Tensão / área de tensão / cos Phi:	[V] / [%] / [-]	400 / ±5 / 1		
Velocidade / frequência:	[1/min] / [Hz]	1500 / 50		

Balanço energético:		100	75	50
Carga:	[%]			
Potência eléctrica COP de acordo com ISO 8528-1:	[kW]	1200	900	600
Calor da água de refrigeração:	[kW ±8%]	640	476	340
Calor do radiador de BT:	[kW ±8%]	94	69	44
Calor do óleo:	[kW ±8%]			
Calor dos gases do escape a temperatura de refrigeração:	[kW ±8%]	581	475	355
Temperatura dos gases de escape:	[°C]	470	493	518
Massa dos gases de escape húmida:	[kg/h]	6490	4893	3377
Massa do ar de combustão:	[kg/h]	5837	4393	3026
Radiação motor / alternador:	[kW ±8%]	41 / 32	39 / 25	38 / 20
Consumo de combustível:	[kW+5%]	2870	2197	1544
eficiência eléctrica / térmica:	[%]	41,8 / 42,5	41,0 / 43,3	38,9 / 45,0
Eficiência total:	[%]	84,3	84,3	83,9

Condições do sistema ¹⁾		
Massa de admissão de ar (incl. ar de combustão) com ΔT = 15K	[kg/h]	30100
Temperatura de aspiração mínima / projeto:	[°C]	20 / 30
Contra-pressão dos gases de escape de / até:	[mbar]	30 / 50
Perda de pressão de aspiração antes do filtro de ar:	[mbar]	5
Linha de regulação de pressão nula seleccionável de / até: ²⁾	[mbar]	20 / 200
Linha de regulação de pré-pressão seleccionável de / até: ²⁾	[bar]	0,5 / 10
Bateria do motor de arranque 24 V, capacidade necessária:	[Ah]	430
Motor de arranque:	[kWel.] / [VDC]	15 / 24
Conteúdo de óleo lubrificante motor / armação base:	[dm ³]	205 / 510
Peso vazio motor / grupo:	[kg]	5080 / 10700

Sistema de refrigeração		
Percentagem de glicol circuito de refrig. do motor / de mistura:	[% Vol.]	35 / 35
Conteúdo de água circuito de refrig. do motor / de mistura:	[dm ³]	111 / 20
Valor Kvs- circuito de refrigeração do motor / de mistura:	[m ³ /h]	42 / 30
Circuito de refrig. do motor entrada de água / saída de água:	[°C]	80 / 93
Circuito de refrig. de mistura entrada de água / saída de água:	[°C]	50 / 53
Caudal volúmico da água de refrigeração do motor min / máx:	[m ³ /h]	36 / 56
Caudal volúmico da água circuito de refrig. do motor / de mistura:	[m ³ /h]	45 / 35
Perda de pressão de água circ. de refrig. do motor / de mistura:	[bar]	1,2 / 1,4

Banda de frequência f [Hz]	L _{wa} [dB(A)]																L _{tot} [dB(A)]	S [m ²]												
	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800			1k	1,25k	1,6k	2k	2,5k	3,15k	4k	5k	6,3k	8k	10k	12,5k
Ruído do ar ³⁾ L _{wa,Tot} [dB(A)]	94	95	98	100	106	109	108	109	106	115	115	109	110	109	109	109	108	108	108	107	109	103	102	114	107	101	104	98	121	114
Ruído dos gas. de esc. ⁴⁾ L _{wa,noise} [dB(A)]					128		135		134		131		123		122		120		119									132	15,5	

PwrC_2.15_Dr0

Reservam-se alterações técnicas

b,221139, 07.11.2014

Antonio Montebello c/o WSM Ltd
EkoCentre,
Triq il-Latmija
Marsascala
MSK 4613

28th February 2017

The REWS is granting a "Regulatory Clearance" for the CHP application which details are listed hereunder:

This clearance is being granted following the licensing to operate such generating facility. An application has to be made to ARMS Ltd. for the provision of a generation meter and connection to the grid or to inform ARMS Ltd of the added capacity, whichever applicable. This document, in original, is required to be attached to the ARMS Ltd. application.

REWS Reference: GEN/APP/CHP/01/16

REWS Authorisation Date: 7-Sep-2016

Name of Applicant: Wasteserv Malta Ltd

ID No / Pass No / Company Registration: C30560

Installation Address: Malta North MBT, Maghtab Landfill, Ramla Rd, Naxxar

ARMS Ltd Account No: 101000240333

PV System Connection Mode: Three Phase

Peak Capacity: 1.523MWe

Feed-in Tariff:

Applicant will benefit from the Sale of Electricity generated from Cogeneration Units Regulations S.L. 545.29, and active current amendments as on the date of the REWS application and has selected:

B (Partial) – to generate electricity primarily for own consumption and be paid for electricity exported to the electric distribution system.

FIT: Units sold to Enemalta Plc. at the marginal cost of kWh as applicable. (S.L. 545.29)


o/b/o CEO-REWS

This consent is valid for 12 months from the REWS Authorisation date, by which an application to ARMS Ltd. has to be done.

Licenses

To

**Wasteserv Malta Ltd
License to produce for own use**

and

License to produce electricity to supply Enemalta Plc

Regulator for Energy and Water Services
Millennia 2nd Floor
Aldo Moro Road
Marsa
MRS 9065
Malta

Tel: 21220 619

Fax: 22955 200

E-mail: enquiry@rews.org.mt

These licenses are being granted by the Regulator for Energy and Water Services under the Regulator for Energy and Water Services Act (Cap. 545) and the Electricity Market Regulations (SL 545.13) hereinafter to be referred to as 'the Regulations',

- (i) to produce electricity for own use from a 1.523MWe licensed facility at Malta North MBT, Maghtab Landfill, Ramla Rd, Naxxar , (license reference no.: MRA/LME/ENE/CHP/PROD/01/17).
- (ii) to produce electricity and supply Enemalta Plc from a 1.523MWe licensed facility at Malta North MBT, Maghtab Landfill, Ramla Rd, Naxxar , (license reference no.: MRA/LME/ENE/CHP/SUPP/01/17).

Wasteserv Malta Ltd (C30560) hereinafter referred to as the 'Licensee' with registered address at EkoCentre, Triq il-Latmija, Marsascalea, is being granted a license to produce electricity for own use and a license to produce electricity to supply Enemalta Plc from a licensed facility of 1.523MW at Malta North MBT, Maghtab Landfill, Ramla Rd, Naxxar .

These licenses are being granted with the attached conditions for the time span declared hereunder. The Regulator for Energy and Water Services reserves the right to amend, modify, replace, add or delete any of the contents and the conditions of these licenses, according to applicable laws and regulations, giving where practicable due notice to the licensee.

These licenses do not cover any changes in operation that are not approved by the Regulator for Energy and Water Services prior to their coming into effect or service.

Validity of these licenses is for 20 years starting from 3-Feb-2017.



Ing Marjohn Abela
Chief Executive Officer
Regulator for Energy and Water Services

CONDITIONS OF LICENSES

- PART 1 DEFINITIONS
- PART 2 SCOPE OF LICENSES
- PART 3 LIMITATIONS, TRANSFER, SUSPENSION,
RENEWAL, VARIATIONS, AMENDMENTS,
AND ADDITION OF NEW CONDITIONS
- PART 4 CONDITIONS
- PART 5 DECLARATION BY THE COMPETENT
ENGINEER
- PART 6 DECLARATION BY THE APPLICANT

PART 1 Definitions

In these licenses and for the purpose of these conditions (except in so far as the context otherwise requires) the definitions of the terms used in these licenses are the same as those in the Regulator for Energy and Water Services Act (Chapter 545), the Electricity Supply Regulations and the Regulations.

- 1.1 **Authorised representative** means the person appointed by the licensee to act as its legal representative with the Regulator;
- 1.2 **Distribution System Operator** means Enemalta Plc as designated by the Electricity Market Regulations (SL 545.13);
- 1.3 **Competent engineer** for the purpose of these licenses means an electrical engineer holding a warrant to practice the profession of an electrical engineer under the Engineering Profession Act or an equivalent professional qualification under the Mutual Recognition of Qualifications Act and also holding an Authorisation A and/ or B as applicable in line with the Electrical Installations Regulations;
- 1.4 **Inspector** means any employee or officer of the Regulator or any other person duly appointed and authorised by the Regulator to inspect and check compliance with the conditions of these licenses;
- 1.5 **Licensee** means any person who is the holder of a valid license to produce electricity for own used and a license to produce and supply Enemalta Plc from a CHP generation station;
- 1.6 **Licensed facility** means a facility, including the generation station incorporating the CHP plant, switchgear protection equipment, ancillary equipment, meter and any other thing within that part of the facility necessary for the production and conveyance of electricity up to the point of connection to the distribution system;
- 1.7 **Material alteration** means an alteration which may reasonably affect the safe operation and the declared capacity and output of a licensed facility and includes change, removal, repair, replacement or cessation of use of any equipment, whether electrical or mechanical, which would affect the safe operation of the licensed facility;

1.8 **Network Code** is published by the Distribution System Operator subject to the approval of the Regulator, establishing the basic technical design and operational requirements for the connection to the distribution system of generating installations, consumers' installations and direct lines as per Electricity Market Regulations(SL 545.13);

1.9 **Person** includes a body or other association of persons, whether such body or association is corporate or unincorporated.



PART 2 SCOPE OF LICENSES

2.1 Scope of these licenses

These licenses permit the holder to

- i. produce electricity for own use;
- ii. produce electricity to supply Enemalta Plc.



**PART 3 LIMITATIONS, TRANSFER, SUSPENSION, RENEWAL, VARIATIONS,
AMENDMENTS AND ADDITION OF NEW CONDITIONS**

3.1 Limitations

Nothing in these licenses or in the conditions attached thereto should be construed as, and/or should in any way be understood and, or be deemed to exonerate the holder and/or any other person or persons from being obliged to observe, comply with or carry out any requirement or comply with a provision of any law or subsidiary legislation or any other legal requirement for the time being in force.

3.2 Transfer of license

- i. These licenses shall not be validly transferred *inter vivos* to any other natural or legal person unless:
 - (a) the transferor informs in writing the Regulator in such form and manner as the Regulator shall prescribe;
 - (b) the transfer is subject to the conditions prescribed in these licenses; and
 - (c) the Regulator approves in writing the transfer of the licenses:

Provided that the leasing of the licensed facility shall require the licensee to inform the Regulator of the particulars of the person leasing the licensed facility.

Provided also that the transfer of the licensed facility to a different address shall require the licensee to inform the Regulator and submit any certificates that the Regulator shall prescribe.

- ii. These licenses shall not be validly transmitted *causa mortis* to any other natural or legal person unless:
 - (a) the transferee informs in writing the Regulator in such form and manner as the Regulator shall prescribe;
 - (b) the transfer is subject to the conditions prescribed in these licenses; and
 - (c) the Regulator approves in writing the transfer of the license:

Provided that these licenses shall be an indivisible right:



Provided further that in the event that the Regulator approves the transfer of the license aforesaid, the transfer shall have retrospective effect from the date of the death of the *decejus*.

3.3 Suspension or revocation of the licenses

These licenses may be suspended or revoked by the Regulator as it may deem fit if the licensee fails to comply with any of the conditions of these licenses or if any information supplied by the applicant is found to be incorrect.

3.4 Renewal of the licenses

These licenses shall be renewed by the Regulator for Energy and Water Services every twenty (20) years following the submission of any documentary requirements, certifications and declarations from the applicant, a competent engineer and from the Distribution System Operator as may be required by the Regulator, and including:

- a) the certification required in clause 4.17 ;
- b) a declaration stating that no significant changes to the licensed facility have been made since the granting of these licenses or if significant changes have been made to provide the relevant details;
- c) any other such information as the Regulator may require.

3.5 Variations, amendments and addition of new conditions

Any exemption or variation shall be read together with, and construed as being part of the other conditions of these licenses, unless otherwise specified.

Any condition these licenses may be amended or varied, or conditions added, at the discretion of the Regulator for Energy and Water Services, according to applicable laws and regulations, giving where practicable due notice to the licensee.

The licensee shall however be notified of the intended amendments and consulted by the Regulator prior to any such amendment or variation being put into effect.

Requirements on licensee

3.6 Compliance with laws, regulations and Network Code

- (a) The licensee shall at all times comply with applicable laws and regulations including the Electricity Market Regulations (SL 545.13), the Electricity Supply Regulations and the Network Code.
- (b) The licensee shall comply at all times with all other applicable permits, licenses and approvals required under Maltese law (including but not necessarily limited to permits issued by the Malta Environment and Planning Authority) already made at the date of the authorisation to construct the generation station or made subsequent to these licenses.
- (c) These licenses do not exempt the licensee from meeting the following requirements
 - i. compliance with the relevant laws and regulations;
 - ii. protection of the environment;
 - iii. continued maintenance of adequate standards in the licensed facility with regard to safety, health, security, hazardous substances and the environment.

PART 4 CONDITIONS

- 4.1 The licensee shall comply with any applicable laws or regulations.
- 4.2 The licensee and all persons who perform works on the licensed facility shall act in accordance with, and observe the conditions attached to these licenses.
- 4.3 The licensee shall ensure that any electrical works on the licensed facility are carried out by persons who are at least
 - i) Authorisation A holders for single phase installations works as per the Electrical Installations Regulations;
 - ii) Authorisation B holders for three phase installations works as per the Electrical Installations Regulations;

Provided also that any commissioning, testing and certification are done by a competent engineer.

- 4.4 These licenses including the granting form duly issued by the Regulator for Energy and Water Services shall be produced to an inspector upon demand.
- 4.5 The licensee shall take all reasonably practical steps to protect the environment in the course of operations associated with these licenses.
- 4.6 The licensed facility and its operation must comply with guidelines and codes approved or issued from time to time by the Regulator for Energy and Water Services.
- 4.7 The licensee must provide assistance and facilitate the work of the various Authorities instituted by law in Malta, in so far as, and in the carrying out of their duties in accordance with their legislative remit and relevance to the license concerned.
- 4.8 The Regulator may require the licensee to obtain and retain insurance cover for third party liability.

Licensed facility

- 4.9 The licensee and all the persons performing works related to the licensed facility shall observe and act in accordance with relevant regulations and the Network Code.

Inspection, testing and certification by a competent engineer

- 4.10 Any inspection, checking and certification by a competent engineer must comply with latest edition of I.E.T. Regulations (BS 7671) and compliant with the Network Code, current relevant regulations, applicable standards and manufacturer recommendations. This requirement does not exonerate the licensee from carrying out any other inspection, checking and certification required by other relevant authorities and the Distribution System Operator.

Records and Supply of Data

- 4.11 The licensee shall furnish to the Regulator for Energy and Water Services with information in such manner and at such times as the Regulator may require, and shall also procure and furnish to it such reports as the Regulator may consider necessary.
- 4.12 The licensee shall maintain records of at least the monthly kWh output of the licensed facility, material alterations as described in clause 4.15 and inform the Regulator when such material alterations maintenance result in a change in the kW output capacity of the licensed facility. This is without prejudice to compliance with requirements of the Distribution System Operator, other authorities, the relevant regulations and the Network Code.

Inspection by officers of the Regulator

- 4.13 The licensee shall accept, at all reasonable times, inspections carried out by officers of the Regulator for Energy and Water Services or other persons acting on its behalf for the purposes of ascertaining the condition of the licensed facility, its equipment and operational standards.
- 4.14 Inspectors duly authorised by the Regulator for Energy and Water Services may enter and inspect the licensed facility and the electrical equipment, ancillary equipment and other equipment or assets directly or indirectly connected with the carrying out of activities governed by these licenses.

Material Alterations

- 4.15 Any material alteration on the licensed facility must be carried out under the supervision of a competent engineer.



Once the material alterations have been carried out, the competent engineer shall certify that:

- (i) the work has been performed to good engineering standards and in accordance with applicable regulations, guidelines and the Network Code;
- (ii) all safety standards and requirements imposed in regard to the licensed facility have been met;
- (iii) the generation capacity of the licensed facility was not changed. If changed, details of such change shall be recorded and submitted to the Regulator.

Safety at the Licensed Facility

- 4.16 It is the responsibility of the licensee to ensure that all practicable steps necessary to prevent health and safety hazards at the licensed facility are taken.
- 4.17 The licensed facility shall be certified by a competent engineer, every five (5) years starting from the date of the commencement of the validity of these licenses. This certification shall include a declaration confirming the continued integrity of the system including its operational safety and security of the licensed facility and the compliance of the licensed facility with relevant regulations, applicable standards, guidelines and the Network Code.
- 4.18 It is the responsibility of the licensee to ensure that the licensed facility is certified at intervals mentioned in clause 4.17 and to retain all certificates issued by the competent engineer for the duration of the lifetime of the generation facility plus a further 5 years.

Compliance with License Conditions

- 4.19 The licensee shall notify the Regulator for Energy and Water Services and the Distribution System Operator (Enemalta Plc) in the event that:
 - (i) any of the conditions of the license are not being met;

- (ii) any emergency in the operation of the system arises. For the purpose of this clause, emergency includes any occurrence that causes, or threatens to cause, loss of life or property, or destruction or impairment of any asset including that of the Distribution System Operator or that in any way endangers the safety of the public or the operational safety of the distribution system or the environment.



PART 5 DECLARATION BY THE COMPETENT ENGINEER

I, Ing. Ronald Vella I.D. No.: 1069446M and holder of **Warrant No 262** being the competent engineer responsible for the commissioning and testing of the licensed facility of capacity **1.523MWe at Malta North MBT, Maghtab Landfill, Ramla Rd, Naxxar**, declare that the said licensed facility has been constructed according to the information submitted in the application for authorisation to construct the generation station **GEN/APP/CHP/01/16** and is in compliance with the conditions of the authorisation no **GEN/AUT/CHP/01/16** do also hereby certify that the said commissioning and testing which I carried out and is responsible for, is to the best of my knowledge in accordance with the I.E.T. Regulations (BS 7671) as currently applicable and compliant with the current relevant regulations, the applicable standards and the Network Code.



(Signature of the competent engineer)




PART 6 DECLARATION BY THE APPLICANT

Wasteserv Malta Ltd (C30560) accepts these licenses (license reference no.:
MRA/LME/ENE/CHP/PROD/01/17) and (license reference no.:
MRA/LME/ENE/CHP/SUPP/01/17) with the attached conditions.



(Signature of authorised legal representative o/b/o Wasteserv Malta Ltd)

Name: Antonio Montebello c/o WSM Ltd ID: 80374M
Position held: Chief Executive Officer



ERIC MICALLEF ID: 453577(M)
(Signature of authorised legal representative o/b/o Wasteserv Malta Ltd)



Name: David Borg c/o WSM Ltd ID: 186471M
Position held: Chairman



Tender ref: WSMQ 46/224/2017

**Monitoring, Analysis and Reporting of Emissions
to Air at the Malta North waste Treatment Plant**

**Report of the sampling of monitoring, carried out in
May 2019**

Report submitted to
WasteServ Malta Ltd

By



Sunlab Group Ltd
Life Science Park,
Industrial Estate,
San Gwann, Malta
Mob. (+356) 79598726
Tel. (+365) 21381391
www.sunlabgroup.com



*Chimica
Applicata
Depurazione
Acque s.n.c.*
di Filippo
Giglio & C.

C. A. D. A. s.n.c.
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Menfi (AG)
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Fax 0925/72079
www.cadaonline.it



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www.ecoserv.com.mt

SUNLAB'S REPORT REFERENCE:

201905027A

JULY 2019

Introduction

1. In July 2017, WasteServ Malta Ltd. (WSM) issued a call for tender titled “Service Tender for the Emissions to Air Monitoring *at the Malta North Waste Treatment Plant (Tender Reference Number WSM 46/224/2017)*”.
2. Sunlab Ltd, CADA s.n.c., Ecoserv Ltd (SCE consortium) submitted a joint bid for this job and were subsequently informed by WSM that their offer for sampling, monitoring, analysis and reporting of Emissions to Air at the Malta North Waste Treatment Plant had been accepted as per conditions outlined in the contract signed on the 27th November 2017 and as described in the tender submission.
3. The specific object behind the required monitoring is to determine whether the concentrations of gaseous pollutants and/or particulates present in the effluent flue gases to the atmosphere for Combined Heat and Power Plant (AD CHP Station 1 – PS 4) and Combined Heat and Power Plant (AD CHP Station 2 – PS 5) and emissions to air from Biofilter vent (PS 7), AD plant (PS 8) and Compost shed (PS 9) are below the emission limit values (ELV) set by permit IP 0007/13/A which limits are indicated in Table 1.



Figure 1: Malta North waste Treatment Plant



Figure 2: Stacks situated at the AD Malta North waste AD Treatment Plant



Figure 3: AD plant (PS 8) sampling point



Figure 4: Biofilter vent (PS 7) sampling point



Figure 5: Compost shed (PS 9)

Table 1. Emission Limit Values for pollutants in emissions to air from the specified points (extract from IP 0007/13/A)

Monitoring Points	Parameter	Control Limits	Unit
(AD CHP Station 1 - PS 4) and (AD CHP Station 2 - PS 5)	Total Particulate matter	50	mg/m ³
	Carbon Monoxide	80	mg/m ³
	Nitrogen Dioxide	350	mg/m ³
	Sulfur dioxide	850	mg/m ³
Biofilter vent (PS 7) and AD plant (PS 8)	Volatile Organic Carbons (VOCs)	20	mgC/Nm ³
	PM 10	20	mg/m ³
	Ammonia	20	mg/Nm ³
Compost shed (PS 9)	Ammonia	20	mg/Nm ³

For the emission points “CHP” the stated ELVs refer to measurements taken at standard conditions of the dry gas (temperature 273K, pressure 101.3 kPa).

4. Sampling and analysis were carried out by laboratories that is accredited to ISO 17025:2005 standard.
5. The current report presents the results of analysis to the sampling for Malta Waste Treatment Plant, held in May 2019 for emissions to air from Biofilter vent (PS 7), AD plant (PS 8) and Compost shed (PS 9). Due to the maintenance on “Combined Heat and Power Plant (AD CHP Station 1 - SP 4)” and due to a malfunction of the “Combined Heat and Power Plant (AD CHP Station 2 – PS 5)”, the stack emission monitoring activity were not carried out.

Methodology

6. Sampling from Biofilter vent (PS 7), AD plant (PS 8) and Compost shed (PS 9) at the Waste Treatment Facility at Malta North took place between the 27th and 29th May 2019.
7. Sampling and analysis for all parameters were undertaken by SUN LAB Ltd using the necessary instrumentation, such as samplers, analysers and record keeping

instrumentation for the collection and storage of samples and for the collection of the required information for all the parameters monitored.

The methods and detection limits used for the determination of the requested parameters are listed in Table 2.

8. The sampling methodology for the different groups of parameters followed the details provided in the standard international methods as shown in Table 3.

Table 2. Details of the sampling methodology for stack emissions

Emission point reference	Parameters to be analysed	Control limits (as per IPPC permit)*	Method	Detection limits (to be filled in by bidder)
PS 4	Oxides of Nitrogen	350 mg/m ³	EN 14792	1 mg/Nm ³
	Oxides of Sulphur	850 mg/m ³	ISO 11042-1 1996	1 mg/Nm ³
PS 5	Carbon Monoxide	Mass concentration of 80 mg/m ³	EN 15058	1 mg/Nm ³
	Total Particulate Matter	50 mg/m ³	EN 13284-1:2003	0.1 mg/Nm ³

9. The collection of data on flue gas flow and of gas and dust samples involved the use of Darcy tube isokinetic probes. An isokinetic station with a precision of $\pm 2\%$ of volume flows was used for all isokinetic measurements. The instrument features automatic compensation of losses, and a flow meter for reading the aspirated volume and flow. The instrument is able to monitor the parameters specified in Table 3.

Table 3. Parameters monitored by the isokinetic station

Flue gas temperature in °C	Speed of flow in m/sec.
Absolute pressure in conduit	Differential pressure in conduit
Density of crude gases Kg/ m ³	Density of dry gases Kg/ m ³

Density of water vapour in Kg/m ³	Dry gaseous flow Nm ³ /h
Effective flow in m ³ /h	Flow normalized to 0 °C in Nm ³ /h
Withdrawal Time in min.	Volume of gases aspirated in NI
Nozzle used for connection to the sampling probe	

10. For sampling rates were taken using rotary pumps capable of a precision of +/- 2% of volume flows. The rotary pumps used also feature automatic compensation of losses, and a flow meter for reading volumes.

Sampling was executed with the use of automatic measurement instruments.

11. The measurements carried out *in-situ*, sampling and subsequent laboratory analysis of the gaseous emissions to the atmosphere will be used to certify compliance or otherwise to the legal limits established by relevant regulations and IP permit, and to enable recommendations and subsequent decisions as necessary.
12. The methods that will be used for ambient air sampling points, PS7, PS8, PS9, are given in Table 4

Table 4: Monitoring methods for Ambient Air Emission

Emission point reference	Parameters to be analysed	Control limits (as per IPPC permit)*	Method (to be filled in by bidder)	Detection limits (to be filled in by bidder)
PS 7 PS 8	Volatile Organic Carbons (VOCs)	20 mgC/Nm ³	EN 12619:2013	0.1 mgC/Nm ³
	PM 10	20 mg/m ³	DM n° 60 02/04/2002 SO GU n° 87 13/04/2002 + UNI EN 12341:2014	1 µg/m ³
	Ammonia	20 mg/Nm ³	NIOSH 6015 1994	0.1 mg/m ³

PS 9	Ammonia	20 mg/Nm ³	NIOSH 6015 1994	0.1 mg/m ³
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13. The concentration of suspended particulate matter (PM 10) will be determined using a low-volume sampler in accordance with the standard method EN 12341:2014, combined with a reference head that selectively allows the required fraction of dust particles to flow through. The duration of the sampling period at each station will be equal to 24 hours as required in the tender conditions and in the respective standard method for dust, with a flow rate of the sampler adjusted to 38.3 L / min.
14. Sampling and analysis of volatile organic carbon substances is carried out with the FID (Flame Ionization Detector). This analyzer determines the total concentration of organic substances present in the emission and returns a concentration signal (mgC/Nm³ as required in the tender). FID works by the ionization principle, the sample passes through an air/hydrogen flame, that pyrolysis the organic compounds by producing molecules (cations) and electrons. The potential difference that is generated is switched, by an ammeter, current, and then into a concentration signal.
15. For this parameter a very low volume sampler will be used, which is coupled to a vial having a specific adsorbent material that will collect the required parameter. After sampling, the vial will be transported to the lab for analysis.
16. The instruments that will be used for the sampling required at the ambient air sampling points (PS7, PS8, PS9) are listed in Table 2 and further details about the sampling process are provided below.

Table 5: Sampling equipment to be used for ambient air stations (PS7, PS8, PS9)

Parameter	Instrument type
Volatile Organic Carbons (VOCs)	Sampling by FID Analyzer (Flame Ionization Detector)
PM 10	Standard sampler with 38.3 L/min flow rate and PM 10 reference head
Ammonia	Low-volume sampler and adsorbent vials

17. In addition, we will deploy a meteorological station at an appropriate position to collect the following meteorological data during each monthly session, as request to the tender’s document:
- Temperature
 - Pressure
 - Humidity
 - Wind speeds and directions
 - Rainfall patterns

Results and Appraisal

18. SUN LAB’s reports reference for the sampling and analyses reported in the present document are:

Table 6: Sunlab code reference for every sampling point

SUNLAB Referec COD	Sampling Point
201905027A-001	Biofilter vent (PS 7)
201905027A-002	AD plant (PS 8)
201905027A-003	Compost shed (PS 9)

19. The results of analysis carried out are detailed in SUN LAB’s certified, comprehensive report which is included herewith as Appendix A. The calibration certificates are reported on Appendix B.
20. The comprehensive report includes additional information about the sampling procedures and the emissions resulting from each sampling point, such as:
- (i) the percentage gas composition and humidity;
 - (ii) flow speed and related physical characteristics;
 - (iii) chimney stack specifications,

- (iv) equipment used; and
- (v) quality assurance.

21. The values recorded during this monitoring were compared with the emission limit values listed in table 1 (IP 0007/13/A).

Table 7: Comparison of results for the data collected by SUN LAB Ltd with Emission Limit Value (ELV)

Monitoring Point	Pollutant	References of Emission Limit Value - ELV	Result of current monitoring session	Result of April monitoring session (January session for for stationary emission monitoring)
Biofilter vent(PS7)	Volatile Organic Carbons (VOCs)	20 mgC/Nm ³	0.6 mgC/m ³	1.6 mgC/m ³
	PM 10	20 mg/m ³	21 µg/m ³	43 µg/m ³
	Ammonia	20 mg/Nm ³	< 0.1 mg/m ³	0.6 mg/m ³
AD plant(PS8)	Volatile Organic Carbons (VOCs)	20 mgC/Nm ³	36 mgC/m ³	137 mgC/m ³
	PM 10	20 mg/m ³	22 µg/m ³	4.0 µg/m ³
	Ammonia	20 mg/Nm ³	0.62 mg/m ³	1.1 mg/m ³
Compost shed (PS 9)	Ammonia	20 mg/Nm ³	0.28 mg/m ³	0.7 mg/m ³

Table8. Results of meteorological data recorded during the sampling period.

Date and Time (hour)	MSLP	Mean Temp	Relative Humidity	Average Wind Direction	Wind Speed	Weather
	mbar	°C	%		m/s	
27/05/201 9 09:03	1005.7	22.2	55	W	6.1	0.0
27/05/201 9 09:33	1005.6	22.3	54	NWW	3.6	0.0
27/05/201 9 10:03	1005.4	23.0	46	SWW	11.2	0.0
27/05/201 9 10:33	1005.6	23.1	50	NWW	17.3	0.0
27/05/201 9 11:03	1005.9	24.1	50	NW	7.2	0.0
27/05/201 9 11:33	1005.8	24.0	48	S	6.1	0.0
27/05/201 9 12:03	1006.1	25.5	44	W	5.0	0.0
27/05/201 9 12:33	1006.2	24.6	44	NE	7.2	0.0
27/05/201 9 13:03	1006.1	25.0	47	W	7.2	0.0
27/05/201 9 13:33	1006.3	24.8	49	SWW	5.0	0.0
27/05/201 9 14:03	1006.4	23.9	46	W	9.7	0.0
27/05/201 9 14:33	1006.2	24.2	49	SSW	12.2	0.0
27/05/201 9 15:03	1006.1	23.8	51	NWW	8.6	0.0
27/05/201 9 15:33	1005.9	24.2	49	NW	8.6	0.0

27/05/201 9 16:03	1006.2	24.3	44	SE	8.6	0.0
27/05/201 9 16:33	1005.8	24.1	46	NW	11.2	0.0
27/05/201 9 17:03	1005.8	23.8	50	NWW	9.7	0.0
27/05/201 9 17:33	1005.9	23.6	51	W	8.6	0.0
27/05/201 9 18:03	1005.7	23.0	56	W	6.1	0.0
27/05/201 9 18:33	1005.7	23.3	60	W	8.6	0.0
27/05/201 9 19:03	1005.9	22.6	60	W	8.6	0.0
27/05/201 9 19:33	1006.3	20.9	70	SW	8.6	0.0
27/05/201 9 20:03	1006.3	19.9	74	W	5.0	0.0
27/05/201 9 20:33	1006.6	19.5	80	NE	7.2	0.0
27/05/201 9 21:03	1006.4	19.2	81	SW	3.6	0.0
27/05/201 9 21:33	1006.9	19.3	77	NW	9.7	0.0
27/05/201 9 22:03	1007.0	19.4	79	SW	8.6	0.0
27/05/201 9 22:33	1006.9	19.0	80	W	11.2	0.0
27/05/201 9 23:03	1007.5	18.8	80	W	6.1	0.0
27/05/201 9 23:33	1007.5	18.9	80	W	9.7	0.0

28/05/201 9 00:03	1007.5	19.0	78	NWW	6.1	0.0
28/05/201 9 00:33	1007.4	19.1	73	NW	8.6	0.0
28/05/201 9 01:03	1007.6	18.7	76	SWW	8.6	0.0
28/05/201 9 01:33	1007.5	18.5	80	N	8.6	0.0
28/05/201 9 02:03	1007.4	18.6	80	W	7.2	0.0
28/05/201 9 02:33	1007.4	19.0	74	SWW	7.2	0.0
28/05/201 9 03:03	1007.3	18.8	75	W	8.6	0.0
28/05/201 9 03:33	1007.0	18.6	76	NWW	9.7	0.0
28/05/201 9 04:03	1007.0	18.6	78	NW	9.7	0.0
28/05/201 9 04:33	1007.3	18.8	77	NW	11.2	0.0
28/05/201 9 05:03	1007.4	18.3	80	W	8.6	0.0
28/05/201 9 05:33	1007.8	18.4	80	W	13.3	0.0
28/05/201 9 06:03	1007.7	18.4	81	NW	12.2	0.0
28/05/201 9 06:33	1008.0	17.8	82	NW	7.2	0.0
28/05/201 9 07:03	1008.3	18.2	83	W	8.6	0.0
28/05/201 9 07:33	1008.3	19.0	78	W	13.3	0.0

28/05/201 9 08:03	1008.6	19.3	77	W	11.2	0.0
28/05/201 9 08:33	1008.8	19.4	75	W	13.3	0.0
28/05/201 9 09:03	1009.7	19.9	72	SW	18.4	0.0
28/05/201 9 09:33	1009.6	20.5	71	NWW	11.2	0.0
28/05/201 9 10:03	1009.9	20.7	68	NW	15.8	0.0
28/05/201 9 10:33	1009.8	20.8	68	W	20.9	0.0
28/05/201 9 11:03	1010.0	21.1	66	W	14.8	0.0
28/05/201 9 11:33	1010.1	21.7	64	W	14.8	0.0
28/05/201 9 12:03	1010.6	22.5	59	NW	14.8	0.0
28/05/201 9 12:33	1010.7	22.4	61	NW	13.3	0.0
28/05/201 9 13:03	1010.8	22.0	61	NWW	17.3	0.0
28/05/201 9 13:33	1010.8	22.5	56	W	19.4	0.0
28/05/201 9 14:03	1011.0	22.3	59	W	23.4	0.0
28/05/201 9 14:33	1010.4	22.8	51	W	18.4	0.0
28/05/201 9 15:03	1010.7	23.1	54	N	13.3	0.0
28/05/201 9 15:33	1010.5	22.8	54	NW	18.4	0.0

28/05/201 9 16:03	1010.5	22.5	55	NW	14.8	0.0
28/05/201 9 16:33	1010.3	22.5	56	NW	15.8	0.0
28/05/201 9 17:03	1010.6	22.4	55	NW	17.3	0.0
28/05/201 9 17:33	1010.3	22.5	50	SW	15.8	0.0
28/05/201 9 18:03	1010.2	22.3	51	SWW	17.3	0.0
28/05/201 9 18:33	1010.4	22.1	52	W	19.4	0.0
28/05/201 9 19:03	1010.0	22.1	56	W	8.6	0.0
28/05/201 9 19:33	1010.5	21.3	58	W	9.7	0.0
28/05/201 9 20:03	1010.6	20.6	62	W	8.6	0.0
28/05/201 9 20:33	1010.7	19.6	66	NW	3.6	0.0
28/05/201 9 21:03	1010.9	19.2	68	SW	2.5	0.0
28/05/201 9 21:33	1011.0	18.7	73	N	2.5	0.0
28/05/201 9 22:03	1011.3	18.4	77	S	1.1	0.0
28/05/201 9 22:33	1011.6	18.3	83	S	5.0	0.0
28/05/201 9 23:03	1011.8	18.2	86	W	1.1	0.0
28/05/201 9 23:33	1011.8	18.2	85	W	5.0	0.0

29/05/201 9 00:03	1011.9	18.1	84	SW	3.6	0.0
29/05/201 9 00:33	1011.8	18.0	82	W	5.0	0.0
29/05/201 9 01:03	1011.6	18.1	86	W	5.0	0.0
29/05/201 9 01:33	1011.8	18.0	82	SWW	1.1	0.0
29/05/201 9 02:03	1011.8	17.7	83	NW	2.5	0.0
29/05/201 9 02:33	1011.4	17.9	81	NW	3.6	0.0
29/05/201 9 03:03	1011.3	17.7	76	W	1.1	0.0
29/05/201 9 03:33	1011.3	17.8	76	W	2.5	0.0
29/05/201 9 04:03	1010.9	18.2	75	NW	6.1	0.0
29/05/201 9 04:33	1011.0	18.2	74	W	2.5	0.0
29/05/201 9 05:03	1010.9	18.0	77	S	1.1	0.0
29/05/201 9 05:33	1011.0	17.8	82	W	1.1	0.0
29/05/201 9 06:03	1011.1	18.0	87	W	1.1	0.0
29/05/201 9 06:33	1010.9	18.5	89	S	5.0	0.0
29/05/201 9 07:03	1011.2	19.8	82	SW	3.6	0.0
29/05/201 9 07:33	1011.0	19.9	82	W	8.6	0.0

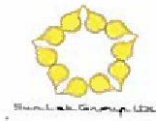
29/05/201 9 08:03	1011.3	21.0	74	W	3.6	0.0
29/05/201 9 08:33	1011.6	22.7	57	W	6.1	0.0
29/05/201 9 09:03	1011.9	25.6	44	S	7.2	0.0
29/05/201 9 09:33	1011.9	26.2	36	W	5.0	0.0
29/05/201 9 10:03	1012.1	25.4	54	NE	13.3	0.0
29/05/201 9 10:33	1012.5	22.4	70	NE	8.6	0.0
29/05/201 9 11:03	1012.4	22.9	65	NE	11.2	0.0
29/05/201 9 11:33	1012.7	23.8	65	NE	7.2	0.0
29/05/201 9 12:03	1012.2	25.9	59	NE	2.5	0.0
29/05/201 9 12:33	1012.5	26.5	57	N	3.6	0.0
29/05/201 9 13:03	1012.8	26.9	56	E	2.5	0.0
29/05/201 9 13:33	1012.7	28.2	31	W	7.2	0.0
29/05/201 9 14:03	1012.5	28.6	34	W	8.6	0.0
29/05/201 9 14:33	1012.8	27.6	44	SW	11.2	0.0
29/05/201 9 15:03	1012.4	26.5	50	SSW	9.7	0.0
29/05/201 9 15:33	1012.5	27.2	42	SW	7.2	0.0

29/05/201 9 16:03	1012.4	27.5	33	NW	9.7	0.0
29/05/201 9 16:33	1012.3	26.7	40	SW	8.6	0.0

Appraisal

22. For the air quality monitoring points “Biofilter vent (PS7)” and “AD plant (PS8)”, respectively, results were below the limits imposed by the IPPC except for VOCs value on “AD plant” point as below to the last value found the last monitoring session but remains above the the limit of 20 mgC/m³.
23. The concentration of ammonia detected for all points remains below the limit in line with the previous monitoring sessions.

Appendix A



Test Report



Test Report n°	201905027A-001	Test Report Date	08/07/2019
Description	Air Quality Monitoring at the sampling point labeled P57 "Biofilter" - 1B* session - Malta North Waste Treatment Plant L/O Ghallis, Naxxar		
	Client	WasteServe Malta Ltd EkoCentre, Latmija Road - Marsaskala - MSK 4613 - Malta	
Sample Reception Date	28/05/2019		
Test Start Date	27/05/2019		
Test Finish Date	21/06/2019		
Sampling mode	Curated by SUNLAB group Laboratory		
Sampling Plan	201903018A_Ambient Air and Stack Emission Monitoring		
Sampling Method	See the methods reported next to the tests		
Reference for the Limits	Limits reported in WSM 46/224/2017 tender		
Annex	NO		

Tests	U.O.M.	Method	Result	Uncertainty	L.Min.	L.Max.
Chemical Analysis						
Sampling for the determination of particulate matter - PM10	///	EN 12341:2014	///	///	///	///
Determination of PM 10 (*)	µg/m3	EN 12341:2014	21	1	///	20 mg/m3
Sampling and determination of Ammonia (*)	mg/m3	NIOSH 6015-1994	< 0.1	///	///	20
Determination of total organic carbon (TOC) (*)	mg/m3	EN 12619:2017	0.6	0.2	///	20


 Laboratory Director
 (Dott. Filippo Giglio)

Notes:

< Not Detectable because lower than detection limit of the method

The sample (solid, liquid, gaseous matrix) is stored for two weeks unless particular disposition of the law

When indicated, the uncertainty of the measure is expressed in the same unit of measurement of the test performed with a probability of the measure of 95% and a coverage factor K=2 for the chemical tests

This Test report is relative to the sample subordinate to test and it cannot be partially reproduced without written approval from of the Sunlab Ltd

The records of testing of this sample are kept for a minimum period of 10 years

(*) This test is not in the Scope of Accreditation

(c) This test is carried out by other laboratory (sub-contractor)



Test Report



Test Report n°	201905027A-002	Test Report Date	08/07/2019
Description	Air Quality Monitoring at the sampling point labeled PSB "AD-Plant" - 18 ¹ session - Malta North Waste Treatment Plant L/O Ghallis, Naxxar		
	Client	WasteServe Malta Ltd EkoCentre, Latmija Road - Marsaskala - MSK 4613 - Malta	
Sample Reception Date	29/05/2019		
Test Start Date	28/05/2019		
Test Finish Date	21/06/2019		
Sampling mode	Curated by SUNLAB group Laboratory		
Sampling Plan	201903018A_Ambient Air and Stack Emission Monitoring		
Sampling Method	See the methods reported next to the tests		
Reference for the Limits	Limits reported in WSM 46/224/2017 tender		
Annex	NO		

Tests	U.O.M.	Method	Result	Uncertainty	L.Min.	L.Max.
Chemical Analysis						
Sampling for the determination of particulate matter - PM10	///	EN 12341:2014	///	///	///	///
Determination of PM 10 (*)	µg/m3	EN 12341:2014	22	1	///	20 mg/m3
Sampling and determination of Ammonia (*)	mg/m3	NIOSH 6015: 1994	0.62	///	///	20
Determination of total organic carbon (TOC) (*)	mg/m3	EN 12619:2017	36	2	///	20

Laboratory Director
(dott. Filippo Giglio)

Notes:

< Not Detectable because lower than detection limit of the method

The sample/solid, liquid, gaseous matrix is stored for two weeks unless particular disposition of the law

When indicated, the uncertainty of the measure is expressed in the same unit of measurement of the test performed with a probability of the measure of 95% and a coverage factor K=2 for the chemical tests

This Test report is relative to the sample subordinate to test and it cannot be partially reproduced without written approval from the Sunlab Ltd

The records of testing of this sample are kept for a minimum period of 10 years.

(*) This test is not in the Scope of Accreditation

(§) This test is carried out by other laboratory (sub-contractor)



TEST REPORT

Test Report n°	201905027A-003	Test Report Date	08/07/2019			
Description	Air Quality Monitoring at the sampling point labeled P59 "Compost Shed Area" - 18 th session - Malta North Waste Treatment Plant L/O Ghallis, Naxxar		Client WasteServe Malta Ltd EkoCentre, Latmija Road - Marsaskala - MSK 4613			
Sample Reception Date	28/05/2019	Test Start Date	28/05/2019			
Test Finish Date	21/06/2019					
Sampling mode	Curated by SUNLAB group Laboratory					
Sampling Plan	Limits reported in WSM 46/224/2017 tender					
Sampling Method	See the methods reported next to the tests					
Reference for the Limits	Limits reported in WSM 46/224/2017 tender					
Annex	No					
Tests	U.O.M.	Method	Result	Uncertainty	L.Min.	L.Max.
Chemical Analysis						
Sampling and determination of Ammonia (*)	mg/m3	NIOSH 6015: 1994	0.28	///	///	///

Laboratory Director
(dott. Filippo Giglio)

Notes:

< Not Detectable because lower than detection limit of the method

The sample (solid, liquid, gaseous matrix) is stored for two weeks unless particular disposition of the law

When indicated, the uncertainty of the measure is expressed in the same unit of measurement of the test performed

With a probability of the measure of 95% and a coverage factor K=2 for the chemical tests

This Test report is relative to the sample subordinate to test and it cannot be partially reproduced without written approval from of the Sunlab Ltd

The records of testing of this sample are kept for a minimum period of 10 years

(*) This test isn't accredited; (s) This test is carried out by other laboratory (sub-contractor)

Appendix B



EMIT
 Laboratori di
 Automatica e
 Strumentazione
 Piazzale A. Cantore, 10
 20123 MILANO - Italia
 Tel. 0258101806
 Fax 0283249259
 Internet: <http://www.emit.it>
 e-mail: las@emit.polimi.it

Centro di Taratura LAT N° 024
Calibration Centre
Laboratorio Accreditato di
Taratura



LAT N° 024

CERTIFICATO DI TARATURA LAT 024 0116P17
Certificate of Calibration

- Data di emissione
date of issue 2017-02-21

- cliente
customer C.A.D.A. s.n.c. di Giglio Filippo & C.
 Via Pio La Torre, 13 - Area P.I.P.
 92013 Menfi (AG)

- destinatario
receiver —

- richiesta
application 318/16/LMC

- in data
date 2016-12-20

Riferisce a
Referring to

- oggetto
item Manometro digitale

- costruttore
manufacturer DADO LAB

- modello
model ST5

- matricola
serial number ST55AA20160199

- data di ricevimento oggetto
date of receipt of item

- data delle misure
date of measurements 2017-02-20

- registro di laboratorio
laboratory reference 0116-17

Il presente certificato di taratura è emesso in base all'accREDITAMENTO LAT N° 024 rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). ACCREDIA attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI). Questo certificato non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Centro.

This certificate of calibration is issued in compliance with the accreditation LAT N° 024 granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System. ACCREDIA attests the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI). This certificate may not be partially reproduced, except with the prior written permission of the issuing Centre.

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure di taratura citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.
The measurement results reported in this Certificate were obtained following the calibration procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla Guida ISO/IEC 98 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura *k* corrispondente ad un livello di fiducia di circa il 95%. Normalmente tale fattore *k* vale 2.
*The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor *k* corresponding to a confidence level of about 95%. Normally, this factor *k* is 2.*

Il Responsabile del Centro
 Head of the Centre

dot. Paolo Biffi

CERTIFICATO DI TARATURA LAT 024 0116P17
Certificate of Calibration

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N.

PT-MP-01 Rev. 2

The measurement results reported in this Certificate were obtained following procedures No.

La catena di riferibilità ha inizio dai campioni di prima linea N.

FBB100, FBA100, FBA101, PCD100

Traceability is through first line standards No.

Unità di certificati validi di taratura rispettivamente N.

11-0003-01, 14-0376-01, 14-0376-02, 16-0061-01 INRIM

validated by certificates of calibration No.

I risultati numerici del presente certificato di taratura sono espressi utilizzando il punto come separatore decimale.

The numerical results of this certificate of calibration are expressed using the point like decimal separator.

Condizioni ambientali di taratura (environmental calibration conditions)

Temperatura ambiente (ambient temperature): (20.0 ± 1.5) °C

Umidità ambiente (ambient moisture): (45 ± 15) % U.R.

Pressione atmosferica (atmospheric pressure): 1013.6 hPa

Condizioni di taratura (calibration conditions)

Campo di misura (range): (10.000 + 105.000) kPa

Segnale d'uscita (output signal): (10.00 + 105.00) kPa

Pressione misurata (measured pressure): Pressione assoluta (absolute pressure)

Fluido vettore della pressione (pressure transfer medium): Azoto (nitrogen)

Posizione di montaggio (mounting position): Verticale (vertical)

Livello di riferimento (reference level): Asse della connessione pneumatica (pneumatic connection's axis)

Alimentazione elettrica (power supply): (230 ± 10) V, (50 ± 0.1) Hz

Manometro campione (standard manometer): PCD200

Operatore (operator): Andrea Sala

Note (notes): Taratura AS FOUND.

Procedura di taratura (calibration procedure)

Conforme alle procedure di taratura definite dalle Guide EA-10/17 "Guidelines on the Calibration of Electromechanical Manometers" e SIT/Tec-009/05 "Guida per la taratura di misuratori di pressione" (in compliance with the procedure of calibration defined from Guides EA-10/17 "Guidelines on the Calibration of Electromechanical Manometers" and SIT/Tec-009/05 "Guida per la taratura di misuratori di pressione").

Metodo di taratura (calibration method)

Confronto diretto con manometro campione conforme ai metodi di taratura "basic" definito dalla Guida EA-10/17 e "base" definito dalla Guida SIT/Tec-009/05 (direct comparison with standard manometer in compliance with the methods of calibration "basic" defined from Guide EA-10/17 and "base" defined from Guide SIT/Tec-009/05).

Funzione di taratura (calibration function)

e_m : Media dell'errore di indicazione del manometro digitale (mean of indication error of the digital manometer)

$$e_m = P_{i,m} - P_{r,m}$$

$P_{i,m}$: Media della pressione indicata del manometro digitale (mean of the indicated pressure of the digital manometer).

$P_{r,m}$: Media della pressione di riferimento (mean of the reference pressure).

Riferimenti (link)

<http://www.accredia.it/>

<http://www.european-accreditation.org/>

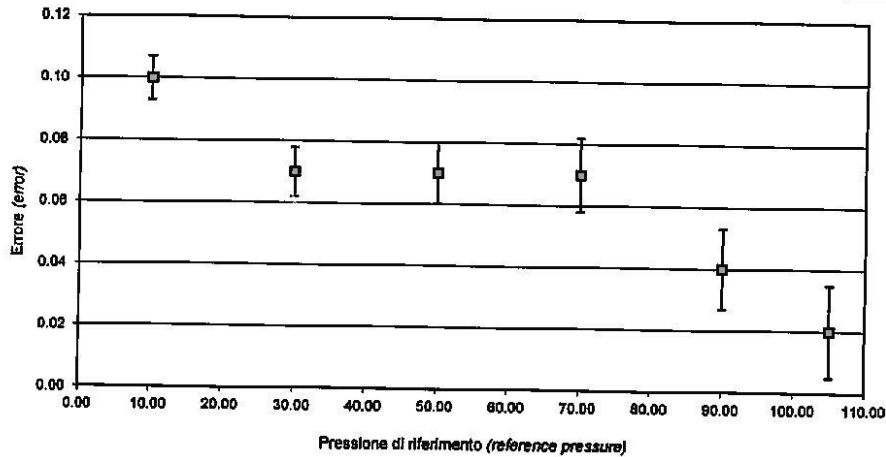
<http://www.emitlas.it/>

CERTIFICATO DI TARATURA LAT 024 0116P17
 Certificate of Calibration

Risultati della taratura (calibration results)

I risultati sono presentati come media dei valori della pressione indicata con pressione crescente e decrescente (the results are introduced like mean of the values of the increasing and decreasing indicated pressure).
 L'incertezza di misura è stata determinata in accordo alle Guide EA-10/17 e SIT/Tec-009/05 considerando i seguenti contributi: incertezza dovuta al manometro campione, incertezze dovute alla risoluzione, alla ripetibilità e all'isteresi del manometro in taratura, incertezza dovuta al dislivello (the measurement uncertainty has been determined in agreement to Guides EA-10/17 and SIT/Tec-009/05 considering the following contributions: uncertainty due to the standard manometer, uncertainties due to the resolution, the repeatability and the hysteresis of the manometer under calibration, uncertainty due to the head correction).

Media della pressione di riferimento (mean of the reference pressure)	Media della pressione indicata (mean of the indicated pressure)	Media dell'errore di indicazione (mean of the indication error)	Deriva di Zero (zero offset)	Isteresi (hysteresis)	Ripetibilità (repeatability)	Incetezza di misura (measurement uncertainty)	Incetezza di misura quando non si applica la correzione (error span)
$p_{L,m}$ [kPa]	$p_{I,m}$ [kPa]	e_m [kPa]	f [kPa]	h [kPa]	b^* [kPa]	$U(e_m)$ [kPa]	$U(e_m)$ [kPa]
10.000	10.10	0.10	0.00	0.00	---	0.007	0.11
30.000	30.07	0.07	---	0.00	---	0.008	0.08
50.000	50.07	0.07	---	0.00	---	0.010	0.08
70.000	70.07	0.07	---	0.00	0.00	0.012	0.08
90.000	90.04	0.04	---	0.00	---	0.013	0.05
105.000	105.02	0.02	---	0.00	---	0.015	0.04





EMIT
Laboratori di
Automatica e
Strumentazione

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20123 MILANO - Italia
Tel. 0253101806
Fax 0283249259
Internet: <http://www.emitias.it>
e-mail: fas@emit.polimi.it

Centro di Taratura LAT N° 024
Calibration Centre
Laboratorio Accreditato di
Taratura



LAT N° 024

Pagina 1 di 3

Page 1 of 3

CERTIFICATO DI TARATURA LAT 024 0115P17
Certificate of Calibration

- Data di emissione
date of issue 2017-02-21

- cliente
customer C.A.D.A. s.n.c. di Giglio Filippo & C.
Via Pio La Torre, 13 - Area P.I.P.
92013 Menfi (AG)

- destinatario
receiver ---

- richiesta
application 319/16/LMC

- in data
date 2016-12-20

Si riferisce a
Referring to

- oggetto
item Manometro digitale

- costruttore
manufacturer DADO LAB

- modello
model ST5

- matricola
serial number ST55AA20160199

- data di ricevimento oggetto
date of receipt of item

- data delle misure
date of measurements 2017-02-20

- registro di laboratorio
laboratory reference 0115-17

Il presente certificato di taratura è emesso in base all'accreditamento LAT N° 024 rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). ACCREDIA attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI). Questo certificato non può essere riprodotto in modo parziale, salvo espresse autorizzazione scritta da parte del Centro.

This certificate of calibration is issued in compliance with the accreditation LAT N° 024 granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System. ACCREDIA attests the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI). This certificate may not be partially reproduced, except with the prior written permission of the issuing Centre.

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure di taratura citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.
The measurement results reported in this Certificate were obtained following the calibration procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla Guida ISO/IEC 96 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura K corrispondente ad un livello di fiducia di circa il 95%. Normalmente tale fattore k vale 2.
The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Il Responsabile del Centro

Head of the Centre
dott. Paolo Biffi

CERTIFICATO DI TARATURA LAT 024 0115P17
Certificate of Calibration

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N. **PT-MP-01 Rev. 2**
The measurement results reported in this Certificate were obtained following procedures No.

La catena di riferibilità ha inizio dai campioni di prima linea N. **PBB100, PBA100, PBA101, PCD100**
Traceability is through first line standards No.

I campioni di certificati validi di taratura rispettivamente N. **11-0003-01, 14-0378-01, 14-0378-02, 16-0061-01 INRIM**
validated by certificates of calibration No.

I risultati numerici del presente certificato di taratura sono espressi utilizzando il punto come separatore decimale.
The numerical results of this certificate of calibration are expressed using the point like decimal separator.

Condizioni ambientali di taratura (environmental calibration conditions)

Temperatura ambiente (ambient temperature): **(20.0 ± 1.5) °C**
 Umidità ambiente (ambient moisture): **(45 ± 15) % U.R.**
 Pressione atmosferica (atmospheric pressure): **1013.6 hPa**

Condizioni di taratura (calibration conditions)

Campo di misura (range): **(-100.0 + 1000.0) Pa**
 Segnale d'uscita (output signal): **(-100.0 + 1000.0) Pa**
 Pressione misurata (measured pressure): **Pressione relativa alla pressione atmosferica (gauge pressure)**
 Fluido vettore della pressione (pressure transfer medium): **Azoto (nitrogen)**
 Posizione di montaggio (mounting position): **Verticale (vertical)**
 Livello di riferimento (reference level): **Asse della connessione pneumatica (pneumatic connection's axis)**
 Alimentazione elettrica (power supply): **(230 ± 10) V, (50 ± 0.1) Hz**
 Manometro campione (standard manometer): **PCD100**
 Operatore (operator): **Andrea Sala**
 Note (notes): **Taratura AS FOUND. Pressione differenziale**

Procedura di taratura (calibration procedure)

Conforme alle procedure di taratura definite dalle Guide EA-10/17 "Guidelines on the Calibration of Electromechanical Manometers" e SIT/Tec-009/05 "Guida per la taratura di misuratori di pressione" (in compliance with the procedures of calibration defined from Guides EA-10/17 "Guidelines on the Calibration of Electromechanical Manometers" and SIT/Tec-009/05 "Guida per la taratura di misuratori di pressione").

Metodo di taratura (calibration method)

Confronto diretto con manometro campione conforme ai metodi di taratura "basic" definito dalla Guida EA-10/17 e "base" definito dalla Guida SIT/Tec-009/05 (direct comparison with standard manometer in compliance with the methods of calibration "basic" defined from Guide EA-10/17 and "base" defined from Guide SIT/Tec-009/05).

Funzione di taratura (calibration function)

e_m : Media dell'errore di indicazione del manometro digitale (mean of indication error of the digital manometer)

$e_m = P_{i,m} - P_{r,m}$ $p_{i,m}$: Media della pressione indicata del manometro digitale (mean of the indicated pressure of the digital manometer).

$p_{r,m}$: Media della pressione di riferimento (mean of the reference pressure).

Riferimenti (link)

<http://www.accredia.it/>

<http://www.european-accreditation.org/>

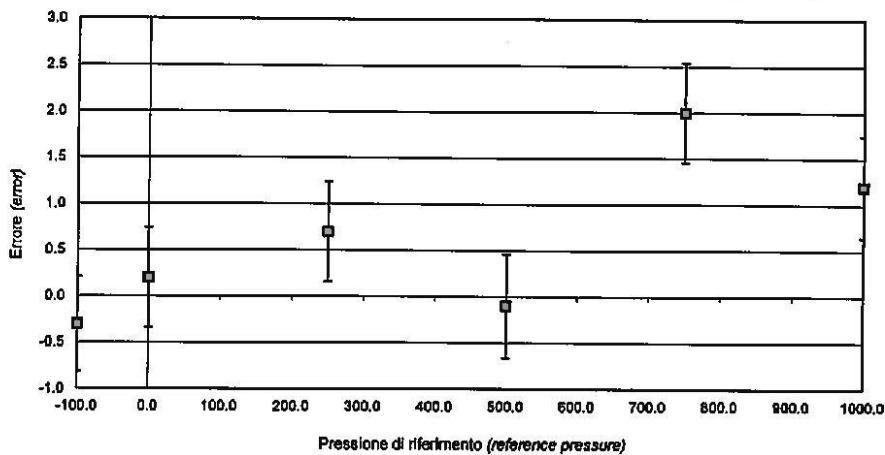
<http://www.emitias.it/>

CERTIFICATO DI TARATURA LAT 024 0116P17
 Certificate of Calibration

Risultati della taratura (calibration results)

I risultati sono presentati come media dei valori della pressione indicata con pressione crescente e decrescente (the results are introduced like mean of the values of the increasing and decreasing indicated pressure).
 L'incertezza di misura è stata determinata in accordo alle Guide EA-10/17 e SIT/Tec-009/05 considerando i seguenti contributi: incertezza dovuta al manometro campione, incertezze dovute alla risoluzione, alla ripetibilità e all'isteresi del manometro in taratura, incertezza dovuta al dislivello (the measurement uncertainty has been determined in agreement to Guides EA-10/17 and SIT/Tec-009/05 considering the following contributions: uncertainty due to the standard manometer, uncertainties due to the resolution, the repeatability and the hysteresis of the manometer under calibration, uncertainty due to the head correction).

Media della pressione di riferimento (mean of the reference pressure)	Media della pressione indicata (mean of the indicated pressure)	Media dell'errore di indicazione (mean of the indication error)	Deriva di Zero (zero offset)	Isteresi (hysteresis)	Ripetibilità (repeatability)	Incetenza di misura (measurement uncertainty)	Incetenza di misura quando non si applica la correzione (error span)
$p_{r,m}$ [Pa]	$p_{l,m}$ [Pa]	e_{m} [Pa]	f [Pa]	h [Pa]	b' [Pa]	$U(e_{m})$ [Pa]	$U'(e_{m})$ [Pa]
-100.0	-100.3	-0.3	0.0	0.0	---	0.6	0.8
0.0	0.2	0.2	---	0.3	---	0.6	0.7
250.0	250.7	0.7	---	0.3	---	0.5	1.2
500.0	499.9	-0.1	---	0.3	0.0	0.6	0.7
750.0	752.0	2.0	---	0.2	---	0.5	2.5
1000.0	1001.2	1.2	---	0.0	---	0.6	1.8





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 www.irving80.it
 P. IVA e C.F. 03276540121

Centro di Taratura LAT N° 238
 Calibration Centre
 Laboratorio Accreditato di
 Taratura



LAT N° 238

Pagina 1 di 3
 Page 1 of 3

CERTIFICATO DI TARATURA LAT 238 0243-17
 Certificate of Calibration

- data di emissione
date of issue 2017-02-01

- cliente
customer EMIT-LAS
 P.le Cantore, 10 - 20123 Milano (MI)

- destinatario
receiver C.A.D.A. s.n.c. di Giglio Filippo & C.
 Via Pio La Torre, 13
 Area P.I.P. - 92013 Menfi (AG)

- richiesta
application 10009

- in data
date 2017-02-20

Il presente certificato di taratura è emesso in base all'accreditamento LAT N° 238 rilasciato in accordo ai decreti attuativi della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). ACCREDIA attesta le capacità di misura e di taratura, le competenze metrologiche del Centro e la riferibilità delle tarature eseguite ai campioni nazionali e internazionali delle unità di misura del Sistema Internazionale delle Unità (SI). Questo certificato non può essere riprodotto in modo parziale, salvo espressa autorizzazione scritta da parte del Centro.

This certificate of calibration is issued in compliance with the accreditation LAT N° 238 granted according to decrees connected with Italian law No. 273/1991 which has established the National Calibration System. ACCREDIA attests the calibration and measurement capability, the metrological competence of the Centre and the traceability of calibration results to the national and international standards of the International System of Units (SI). This certificate may not be partially reproduced, except with the prior written permission of the Issuing Centre.

Si riferisce a

Referring to

- oggetto
item Calibratore Multifunzione

- costruttore
manufacturer dadol eb

- modello
model ST5

- matricola
serial number ST55AA20160199

- data delle misure
date of measurements 2017-02-01

- registro di laboratorio
laboratory reference BCSGL/5976

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure di taratura citate alla pagina seguente, dove sono specificati anche i campioni o gli strumenti che garantiscono la catena di riferibilità del Centro e i rispettivi certificati di taratura in corso di validità. Essi si riferiscono esclusivamente all'oggetto in taratura e sono validi nel momento e nelle condizioni di taratura, salvo diversamente specificato.
The measurement results reported in this Certificate were obtained following the calibration procedures given in the following page, where the reference standards or instruments are indicated which guarantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Le incertezze di misura dichiarate in questo documento sono state determinate conformemente alla Guida ISO/IEC 98 e al documento EA-4/02. Solitamente sono espresse come incertezza estesa ottenuta moltiplicando l'incertezza tipo per il fattore di copertura k corrispondente ad un livello di fiducia di circa il 95 %. Normalmente tale fattore k vale 2.
The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02. Usually, they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Il Responsabile del Centro
Head of the Centre
 Roberto Barbieri



Centro di Taratura LAT N° 238
Calibration Centre
Laboratorio Accreditato di
Taratura



IRVING 80 s.r.l.
Via Giovanni XXIII 16
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Tel: +39 0332948907
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E-mail: Lab@irving80.it // Pec: info@pec.irving80.it

Pagina 2 di 3
Page 2 of 3

CERTIFICATO DI TARATURA LAT 238 0243-17
Certificate of Calibration

Di seguito vengono riportate le seguenti informazioni:
In the following, information is reported about:

- la descrizione dell'oggetto in taratura (se necessaria);
description of the item to be calibrated (if necessary)

- le procedure utilizzate per eseguire le tarature;
technical procedures used for calibration performed

PT-MT-01 rev.5

- gli strumenti/campioni che garantiscono la catena della riferibilità del Centro;
instruments or measurement standards which guarantee the traceability chain of the Centre

EDM100, ERF100, ERF101, ERS100, ERS101, ERT100

- gli estremi dei certificati di taratura di tali campioni;
relevant calibration certificates of those standards

16-0250-01, 16-0250-02, 16-0250-03, 16-0250-05, 16-0250-04, 16-0250-06

- l'Ente che li ha emessi: I.N.R.I.M.
the Issuing Body

La taratura è stata effettuata con lo strumento in equilibrio termico con l'ambiente, per 24 ore, ai seguenti parametri ambientali:

Calibration has been carried on with the instrument in thermal environmental balance, with the following environmental and supply parameters:

- Temperatura: 23 °C ± 1,5 °C

- Umidità relativa: 50 U.R.% ± 15 U.R.%

Le misure sono state eseguite direttamente al terminale di ingresso dello strumento.

Measurement were performed directly in the inputs of the instrument

Alimentazione: (230 ± 5) V (50 ± 3) Hz

Prima delle misure lo strumento è stato alimentato per 4 ore

I risultati numerici del presente certificato di taratura sono espressi utilizzando la virgola come separatore decimale.

The numerical results of this certificate of calibration are expressed using the comma like decimal separator.

Taratura senza esecuzione di messa a punto

Calibration without execution of Adjustment

Per la taratura non sono stati utilizzati i cavi in dotazione allo strumento

For the calibration the cables of the instrument were not used

Nelle pagine successive vengono riportati i risultati delle tarature e la loro incertezza estesa.

In the following pages are reported the calibration results and their expanded uncertainty

Nelle tabelle dei risultati di taratura, la colonna 'Errore' è ottenuta come differenza tra:

In the tables of the calibration results, the column "error" is obtained as difference between:

il valore misurato dello strumento in taratura ed il valore impostato sullo strumento campione per la taratura come misuratore

the measured value of the unit under test and the nominal value set on the standard instrument for the calibration as measure mode



Centro di Taratura LAT N° 238
Calibration Centre
Laboratorio Accreditato di
Taratura



LAT N° 238

IRVING 80 s.r.l.
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Fax: +39 03321800694
E-mail: Lab@irving80.it // Pec: info@pec.irving80.it

CERTIFICATO DI TARATURA LAT 238 0243-17
Certificate of Calibration

Pagina 3 di 3
Page 3 of 3

Costruttore: dadol ab
Modello: ST5
Materiale: ST55AA20160199

TARATURA COME MISURATORE DI TERMOCOPPIA "K"
Impostazioni strumento: compensazione giunto di riferimento interno
Taratura eseguita su ingresso "STACK"

Tensione applicata secondo CEI EN60584-1 (strumento campione) (mV)	Temperatura di riferimento t_{ref} (°C)	Temperatura Letta (*) (strumento in taratura) t_L (°C)	Errore ($t_L - t_{ref}$) (°C)	Incertezza (***) U (°C)
0,0000	0,00	0,0	0,0	0,42
4,0962	100,00	100,0	0,0	0,42
8,1385	200,00	200,0	0,0	0,42
12,2086	300,00	300,1	0,1	0,42
16,3871	400,00	399,9	-0,1	0,42
20,6443	500,00	499,3	-0,7	0,42
24,9055	600,00	598,4	-1,6	0,42
29,1290	700,00	697,2	-2,8	0,42
33,2754	800,00	795,9	-4,1	0,42
37,3259	900,00	894,4	-5,6	0,42
41,2756	1000,00	992,9	-7,1	0,42
48,8382	1200,00	1.189,4	-10,6	0,42

(*) Risoluzione: 0,1 °C

(***) L'incertezza estesa di misura U riportata in tabella, è calcolata:
(The extended uncertainty of measure U in the table is calculated)

$$U = k * \sqrt{\left(\frac{U_{cmc}}{2}\right)^2 + u^2_{rep} + u^2_{resol}}$$

Contributi di incertezza indicati nella formula (contribution of uncertainty indicated):

U_{cmc} del laboratorio per lo strumento in taratura (is the cmc relating to for the instrument under calibration), u_{resol} risoluzione

(resolution), u_{rep} è lo scarto tipo delle misure, ripetibilità, (is the standard deviation of the measures, repeatability), $k = 2$ corrispondente a un livello di fiducia pari al 95% (with $k = 2$ corresponding to a confidence level of 95%)

Operator
The Operator



Rapporto taratura n°		122F_201810	Data Emissione	29/10/2018	Data scadenza	29/10/2019
Numero di inventario		122	Denominazione	Stazione Isocinetica DADOLAB- ST5 V 8.5		
Collocazione		R6	Responsabile dello Strumento	D.Ferraro	Unità Digit	0,001
Stato	Attivo	Resp. Taratura	D. Ferraro	Documenti di riferimento	tp1801_rev1_calibration _t-m-f_20170222	
Motivo della taratura		Taratura secondo programma				

Campioni di riferimento utilizzati		
CR n°	Descrizione campione di riferimento	Matricola
RS12	Diaphragm Gas Meter Tj GI.6	2016-0730095

Scostamenti dell'accuratezza ed dell'incertezza estesa						
Misura n°	F _{medio-RS} [l/min]	F _{medio-st} [l/min]	$\Delta(F_{m-st} - F_{m-RS})$ [litri]	E _{acc} [%]	U _{estesa} [litri/min]	U _{estesa} [%]
1	15,41	15,93	0,51	3,336	0,18	1,13
2	21,54	21,74	0,20	0,947	0,25	1,15
3	24,37	25,51	1,14	4,691	0,34	1,32
4	29,37	30,63	1,26	4,301	0,41	1,33

Legenda: F_{medio-CR} = Flusso medio del campione di riferimento; F_{medio-st} = Flusso medio indicato dallo strumento
 $\Delta(F_{m-st} - F_{m-RS})$ = scostamento medio flusso strumento da flusso campione di riferimento; E_{acc} = errore di accuratezza; U_{estesa} = Incertezza estesa;
K_{cor} = coefficiente correttivo applicato (A = medio per tutti i punti; B = puntuale) F_{medio-st-cor} = Flusso medio strumento corretto con fattore di correzione

Nota: per i dati grezzi della taratura fare riferimento al DR.18.145 "Rapporto di taratura interna volume (con campionatore volumetrico)" e DR.18.144 "Scheda taratura interna volume (con campionatore volumetrico)"

Criterio di accettabilità accuratezza e incertezza della misura			
Errore Accuratezza [%]	6	Incertezza di misura [%]	5
Giudizio di conformità:	Conformità Accuratezza Positiva		Conformità Incertezza Positiva

Eventuale correzione da apportare mediante coefficiente							
Fattore di correzione per tutti i punti (K _{cor-A})				Fattore di correzione puntuale (K _{cor-B})			
Misura n°	F _{medio-CR} [l/min]	F _{medio-st} [l/min]	K _{cor1-A} [-]	F _{medio-st-cor} [litri/min]	$\Delta(F_{medio-st-cor} - F_{medio-CR})$ [l/min]	E _{acc} [%]	Esito correzione
1	-	-	/	/	/	/	/
2	-	-	/	/	/	/	/
3	-	-	/	/	/	/	/
4	-	-	/	/	/	/	/
5	-	-	/	/	/	/	/

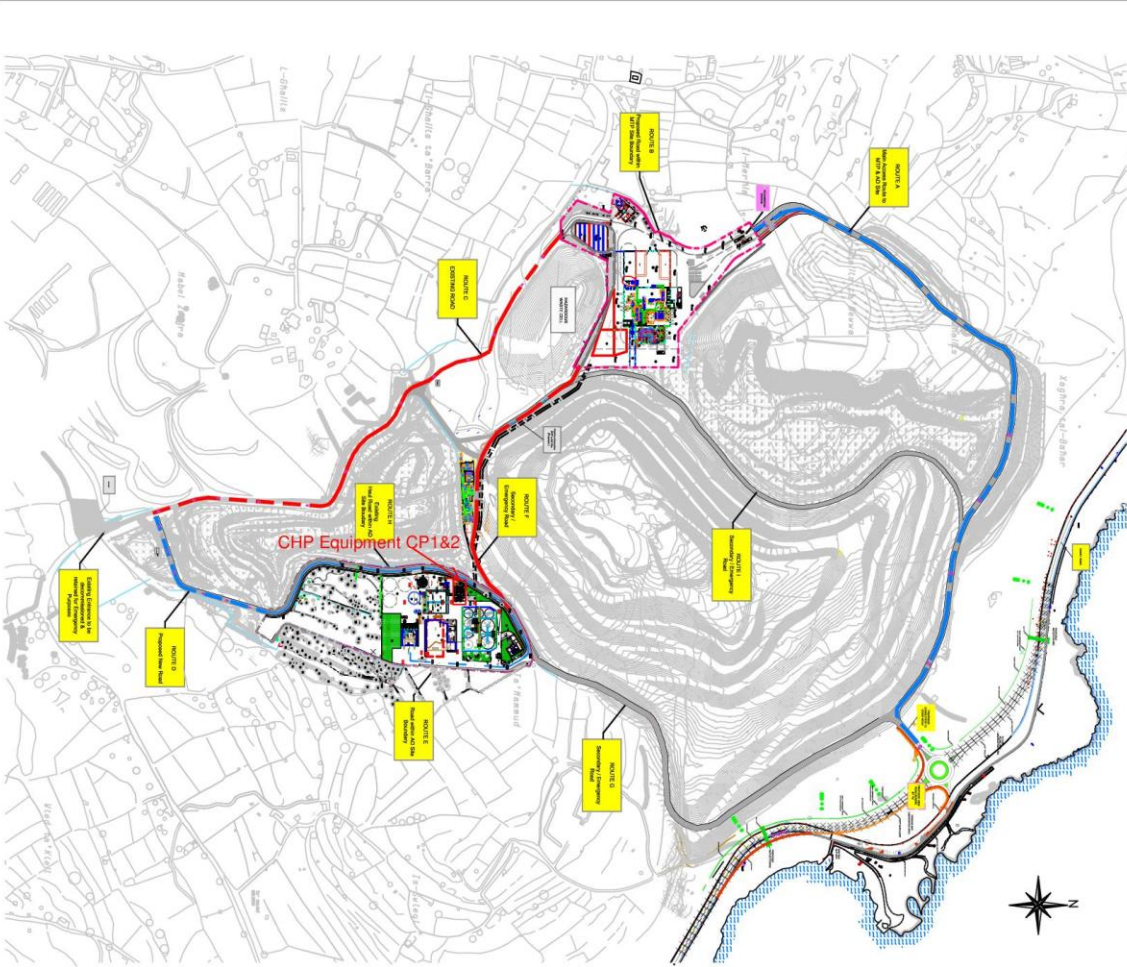
Note:	Fattore di correzione F _{cor-B} della/e misura/e n° (barrare campo celeste)	Valore Medio	/
	Misura 1		
	Misura 2		
	Misura 3		
	Misura 4		
	Misura 5		
Limitazione d'uso			

Nel caso di necessità di correzione, si veda nota (1) su DR.18.144, allegato

Giudizio di conformità a seguito di correzione:	/	/
---	---	---

Responsabile Tarature
(dott. D. Ferraro)

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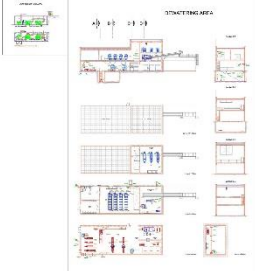
ROUTE	DESCRIPTION	BEGIN POINT	END POINT
A	Main from Main Entrance at 1000	1000	8
B	Secondary from Main Entrance at 1000	1000	8
C	Secondary from Main Entrance at 1000	1000	8
D	Secondary from Main Entrance at 1000	1000	8
E	Secondary from Main Entrance at 1000	1000	8
F	Secondary from Main Entrance at 1000	1000	8
G	Secondary from Main Entrance at 1000	1000	8
H	Secondary from Main Entrance at 1000	1000	8
I	Secondary from Main Entrance at 1000	1000	8



<p>CGE CONSULTING GROUP</p> <p>Architect: Structural Engineer</p> <p>Project: WORKS DESIGN FOR THE SYSTEMS INSTALLATION AND CONNECTIONS AND DESIGN OF A REPLACEMENT AND REDUNDANT MAIN DISTRIBUTION SYSTEM AT THE CHHP CP1&2 SITE.</p> <p>Contractor: nnn</p>	<p>SITA CONSULTING</p> <p>Project: 20th June 2018</p> <p>Drawn: SA</p> <p>Checked: SA</p> <p>Scale: 1:2000</p> <p>Notes: AD</p>	<p>CHHP Equipment CP1&2</p> <p>MTP and AD Sites Combined</p> <p>VAE-DC-0146-01-000000</p> <p>Sheet: 4</p>
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1 2 3 4 5 6 7 8 9 10

THIS DRAWING IS A PRELIMINARY DESIGN AND IS SUBJECT TO CHANGE WITHOUT NOTICE. ANY CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST REVISIONS AND PERMITS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.



Legend

1. Building Footprint	11. Green Space
2. Parking Area	12. Stormwater Management
3. Driveway	13. Utility Lines
4. Walkway	14. Fencing
5. Landscaping	15. Other

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR PERMITS	10/20/2023	J. SMITH
2	REVISIONS TO PERMITS	11/05/2023	J. SMITH
3	ISSUED FOR CONSTRUCTION	11/15/2023	J. SMITH
4	REVISIONS TO CONSTRUCTION	12/01/2023	J. SMITH

AS-BUILT

CGE ENGINEERS

1234 Main Street, Suite 500, Anytown, CA 90210
 Phone: (555) 123-4567
 Email: info@cge.com

Project: **AS-BUILT**

Client: **ABC COMPANY**

Site: **1234 Main Street, Anytown, CA**

Scale: **1" = 10'-0"**

Drawn by: **J. SMITH**

Checked by: **M. JONES**

Date: **11/15/2023**

Sheet: **AS-BUILT**

ANNEX 5: Generators

Wasteserv - Malta North

Generator 1 thermal input calculation

Model	T90D5
Fuel consumption at rated value	27 L/h
Diesel LCV	42.6 MJ/kg
density	0.846 kg/L
1kWh	3.6 MJ
Total Thermal input, P_{TH}	270.3 kW

Generator 2 thermal input calculation

Model	C250D5
Fuel consumption at rated value	57 L/h
Diesel LCV	42.6 MJ/kg
density	0.846 kg/L
1kWh	3.6 MJ
Total Thermal input, P_{TH}	570.6 kW

Energy content by weight (lower calorific value, MJ/kg)	Energy content by volume (lower calorific value, MJ/l)
43	36

Extracts from SUBSIDIARY LEGISLATION 545.17, Seventh Schedule

Control system

Generator set control PowerCommand® 1.2 –

The PowerCommand® 1.2 control is a microprocessor based generator set monitoring control system. The control provides a simple operator interface to the generator set, digital voltage regulation, digital engine speed governing, start/stop control and protective functions.

- The PowerCommand® 1.2 control is suitable for use on a wide range of generator sets in non-paralleling applications.
- The PowerCommand® control can be configured for any frequency, voltage and power configuration from 120 to 600 VAC for 50 Hz or 60 Hz operation.
- Power for the control is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 35 VDC.
- A larger HMI reduces setup time, provides more information per screen, enhanced navigation and serviceability.
- Includes all functions to locally or remotely start and stop, and protect the generator set.
 - Control switch – RUN/OFF/AUTO
 - OFF mode – the generator set is shut down and cannot be started, as well as reset faults
 - RUN mode – the generator set will execute its start sequence
 - AUTO mode – the generator set can be started with a start signal from a remote device

Status indications – The control has a lamp driver for external fault/status indication. Functions include:

- The lamp flashes during preheat (when used) and while the generator set is starting
- READY TO LOAD – flashing until the set is at rated voltage and frequency, then on continuously
- Fault conditions are displayed by flashing a two-digit fault code number

LED indicating lamps – includes LED indicating lamps for the following functions:

- Remote start
- Warning
- Shutdown
- Auto
- Run
- Remote emergency stop switch input. Immediate shut down of the generator set on operation

Major features

- 12 or 24 VDC battery operation
- Digital engine speed governing to provide isochronous frequency regulation
- Digital voltage regulation full wave rectified single phase (line to line) sensing
- Generator set monitoring monitors status of all critical engine and alternator conditions functions
- Engine starting includes relay drivers for start and fuel shut off (FSO)
- Configurable inputs and outputs – two discrete inputs and two dry contact relay outputs
- Generator set monitoring displays status of all critical engine and alternator generator set functions
- Smart starting control system – integrated fuel ramping to limit black smoke and frequency overshoot
- Advanced serviceability using InPower™, a PC-based software service tool

Base engine protection

- Low oil pressure shutdown
- High engine temperature shutdown
- Under speed/sensor fail shutdown
- Fail to start
- Battery charging alternator fail warning

HMI220 operator interface

- Back-lit graphics 128 x 128 LCD display
- English text and symbolic overlay
- Multiple language LCD screens
- Dedicated manual/off/auto function switches with mode LEDs and configurable access code (key switch)
- Control set-up without PC-based tool (InPower)
- UL508 recognized/CSA certified/CE compliant
- Multiple HMIs per generator set (one local and one remote)
- Plug and play operation



Our energy working for you.™

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cumminspower.com

Ratings definitions

Emergency standby power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

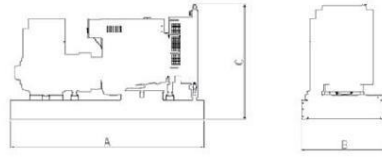
Prime power (unlimited running time):

Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 100% overload capability is available for limited time. (Equivalent to prime power in accordance with AS 2789, DIN 6271 and BS 5514). This rating is not applicable to all generator set models.

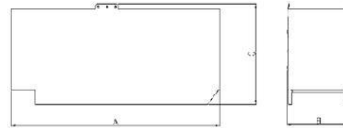
Base load (continuous) power:

Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to continuous power in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514). This rating is not applicable to all generator set models.

OPEN



ENCLOSED



This outline drawing is to provide representative configuration details for Model series only.

See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Weights and dimensions

Model	Open				Enclosed			
	Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry wt.* kg (lbs)	Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry wt.* kg (lbs)
C90 D5	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C110 D5	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C150 D5	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)
C170 D5	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)
C80 D6	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C100 D6	2268 (90)	1094 (44)	1576 (63)	1244 (2737)	3151 (125)	1142 (45)	1714 (68)	1944 (4277)
C135 D6	2537 (99.9)	1090 (42.9)	1846 (72.7)	1635 (3604.6)	3460 (136.2)	1090 (42.9)	2387 (94)	2390 (5269)

* Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		This generator set is available with CE certification.
2000/14/EC	All enclosed products are designed to meet or exceed EU noise legislation 2000/14/EC step 2006.	ISO 8528	This generator set has been designed to comply with ISO 8528 regulation.

Cummins Power Generation

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SS28-CPGK-RevA (11/13)



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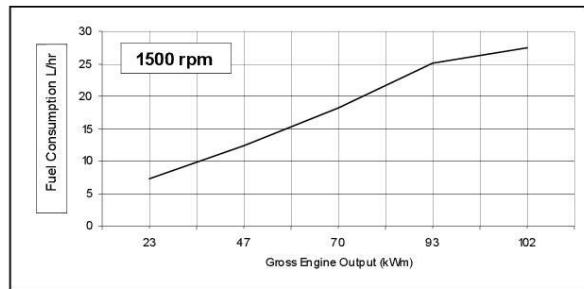
	Cummins Inc. Columbus, Indiana 47202-3005 Engine Data Sheet	Basic Engine Model: 6BTA5.9-G5	Curve Number: FR-92241	G-DRIVE B5.9 1
		Engine Critical Parts List: CPL: 2387	Date: 30Mar09	
Displacement : 5.9 litre (360 in ³)		Bore : 102mm (4.02 in.) Stroke : 120 mm (4.72 in.)		
No. of Cylinders : 6		Aspiration : Turbocharged and Aftercooled		

Engine Speed rpm	Standby Power		Prime Power		Continuous Power	
	kWm	hp	kWm	hp	kWm	hp
1500	102	137	93	125	82	110

Engine Performance Data @ 1500 rpm

litre/hour

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm-h	lb/ hp-h	litre/ hour	US gal/ hour
STANDBY POWER						
100	102	137	0.228	0.376	27	7.2
PRIME POWER						
100	93	125	0.228	0.375	25	6.6
75	70	94	0.221	0.364	18	4.8
50	47	63	0.227	0.373	12	3.3
25	23	31	0.265	0.435	7	1.9
CONTINUOUS POWER						
100	82	110	0.221	0.364	21	5.6



CONVERSIONS: (litres = US Gal x 3.785) (US Gal = litres x 0.2642)

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. **STANDBY POWER RATING:** Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. **PRIME POWER RATING:** Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories: **UNLIMITED TIME RUNNING PRIME POWER:** Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year. **LIMITED TIME RUNNING PRIME POWER:** Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating. **CONTINUOUS POWER RATING:** Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Data Subject to Change Without Notice

Reference AEB 10.47 for determining Electrical Output.

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H₂O air intake restriction and 2 in Hg exhaust back pressure.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/US gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

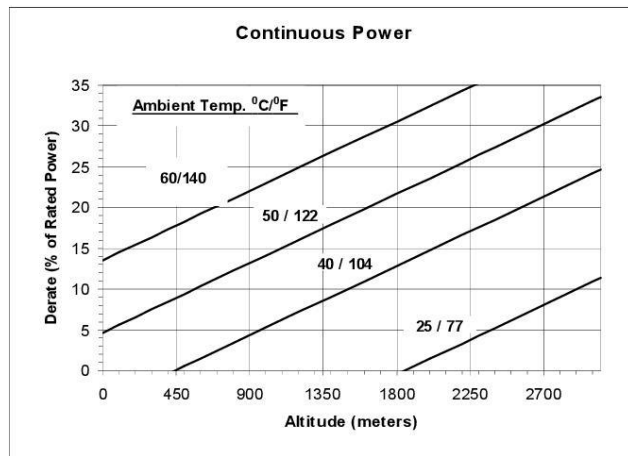
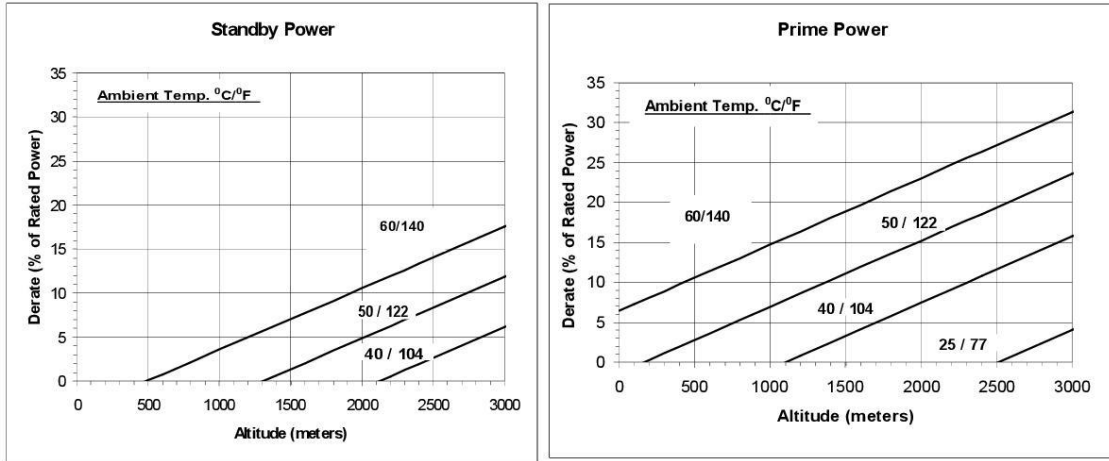
Data Status: Limited Production

Data Tolerance: ± 5%

Chief Engineer:

Shawant

1500 RPM Power Derate Curves



Operation At Elevated Temperature And Altitude:

For **Standby Operation** above these conditions, derate by an additional 2.1% per 300 m (1000 ft), and 5.7% per 10 °C (18 °F).

For **Prime Operation** above these conditions, derate by an additional 2.5% per 300 m (1000 ft), and 7.8% per 10 °C (18 °F).

For **Continuous Operation** above these conditions, derate by an additional 2.8% per 300 m (1000 ft), and 8.9% per 10 °C (18 °F).

Cummins Inc.
Engine Data Sheet

G-DRIVE
B5.9
3

ENGINE MODEL : 6BTA5.9-G5

DATA SHEET : DS-92241
CONFIGURATION NUMBER : D403091GX02 DATE : 30Mar09
PERFORMANCE CURVE : FR-92241

INSTALLATION DIAGRAM

• Fan to Flywheel:

CPL NUMBER

• Engine Critical Parts List: 2387

GENERAL ENGINE DATA

Type	Inline 6-Cylinder Diesel		
Aspiration	Turbocharged and Charge Air Cooled		
Bore x Stroke	4.02 x 4.72 (102 X 120)		
Displacement	360 (5.9)		
Compression Ratio	17.6 :1		
Dry Weight (Approximate), Fan to Flywheel Engine	— lb (kg)	886	(402)
Wet Weight (Approximate), Fan to Flywheel Engine	— lb (kg)	939	(426)
Moment of Inertia of Rotating Components			
• with FW9017 Flywheel	— lb _m • ft ² (kg • m ²)	5	(0.6)
• with FW 9134 Flywheel	— lb _m • ft ² (kg • m ²)	11	(1.2)
Center of Gravity from Rear Face of Block	— in (mm)	21.4	(544)
Center of Gravity Above Crankshaft Centerline	— in (mm)	6.1	(155)
Maximum Static Loading at Rear Main Bearing	— lb (kg)	TBD	TBD

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	— lb • ft (N • m)	996	(1350)
--	-------------------	-----	--------

EXHAUST SYSTEM

Maximum Back Pressure	— in Hg (kPa)	3	(10.25)
-----------------------------	---------------	---	---------

AIR INDUCTION SYSTEM

Maximum Intake Air Restriction:			
• with Dirty Filter Element	— in H ₂ O (kPa)	25	(6)
• with Clean Filter Element	— in H ₂ O (kPa)	15	(4)

COOLING SYSTEM

Jacket Water Circuit Requirements

Coolant Capacity — Engine Only	— US gal (litre)	2.4	(9.1)
Maximum Static Head of Coolant Above Engine Crank Centerline	— ft (m)	46	(14)
Standard Thermostat (Modulating) Range	— °F (°C)	183-203	(84-95)
Minimum Pressure Cap	— psi (kPa)	7	(48)
Maximum Top Tank Temperature for Standby / Prime Power	— °F (°C)	212	(100)
Maximum Coolant Friction Head External to Engine	— psi (kPa)	4	(28)

Charge Air Cooler Requirements

Maximum Temp. Rise Between Engine Air Intake and Aftercooler Air Outlet- 1500/1800 rpm — °F (°C)	N/A	(N/A)	
Maximum Air Pressure Drop from Turbo Air outlet to Intake Manifold - 1500/1800 rpm . — in Hg (kPa)	N/A	(N/A)	
Maximum Intake Manifold Temperature @ 77 °F (25 °C) ambient - 1500/1800 rpm	— °F (°C)	192	(89)
Maximum Compressor Outlet Temperature	— °F (°C)	265	(130)
Maximum Intake Manifold Temperature for engine protection (Shut Down Threshold)	— °F (°C)	207	(97)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed (minimum)	— psi (kPa)	10	(69)
@ Governed Speed	— psi (kPa)	30-50	(207-345)
Maximum Oil Temperature	— °F (°C)	250	(121)
Oil Capacity with OP 9006 Oil Pan : Low - High	— US gal (litre)	3-3.8	(11.5 -14.3)
Total System Capacity (With Combo Filters)	— US gal (litre)	4.3	(16.4)

FUEL SYSTEM

Type Injection System		Bosch Mechanical
Maximum Restriction at Lift Pump(clean/dirty filter).....	— in Hg (kPa)	4/8 (13.5/27)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head)	— in Hg (kPa)	2.5 (8.4)
Maximum Fuel Flow to Injector Pump	— US gph (litre/hr)	11.9 (45)
Maximum Return Fuel Flow	— US gph (litre/hr)	TBD (TBD)
Maximum Fuel Inlet Temperature	— °F (°C)	160 (71)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement).....	— volt	12
Battery Charging System, Negative Ground.....	— ampere	55
Maximum Allowable Resistance of Cranking Circuit	— ohm	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ -18 °C to 0 °C (0 °F to 32 °F).....	— 0°F CCA	950

COLD START CAPABILITY

Minimum Ambient Temperature for Cold Start with 1500 watt Coolant Heater to Rated Speed	— °F (°C)	5 (-15)
Minimum Ambient Temperature for Unaided Cold Start to Idle Speed.....	— °F (°C)	23 (-5)
Minimum Ambient Temperature for NFPA 110 Cold Start (90° F Minimum Coolant Temperature).....	— °F (°C)	TBD TBD

PERFORMANCE DATA

All data is based on:

- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
- Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
- ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure : 100 kPa (29.53 in Hg)	Air Temperature : 25 °C (77 °F)
Altitude : 110 m (361 ft)	Relative Humidity : 30%
Air Intake Restriction : 381 mm H ₂ O (15 in H ₂ O)	Exhaust Restriction : 6.7 kPa (2 in Hg)

Steady State Stability Band at any Constant Load

Estimated Free Field Sound Pressure Level of a Typical Generator Set;

Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); @1800 rpm

Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45°.....

	STANDBY POWER		PRIME POWER	
	60 hz	50 hz	60 hz	50 hz
Governed Engine Speed..... rpm		1500		1500
Engine Idle Speed..... rpm		700-1507		700-1507
Gross Engine Power Output..... hp (kW)		137 (102)		125 (93)
Brake Mean Effective Pressure..... psi (kPa)		201 (1386)		183 (1265)
Piston Speed..... ft/min (m/s)		1181 (6)		1181 (6)
Friction Horsepower..... hp (kW)		N.A.		N.A.
Engine Water Flow at Stated Friction Head External to Engine:				
• 2.5 psi Friction Head..... US gpm (litre/min)		7.5 (28.6)		7.5 (28.6)
• Maximum Friction Head..... US gpm (litre/min)		N.A.		N.A.
Engine Data				
Intake Air Flow..... cfm (litre/s)		276 (131)		253 (120)
Exhaust Gas Temperature..... °F (°C)		1038 (533)		1004 (540)
Exhaust Gas Flow..... cfm (litre/s)		755 (357)		687 (325)
Air to Fuel Ratio..... air : fuel		23.4 : 1		23.7 : 1
Radiated Heat to Ambient..... BTU/min (kW)		628 (12)		572 (11)
Heat Rejection to Jacket Coolant..... BTU/min (kW)		4426 (78)		4018 (71)
Heat Rejection to Exhaust..... BTU/min (kW)		4833 (85)		4401 (78)
Heat Rejected to Fuel..... BTU/min (kW)		N.A.		N.A.
Aftercooler Heat Rejection..... BTU/min (kW)		N.A.		N.A.
Turbocharger Compressor Outlet Pressure..... psi (kPa)		17 (117)		15 (103)
Turbocharger Compressor Outlet Temperature..... °F (°C)		265 (130)		238 (115)

N.A. - Not Available
 N/A - Not Applicable to this Engine
 TBD - To Be Determined

*This is the maximum heat rejection to fuel, which is at low load.

ENGINE MODEL : 6BTA5.9-G5
DATA SHEET : DS-92241
DATE : 30Mar 09
CURVE NO. : FR-92241

Specification sheet



Diesel generator set 6BTA series engine

90 kVA - 170 kVA 50 Hz
80 kW - 135 kW 60 Hz



Description

This Cummins® Power Generation commercial generator set is a fully integrated power generation system, providing optimum performance, reliability, and versatility for stationary standby and prime power duty applications.

Features

Cummins® heavy-duty engine - Rugged 4 cycle industrial diesel delivers reliable power and fast response to load changes.

Alternator - Low reactance 2/3 pitch windings; low waveform distortion with non-linear loads, fault clearing short-circuits capability and class H insulation.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

Control system - The PowerCommand® electronic control is standard equipment and provides total genset system integration, including auto remote start/stop, alarm and status message display.

Enclosures - Optional sound-attenuated enclosures are available.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

Model	3-Phase ratings				Data sheet
	Standby rating		Prime rating		
	50 Hz kVA (kW)	60 Hz kW (kVA)	50 Hz kVA (kW)	60 Hz kW (kVA)	
C90 D5	90 (72)		82 (65)		DS380-CPGK
C110 D5	110 (88)		100 (80)		DS381-CPGK
C150 D5	150 (120)		136 (109)		EMERD-5835
C170 D5	170 (136)		155 (124)		EMERD-5836
C80 D6		80 (100)		73 (91)	DS382-CPGK
C100 D6		100 (125)		91 (114)	DS383-CPGK
C135 D6		135 (169)		123 (153)	EMERD-5834

Generator set specifications

Governor regulation class	ISO 8528 G2
Voltage regulation, no load to full load	± 1%
Random voltage variation	± 1%
Frequency regulation	Isochronous
Random frequency variation	± 0.75%
Radio frequency emissions compliance	BS EN 61000-6-4 / BS EN 61000-6-2

Engine specifications

Design	4-cycle, in-line, 6-cylinder, turbocharged and charge air cooled, diesel	
Bore	102 mm (4.02 in.)	
Stroke	120 mm (4.72 in.)	
Displacement	5.9 liter (360 in ³)	
Cylinder block	Cast iron, 6 cylinder	
Battery charging alternator	55 amps	
Starting voltage	12 volt, 55 amp negative ground	
Standard cooling system	122 °F (50 °C) ambient radiator	
Model name	C150 D5,C170 D5,C135 D6	C90 D5,C110-D5 C80D6, C100 D6
Fuel system	Rotary type Bosch pump	Direct injection
Fuel filter	Ventury combo Stratapore filter	Spin on
Air cleaner type	Heavy duty	Normal duty
Lube oil filter type(s)	Ventury combo Stratapore filter	Spin-on full flow filter

Alternator specifications

Design	Brushless, single bearing, revolving field
Stator	2/3 pitch winding
Rotor	Single bearing, flexible disc coupling
Insulation system	Class H
Standard temperature rise	Standby 50 Hz – 163 °C/27 °C ambient Standby 60 Hz – 150 °C/40 °C ambient
Exciter type	Self excited
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal fan
AC waveform total harmonic distortion (THDV)	No load < 1.8%. Non distorting balanced linear load < 5%
Telephone influence factor (TIF)	< 50% per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 2%

Available voltages

50 Hz line – neutral / line - line	60 Hz line – neutral / line - line
<ul style="list-style-type: none"> • 220/380 • 230/400 • 240/416 • 115/200 • 120/208 • 110/190 	<ul style="list-style-type: none"> • 115/200 • 120/208 • 127/220 • 139/240 • 220/380 • 230/400 • 240/416 • 255/440 • 277/480 • 110/190

Note: Some voltages may not be available on all models - consult factory for availability.

Generator set options and accessories

- | | | |
|--|--|--|
| <input type="checkbox"/> Sound attenuated canopy | <input type="checkbox"/> PC3.3 | <input type="checkbox"/> Exciter voltage regulator (PMG) |
| <input type="checkbox"/> Mains operated battery charger | <input type="checkbox"/> Coolant heater, 240V | <input type="checkbox"/> Low temp rise alternator |
| <input type="checkbox"/> Double wall fuel tank | <input type="checkbox"/> Alternator heater | <input type="checkbox"/> Earth fault relay |
| <input type="checkbox"/> Residential silencer, industrial silencer | <input type="checkbox"/> Main generator heater | <input type="checkbox"/> Shunt trip |
| | | <input type="checkbox"/> Literature language |

Note: Some options may not be available on all models - consult factory for availability.

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cumminspower.com



» Generator set data sheet

Model: C250 D5
Frequency: 50
Fuel Type: Diesel

Spec sheet:	SS7-CPGK
Noise data sheet (Open/enclosed):	ND50-OS550 / ND50-CS550
Airflow data sheet:	AF50-550
Derate data sheet (Open/enclosed):	DD50-OS550 / DD50-CS550
Transient data sheet:	TD50-550

Fuel consumption	Standby				Prime			
	kVA (kW)				kVA (kW)			
Ratings	250 (200)				228 (182)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
gph	3.3	6.2	9.2	12.5	3.0	5.9	8.5	11.3
L/hr	15.0	28.0	42.0	57.0	13.5	26.8	38.9	51.3

Engine	Standby Rating	Prime Rating
Engine manufacturer	Cummins	
Engine model	6CTAA8.3G2	
Configuration	4 Cycle; In-line; 6 Cylinder Diesel	
Aspiration	Turbo Charged and Charge Air Cooled	
Gross engine power output, kWm	231	205
BMEP at set rated load, kPa	2230	1984
Bore, mm	114	
Stroke, mm	135	
Rated speed, rpm	1500	
Piston speed, m/s	6	
Compression ratio	16.7:1	
Lube oil capacity, L	18.9	
Overspeed limit, rpm	1800 ±50	
Regenerative power, kW	17	
Governor type	Electronic	
Starting voltage	24 Volts DC	

Fuel flow	
Maximum fuel flow, L/hr	208
Maximum fuel inlet restriction, mm Hg	102
Maximum fuel inlet temperature (°C)	60

Air	Standby Rating	Prime Rating
Combustion air, m ³ /min	15.30	14.00
Maximum air cleaner restriction, kPa	6.2	

Exhaust		
Exhaust gas flow at set rated load, m ³ /min	40.9	35.8
Exhaust gas temperature, °C	565	548
Maximum exhaust back pressure, kPa	10.2	

Standard set-mounted radiator cooling		
Ambient design, °C	45	
Fan load, KW _m	9	
Coolant capacity (with radiator), L	12	
Cooling system air flow, m ³ /sec @ 12.7mmH ₂ O	5.85	
Total heat rejection, BTU/min	6722	5759
Maximum cooling air flow static restriction mmH ₂ O	19.1	

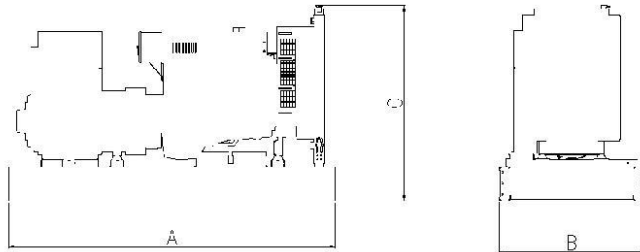
Weights*	Open	Enclosed
Unit dry weight kgs	1940	2700
Unit wet weight kgs	2000	3589

* Weights represent a set with standard features. See outline drawing for weights of other configurations

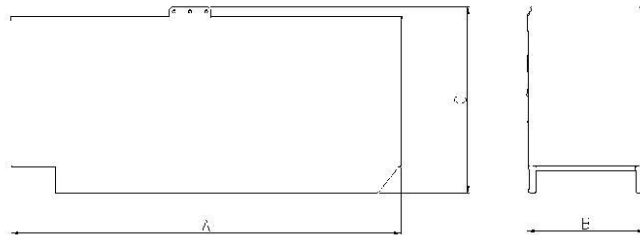
Dimensions	Length	Width	Height
Standard open set dimensions	2686	1300	1547
Enclosed set standard dimensions	3581	1360	2170

Genset outline

Open set



Enclosed set



Outlines are for illustrative purposes only. Please refer to the genset outline drawing for an exact representation of this model.

Alternator data

Connection ¹	Temp rise °C	Duty ²	Alternator	Voltage
Wye, 3 Phase	150/125C	S/P	UC274J	380-415V

Ratings definitions

Emergency Standby Power (ESP)	Limited-Time running Power (LTP):	Prime Power (PRP)	Base Load (Continuous) Power (COP)
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Formulas for calculating full load currents:

Three phase output

$$\frac{kW \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

Single phase output

$$\frac{kW \times \text{Single Phase Factor} \times 1000}{\text{Voltage}}$$

See your distributor for more information.

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6CTAA8.3-G2 Advantage Data Sheet

Cummins Engine Company, Inc. Columbus, Indiana 47201

Curve Number: FR-90767	Engine Critical Parts List: CPL 2894	Date: 30Oct03
Displacement: 8.3 litre (505 in³)	Bore: 114 mm (4.49 in.)	Stroke: 135 mm (5.32 in.)
No. of Cylinders: 6	Aspiration: Turbocharged and Charge Air Cooled	

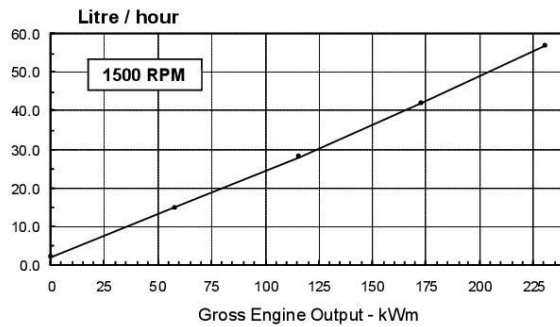
•• PRELIMINARY ••

Emergency Standby Ratings for application in Corporate Generator Sets Only

Engine Speed RPM	Standby Power	
	kWm	BHP
1500	231	310
1800	263	352

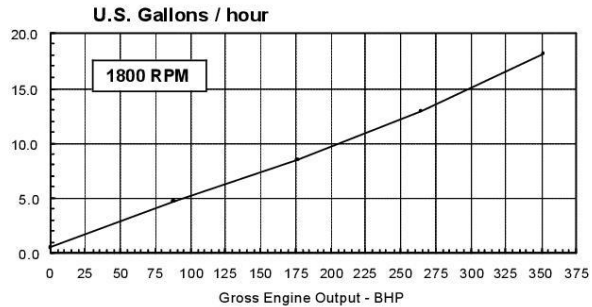
Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm-h	lb/ BHP-h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	231	310	0.204	0.335	57	15
75	173	233	0.197	0.325	42	11
50	116	155	0.199	0.325	28	7.3
25	58	78	0.213	0.355	15	4



Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm-h	lb/ BHP-h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	263	352	0.215	0.354	68	18.1
75	197	264	0.204	0.336	49	12.9
50	132	176	0.203	0.334	32	8.5
25	66	88	0.225	0.370	17	4.7



CONVERSIONS: (litres = U.S. Gal x 3.785) (kWm = BHP x 0.746) (U.S. Gal = litres x 0.2642) (BHP = kWm x 1.34)

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. See reverse side for application rating guidelines.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/U.S. gal).

Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

TECHNICAL DATA DEPT.

CERTIFIED WITHIN 5%

M. Butcher
CHIEF ENGINEER



6CTAA8.3-G2 Advantage Data Sheet

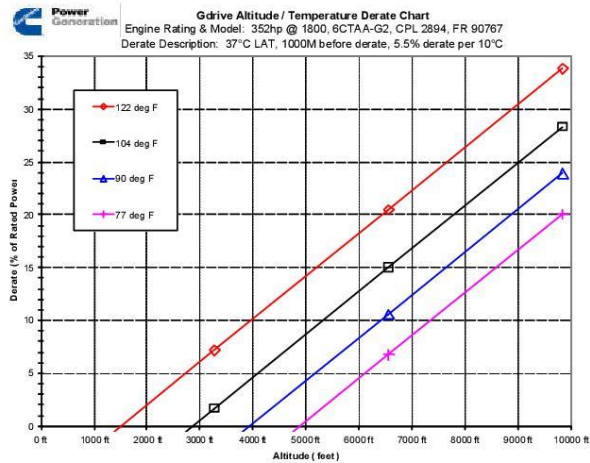
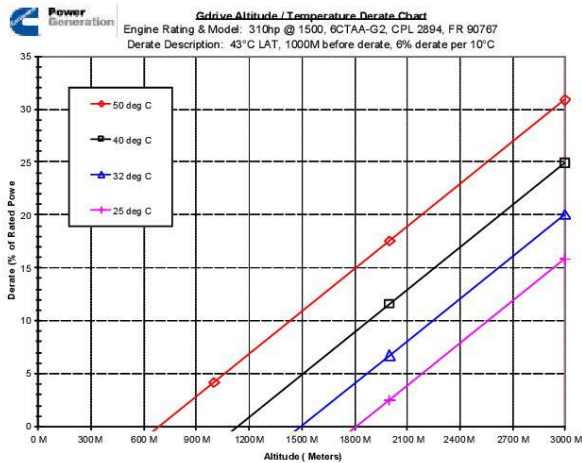
Cummins Engine Company, Inc. Columbus, Indiana 47201

••PRELIMINARY••

POWER RATING APPLICATION GUIDELINES FOR EMERGENCY STANDBY ENGINES FOR APPLICATION IN CORPORATE GENERATOR SETS ONLY

These guidelines have been formulated to ensure proper application of generator drive engines in Cummins corporate generator set installations. Generator drive engines are not designed for and shall not be used in variable speed D.C. generator set applications.

Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this standby rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Emergency Standby Power rating. This rating should be applied where reliable utility power is available. An emergency standby rated engine should be sized for a maximum of an **70%** typical load factor and **200 hours** of operation per year. This includes a maximum of **1 hour** in a **12 hour** period at the Emergency Standby Power rating. Emergency Standby rating should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.





6CTAA8.3-G2 Advantage Data Sheet

Cummins Engine Company, Inc. Columbus, Indiana 47201

GENERAL ENGINE DATA

Type.....	4-Cycle; In-line; 6-Cylinder Diesel
Aspiration.....	Turbocharged and Charge Air Cooled
Bore x Stroke	4.49 x 5.32 (114 x 135)
Displacement	505 (8.3)
Compression Ratio.....	16.7 : 1

Dry Weight	
Fan to Flywheel Engine	— lb (kg) 1505 (684)
Wet Weight	
Fan to Flywheel Engine.....	— lb (kg) 1572 (715)
Moment of Inertia of Rotating Components	
• with FW 9232 Flywheel	— lb _m • ft ² (kg • m ²) 36.5 (1.54)
Center of Gravity from Rear Face of Flywheel Housing	— in (mm) 21.3 (541)
Center of Gravity Above Crankshaft Centerline.....	— in (mm) 6.4 (163)
Maximum Static Loading at Rear Main Bearing	— lb (kg) N.A.

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block.....	— lb • ft (N • m) 1000 (1356)
---	---

EXHAUST SYSTEM

Maximum Back Pressure.....	— in Hg (mm Hg) 3 (76)
----------------------------	----------------------------------

AIR INDUCTION SYSTEM

Maximum Intake Air Restriction	
• with Dirty Filter Element	— in H ₂ O (mm H ₂ O) 25 (635)
• with Normal Duty Air Cleaner and Clean Filter Element.....	— in H ₂ O (mm H ₂ O) 10 (254)
• with Heavy Duty Air Cleaner and Clean Filter Element	— in H ₂ O (mm H ₂ O) 15 (381)

COOLING SYSTEM

Coolant Capacity — Engine Only	— US gal (liter) 3.25 (12.3)
Maximum Coolant Friction Head External to Engine	
— 1800 rpm.....	— psi (kPa) 5 (35)
— 1500 rpm.....	— psi (kPa) 4 (28)
Maximum Static Head of Coolant Above Engine Crank Centerline	— ft (m) 60 (18.3)
Standard Thermostat (Modulating) Range	— °F (°C) 180 - 203 (82 - 95)
Minimum Pressure Cap	— psi (kPa) 10 (69)
Maximum Top Tank Temperature	— °F (°C) 220 (104)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed	— psi (kPa) 15 (103)
@ Governed Speed.....	— psi (kPa) 40 - 60 (276 - 414)
Maximum Oil Temperature	— °F (°C) 250 (121)
Oil Capacity with OP 9006 Oil Pan : High - Low.....	— US gal (liter) 5 - 4 (18.9 - 15.1)
Total System Capacity (Including Full Flow Filter).....	— US gal (liter) 6.3 (23.8)
Angularity of OP 9006 Oil Pan	
— Front Down.....	45°
— Front Up.....	45°
— Side to Side.....	45°



6CTAA8.3-G2 Advantage Data Sheet

Cummins Engine Company, Inc. Columbus, Indiana 47201

FUEL SYSTEM

.... Type Injection System Bosch P7100 Direct Injection

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement).....	— volt	12	24
Battery Charging System, Negative Ground.....	— ampere	64	40
Maximum Allowable Resistance of Cranking Circuit.....	— ohm	0.00075	0.002
Minimum Recommended Battery Capacity (Cold Soak @ 10° F (-12° C) and Above.....	— 0° F CCA	950	475

COLD START CAPABILITY

Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds.....	— °F (°C)	TBD	(TBD)
Minimum Ambient Temperature for Unaided Cold Start.....	— °F (°C)	TBD	(TBD)

PERFORMANCE DATA

All data is based on:

- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
- Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
- ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure	: 100 kPa (29.53 in Hg)	Air Temperature	: 25 °C (77 °F)
Altitude	: 110 m (361 ft)	Relative Humidity	: 30%

Steady State Stability Band at any Constant Load	— %	+/- 0.50
Maximum Temperature Rise Between Engine Air Inlet and Intake Manifold.....	— °F (°C)	45 (25)
Maximum Air Pressure Drop from Turbo Air Outlet to Intake Manifold - @ 1500 RPM.....	— in Hg (mm Hg)	2.5 (63.5)
Maximum Air Pressure Drop from Turbo Air Outlet to Intake Manifold - @ 1800 RPM.....	— in Hg (mm Hg)	4 (102)

STANDBY POWER

Governed Engine Speed	— rpm
Engine Idle Speed.....	— rpm
Gross Engine Power Output.....	— BHP (kW _m)
Brake Mean Effective Pressure	— psi (kPa)
Piston Speed	— ft / min (m / s)
Friction Horsepower.....	— HP (kW _m)
Engine Water Flow at Stated Friction Head External to Engine:	
• 1 psi Friction Head.....	— US gpm (liter / s)
• Maximum Friction Head.....	— US gpm (liter / s)

	1800	1500
	950 - 1150	950 - 1150
	220 (164)	195 (145)
	307 (2119)	323 (2230)
	1416 (7.2)	1180 (6.0)
	22 (16.4)	17 (12.7)
	38 (2.4)	32 (2.0)
	30 (1.9)	24 (1.5)
	664 (313)	540 (255)
	1103 (595)	1050 (565)
	1846 (871)	1443 (681)
	22.7 : 1	22.2 : 1
	1365 (24)	1378 (24)
	5311 (93)	4549 (80)
	13139 (231)	10223 (180)
	2771 (49)	2173 (38)
	47 (21)	38 (17)
	62 (1575)	58.1 (1475)
	360 (182)	347 (175)

Engine Data with Dry Type Exhaust Manifold

Intake Air Flow	— cfm (liter / s)
Exhaust Gas Temperature	— °F (°C)
Exhaust Gas Flow	— cfm (liter / s)
Air to Fuel Ratio	— air : fuel
Radiated Heat to Ambient	— BTU / min (kW _m)
Heat Rejection to Coolant	— BTU / min (kW _m)
Heat Rejection to Exhaust	— BTU / min (kW _m)
Heat Rejection to Aftercooler	— BTU / min (kW _m)
Charge Air Flow	— cfm (liter / s)
Turbocharger Compressor Outlet Pressure	— psi (kPa)
Turbocharger Compressor Outlet Temperature.....	— °F (°C)

ENGINE MODEL : 6CTAA8.3-G2
DATA SHEET : DS-90767
DATE : 30Oct03
CURVNO. : FR-90767

CUMMINS ENGINE COMPANY, INC.

Columbus, Indiana 47202-3005



6CTAA8.3-G2 Advantage Data Sheet
Cummins Engine Company, Inc. Columbus, Indiana 47201

Typical Exhaust Emissions @ 1500 RPM

<u>Component</u>	Standby Power		
	g/BHP-h	mg/m ³	PPM
HC (Total Unburned Hydrocarbons)	0.13	60	N.A.
NOx (Oxides of Nitrogen as NO ₂)	6.0	2820	N.A.
CO (Carbon Monoxide)	0.6	260	N.A.
PM (Particulate Matter)	0.3	120	N.A.

Typical Exhaust Emissions @ 1800 RPM

<u>Component</u>	Standby Power		
	g/BHP-h	mg/m ³	PPM
HC (Total Unburned Hydrocarbons)	0.15	60	N.A.
NOx (Oxides of Nitrogen as NO ₂)	4.5	2020	N.A.
CO (Carbon Monoxide)	0.6	270	N.A.
PM (Particulate Matter)	0.2	100	N.A.

NOTE mg/m³ and PPM numbers are corrected to 5% O₂ content.

Data was recorded during steady state rated engine speed (± 25 RPM) with full load (± 2%). Pressures, temperatures, and emission rates were stabilized.

Fuel Specification: ASTM D975 No. 2-D diesel fuel with 0.2% sulfur content (by weight) and 42-50 cetane number.

Fuel Temperature: 99° F ± 9° (at fuel pump inlet)

Intake Air Temperature: 77° F ± 9°

Barometric Pressure: 29.6 in. Hg ± 1 in. Hg

Humidity: NOx measurement corrected to 75 grains H₂O/lb dry air

The HC, NOx, and CO emissions data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimates. This data is subject to instrumentation, measurement, and engine-to-engine variability. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels. Specifications May Change Without Notice.

ANNEX 6: Best Available Technique (BAT)



IPPC BAT Conclusions

COMMISSION IMPLEMENTING DECISION (EU) 2018/11747 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council

BEST AVAILABLE TECHNIQUES (BAT) CONCLUSIONS FOR WASTE SCOPE

These BAT conclusions concern the following activities specified in Annex I to Directive 2010/75/EU, namely:

5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:

- (a) biological treatment;
- (b) physico-chemical treatment;
- (c) blending or mixing prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
- (d) repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
- (e) solvent reclamation/regeneration;
- (f) recycling/reclamation of inorganic materials other than metals or metal compounds;
- (g) regeneration of acids or bases;
- (h) recovery of components used for pollution abatement;
- (i) recovery of components from catalysts;
- (j) oil re-refining or other reuses of oil;

5.3.(a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC [\(1\)](#):

- (i) biological treatment;
- (ii) physico-chemical treatment;
- (iii) pre-treatment of waste for incineration or co-incineration;
- (iv) treatment of ashes;
- (v) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.

(b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC:

- (i) biological treatment;
- (ii) pre-treatment of waste for incineration or co-incineration;
- (iii) treatment of ashes;
- (iv) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.

When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.

5.5. Temporary storage of hazardous waste not covered under point 5.4 of Annex I to Directive 2010/75/EU pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6 of Annex I to Directive 2010/75/EU with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated.

6.11. Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation undertaking activities covered under points 5.1, 5.3 or 5.5 as listed above.

Referring to independently operated treatment of waste water not covered by Directive 91/271/EEC above, these BAT conclusions also cover the combined treatment of waste water from different origins if the main pollutant load originates from the activities covered under points 5.1, 5.3 or 5.5 as listed above.

These BAT conclusions do not address the following:

- Surface impoundment.
- Disposal or recycling of animal carcasses or of animal waste covered by the activity description in point 6.5 of Annex I to Directive 2010/75/EU when this is covered by the BAT conclusions on the slaughterhouses and animal by-products industries (SA).
- On-farm processing of manure when this is covered by the BAT conclusions for the intensive rearing of poultry or pigs (IRPP).
- Direct recovery (i.e. without pretreatment) of waste as a substitute for raw materials in installations carrying out activities covered by other BAT conclusions, e.g.:
 - o Direct recovery of lead (e.g. from batteries), zinc or aluminium salts or recovery of the metals from catalysts. This may be covered by the BAT conclusions for the non-ferrous metals industries (NFM).
 - o Processing of paper for recycling. This may be covered by the BAT conclusions for the production of pulp, paper and board (PP).
 - o Use of waste as fuel/raw material in cement kilns. This may be covered by the BAT conclusions for the production of cement, lime and magnesium oxide (CLM).
- Waste (co-)incineration, pyrolysis and gasification. This may be covered by the BAT conclusions for waste incineration (WI) or the BAT conclusions for large combustion plants (LCP).
- Landfill of waste. This is covered by Council Directive 1999/31/EC ⁽²⁾. In particular, underground permanent and long-term storage (≥ 1 year before disposal, ≥ 3 years before recovery) are covered by Directive 1999/31/EC.
- *In situ* remediation of contaminated soil (i.e. unexcavated soil).
- Treatment of slags and bottom ashes. This may be covered by the BAT conclusions for waste incineration (WI) and/or the BAT conclusions for large combustion plants (LCP).
- Smelting of scrap metals and metal-bearing materials. This may be covered by the BAT conclusions for non-ferrous metals industries (NFM), the BAT conclusions for iron and steel production (IS), and/or the BAT conclusions for the smitheries and foundries industry (SF).
- Regeneration of spent acids and alkalis when this is covered by the BAT conclusions for ferrous metals processing.
- Combustion of fuels when it does not generate hot gases which come into direct contact with the waste. This may be covered by the BAT conclusions for large combustion plants (LCP) or by Directive (EU) 2015/2193 of the European Parliament and of the Council ⁽³⁾.

Other BAT conclusions and reference documents which could be relevant for the activities covered by these BAT conclusions are the following:

- Economics and cross-media effects (ECM);
- Emissions from storage (EFS);
- Energy efficiency (ENE);
- Monitoring of emissions to air and water from IED installations (ROM);
- Production of cement, lime and magnesium oxide (CLM);
- Common waste water and waste gas treatment/management systems in the chemical sector (CWW);
- Intensive rearing of poultry or pigs (IRPP).

These BAT conclusions apply without prejudice to the relevant provisions of EU legislation, e.g. the waste hierarchy.

DEFINITIONS

For the purposes of these BAT conclusions, the following **definitions** apply:

Term used	Definition
General terms	
Channelled emissions	Emissions of pollutants into the environment through any kind of duct, pipe, stack, etc. This also includes emissions from open-top biofilters.
Continuous measurement	Measurement using an 'automated measuring system' permanently installed on site.
Declaration of cleanliness	Written document provided by the waste producer/holder certifying that the empty waste packaging concerned (e.g. drums, containers) is clean with respect to the acceptance criteria.
Diffuse emissions	Non-channelled emissions (e.g. of dust, organic compounds, odour) which can result from 'area' sources (e.g. tanks) or 'point' sources (e.g. pipe flanges). This also includes emissions from open-air windrow composting.
Direct discharge	Discharge to a receiving water body without further downstream waste water treatment.
Emissions factors	Numbers that can be multiplied by known data such as plant/process data or throughput data to estimate emissions.
Existing plant	A plant that is not a new plant.
Flaring	High-temperature oxidation to burn combustible compounds of waste gases from industrial operations with an open flame. Flaring is primarily used for burning off flammable gas for safety reasons or during non-routine operating conditions.
Fly ashes	Particles from the combustion chamber or formed within the flue-gas stream, that are transported in the flue-gas.
Fugitive emissions	Diffuse emissions from 'point' sources.

Hazardous waste	Hazardous waste as defined in point 2 of Article 3 of Directive 2008/98/EC.
Indirect discharge	Discharge which is not a direct discharge.
Liquid biodegradable waste	Waste of biological origin with a relatively high water content (e.g. fat separator contents, organic sludges, catering waste).
Major plant upgrade	A major change in the design or technology of a plant with major adjustments or replacements of the process and/or abatement technique(s) and associated equipment.
Mechanical biological treatment (MBT)	Treatment of mixed solid waste combining mechanical treatment with biological treatment such as aerobic or anaerobic treatment.
New plant	A plant first permitted at the site of the installation following the publication of these BAT conclusions or a complete replacement of a plant following the publication of these BAT conclusions.
Output	The treated waste exiting the waste treatment plant.
Pasty waste	Sludge which is not free-flowing.
Periodic measurement	Measurement at specified time intervals using manual or automated methods.
Recovery	Recovery as defined in Article 3(15) of Directive 2008/98/EC.
Re-refining	Treatments carried out on waste oil to transform it to base oil.
Regeneration	Treatments and processes mainly designed to make the treated materials (e.g. spent activated carbon or spent solvent) suitable again for a similar use.

Sensitive receptor	Area which needs special protection, such as: — residential areas; — areas where human activities are carried out (e.g. neighbouring workplaces, schools, daycare centres, recreational areas, hospitals or nursing homes).
Surface impoundment	Placement of liquid or sludgy discards into pits, ponds, lagoons, etc.
Treatment of waste with calorific value	Treatment of waste wood, waste oil, waste plastics, waste solvents, etc. to obtain a fuel or to allow a better recovery of its calorific value.
VFCs	Volatile (hydro)fluorocarbons: VOCs consisting of fluorinated (hydro)carbons, in particular chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs).
VHCs	Volatile hydrocarbons: VOCs consisting entirely of hydrogen and carbon (e.g. ethane, propane, iso-butane, cyclopentane).
VOC	Volatile organic compound as defined in Article 3(45) of Directive 2010/75/EU.
Waste holder	Waste holder as defined in Article 3(6) of Directive 2008/98/EC of the European Parliament and of the Council (4) .
Waste input	The incoming waste to be treated in the waste treatment plant.
Water-based liquid waste	Waste consisting of aqueous liquids, acids/alkalis or pumpable sludges (e.g. emulsions, waste acids, aqueous marine waste) which is not liquid biodegradable waste.
Pollutants/parameters	
AOX	Adsorbable organically bound halogens, expressed as Cl, include adsorbable organically bound chlorine, bromine and iodine.
Arsenic	Arsenic, expressed as As, includes all inorganic and organic arsenic compounds, dissolved or bound to particles.

BOD	Biochemical oxygen demand. Amount of oxygen needed for the biochemical oxidation of organic and/or inorganic matter in five (BOD ₅) or in seven (BOD ₇) days.
Cadmium	Cadmium, expressed as Cd, includes all inorganic and organic cadmium compounds, dissolved or bound to particles.
CFCs	Chlorofluorocarbons: VOCs consisting of carbon, chlorine and fluorine.
Chromium	Chromium, expressed as Cr, includes all inorganic and organic chromium compounds, dissolved or bound to particles.
Hexavalent chromium	Hexavalent chromium, expressed as Cr(VI), includes all chromium compounds where the chromium is in the oxidation state +6.
COD	Chemical oxygen demand. Amount of oxygen needed for the total chemical oxidation of the organic matter to carbon dioxide. COD is an indicator for the mass concentration of organic compounds.
Copper	Copper, expressed as Cu, includes all inorganic and organic copper compounds, dissolved or bound to particles.
Cyanide	Free cyanide, expressed as CN ⁻ .
Dust	Total particulate matter (in air).
HOI	Hydrocarbon oil index. The sum of compounds extractable with a hydrocarbon solvent (including long-chain or branched aliphatic, alicyclic, aromatic or alkyl-substituted aromatic hydrocarbons).
HCl	All inorganic gaseous chlorine compounds, expressed as HCl.
HF	All inorganic gaseous fluorine compounds, expressed as HF.
H₂S	Hydrogen sulphide. Carbonyl sulphide and mercaptans are not included.
Lead	Lead, expressed as Pb, includes all inorganic and organic lead compounds, dissolved or bound to particles.

Mercury	Mercury, expressed as Hg, includes elementary mercury and all inorganic and organic mercury compounds, gaseous, dissolved or bound to particles.
NH₃	Ammonia.
Nickel	Nickel, expressed as Ni, includes all inorganic and organic nickel compounds, dissolved or bound to particles.
Odour concentration	Number of European Odour Units (ou _E) in one cubic metre at standard conditions measured by dynamic olfactometry according to EN 13725.
PCB	Polychlorinated biphenyl.
Dioxin-like PCBs	Polychlorinated biphenyls as listed in Commission Regulation (EC) No 199/2006 (5) .
PCDD/F	Polychlorinated dibenzo- <i>p</i> -dioxin/furan(s).
PFOA	Perfluorooctanoic acid.
PFOS	Perfluorooctanesulphonic acid.
Phenol index	The sum of phenolic compounds, expressed as phenol concentration and measured according to EN ISO 14402.
TOC	Total organic carbon, expressed as C (in water), includes all organic compounds.
Total N	Total nitrogen, expressed as N, includes free ammonia and ammonium nitrogen (NH ₄ -N), nitrite nitrogen (NO ₂ -N), nitrate nitrogen (NO ₃ -N) and organically bound nitrogen.
Total P	Total phosphorus, expressed as P, includes all inorganic and organic phosphorus compounds, dissolved or bound to particles
TSS	Total suspended solids. Mass concentration of all suspended solids (in water), measured via filtration through glass fibre filters and gravimetry.
TVOC	Total volatile organic carbon, expressed as C (in air).

Zinc	Zinc, expressed as Zn, includes all inorganic and organic zinc compounds, dissolved or bound to particles.
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For the purposes of these BAT conclusions, the following acronyms apply:

Acronym	Definition
EMS	Environmental management system
EoLVs	End-of-life vehicles (as defined in Article 2(2) of Directive 2000/53/EC of the European Parliament and of the Council (6))
HEPA	High-efficiency particle air (filter)
IBC	Intermediate bulk container
LDAR	Leak detection and repair
LEV	Local exhaust ventilation system
POP	Persistent organic pollutant (as listed in Regulation (EC) No 850/2004 of the European Parliament and of the Council (7))
WEEE	Waste electrical and electronic equipment (as defined in Article 3(1) of Directive 2012/19/EU of the European Parliament and of the Council (8))

General Considerations:

Best Available Techniques

The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection. Unless otherwise stated, the BAT conclusions are generally applicable.

Emission levels associated with BAT

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273,15 K and a pressure of 101,3 kPa, without correction for oxygen content, and expressed in $\mu\text{g}/\text{Nm}^3$ or mg/Nm^3 .

For averaging periods of BAT-AELs for emissions to air, the following definitions apply.

Type of measurement	Averaging period	Definition
Continuous	Daily average	Average over a period of one day based on valid hourly or half-hourly averages.
Periodic	Average over the sampling period	Average value of three consecutive measurements of at least 30 minutes each (9).

Where continuous measurement is used, the BAT-AELs may be expressed as daily averages.

Emission levels associated with the best available techniques (BAT-AELs) for emissions to water

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to water given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of water), expressed in $\mu\text{g}/\text{l}$ or mg/l .

Unless stated otherwise, averaging periods associated with the BAT-AELs refer to either of the following two cases:

- in the case of continuous discharge, daily average values, i.e. 24-hour flow-proportional composite samples;
- in the case of batch discharge, average values over the release duration taken as flow-proportional composite samples, or, provided that the effluent is appropriately mixed and homogeneous, a spot sample taken before discharge.

Time-proportional composite samples can be used provided that sufficient flow stability is demonstrated.

All BAT-AELs for emissions to water apply at the point where the emission leaves the installation.

Abatement efficiencies

The calculation of the average abatement efficiency referred to in these BAT conclusions (see Table 6.1) does not include, for COD and TOC, initial treatment steps aiming at separating the bulk organic content from the water-based liquid waste, such as evapo-condensation, emulsion breaking or phase separation.

General BAT conclusions

Kindly cross-reference to the relevant part of the application document for the various aspects below (as may be required) and include further justifications for the responses provided.

BAT conclusion	Status at Installation
1. Environmental management systems	

BAT 1
In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:

- i. commitment of the management, including senior management;
- ii. definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;
- iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;
- iv. implementation of procedures paying particular attention to:
 - a) structure and responsibility;
 - b) recruitment, training, awareness and competence;
 - c) communication;
 - d) employee involvement;
 - e) documentation;
 - f) effective process control;

Is an Environmental Management System (EMS) being implemented as part of the installation process? **Yes – implemented.**

If yes, does it incorporate the aforementioned features? (Ex: commitment of the management, planning and establishing the necessary procedures in conjunction with investment and financial planning etc.) If certain features are not incorporated in the current EMS kindly indicate a timeframe by when the EMS shall be updated to include all missing features (*as may be applicable to your operations*).

Features	Yes/No
i. Commitment of the management, including senior management	Yes
ii. An environmental policy that includes the continuous improvement of the installation by the management	Yes
iii. Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment	Yes
iv. Implementation of procedures paying particular attention to : a) Structure and responsibility b) Recruitment, training, awareness and competence c) Communication d) Employee involvement e) Documentation f) Effective process control g) Maintenance programmes h) Emergency preparedness and response i) Safeguarding compliance with environmental legislation	Yes
v. checking performance and taking corrective action, paying particular attention to: a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); b) Corrective and preventive action c) Maintenance of records	Yes

<ul style="list-style-type: none"> g) maintenance programmes; h) emergency preparedness and response; i) safeguarding compliance with environmental legislation; 	<ul style="list-style-type: none"> d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; 	
<ul style="list-style-type: none"> v. checking performance and taking corrective action, paying particular attention to: 	<ul style="list-style-type: none"> vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management 	Yes
<ul style="list-style-type: none"> a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to Air and Water from IED installations – ROM); 	<ul style="list-style-type: none"> vii. following the development of cleaner technologies 	Yes
<ul style="list-style-type: none"> b) corrective and preventive action; 	<ul style="list-style-type: none"> viii. consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life 	Yes
<ul style="list-style-type: none"> c) maintenance of records; 	<ul style="list-style-type: none"> ix. application of sectoral benchmarking on a regular basis 	Yes
<ul style="list-style-type: none"> d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; 	<ul style="list-style-type: none"> x. waste management plan (see BAT 13) 	Yes
<ul style="list-style-type: none"> vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; 	<p>Specifically for chemical sector activities, BAT is to incorporate the following features in the EMS:</p> <ul style="list-style-type: none"> i. on multi-operator installations/sites, establishment of a convention that sets out the roles, responsibilities and coordination of operating procedures of each plant operator in order to enhance the cooperation between the various operators 	N/A
<ul style="list-style-type: none"> vii. following the development of cleaner technologies; 	<ul style="list-style-type: none"> ii. establishment of inventories of waste water and waste gas streams (see BAT 2). 	Yes
<ul style="list-style-type: none"> viii. consideration for the environmental impacts from the eventual decommissioning of the plant at the 	<p>In some cases, the following features are part of the EMS :</p> <ul style="list-style-type: none"> i. odour management plan (see BAT 20) 	Yes
	<ul style="list-style-type: none"> ii. noise management plan (see BAT 22) 	Yes
<p><i>Further details may be provided in a separate document.</i></p>		

<p>design stage of a new plant, and throughout its operating life;</p> <ul style="list-style-type: none"> ix. application of sectoral benchmarking on a regular basis; x. waste stream management (see BAT 13). xi. establishment of inventories of waste water and waste gas streams (see BAT 2). xii. residues management plan (see description in Section 6.5); xiii. accident management plan (see description in Section 6.5); xiv. odour management plan (see BAT 20); xv. noise and vibration management plan (see BAT 22). 	
<p>Applicability</p>	<p>The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will be generally related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed). EMS submitted to ERA on 23.07.2019.</p>

BAT 2

In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques provided :

Which of the following techniques are used to assess environmental performance (kindly provide supporting documentation as evidence that such measures are being implemented):

Should any of the techniques below not be currently implemented on site, kindly provide a timeframe and proposal for their implementation.

		Yes/No
a.	Set up and implement waste characterisation and pre-acceptance procedures	Yes
b.	Set up and implement waste acceptance procedures	Yes
c.	Set up and implement a waste tracking system and inventory	Yes
d.	Set up and implement an output quality management system	Yes
e.	Ensure waste segregation	Yes
f.	Ensure waste compatibility prior to mixing or blending of waste	Yes
g.	Sort incoming solid waste	Yes

Waste characterisation is managed by procedures that are underpinned by the EMS. To summarise the operations regulated by procedure:

Technique		Description	
a.	Set up and implement waste characterisation and pre- acceptance procedures	These procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. They include procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	<ul style="list-style-type: none"> • Waste acceptance procedures act as a high-level filter to direct to the plant only those waste streams which can be accepted at the plant. • At the weighbridge, there is another check which ascertains that only permitted waste streams enter into the plant. Unpermitted waste is refused. • Inspections are carried out during unloading of waste. Any unpermitted waste indintified is directed to Quarantine. • Grabber operator, when loading waste into the plant, is also in a position to also identify unpermitted waste (which was 'hidden' in the bulk) and/or large or bulky waste which may cause stoppages or plant stoppages. • Waste flows between parts of the plant are followed and different waste types are kept segregated. • Output wastes destined for recovery or recycling are segregated and baled; other wastes are sent to other processing or disposal operations as appropriate • Employees are trained on how to handle momentary stoppages to ensure protection of the environment.
b.	Set up and implement waste acceptance procedures	Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. These procedures define the elements to be verified upon the arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	

c.	Set up and implement a waste tracking system and inventory	<p>A waste tracking system and inventory aim to track the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g. date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site. The waste tracking system is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).</p>	
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d.	Set up and implement an output quality management system	This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is in line with the expectations, using for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	
e.	Ensure waste segregation	Waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that identify when and where wastes are stored.	
f.	Ensure waste compatibility prior to mixing or blending of waste	Compatibility is ensured by a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g. polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending or carrying out other treatment operations. The compatibility tests are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	

g.	Sort incoming solid waste	<p>Sorting of incoming solid waste ⁽¹⁾ aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include:</p> <ul style="list-style-type: none"> • manual separation by means of visual examinations; • ferrous metals, non-ferrous metals or all-metals separation; • optical separation, e.g. by near-infrared spectroscopy or X-ray systems; • density separation, e.g. by air classification, sink-float tanks, vibration tables; • size separation by screening/sieving. 						
<p>BAT 3</p> <p>In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:</p> <p>(i) information about the characteristics of the waste to be treated and the waste treatment processes, including:</p> <p>(a) simplified process flow sheets that show the origin of the emissions;</p> <p>(b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;</p> <p>(ii) information about the characteristics of the waste water streams, such as:</p> <p>(a) average values and variability of flow, pH, temperature, and conductivity;</p> <p>(b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);</p> <p>(c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);</p>		<p>Simplified process flow & emission sources are shown in Attachment A.</p> <p>Which of the following elements are included as part of the inventory relating wastewater? (kindly provide supporting documentation as evidence of the information requested below).</p> <p>(i) information about the characteristics of the waste to be treated and the waste treatment processes, including:</p> <table border="1" data-bbox="1236 965 2029 1256"> <thead> <tr> <th data-bbox="1236 965 1868 1005">Features</th> <th data-bbox="1868 965 2029 1005">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1236 1005 1868 1109">a) simplified process flow sheets that show the origin of the emissions;</td> <td data-bbox="1868 1005 2029 1109">Yes</td> </tr> <tr> <td data-bbox="1236 1109 1868 1256">b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;</td> <td data-bbox="1868 1109 2029 1256">Yes</td> </tr> </tbody> </table> <p>(ii) information about the characteristics of the waste water streams, such as:</p>	Features	Yes/No	a) simplified process flow sheets that show the origin of the emissions;	Yes	b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;	Yes
Features	Yes/No							
a) simplified process flow sheets that show the origin of the emissions;	Yes							
b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;	Yes							

- (iii) information about the characteristics of the waste gas streams, such as:
- (a) average values and variability of flow and temperature;
 - (b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs);
 - (c) flammability, lower and higher explosive limits, reactivity;
 - (d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).

Applicability

The scope (e.g. level of detail) and nature of the inventory will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

Features	Yes/No
a) average values and variability of flow, pH, temperature, and conductivity;	Yes, as applicable
b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);	Yes, as applicable
c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);	Yes, as applicable

Which of the following elements are included as part of the inventory relating waste gas streams?

- (iii) information about the characteristics of the waste gas streams, such as:

Features	Yes/No
a) average values and variability of flow and temperature;	Yes, as applicable
b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs);	Yes, as applicable
c) flammability, lower and higher explosive limits, reactivity;	Yes, as applicable
d) presence of other substances that may affect the waste gas treatment system or	Yes, as applicable

plant safety (e.g. oxygen, nitrogen, water vapour, dust).

BAT 4

In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.

Kindly provide details on how each of the following techniques is being implemented on site.

Technique	Description	Applicability
a. Optimised storage location	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.; — the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long). 	Generally applicable to new plants.

	Technique	Yes/No
a.	Optimized storage location	Yes
	Storage is in impermeable and covered areas. Issues of distance from sensitive receptors were managed via the original EIA and IPPC processes. Attention was also given in the design stages to minimise handling, subject to the limitation of the site configuration.	
b.	Adequate storage capacity	
	Storage capacity is based on predicted demand, determined through evaluation of waste input and type. The original IPPC application details the infrastructural features to manage environmental risks (e.g. fire and/or containment measures) applicable to the different waste streams.	

b.	Adequate storage capacity	<p>Measures are taken to avoid accumulation of waste, such as:</p> <ul style="list-style-type: none"> — the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity; — the quantity of waste stored is regularly monitored against the maximum allowed storage capacity; — the maximum residence time of waste is clearly established. 	Generally applicable.		
c.	Safe storage operation	<p>This includes measures such as:</p> <ul style="list-style-type: none"> — equipment used for loading, unloading and storing waste 		c.	Safe storage operation
					<p>Maximum storage is established in the IPPC permit, and reflects the physical dimensions of the plant and its capacity limits. Quantity of wastes and residence times are managed through procedures that manage process flow or instrumentation as part of process flow management.</p>
				d.	<p>Separate area for storage and handling of packaged hazardous waste</p>
				<p>Storage and handling areas of hazardous wastes are limited to the block plan.</p>	

		<p>is clearly documented and labelled;</p> <ul style="list-style-type: none"> — wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; — containers and drums are fit for purpose and stored securely. 		
d.	Separate area for storage and handling of packaged hazardous waste	When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.		
<p>BAT 5</p> <p>In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.</p> <p>Description</p> <p>Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements:</p> <ul style="list-style-type: none"> • handling and transfer of waste are carried out by competent staff; 				<p>How will handling and transfer procedures be carried out?</p> <p>Handling and transfer is done in an enclosed environment. RCVs download the waste in the reception hall, whilst a wheeled material handler inputs the waste into a hopper.</p> <p>A proper system of odour abatement, using scrubber, is installed. Air treatment system includes a general odour treatment system in the main buildings and tanks, by biofilters and a dedusting system for the BW crashing area. By this system, crushing, shredding and sieving operations are carried out in areas with extractive vent systems and abatement.</p>

- handling and transfer of waste are duly documented, validated prior to execution and verified after execution;
- measures are taken to prevent, detect and mitigate spills;
- operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes).

Handling and transfer procedures are risk-based considering the likelihood of accidents and incidents and their environmental impact.

All tanks and bunds are waterproof. Bunding is provided when necessary. Waste is only stored within the designated halls that are all banded and/or designated areas.

1.2 Monitoring

BAT 6

For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, at the inlet to the final treatment, at the point where the emission leaves the installation).

Which process parameters will be monitored, and at which points?

Parameters	Yes/No (If yes, at which points?)
Waste water flow	Yes
pH	Yes
Temperature	Yes
Conductivity	Yes
BOD	Yes

BAT 7

BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Substance/parameter	Standard (s)	Waste treatment	Minimum monitoring	Monitoring

BAT 7

BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Parameters and frequencies shall be managed via consolidated EMP for MEC.

		nt process	frequency ⁽¹¹⁾ ⁽¹²⁾	associat ed with	
Adsorbable organically bound halogens (AOX) ⁽¹³⁾ ⁽¹⁴⁾	EN ISO 9562	Treatment of water-based liquid waste	Once every day	BAT 20	
Benzene, toluene, ethylbenzene, xylene (BTEX) ⁽¹³⁾ ⁽¹⁴⁾	EN ISO 15680	Treatment of water-based liquid waste	Once every month		
Chemical oxygen demand (COD) ⁽¹⁵⁾ ⁽¹⁶⁾	No EN standard available	All waste treatments except treatment of water-based liquid waste	Once every month		
		Treatment of water-	Once every day		

		based liquid waste			
Free cyanide (CN ⁻) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 14403-1 and -2)	Treatment of water-based liquid waste	Once every day		
Hydrocarbon oil index (HOI) ⁽¹⁴⁾	EN ISO 9377-2	Mechanical treatment in shredders of metal waste	Once every month		
		Treatment of WEEE containing VFCs and/or VHCs			

		Re-refining of waste oil			
		Physico-chemical treatment of waste with calorific value			
		Water washing of excavated contaminated soil			
		Treatment of water-based liquid waste	Once every day		
Arsenic (As), Cadmium (Cd),	Various EN standards	Mechanical treatment			

Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) ⁽¹³⁾ ⁽¹⁴⁾	available (e.g. EN ISO 11885, EN ISO 17294- 2, EN ISO 15586)	in shredders of metal waste	Once every month		
		Treatment of WEEE containing VFCs and/or VHCs			
		Mechanica l biological treatment of waste			
		Re-refining of waste oil			
		Physico- chemical treatment of waste with			

		calorific value			
		Physico-chemical treatment of solid and/or pasty waste			
		Regeneration of spent solvents			
		Water washing of excavated contaminated soil			
		Treatment of water-based liquid waste	Once every day		

Manganese (Mn) ⁽¹³⁾ ⁽¹⁴⁾		Treatment of water-based liquid waste	Once every day		
Hexavalent chromium (Cr(VI)) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 10304-3, EN ISO 23913)	Treatment of water-based liquid waste	Once every day		
Mercury (Hg) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 17852, EN ISO 12846)	Mechanical treatment in shredders of metal waste	Once every month		
		Treatment of WEEE containing VFCs and/or VHCs			

		Mechanical biological treatment of waste			
		Re-refining of waste oil			
		Physico-chemical treatment of waste with calorific value			
		Physico-chemical treatment of solid and/or pasty waste			

		Regenerati on of spent solvents			
		Water washing of excavated contaminat ed soil			
		Treatment of water- based liquid waste	Once every day		
PFOA ₍₁₃₎	No EN standard available	All waste treatments	Once every six months		
PFOS ₍₁₃₎					
Phenol index ₍₁₆₎	EN ISO 14402	Re-refining of waste oil	Once every month		
		Physico- chemical			

		treatment of waste with calorific value			
		Treatment of water-based liquid waste	Once every day		
Total nitrogen (Total N) ₍₁₆₎	EN 12260, EN ISO 119 05-1	Biological treatment of waste	Once every month		
		Re-refining of waste oil			
		Treatment of water-based liquid waste	Once every day		

Total organic carbon (TOC) ⁽¹⁵⁾ ⁽¹⁶⁾	EN 1484	All waste treatments except treatment of water-based liquid waste	Once every month		
		Treatment of water-based liquid waste	Once every day		
Total phosphorus (Total P) ⁽¹⁶⁾	Various EN standards available (i.e. EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)	Biological treatment of waste	Once every month		
		Treatment of water-based liquid waste	Once every day		

Total suspended solids (TSS) ₍₁₆₎	EN 872	All waste treatments except treatment of water-based liquid waste	Once every month		
		Treatment of water-based liquid waste	Once every day		
<p>BAT 8 BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>					<p>Kindly include the list of parameters together with the proposed monitoring standard as part of the monitoring proposal submitted in line with Section B3.10 of the application.</p> <p>Parameters and frequencies shall be managed via consolidated EMP for MEC.</p>
Substance/Parameter	Standard (s)	Waste treatment process	Minimum monitoring frequency ₍₁₇₎	Monitoring associated with	

Brominated flame retardants ⁽¹⁸⁾	No EN standard available	Mechanical treatment in shredders of metal waste	Once every year	BAT 25	
CFCs	No EN standard available	Treatment of WEEE containing VFCs and/or VHCs	Once every six months	BAT 29	
Dioxin-like PCBs	EN 1948-1, -2, and -4 ⁽¹⁹⁾	Mechanical treatment in shredders of metal waste ⁽¹⁸⁾	Once every year	BAT 25	
		Decontamination of equipment containing PCBs	Once every three months	BAT 51	
Dust	EN 13284-1	Mechanical treatment of waste	Once every six months	BAT 25	

		Mechanical biological treatment of waste		BAT 34	
		Physico-chemical treatment of solid and/or pasty waste		BAT 41	
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil		BAT 49	
		Water washing of excavated contaminated soil		BAT 50	

HCl	EN 1911	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil ⁽¹⁸⁾	Once every six months	BAT 49	
		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	
HF	No EN standard available	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil ⁽¹⁸⁾	Once every six months	BAT 49	

Hg	EN 13211	Treatment of WEEE containing mercury	Once every three months	BAT 32	
H ₂ S	No EN standard available	Biological treatment of waste ⁽²⁰⁾	Once every six months	BAT 34	
Metals and metalloids except mercury (e.g. As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V) ⁽¹⁸⁾	EN 14385	Mechanical treatment in shredders of metal waste	Once every year	BAT 25	
NH ₃	No EN standard available	Biological treatment of waste ⁽²⁰⁾	Once every six months	BAT 34	
		Physico-chemical treatment of solid and/or pasty waste ⁽¹⁸⁾	Once every six months	BAT 41	

		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	
Odour concentration	EN 13725	Biological treatment of waste ⁽²¹⁾	Once every six months	BAT 34	
PCDD/F ⁽¹⁸⁾	EN 1948-1, -2 and -3 ⁽¹⁹⁾	Mechanical treatment in shredders of metal waste	Once every year	BAT 25	
TVOC	EN 12619	Mechanical treatment in shredders of metal waste	Once every six months	BAT 25	
		Treatment of WEEE containing VFCs and/or VHCs	Once every six months	BAT 29	

		Mechanical treatment of waste with calorific value ⁽¹⁸⁾	Once every six months	BAT 31	
		Mechanical biological treatment of waste	Once every six months	BAT 34	
		Physico-chemical treatment of solid and/or pasty waste ⁽¹⁸⁾	Once every six months	BAT 41	
		Re-refining of waste oil		BAT 44	
		Physico-chemical treatment of waste with calorific value		BAT 45	

		Regeneration of spent solvents		BAT 47	
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil		BAT 49	
		Water washing of excavated contaminated soil		BAT 50	
		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	

		Decontamination of equipment containing PCBs ⁽²²⁾	Once every three months	BAT 51																					
<p>BAT 9 BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.</p>					<p>Which techniques will be applied to monitor diffuse emissions of organic compounds from solvent regeneration?</p> <p>Kindly also specify how diffuse emissions shall be monitored using the chosen technique. Kindly include the proposed monitoring technique as part of the monitoring proposal submitted in line with Section B3.10 of the application.</p>																				
<table border="1"> <thead> <tr> <th colspan="2">Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>Measurement</td> <td>Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2.</td> </tr> <tr> <td>b</td> <td>Emissions factors</td> <td>Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.</td> </tr> <tr> <td>c</td> <td>Mass balance</td> <td>Calculation of diffuse emissions using a mass balance considering the solvent input, channelled emissions to air,</td> </tr> </tbody> </table>					Technique		Description	a	Measurement	Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2.	b	Emissions factors	Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.	c	Mass balance	Calculation of diffuse emissions using a mass balance considering the solvent input, channelled emissions to air,	<table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>Measurement</td> <td></td> </tr> <tr> <td>Emissions factors</td> <td></td> </tr> <tr> <td>Mass balance</td> <td></td> </tr> </tbody> </table> <p>Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.</p>	Technique	Yes/No	Measurement		Emissions factors		Mass balance	
Technique		Description																							
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Technique	Yes/No																								
Measurement																									
Emissions factors																									
Mass balance																									

		emissions to water, the solvent in the process output, and process (e.g. distillation) residues.								
<p>BAT 10 BAT is to periodically monitor odour emissions.</p> <p>Description Odour emissions can be monitored using:</p> <ul style="list-style-type: none"> - EN standards (e.g. dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); - when applying alternative methods for which no EN standards are available (e.g. estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. <p>The monitoring frequency is determined in the odour management plan (see BAT 12).</p> <p>Applicability The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.</p>		<p>Which methods or features will be applied for frequent monitoring of odour emissions? Kindly also specify how odour emissions shall be monitored using the chosen technique. Kindly include the he proposed moniroing technque as part of the monitoring proposal submitted in line with Section B3.10 of the application.</p> <table border="1" data-bbox="1238 571 2029 1050"> <thead> <tr> <th data-bbox="1238 571 1749 611">Features/Methods</th> <th data-bbox="1749 571 2029 611">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1238 611 1749 831">1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)</td> <td data-bbox="1749 611 2029 831">Yes as per EMP</td> </tr> <tr> <td data-bbox="1238 831 1749 903">2) Alternative methods for which no EN standards are available</td> <td data-bbox="1749 831 2029 903"></td> </tr> <tr> <td data-bbox="1238 903 1749 1050">3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality</td> <td data-bbox="1749 903 2029 1050"></td> </tr> </tbody> </table>	Features/Methods	Yes/No	1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)	Yes as per EMP	2) Alternative methods for which no EN standards are available		3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality	
Features/Methods	Yes/No									
1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)	Yes as per EMP									
2) Alternative methods for which no EN standards are available										
3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality										
<p>BAT 11 BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water, with a frequency of at least once per year.</p> <p>Description Monitoring includes direct measurements, calculation or recording, e.g. using suitable meters or invoices. The monitoring is broken down at the most</p>		<p>How will the monitoring of the annual consumption of water, energy and raw materials, as well as the annual generation of residues and wastewater, be carried out?</p> <p>The Control System includes monitoring and documentation of key performance parameters.</p>								

<p>appropriate level (e.g. at process or plant/installation level) and considers any significant changes in the plant/installation.</p>	<p>Energy efficiency, consumption and generation are monitored throughout the year.</p>					
<p>1.3 Emissions to air</p>						
<p>BAT 12 In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <ul style="list-style-type: none"> • a protocol containing actions and timelines; • a protocol for conducting odour monitoring as set out in BAT 10; • a protocol for response to identified odour incidents, e.g. complaints; • an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures. <p>Applicability The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.</p>	<p>Kindly specify which of the following elements are included or proposed to be included as part of the odour management plan. Should any of these elements not be currently included in such plan, kindly provide a timeframe by when these elements will be included.</p> <table border="1" data-bbox="1236 630 2045 890"> <thead> <tr> <th style="text-align: center;">Elements</th> </tr> </thead> <tbody> <tr> <td>1) A protocol containing actions and timelines</td> </tr> <tr> <td>2) A protocol conducting odour monitoring as set out in BAT 10</td> </tr> <tr> <td>3) A protocol for response to identified odour incidents, e.g. complaints</td> </tr> <tr> <td>4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and implement prevention and/or reduction measures</td> </tr> </tbody> </table> <p>To be captured via consolidated EMP for MEC.</p>	Elements	1) A protocol containing actions and timelines	2) A protocol conducting odour monitoring as set out in BAT 10	3) A protocol for response to identified odour incidents, e.g. complaints	4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and implement prevention and/or reduction measures
Elements						
1) A protocol containing actions and timelines						
2) A protocol conducting odour monitoring as set out in BAT 10						
3) A protocol for response to identified odour incidents, e.g. complaints						
4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and implement prevention and/or reduction measures						
<p>BAT 13 In order to prevent or, where that is not practicable, to reduce odour</p>						

emissions, BAT is to use one or a combination of the techniques given below.

Technique		Description	Applicability
a.	Minimising residence times	Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.	Only applicable to open systems.
b.	Using chemical treatment	Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).	Not applicable if it may hamper the desired output quality.
c.	Optimising aerobic treatment	In the case of aerobic treatment of water-based liquid waste, it may include: <ul style="list-style-type: none"> — use of pure oxygen; — removal of scum in tanks; 	Generally applicable.

Kindly specify which odour minimisation technique shall be implemented on site and provide details of the chosen technique:

Technique	Yes/No
1) Minimizing residence times	Yes
2) Using chemical treatment	Yes – scrubber system described in original permit
3) Optimizing aerobic treatment	Yes

Transfer from containers at MTP:
Incoming waste are only transferred into the system in the reception hall. Odour emissions are minimized by using fast roller doors with air curtains and an air treatment system based on biofilters.

At AD:
The tanks subject to important odour emissions are closed and connected to the air treatment system. All connections between the vessels are capable of being closed via valves.

		<p>— frequent maintenance of the aeration system.</p> <p>In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.</p>																											
<p>BAT 14</p> <p>In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.</p> <p>Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 14d is especially relevant.</p> <table border="1" data-bbox="206 855 1205 1300"> <thead> <tr> <th data-bbox="206 855 477 948">Technique</th> <th data-bbox="477 855 929 948">Description</th> <th data-bbox="929 855 1205 948">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="206 948 271 1300">a.</td> <td data-bbox="271 948 477 1300"> Minimising the number of potential diffuse emission sources </td> <td data-bbox="477 948 929 1300"> This includes techniques such as: — appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes); </td> <td data-bbox="929 948 1205 1300"> Generally applicable. </td> </tr> </tbody> </table>				Technique	Description	Applicability	a.	Minimising the number of potential diffuse emission sources	This includes techniques such as: — appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes);	Generally applicable.	<p>Which techniques will be used in order to reduce diffuse emissions to air, in particular dust, organic compounds and odour?</p> <table border="1" data-bbox="1236 624 2029 1391"> <thead> <tr> <th data-bbox="1236 624 1686 662">Technique</th> <th data-bbox="1686 624 2029 662">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1236 662 1686 772">a) Minimizing the number of potential diffuse emission sources</td> <td data-bbox="1686 662 2029 772">Yes</td> </tr> <tr> <td data-bbox="1236 772 1686 847">b) Selection and use of high-integrity equipment</td> <td data-bbox="1686 772 2029 847">Yes</td> </tr> <tr> <td data-bbox="1236 847 1686 885">c) Corrosion prevention</td> <td data-bbox="1686 847 2029 885">Yes</td> </tr> <tr> <td data-bbox="1236 885 1686 960">d) Containment, collection and treatment of diffuse emissions</td> <td data-bbox="1686 885 2029 960">Yes</td> </tr> <tr> <td data-bbox="1236 960 1686 999">e) Dampening</td> <td data-bbox="1686 960 2029 999">n/a</td> </tr> <tr> <td data-bbox="1236 999 1686 1037">f) Maintenance</td> <td data-bbox="1686 999 2029 1037">Yes</td> </tr> <tr> <td data-bbox="1236 1037 1686 1112">g) Cleaning of waste treatment and storage areas</td> <td data-bbox="1686 1037 2029 1112">Yes</td> </tr> <tr> <td data-bbox="1236 1112 1686 1391">h) Leak detection and repair programmes (LDAR)</td> <td data-bbox="1686 1112 2029 1391"> Yes – the inspection program will be included in O&M manual that covers storage areas, pipes, containers/tanks, including a system for keeping records. </td> </tr> </tbody> </table>	Technique	Yes/No	a) Minimizing the number of potential diffuse emission sources	Yes	b) Selection and use of high-integrity equipment	Yes	c) Corrosion prevention	Yes	d) Containment, collection and treatment of diffuse emissions	Yes	e) Dampening	n/a	f) Maintenance	Yes	g) Cleaning of waste treatment and storage areas	Yes	h) Leak detection and repair programmes (LDAR)	Yes – the inspection program will be included in O&M manual that covers storage areas, pipes, containers/tanks, including a system for keeping records.
Technique	Description	Applicability																											
a.	Minimising the number of potential diffuse emission sources	This includes techniques such as: — appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes);	Generally applicable.																										
Technique	Yes/No																												
a) Minimizing the number of potential diffuse emission sources	Yes																												
b) Selection and use of high-integrity equipment	Yes																												
c) Corrosion prevention	Yes																												
d) Containment, collection and treatment of diffuse emissions	Yes																												
e) Dampening	n/a																												
f) Maintenance	Yes																												
g) Cleaning of waste treatment and storage areas	Yes																												
h) Leak detection and repair programmes (LDAR)	Yes – the inspection program will be included in O&M manual that covers storage areas, pipes, containers/tanks, including a system for keeping records.																												

		<ul style="list-style-type: none"> — favouring the use of gravity transfer rather than using pumps; — limiting the drop height of material; — limiting traffic speed; — using wind barriers. 		
b.	Selection and use of high-integrity equipment	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — valves with double packing seals or equally efficient equipment; — high-integrity gaskets (such as spiral wound, ring joints) for critical applications; — pumps/compressors/agitators fitted with mechanical seals instead of packing; — magnetically driven pumps/compressors/agitators; 	Applicability may be restricted in the case of existing plants due to operability requirements.	

		<ul style="list-style-type: none"> — appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs. 		
c.	Corrosion prevention	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — appropriate selection of construction materials; — lining or coating of equipment and painting of pipes with corrosion inhibitors. 	Generally applicable.	
d.	Containment, collection and treatment of diffuse emissions	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts); — maintaining the enclosed equipment or buildings under an adequate pressure; 	<p>The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion.</p> <p>The use of enclosed equipment or buildings may also be constrained</p>	

		<ul style="list-style-type: none"> — collecting and directing the emissions to an appropriate abatement system (see Section 6.1) via an air extraction system and/or air suction systems close to the emission sources. 	by the volume of waste.	
e.	Dampening	Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.	Generally applicable.	
f.	Maintenance	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — ensuring access to potentially leaky equipment; — regularly controlling protective equipment such as lamellar curtains, fast-action doors. 	Generally applicable.	
g.	Cleaning of waste treatment and storage areas	This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas,	Generally applicable.	

		storage areas, etc.), conveyor belts, equipment and containers.																
h.	Leak detection and repair (LDAR) programme	See Section 6.2. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.	Generally applicable.															
<p>BAT 15 BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.</p> <table border="1"> <thead> <tr> <th colspan="2">Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Correct plant design</td> <td>This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.</td> <td>Generally applicable to new plants. A gas recovery system may be retrofitted in existing plants.</td> </tr> </tbody> </table>				Technique		Description	Applicability	a.	Correct plant design	This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.	Generally applicable to new plants. A gas recovery system may be retrofitted in existing plants.	<p>Kindly specify which of the following techniques shall be utilised to ensure safe use of flares, and details of how this will be monitored? Kindly provide details of the monitoring, which will be carried out during such flaring.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Correct plant design</td> <td>Yes – a gas recovery system with high integrity relief valves are used</td> </tr> <tr> <td>b) Plant management</td> <td>Yes – process control for balancing gas system is available</td> </tr> </tbody> </table>	Technique	Yes/No	a) Correct plant design	Yes – a gas recovery system with high integrity relief valves are used	b) Plant management	Yes – process control for balancing gas system is available
Technique		Description	Applicability															
a.	Correct plant design	This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.	Generally applicable to new plants. A gas recovery system may be retrofitted in existing plants.															
Technique	Yes/No																	
a) Correct plant design	Yes – a gas recovery system with high integrity relief valves are used																	
b) Plant management	Yes – process control for balancing gas system is available																	

b.	Plant management	This includes balancing the gas system and using advanced process control.	Generally applicable.																			
<p>BAT 16 In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.</p> <table border="1" data-bbox="203 563 1211 1372"> <thead> <tr> <th data-bbox="203 563 266 655"></th> <th data-bbox="266 563 495 655">Technique</th> <th data-bbox="495 563 898 655">Description</th> <th data-bbox="898 563 1211 655">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="203 655 266 999">a.</td> <td data-bbox="266 655 495 999">Correct design of flaring devices</td> <td data-bbox="495 655 898 999">Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.</td> <td data-bbox="898 655 1211 999">Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.</td> </tr> <tr> <td data-bbox="203 999 266 1372">b.</td> <td data-bbox="266 999 495 1372">Monitoring and recording as part of flare management</td> <td data-bbox="495 999 898 1372">This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions</td> <td data-bbox="898 999 1211 1372">Generally applicable.</td> </tr> </tbody> </table>					Technique	Description	Applicability	a.	Correct design of flaring devices	Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.	Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.	b.	Monitoring and recording as part of flare management	This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions	Generally applicable.	<p>How will flaring emissions be reduced? Which techniques will be applied in order to do so?</p> <table border="1" data-bbox="1238 480 2033 735"> <thead> <tr> <th data-bbox="1238 480 1854 520">Techniques</th> <th data-bbox="1854 480 2033 520">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1238 520 1854 628">a) Correct design of flaring devices</td> <td data-bbox="1854 520 2033 628">As per original application</td> </tr> <tr> <td data-bbox="1238 628 1854 735">b) Monitoring and recording as part of flare management</td> <td data-bbox="1854 628 2033 735">Records on flaring maintained</td> </tr> </tbody> </table>	Techniques	Yes/No	a) Correct design of flaring devices	As per original application	b) Monitoring and recording as part of flare management	Records on flaring maintained
	Technique	Description	Applicability																			
a.	Correct design of flaring devices	Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.	Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.																			
b.	Monitoring and recording as part of flare management	This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions	Generally applicable.																			
Techniques	Yes/No																					
a) Correct design of flaring devices	As per original application																					
b) Monitoring and recording as part of flare management	Records on flaring maintained																					

		(e.g. NO _x , CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.		
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1.4. Noise and vibrations

BAT 17

In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:

- I. a protocol containing appropriate actions and timelines;
- II. a protocol for conducting noise and vibration monitoring;
- III. a protocol for response to identified noise and vibration events, e.g. complaints;
- IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.

Applicability

The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated.

How will noise and vibration emissions be mitigated? Will a noise and vibration management plan be implemented? If yes, which features will be included?

Feature	Yes/No
a) A protocol containing appropriate actions and timelines	
b) A protocol for conducting noise and vibration monitoring	
c) A protocol for response to identified noise and vibration events, e.g. complaints	
d) A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterize the contributions of the sources and to implement prevention and/or reduction measures	

Noise and vibration monitoring have been included in the consolidated EMP for MEC (see Section 14). Possible noisy

				equipment is located within enclosures or rooms to attenuate the noise generated. Baseline and operational noise and vibration measurements have been carried out.																					
<p>BAT 18 In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.</p>				<p>Kindly specify which of the following techniques shall be implemented to reduce emissions from noise and vibration. Details of the chosen technique are to be submitted.</p>																					
<table border="1"> <thead> <tr> <th colspan="2">Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Appropriate location of equipment and buildings</td> <td>Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens</td> <td>For existing plants, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.</td> </tr> </tbody> </table>				Technique		Description	Applicability	a.	Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens	For existing plants, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.	<table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>1) Appropriate location of equipment and buildings</td> <td>Yes/abc</td> </tr> <tr> <td>2) Operational measures</td> <td>Yes</td> </tr> <tr> <td>3) Low-noise equipment</td> <td>Yes</td> </tr> <tr> <td>4) Noise and vibration control equipment</td> <td>Yes</td> </tr> <tr> <td>5) Noise attenuation</td> <td>Yes</td> </tr> </tbody> </table> <p>The equipment is housed in insulated structures, which serve to attenuate noise generated.</p>		Technique	Yes/No	1) Appropriate location of equipment and buildings	Yes/abc	2) Operational measures	Yes	3) Low-noise equipment	Yes	4) Noise and vibration control equipment	Yes	5) Noise attenuation	Yes
Technique		Description	Applicability																						
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		and by relocating building exits or entrances.		
b.	Operational measures	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> (i) inspection and maintenance of equipment; (ii) closing of doors and windows of enclosed areas, if possible; (iii) equipment operation by experienced staff; (iv) avoidance of noisy activities at night, if possible; (v) provisions for noise control during maintenance, traffic, handling and treatment activities. 	Generally applicable.	

c.	Low-noise equipment	This may include direct drive motors, compressors, pumps and flares.		
d.	Noise and vibration control equipment	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> (i) noise reducers; (ii) acoustic and vibrational insulation of equipment; (iii) enclosure of noisy equipment; (iv) soundproofing of buildings. 	Applicability may be restricted by a lack of space (for existing plants).	
e.	Noise attenuation	Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may be restricted by a lack of space.	

			For mechanical treatment in shredders of metal wastes, it is applicable within the constraints associated with the risk of deflagration in shredders.	
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1.5. Emissions to water

BAT 19

In order to optimise water consumption, to reduce the volume of wastewater generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.

Technique		Description
a.	Water management	Water consumption is optimised by using measures which may include: <ul style="list-style-type: none"> — water-saving plans (e.g. establishment of water efficiency objectives, flow diagrams and water mass balances); — optimising the use of washing water (e.g. dry cleaning instead of hosing down, using trigger control on all washing equipment); — reducing the use of water for vacuum generation (e.g. use of ring pumps with high boiling point liquids).

How will wastewater volume be reduced? Moreover, which techniques will be applied to reduce emissions to soil and water? Kindly provide details of the relevant technique.

Technique	Yes/No
a) Water management	n/a
b) Water recirculation	Yes
c) Impermeable surface	Yes
d) Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	Yes
e) Roofing of waste storage and treatment areas	Yes
f) Segregation of water streams	Yes
g) Adequate drainage infrastructure	Yes
h) Design and maintenance provisions to allow detection and repair of leaks	Yes
i) Appropriate buffer storage capacity	Yes

Waste water is re-used in the treatment process and is always available as the production of waste water is a necessary part of the process. Service water (from rain water runoff) is also available if necessary.

b.	Water recirculation	Water streams are recirculated within the plant, if necessary after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).	Confirmed	Generally applicable. A dedicated drainage system is in place inside the plant, driving all drainage from the different halls to an underground process water tank. This water will be used in the process. Waste water is reused in the treatment process (define as process water). Service water (from rain water runoff) is used for specific needs, when higher quality water is required.	
c.	Impermeable surface	Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned.	Confirmed	Generally applicable. The only products that stored outside (but on hardstanding) are the bales of RDF, Paper/Card and Plastic but these are deemed to be low risk.	
d.	Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as: <ul style="list-style-type: none"> — overflow detectors; — overflow pipes that are directed to a contained drainage system (i.e. the relevant secondary containment or another vessel); — tanks for liquids that are located in a suitable secondary containment; the volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment; — isolation of tanks, vessels and secondary containment (e.g. closing of valves). 	Confirmed	Site containment is included: Generally applicable. <ul style="list-style-type: none"> • In the halls, potentially contaminated drainage is collected in dedicated process waste water tank to be used for the process; • The digesters, suspension buffer and aeration tanks are placed in a bund; • In the other outside areas, potentially contaminated run off water is diverted to underground reservoirs, fitted with a silt trap and oil-water interceptor to ensure that clean water enter the reservoirs; • Chemicals are stored within dedicated bunded rooms. • Chemical tanks have their own bunds or double walls. 	

e.	Roofing of waste storage and treatment areas	Depending on the risks posed by the waste in terms of soil and/or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and thus minimise the volume of contaminated run-off water.		Applicability may be constrained when high volumes of waste are stored or treated (e.g. mechanical treatment in shredders of metal waste).	
f.	Segregation of water streams	Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated waste water streams are segregated from waste water streams that require treatment.		Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water collection system.	
g.	Adequate drainage infrastructure	The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.		Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water drainage system.	

h.	Design and maintenance provisions to allow detection and repair of leaks	<p>Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired.</p> <p>The use of underground components is minimised. When underground components are used, and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place.</p>		<p>The use of above-ground components is generally applicable to new plants. It may be limited however by the risk of freezing.</p> <p>The installation of secondary containment may be limited in the case of existing plants.</p>			
i.	Appropriate buffer storage capacity	<p>Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment).</p> <p>The discharge of waste water from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse).</p>		<p>Generally applicable to new plants.</p> <p>For existing plants, applicability may be limited by space availability and by the layout of the water collection system.</p>			
<p>BAT 20 In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of the techniques given below.</p>				<p>How will the treatment procedure for waste water be undertaken? Which techniques will be applied? <i>Operator is to also provide justification as to the proposed abatement technique of choice. Moreover, the operator is to also indicated the expected emission limits depending on the proposed technique(s).</i></p> <table border="1" data-bbox="1238 1353 2033 1391"> <thead> <tr> <th data-bbox="1238 1353 1765 1391">Technique</th> <th data-bbox="1765 1353 2033 1391">Yes/No</th> </tr> </thead> </table>		Technique	Yes/No
Technique	Yes/No						

Technique ⁽²³⁾		Typical pollutants targeted	Applicability
Preliminary and primary treatment, e.g.			
a.	Equalisation	All pollutants	Generally applicable.
b.	Neutralisation	Acids, alkalis	
c.	Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks	Gross solids, suspended solids, oil/grease	
Physico-chemical treatment, e.g.			
d.	Adsorption	Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX	Generally applicable.

Preliminary and primary treatment	
a) Equalization	No
b) Neutralization	No
c) Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks	Yes
Physico-chemical treatment, e.g.	
d) Adsorption	n/a*
e) Distillation/rectification	n/a*
f) Precipitation	n/a*
g) Chemical oxidation	n/a*
h) Chemical reduction	n/a*
i) Evaporation	n/a*
j) Ion exchange	n/a*
k) Stripping	n/a*
Biological treatment, e.g.	
l) Activated sludge process	Yes
m) Membrane bioreactor	Yes
Nitrogen removal	
n) Nitrification/denitrification when the treatment includes a biological treatment	Yes
Solids removal, e.g.	
o) Coagulation and flocculation	Yes
p) Sedimentation	Yes
q) Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Yes – sand traps
r) Flotation	Yes

Flotation agent is used for dewatering purposes.

e.	Distillation/rectification	Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents		<p>*Not applicable. The plant is a Mechanical-Biological Treatment Plant and not a Physico-Chemical Treatment Plant.</p> <p>Anaerobic conditions are used only on digesters. In critical parts of the process, like suspension buffer (before digesters) and aeration tanks (after digesters) anaerobic conditions will be avoided by their own air supply.</p> <p>The WWTP uses a nitrification/denitrification process that uses the aeration control to regulate its activity.</p> <p>AELs not applicable given that there is no direct discharge to a receiving water body.</p>
f.	Precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus		
g.	Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide		
h.	Chemical reduction	Reducible dissolved non-biodegradable or inhibitory		

		pollutants, e.g. hexavalent chromium (Cr(VI))		
i.	Evaporation	Soluble contaminants		
j.	Ion exchange	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals		
k.	Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable organically bound halogens (AOX), hydrocarbons		

<i>Biological treatment, e.g.</i>			
l.	Activated sludge process	Biodegradable organic compounds	Generally applicable.
m.	Membrane bioreactor		
<i>Nitrogen removal</i>			
n.	Nitrification/denitrification when the treatment includes a biological treatment	Total nitrogen, ammonia	Nitrification may not be applicable in the case of high chloride concentrations (e.g. above 10 g/l) and when the reduction of the chloride concentration prior to nitrification would not be justified by the environmental benefits. Nitrification is not applicable when the temperature of the waste water is low (e.g. below 12 °C).
<i>Solids removal, e.g.</i>			

o.	Coagulation and flocculation	Suspended solids and particulate-bound metals	Generally applicable.
p.	Sedimentation		
q.	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)		
r.	Flotation		

Table 6.1: BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body

Substance/Parameter	BAT-AEL ⁽²⁴⁾	Waste treatment process to which the BAT-AEL applies
Total organic carbon (TOC) ⁽²⁵⁾	10-60 mg/l	— All waste treatments except treatment of water-based liquid waste
	10-100 mg/l ⁽²⁶⁾ ⁽²⁷⁾	— Treatment of water-based liquid waste

Chemical oxygen demand (COD) _[25]	30-180 mg/l	— All waste treatments except treatment of water-based liquid waste
	30-300 mg/l _[26] _[27]	— Treatment of water-based liquid waste
Total suspended solids (TSS)	5-60 mg/l	— All waste treatments
Hydrocarbon oil index (HOI)	0,5-10 mg/l	<ul style="list-style-type: none"> — Mechanical treatment in shredders of metal waste — Treatment of WEEE containing VFCs and/or VHCs — Re-refining of waste oil — Physico-chemical treatment of waste with calorific value

		<ul style="list-style-type: none"> — Water washing of excavated contaminated soil — Treatment of water-based liquid waste 	
Total nitrogen (Total N)	1-25 mg/l ⁽²⁸⁾ ⁽²⁹⁾	<ul style="list-style-type: none"> — Biological treatment of waste — Re-refining of waste oil 	
	10-60 mg/l ⁽²⁸⁾ ⁽²⁹⁾ ⁽³⁰⁾	<ul style="list-style-type: none"> — Treatment of water-based liquid waste 	
Total phosphorus (Total P)	0,3-2 mg/l	<ul style="list-style-type: none"> — Biological treatment of waste 	
	1-3 mg/l ⁽²⁷⁾	<ul style="list-style-type: none"> — Treatment of water-based liquid waste 	
Phenol index	0,05-0,2 mg/l	<ul style="list-style-type: none"> — Re-refining of waste oil 	

			— Physico-chemical treatment of waste with calorific value	
		0,05-0,3 mg/l	— Treatment of water-based liquid waste	
	Free cyanide (CN ⁻) _[31]	0,02-0,1 mg/l	— Treatment of water-based liquid waste	
	Adsorbable organically bound halogens (AOX) _[31]	0,2-1 mg/l	— Treatment of water-based liquid waste	
Metals and metalloids _[31]	Arsenic (expressed as As)	0,01-0,05 mg/l	— Mechanical treatment in shredders of metal waste	
	Cadmium (expressed as Cd)	0,01-0,05 mg/l	— Treatment of WEEE containing VFCs and/or VHCs	
	Chromium (expressed as Cr)	0,01-0,15 mg/l	— Mechanical biological treatment of waste	

	Copper (expressed as Cu)	0,05-0,5 mg/l	— Re-refining of waste oil	
	Lead (expressed as Pb)	0,05-0,1 mg/l ^[32]	— Physico-chemical treatment of waste with calorific value	
	Nickel (expressed as Ni)	0,05-0,5 mg/l	— Physico-chemical treatment of solid and/or pasty waste	
	Mercury (expressed as Hg)	0,5-5 µg/l	— Regeneration of spent solvents	
	Zinc (expressed as Zn)	0,1-1 mg/l ^[33]	— Water washing of excavated contaminated soil	
	Arsenic (expressed as As)	0,01-0,1 mg/l	— Treatment of water-based liquid waste	

	Cadmium (expressed as Cd)	0,01-0,1 mg/l		
	Chromium (expressed as Cr)	0,01-0,3 mg/l		
	Hexavalent chromium (expressed as Cr(VI))	0,01-0,1 mg/l		
	Copper (expressed as Cu)	0,05-0,5 mg/l		
	Lead (expressed as Pb)	0,05-0,3 mg/l		
	Nickel (expressed as Ni)	0,05-1 mg/l		

	Mercury (expressed as Hg)	1-10 µg/l	
	Zinc (expressed as Zn)	0,1-2 mg/l	

The associated monitoring is given in BAT 7.

Table 6.2 : BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body

Substance/Parameter	BAT-AEL ⁽³⁴⁾ ⁽³⁵⁾	Waste treatment process to which the BAT-AEL applies
Hydrocarbon oil index (HOI)	0,5-10 mg/l	<ul style="list-style-type: none"> — Mechanical treatment in shredders of metal waste — Treatment of WEEE containing VFCs and/or VHCs — Re-refining of waste oil

		<ul style="list-style-type: none"> — Physico-chemical treatment of waste with calorific value — Water washing of excavated contaminated soil — Treatment of water-based liquid waste 	
Free cyanide (CN ⁻) _[36]		0,02-0,1 mg/l	—Treatment of water-based liquid waste
Adsorbable organically bound halogens (AOX) _[36]		0,2-1 mg/l	—Treatment of water-based liquid waste
Metals and metalloids _[36]	Arsenic (expressed as As)	0,01-0,05 mg/l	—Mechanical treatment in

	Cadmium (expressed as Cd)	0,01-0,05 mg/l	shredders of metal waste	
	Chromium (expressed as Cr)	0,01-0,15 mg/l	—Treatment of WEEE containing VFCs and/or VHCs	
	Copper (expressed as Cu)	0,05-0,5 mg/l	—Mechanical biological treatment of waste	
	Lead (expressed as Pb)	0,05-0,1 mg/l ⁽³⁷⁾	—Re-refining of waste oil	
	Nickel (expressed as Ni)	0,05-0,5 mg/l	—Physico-chemical treatment of waste with calorific value	
	Mercury (expressed as Hg)	0,5-5 µg/l		
	Zinc (expressed as Zn)	0,1-1 mg/l ⁽³⁸⁾		

			<ul style="list-style-type: none"> —Physico-chemical treatment of solid and/or pasty waste —Regeneration of spent solvents —Water washing of excavated contaminated soil 	
	Arsenic (expressed as As)	0,01-0,1 mg/l	—Treatment of water-based liquid waste	
	Cadmium (expressed as Cd)	0,01-0,1 mg/l		

	Chromium (expressed as Cr)	0,01-0,3 mg/l		
	Hexavalent chromium (expressed as Cr(VI))	0,01-0,1 mg/l		
	Copper (expressed as Cu)	0,05-0,5 mg/l		
	Lead (expressed as Pb)	0,05-0,3 mg/l		
	Nickel (expressed as Ni)	0,05-1 mg/l		
	Mercury (expressed as Hg)	1-10 µg/l		

	Zinc (expressed as Zn)	0,1-2 mg/l	
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The associated monitoring is given in BAT 7.

1.6 Emissions from accidents and incidents

BAT 21

In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).

Technique		Description
a.	Protection measures	<p>These include measures such as:</p> <ul style="list-style-type: none"> — protection of the plant against malevolent acts; — fire and explosion protection system, containing equipment for prevention, detection, and extinction; — accessibility and operability of relevant control equipment in emergency situations.

Kindly specify how each of the following techniques shall be implemented to prevent or limit the environmental consequences of accidents and incidents.

Technique
<p>a) Protection measures</p> <p>Site is secured by perimeter boundary, manned gates and security measures to register all authorized vehicles and prevent unauthorised access.</p> <p>Fire and explosion protection are managed via an Emergency Preparedness and Response procedure, which requires the use of the appropriate response equipment.</p> <p>Relevant control equipment is accessible in emergency situations.</p>
<p>b) Management of incidental/accidental emissions</p> <p>See EMS, Section 8.2.1 Emergency Preparedness & Response</p>

b.	Management of incidental/accidental emissions	Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.	<p>c) Incident/accident registration and assessment system</p> <p>See EMS, Section 8.2.1 Emergency Preparedness & Response</p>
c.	Incident/accident registration and assessment system	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; — procedures to identify, respond to and learn from such incidents and accidents. 	

1.7. Material efficiency

BAT 22

In order to use materials efficiently, BAT is to substitute materials with waste.

Description

Waste is used instead of other materials for the treatment of wastes (e.g. waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).

Applicability

Some applicability limitations derive from the risk of contamination posed by the presence of impurities (e.g. heavy metals, POPs, salts, pathogens) in the waste

How will the substitution of materials with waste be carried out?
Where will it apply?

Not feasible, given the nature of the wastes processed at this facility.

that substitutes other materials. Another limitation is the compatibility of the waste substituting other materials with the waste input (see BAT 2).

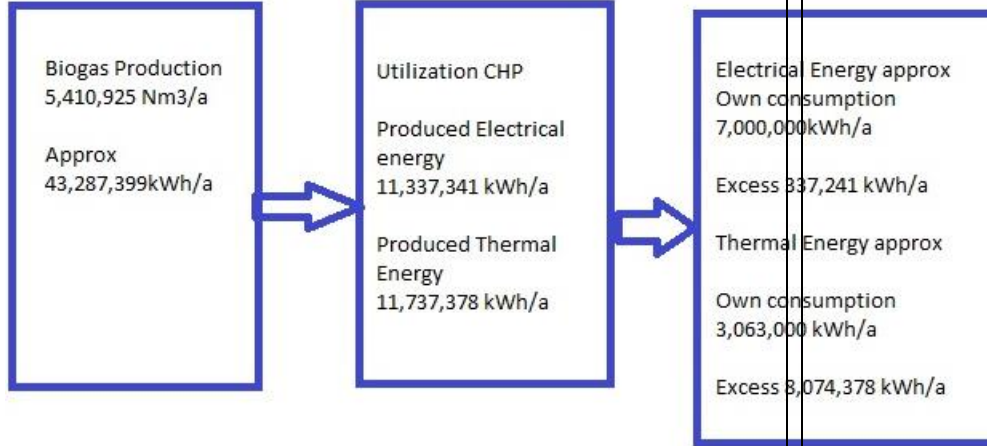
1.8 Energy efficiency

BAT 23

In order to use energy efficiently, BAT is to use both of the techniques given below.

Technique		Description
a.	Energy efficiency plan	An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.
b.	Energy balance record	An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: (i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation;

Kindly specify how each of the following techniques shall be implemented on site.

Technique	
a)	<p>Energy efficiency plan</p> <p>Energy efficiency management shall be captured via EMS objectives and targets.</p>
b)	<p>Energy balance record</p> <p>Energy balance of the Plant:</p>  <pre> graph LR A["Biogas Production 5,410,925 Nm3/a Approx 43,287,399 kWh/a"] --> B["Utilization CHP Produced Electrical energy 11,337,341 kWh/a Produced Thermal Energy 11,737,378 kWh/a"] B --> C["Electrical Energy approx Own consumption 7,000,000 kWh/a Excess 337,241 kWh/a"] B --> D["Thermal Energy approx Own consumption 3,063,000 kWh/a Excess 3,074,378 kWh/a"] </pre> <p>The Facilities have been designed to maximise energy efficiency related to both energy generation from the Mechanical -</p>

		<p>(iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process.</p> <p>The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.</p>	<p>Biological Treatment Plant (MBT) and the Biogas Plant (BGP) as well as energy consumption of buildings and equipment. The facility design incorporates all reasonable energy efficiency measures including:</p> <ul style="list-style-type: none"> · Building insulation to minimum Building Regulation standards · Pipework insulation · Variable speed drives where appropriate · Energy efficient lighting and controls as required by building regulations <p>Both Facilities are energy self-sufficient in yearly average.</p>
<p>1.9 Reuse of packaging</p>			
<p>BAT 24 In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).</p> <p>Description Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g. reconditioning, cleaning).</p> <p>Applicability Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.</p>		<p>Kindly specify how will the re-use of waste packaging shall be maximised to reduce the amount of waste sent for disposal. Kindly provide a copy of the residues management plan?</p> <p>Packaging waste, typically in the form of pallets, are reused whenever possible.</p>	
<p>2. BAT conclusions for the mechanical treatment of waste</p>			
<p>Unless otherwise stated, the BAT conclusions presented in Section 2 apply to the mechanical treatment of waste when it is not combined with biological treatment, and in addition to the general BAT conclusions in Section 1.</p>			

2.1 General BAT conclusions for the mechanical treatment of waste

2.1.1 Emissions to air

BAT 25

In order to reduce emissions to air of dust, and of particulate-bound metals, PCDD/F and dioxin-like PCBs, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique		Description	Applicability
a.	Cyclone	See Section 6.1. Cyclones are mainly used as preliminary separators for coarse dust.	Generally applicable.
b.	Fabric filter	See Section 6.1.	May not be applicable to exhaust air ducts directly connected to the shredder when the effects of deflagration on the fabric filter cannot be mitigated (e.g. by using pressure relief valves).
c.	Wet scrubbing	See Section 6.1.	Generally applicable.

A proper system of odour abatement, using scrubber is installed.

Air treatment system, including a general odour treatment system in the main buildings and tanks, consists of biofilters and a dedusting system for the bulky waste crushing area. Through this system crushing, shredding and sieving operations are carried out in areas with extractive vent systems and abatement.

Foreseen limit of emissions:

Dust ≤ 10 mg/Nm³ – however, it should be noted that the general environs of the plant can be a source of dust.

Kindly specify which of the following technique(s) shall be used in order to reduce emissions to air of the specified parameters.

Further details of the relevant techniques are to be provided in the relevant section of the application.

Technique	Yes/No
a) Cyclone	Yes
b) Fabric filter	No
c) Wet scrubbing	Yes
d) Water injection into the shredder	No

d.	Water injection into the shredder	<p>The waste to be shredded is damped by injecting water into the shredder. The amount of water injected is regulated in relation to the amount of waste being shredded (which may be monitored via the energy consumed by the shredder motor).</p> <p>The waste gas that contains residual dust is directed to cyclone(s) and/or a wet scrubber.</p>	Only applicable within the constraints associated with local conditions (e.g. low temperature, drought).
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Table 6.3 : BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from the mechanical treatment of waste

Parameter	Unit	BAT-AEL (Average over the sampling period)
Dust	mg/Nm ³	2-5 ⁽¹⁾
⁽¹⁾ When a fabric filter is not applicable, the upper end of the range is 10 mg/Nm ³ .		

The associated monitoring is given in BAT 8.

2.2 BAT conclusions for the mechanical treatment in shredders of metal waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment in shredders of metal waste, in addition to BAT 25.

2.2.1 Overall environmental performance

BAT 26

In order to improve the overall environmental performance, and to prevent emissions due to accidents and incidents, BAT is to use BAT 14g and all of the techniques given below:

- a. implementation of a detailed inspection procedure for baled waste before shredding;
- b. removal of dangerous items from the waste input stream and their safe disposal (e.g. gas cylinders, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items);
- c. treatment of containers only when accompanied by a declaration of cleanliness.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Kindly specify how each of the following techniques shall be implemented in order to improve the overall environmental performance improve?

Technique
a) Implementation of a detailed inspection procedure for baled waste before shredding
b) Removal of dangerous items from the waste input stream and their safe disposal (e.g. gas cylinders, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items)
c) Treatment of containers only when accompanied by a declaration of cleanliness

BAT 27

In order to prevent deflagrations and to reduce emissions when deflagrations occur, BAT is to use technique a. and one or both of the techniques b. and c. given below.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Which techniques will be used to prevent deflagrations as well as to reduce emissions from deflagrations?

Technique		Description	Applicability
a.	Deflagration management plan	<p>This includes:</p> <ul style="list-style-type: none"> —a deflagration reduction programme designed to identify the source(s), and to implement measures to prevent deflagration occurrences, e.g. inspection of waste input as described in BAT 26a, removal of dangerous items as described in BAT 26b; —a review of historical deflagration incidents and remedies and the dissemination of deflagration knowledge; —a protocol for response to deflagration incidents. 	Generally applicable.
b.	Pressure relief dampers	Pressure relief dampers are installed to relieve pressure waves coming from deflagrations that would	

Technique	Yes/No
a) Deflagration management plan	
b) Pressure relief dampers	
c) Pre-shredding	

		otherwise cause major damage and subsequent emissions.		
c.	Pre-shredding	Use of a low-speed shredder installed upstream of the main shredder	Generally applicable for new plants, depending on the input material. Applicable for major plant upgrades where a significant number of deflagrations have been substantiated.	
2.2.3 Energy efficiency				
BAT 28		Kindly specify how the shredder operations shall be stabilised to ensure efficient use of energy?		
In order to use energy efficiently, BAT is to keep the shredder feed stable.		Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.		
Description				
The shredder feed is equalised by avoiding disruption or overload of the waste feed which would lead to unwanted shutdowns and start-ups of the shredder.				
2.3 BAT conclusions for the treatment of WEEE containing VFCs and/or VHCs				
Unless otherwise stated, the BAT conclusions presented in this section apply to the treatment of WEEE containing VFCs and/or VHCs, in addition to BAT 25.				

2.3.1 Emissions to air

BAT 29

In order to prevent or, where that is not practicable, to reduce emissions of organic compounds to air, BAT is to apply BAT 14d, BAT 14h and to use technique a. and one or both of the techniques b. and c. given below.

Technique		Description
a.	Optimised removal and capture of refrigerants and oils	All refrigerants and oils are removed from the WEEE containing VFCs and/or VHCs and captured by a vacuum suction system (e.g. achieving refrigerant removal of at least 90 %). Refrigerants are separated from oils and the oils are degassed. The amount of oil remaining in the compressor is reduced to a minimum (so that the compressor does not drip).
b.	Cryogenic condensation	Waste gas containing organic compounds such as VFCs/VHCs is sent to a cryogenic condensation unit where they are liquefied (see description in Section 6.1). The liquefied gas is stored in pressurised vessels for further treatment.
c.	Adsorption	Waste gas containing organic compounds such as VFCs/VHCs is led into adsorption systems (see description in Section 6.1). The spent activated carbon is regenerated by means of heated air

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Kindly specify how technique a. and one of both of techniques b. and c. shall be implemented to ensure that emissions of organic compounds to air shall be prevented and reduced?

Technique	Yes/No
a) Optimized removal and capture of refrigerants and oils	
b) Cryogenic condensation	
c) Adsorption	

pumped into the filter to desorb the organic compounds. Subsequently, the regeneration waste gas is compressed and cooled in order to liquefy the organic compounds (in some cases by cryogenic condensation). The liquefied gas is then stored in pressurised vessels. The remaining waste gas from the compression stage is usually led back into the adsorption system in order to minimise VFC/VHC emissions.

Kindly specify the emissions level which the proposed techniques is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.

Table 6.4 : BAT-associated emission levels (BAT-AELs) for channelled TVOC and CFC emissions to air from the treatment of WEEE containing VFCs and/or VHCs

Parameter	Unit	BAT-AEL (Average over the sampling period)
TVOC	mg/Nm ³	3-15
CFCs	mg/Nm ³	0,5-10

The associated monitoring is given in BAT 8.

2.3.2 Explosions

BAT 30
In order to prevent emissions due to explosions when treating WEEE containing VFCs and/or VHCs, BAT is to use either of the techniques given

How will emissions from explosions be prevented when treating WEEE containing VFCs and/or VHCs? Which techniques will be suitable for use and application?

below.																	
<table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. Inert atmosphere</td> <td>By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).</td> </tr> <tr> <td>b. Forced ventilation</td> <td>By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.</td> </tr> </tbody> </table>		Technique	Description	a. Inert atmosphere	By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).	b. Forced ventilation	By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.	<table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Inert atmosphere</td> <td></td> </tr> <tr> <td>b) Forced ventilation</td> <td></td> </tr> </tbody> </table> <p>Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.</p>		Technique	Yes/No	a) Inert atmosphere		b) Forced ventilation			
Technique	Description																
a. Inert atmosphere	By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).																
b. Forced ventilation	By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.																
Technique	Yes/No																
a) Inert atmosphere																	
b) Forced ventilation																	
2.4 BAT conclusions for the mechanical treatment of waste with calorific value																	
In addition to BAT 25, the BAT conclusions presented in this section apply to the mechanical treatment of waste with calorific value covered by points 5.3(a)(iii) and 5.3(b)(ii) of Annex I to Directive 2010/75/EU.																	
2.4.1 Emissions to air																	
BAT 31 In order to reduce emissions to air of organic compounds, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.		Kindly specify which of the following techniques shall be implemented to reduce emissions to air of organic compounds.															
<table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. Adsorption</td> <td>See Section 6.1.</td> </tr> </tbody> </table>		Technique	Description	a. Adsorption	See Section 6.1.	<table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Adsorption</td> <td>No</td> </tr> <tr> <td>b) Biofilter</td> <td>Yes</td> </tr> <tr> <td>c) Thermal oxidation</td> <td>No</td> </tr> <tr> <td>d) Wet scrubbing</td> <td>Yes</td> </tr> </tbody> </table>		Technique	Yes/No	a) Adsorption	No	b) Biofilter	Yes	c) Thermal oxidation	No	d) Wet scrubbing	Yes
Technique	Description																
a. Adsorption	See Section 6.1.																
Technique	Yes/No																
a) Adsorption	No																
b) Biofilter	Yes																
c) Thermal oxidation	No																
d) Wet scrubbing	Yes																

b.	Biofilter		<p>Kindly specify the emissions levels which the proposed technique(s) is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.</p> <p>Air treatment system includes a general odour treatment system in the main buildings and tanks, by biofilters and a dedusting system for the bulky waste crushing area. By this system, crushing, shredding and sieving operations will be carried out in areas with extractive vent systems and abatement.</p> <p>Average TVOC readings (post air treatment) during the period January to June 2019 was 1.33mgC/Nm³.</p>								
c.	Thermal oxidation										
d.	Wet scrubbing										
<p>Table 6.5: BAT-associated emission level (BAT-AEL) for channelled TVOC emissions to air from the mechanical treatment of waste with calorific value</p> <table border="1" data-bbox="197 722 1131 995"> <thead> <tr> <th data-bbox="197 722 560 879">Parameter</th> <th data-bbox="560 722 810 879">Unit</th> <th data-bbox="810 722 1131 879">BAT-AEL (Average over the sampling period)</th> </tr> </thead> <tbody> <tr> <td data-bbox="197 879 560 911">TVOC</td> <td data-bbox="560 879 810 911">mg/Nm³</td> <td data-bbox="810 879 1131 911">10-30 (1)</td> </tr> <tr> <td colspan="3" data-bbox="197 911 1131 995">(1) The BAT-AEL only applies when organic compounds are identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.</td> </tr> </tbody> </table> <p>The associated monitoring is given in BAT 8.</p>			Parameter	Unit	BAT-AEL (Average over the sampling period)	TVOC	mg/Nm ³	10-30 (1)	(1) The BAT-AEL only applies when organic compounds are identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.		
Parameter	Unit	BAT-AEL (Average over the sampling period)									
TVOC	mg/Nm ³	10-30 (1)									
(1) The BAT-AEL only applies when organic compounds are identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.											
<p>2.5. BAT conclusions for the mechanical treatment of WEEE containing mercury</p> <p>Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment of WEEE containing mercury, in addition to BAT 25.</p>											
<p>2.5.1. Emissions to air</p>											

BAT 32
In order to reduce mercury emissions to air, BAT is to collect mercury emissions at source, to send them to abatement and to carry out adequate monitoring.

Description

This includes all of the following measures:

- equipment used to treat WEEE containing mercury is enclosed, under negative pressure and connected to a local exhaust ventilation (LEV) system;
- waste gas from the processes is treated by dedusting techniques such as cyclones, fabric filters, and HEPA filters, followed by adsorption on activated carbon (see Section 6.1);
- the efficiency of the waste gas treatment is monitored;
- mercury levels in the treatment and storage areas are measured frequently (e.g. once every week) to detect potential mercury leaks.

Table 6.6: BAT-associated emission level (BAT-AEL) for channelled mercury emissions to air from the mechanical treatment of WEEE containing mercury

Parameter	Unit	BAT-AEL (Average over the sampling period)
Mercury (Hg)	µg/Nm ³	2–7

The associated monitoring is given in BAT 8.

Which measures and schemes will be implemented to reduce mercury emissions to air?

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

3. BAT conclusions for the biological treatment of waste

Unless otherwise stated, the BAT conclusions presented in Section 3 apply to the biological treatment of waste, and in addition to the general BAT conclusions in Section 1. The BAT conclusions in Section 3 do not

apply to the treatment of water-based liquid waste.

3.1. General BAT conclusions for the biological treatment of waste

3.1.1. Overall environmental performance

BAT 33

In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.

Description

The technique consists of carrying out the pre-acceptance, acceptance and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g. in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.

Kindly describe the relevant technique which will be implemented in order to reduce odour emissions and improving the overall environmental performance in relation to waste input?

Incoming waste will only be transferred into the system in the reception hall.

Odour emissions will be minimized by using fast roller doors with air curtains and an air treatment system based on biofilters.

The incoming waste will be separated at various stages, both mechanically and manually (in the sorting cabin) to produce a variety of segregated waste.

A mechanical pre-treatment step will be used to separate non-biodegradable components of waste and maximize the efficiency of the process.

In addition, the plant and the abatement system has been designed specifically for the types of waste that will be accepted in order to ensure the high performance of the plant.

3.1.2. Emissions to air

BAT 34

In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H₂S and NH₃, BAT is to use one or a combination of the techniques given below.

Kindly specify which technique shall be implemented to reduce channelled emissions to air of dust, organic and odorous compounds be reduced?

Technique	Yes/No
a) Adsorption	No
b) Biofilter	Yes

Technique		Description
a.	Adsorption	See Section 6.1.
b.	Biofilter	See Section 6.1. A pretreatment of the waste gas before the biofilter (e.g. with a water or acid scrubber) may be needed in the case of a high NH ₃ content (e.g. 5-40 mg/Nm ³) in order to control the media pH and to limit the formation of N ₂ O in the biofilter. Some other odorous compounds (e.g. mercaptans, H ₂ S) can cause acidification of the biofilter media and necessitate the use of a water or alkaline scrubber for pretreatment of the waste gas before the biofilter.
c.	Fabric filter	See Section 6.1. The fabric filter is used in the case of mechanical biological treatment of waste.
d.	Thermal oxidation	See Section 6.1.
e.	Wet scrubbing	See Section 6.1. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.

c) Fabric filter	No
d) Thermal oxidation	No
e) Wet scrubbing	Yes

Kindly specify the emissions level which the proposed technique(s) is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.

The proposed technology to reduce the H₂S content in the biogas, and consequent additional emissions, is Biological Desulphurization, which is effectively a form of biofilter. This process was included to reduce the consumption of iron chloride in the flocculation stages, and to prevent an unnecessary increase of salinity in the waste suspension.

Maintaining good housekeeping and dust removal is implemented in the MBT that is equipped with a biofilter system, together with an acid scrubber to precipitate NH₃ to the indicated levels.

The specific NH₃ levels are: <20mg/m³
VOC emissions: < 20mgC/Nm³.
Odour (OUE/m³): <500
Dust<=10mg/Nm³

Table 6.7: BAT-associated emission levels (BAT-AELs) for channelled NH₃, odour, dust and TVOC emissions to air from the biological treatment of waste

Parameter	Unit	BAT-AEL (Average over the sampling period)	Waste treatment process
NH ₃ ⁽¹⁾ ⁽²⁾	mg/Nm ³	0.3–20	All biological treatments of waste
Odour concentration ⁽¹⁾ ⁽²⁾	ouE /Nm ³	200–1 000	
Dust	mg/Nm ³	2–5	Mechanical biological treatment of waste
TVOC	mg/Nm ³	5–40 ⁽³⁾	
<p>(1) Either the BAT-AEL for NH₃ or the BAT-AEL for the odour concentration applies. (2) This BAT-AEL does not apply to the treatment of waste mainly composed of manure. (3) The lower end of the range can be achieved by using thermal oxidation.</p>			

The associated monitoring is given in BAT 8.

3.1.3. Emissions to water and water usage

BAT 35

In order to reduce the generation of waste water and to reduce water usage, BAT is to use all of the techniques given below.

Technique	Description	Applicability
a. Segregation of water streams	Leachate seeping from compost piles and	Generally applicable to new plants.

Kindly provide a description of how each of the following techniques shall be implemented to reduce the generation of waste water, as well as water usage?

A contained drainage system will be in place inside the plant, driving all drainage from the different hall to an underground process water tank. This water will be used in the process.

Waste water will be reused in the treatment process (defined as process water). Service water (from rain water runoff) will be used for specific needs, when higher quality water is required.

		windrows is segregated from surface run-off water (see BAT 19f).	Generally applicable to existing plants within the constraints associated with the layout of the water circuits.															
b.	Water recirculation	Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).	Generally applicable.	<table border="1"> <thead> <tr> <th colspan="2">Technique</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Segregation of water streams</td> </tr> <tr> <td></td> <td>Yes</td> </tr> <tr> <td>b)</td> <td>Water recirculation</td> </tr> <tr> <td></td> <td>Yes</td> </tr> <tr> <td>c)</td> <td>Minimization of the generation of leachate</td> </tr> <tr> <td></td> <td>Yes</td> </tr> </tbody> </table>	Technique		a)	Segregation of water streams		Yes	b)	Water recirculation		Yes	c)	Minimization of the generation of leachate		Yes
Technique																		
a)	Segregation of water streams																	
	Yes																	
b)	Water recirculation																	
	Yes																	
c)	Minimization of the generation of leachate																	
	Yes																	

c.	Minimisation of the generation of leachate	Optimising the moisture content of the waste in order to minimise the generation of leachate.	Generally applicable.	
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3.2 BAT conclusions for the aerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the aerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1

3.2.1. Overall environmental performance

<p>BAT 36 In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.</p> <p>Description Monitoring and/or control of key waste and process parameters, including:</p> <ul style="list-style-type: none"> waste input characteristics (e.g. C to N ratio, particle size); temperature and moisture content at different points in the windrow; aeration of the windrow (e.g. via the windrow turning frequency, O₂ and/or CO₂ concentration in the windrow, temperature of air streams in the case of forced aeration); windrow porosity, height and width. <p>Applicability Monitoring of the moisture content in the windrow is not applicable to enclosed processes when health and/or safety issues have been identified. In that case, the moisture content can be monitored before loading the waste into the enclosed composting stage and adjusted when it exits the enclosed composting stage.</p>	<p>How will emissions to air be reduced? Which strategy will be utilized to improve the overall environmental performance? Which of the following waste and process parameters will be monitored?</p> <p>Compost-like output is currently sent to landfill. At present there are no plans to go for the end of waste process since mixed municipal waste is being treated.</p> <table border="1" data-bbox="1160 884 2029 1216"> <thead> <tr> <th data-bbox="1160 884 1912 922">Parameters</th> <th data-bbox="1912 884 2029 922">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1160 922 1912 995">a) Waste input characteristics (e.g. C to N ratio, particle size)</td> <td data-bbox="1912 922 2029 995"></td> </tr> <tr> <td data-bbox="1160 995 1912 1069">b) Temperature and moisture content at different points in the windrow</td> <td data-bbox="1912 995 2029 1069"></td> </tr> <tr> <td data-bbox="1160 1069 1912 1177">c) Aeration of the windrow (e.g. via the windrow turning frequency, O₂ and/or CO₂ concentration in the windrow, temperature of air streams in the case of forced aeration)</td> <td data-bbox="1912 1069 2029 1177"></td> </tr> <tr> <td data-bbox="1160 1177 1912 1216">d) Windrow porosity, height and width</td> <td data-bbox="1912 1177 2029 1216"></td> </tr> </tbody> </table>	Parameters	Yes/No	a) Waste input characteristics (e.g. C to N ratio, particle size)		b) Temperature and moisture content at different points in the windrow		c) Aeration of the windrow (e.g. via the windrow turning frequency, O ₂ and/or CO ₂ concentration in the windrow, temperature of air streams in the case of forced aeration)		d) Windrow porosity, height and width	
Parameters	Yes/No										
a) Waste input characteristics (e.g. C to N ratio, particle size)											
b) Temperature and moisture content at different points in the windrow											
c) Aeration of the windrow (e.g. via the windrow turning frequency, O ₂ and/or CO ₂ concentration in the windrow, temperature of air streams in the case of forced aeration)											
d) Windrow porosity, height and width											

3.2.2. Odour and diffuse emissions to air

BAT 37

In order to reduce diffuse emissions to air of dust, odour and bioaerosols from open-air treatment steps, BAT is to use one or both of the techniques given below.

Technique		Description	Applicability
a.	Use of semipermeable membrane covers	Active composting windrows are covered by semipermeable membranes.	Generally applicable.
b.	Adaptation of operations to the meteorological conditions	This includes techniques such as the following: —Taking into account weather conditions and forecasts when undertaking major outdoor process activities. For instance, avoiding formation or turning of windrows or piles, screening or shredding in the case of adverse meteorological conditions in terms of emissions dispersion (e.g. the wind speed is too low or too high, or the wind blows in	Generally applicable.

How will diffuse emissions to air of dust, odour and bioaerosols be reduced from open-air treatment steps? Will the following techniques be used in order to do so?

Technique	Yes/No
a) Use of semipermeable membrane covers	A degree of shelter is provided to the compost pile.
b) Adaptation of operations to the meteorological conditions	Yes

If none of the above techniques is currently being implemented, kindly provide a proposal including timeframes of the technique which shall be implemented.

		<p>the direction of sensitive receptors).</p> <p>—Orientating windrows, so that the smallest possible area of composting mass is exposed to the prevailing wind, to reduce the dispersion of pollutants from the windrow surface. The windrows and piles are preferably located at the lowest elevation within the overall site layout.</p>		
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3.3 BAT conclusions for the anaerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the anaerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

3.3.1. Emissions to air

<p>BAT 38 In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.</p> <p>Description Implementation of a manual and/or automatic monitoring system to:</p> <ul style="list-style-type: none"> • ensure a stable digester operation; • minimise operational difficulties, such as foaming, which may lead to odour emissions; • provide sufficient early warning of system failures which may lead to a loss of containment and explosions. 	<p>How can a reduction in emissions to air be achieved along with improvements in the overall environmental performance?</p> <p>Operational control systems are utilised to stabilise digester operations and minimise operational difficulties.</p> <p>Which of the following key waste and process parameters will be monitored?</p> <table border="1" data-bbox="1160 1294 2029 1369"> <thead> <tr> <th data-bbox="1160 1294 1912 1329">Parameters</th> <th data-bbox="1912 1294 2029 1329">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1160 1329 1912 1369">a) pH and alkalinity of the digester feed</td> <td data-bbox="1912 1329 2029 1369">Yes</td> </tr> </tbody> </table>	Parameters	Yes/No	a) pH and alkalinity of the digester feed	Yes
Parameters	Yes/No				
a) pH and alkalinity of the digester feed	Yes				

<p>This includes monitoring and/or control of key waste and process parameters, e.g.:</p> <ul style="list-style-type: none"> • pH and alkalinity of the digester feed; • digester operating temperature; • hydraulic and organic loading rates of the digester feed; • concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; • biogas quantity, composition (e.g. H₂S) and pressure; • liquid and foam levels in the digester. 	b) digester operating temperature	Yes
	c) hydraulic and organic loading rates of the digester feed	No
	d) concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate	Yes
	e) biogas quantity, composition (e.g. H ₂ S) and pressure	Yes
	f) liquid and foam levels in the digester	Yes
	<p>Additional measures that are taken in the inlet/outlet of the digester are: TS; VS; T; pH; Gas amount; CH₄; CO₂; O₂; H₂S.</p>	

3.4 BAT conclusions for the mechanical biological treatment (MBT) of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to MBT, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

The BAT conclusions for the aerobic treatment (Section 3.2) and anaerobic treatment (Section 3.3) of waste apply, when relevant, to the mechanical biological treatment of waste.

3.4.1. Emissions to air

<p>BAT 39 In order to reduce emissions to air, BAT is to use both of the techniques given below.</p>			<p>Kindly provide details of how each of the following techniques is or will be applied?</p>	
Technique	Description	Applicability		
<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Technique</th> </tr> </thead> <tbody> <tr> <td>a) Segregation of the waste gas streams</td> </tr> </tbody> </table>				Technique
Technique				
a) Segregation of the waste gas streams				

a.	Segregation of the waste gas streams	Splitting of the total waste gas stream into waste gas streams with a high pollutant content and waste gas streams with a low pollutant content, as identified in the inventory mentioned in BAT 3.	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the air circuits.		<p>Emissions from the MBT plant are collected and directed towards a scrubber and biofilter.</p> <p>At the AD plant, the Biological Desulphurization system reduces the H₂S content in the biogas, and consequent additional emissions.</p>	
b.	Recirculation of waste gas	<p>Recirculation of waste gas with a low pollutant content in the biological process followed by waste gas treatment adapted to the concentration of pollutants (see BAT 34).</p> <p>The use of waste gas in the biological process may be limited by the waste gas temperature and/or the pollutant content.</p> <p>It may be necessary to condense the water vapour contained in the waste gas before reuse. In this case, cooling is necessary, and the condensed water is</p>			<p>b) Recirculation of waste gas</p> <p>Given the layout of the plant and the abatement systems for channelled emissions to air, scope for recirculation is extremely limited.</p>	

		recirculated when possible (see BAT 35) or treated before discharge.			
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4. BAT conclusions for the physico-chemical treatment of waste

Unless otherwise stated, the BAT conclusions presented in Section 4 apply to the physico-chemical treatment of waste, and in addition to the general BAT conclusions in Section 1.

4.1. BAT conclusions for the physico-chemical treatment of solid and/or pasty waste

4.1.1. Overall environmental performance

<p>BAT 40 In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).</p> <p>Description Monitoring the waste input, e.g. in terms of:</p> <ul style="list-style-type: none"> • content of organics, oxidising agents, metals (e.g. mercury), salts, odorous compounds; • H₂ formation potential upon mixing of flue-gas treatment residues, e.g. fly ashes, with water. 	<p>Kindly describe how waste input will be monitored and for which parameters?</p> <p>Not applicable. The plant is a Mechanical-Biological Treatment Plant and not a Physico-Chemical Treatment Plant.</p>
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4.1.2. Emissions to air

<p>BAT 41 In order to reduce emissions of dust, organic compounds and NH₃ to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p>	<p>How will emissions of dust, organic compounds and NH₃ be reduced? Which technique(s) shall be implemented to mitigate such emissions?</p> <p>Not applicable. The plant is a Mechanical-Biological Treatment Plant and not a Physico-Chemical Treatment Plant.</p>
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Technique	Description
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<table border="1"> <tr><td>a.</td><td>Adsorption</td></tr> <tr><td>b.</td><td>Biofilter</td></tr> <tr><td>c.</td><td>Fabric filter</td></tr> <tr><td>d.</td><td>Wet scrubbing</td></tr> </table>	a.	Adsorption	b.	Biofilter	c.	Fabric filter	d.	Wet scrubbing	<p style="text-align: center;">See Section 6.1.</p>	<table border="1"> <tr><th>Technique</th><th>Yes/No</th></tr> <tr><td>a) Adsorption</td><td></td></tr> <tr><td>b) Biofilter</td><td></td></tr> <tr><td>c) Fabric filter</td><td></td></tr> <tr><td>d) Wet scrubbing</td><td></td></tr> </table>	Technique	Yes/No	a) Adsorption		b) Biofilter		c) Fabric filter		d) Wet scrubbing		
a.	Adsorption																				
b.	Biofilter																				
c.	Fabric filter																				
d.	Wet scrubbing																				
Technique	Yes/No																				
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<p>Table 6.8: BAT-associated emission level (BAT-AEL) for channelled emissions of dust to air from the physico-chemical treatment of solid and/or pasty waste</p> <table border="1" data-bbox="197 555 1131 683"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>BAT-AEL (Average over the sampling period)</th> </tr> </thead> <tbody> <tr> <td>Dust</td> <td>mg/Nm³</td> <td>2–5</td> </tr> </tbody> </table> <p>The associated monitoring is given in BAT 8.</p>		Parameter	Unit	BAT-AEL (Average over the sampling period)	Dust	mg/Nm ³	2–5	<p>Kindly specify the emission limit which shall be achieved by the selected technology.</p>													
Parameter	Unit	BAT-AEL (Average over the sampling period)																			
Dust	mg/Nm ³	2–5																			
<p>4.2 BAT conclusions for the re-refining of waste oil</p>																					
<p>4.2.1. Overall environmental performance</p>																					
<p>BAT 42 In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).</p> <p>Description Monitoring of the waste input in terms of content of chlorinated compounds (e.g. chlorinated solvents or PCBs).</p>		<p>Kindly specify how monitoring of the waste input in terms of chlorinated compounds will be carried out.</p> <p>Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.</p>																			

BAT 43
In order to reduce the quantity of waste sent for disposal, BAT is to use one or both of the techniques given below.

Technique	Description
a. Material recovery	Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. in asphalt products, etc.
b. Energy recovery	Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. to recover energy.

How can the quantity of waste be reduced to minimize amounts sent for disposal? Will the following techniques apply?

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique	Yes/No
a) Material recovery	
b) Energy recovery	

4.2.2. Emissions to air

BAT 44
In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Adsorption	See Section 6.1.
b. Thermal oxidation	See Section 6.1. This includes when the waste gas is sent to a process furnace or a boiler.
c. Wet scrubbing	See Section 6.1.

The BAT-AEL set in

Kindly specify which of the following techniques shall be applied in order to reduce emissions of organic compounds to air.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique	Yes/No
a) Adsorption	
b) Thermal oxidation	
c) Wet scrubbing	

Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).

Section 4.5 applies.

The associated monitoring is given in BAT 8.

4.3 BAT conclusions for the physico-chemical treatment of waste with calorific value

4.3.1. Emissions to air

BAT 45
In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

	Tec hniq ue	Des crip tio n
a.	Adsorption	See Sec tio n 6.1
b.	Cryogenic condensation	
c.	Thermal oxidation	
d.	Wet scrubbing	

The BAT-AEL set in Section 4.5 applies.

Kindly specify which of the following techniques shall be applied in order to reduce emissions of organic compounds to air.

Not applicable. The plant is a Mechanical-Biological Treatment Plant and not a Physico-Chemical Treatment Plant.

Technique	Yes/No
a) Adsorption	
b) Cryogenic condensation	
c) Thermal oxidation	
d) Wet scrubbing	

Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).

The associated monitoring is given in BAT 8.

4.4 BAT conclusions for the regeneration of spent solvents

4.4.1. Overall environmental performance

BAT 46
In order to improve the overall environmental performance of the regeneration of spent solvents, BAT is to use one or both of the techniques given below.

	Technique	Description	Applicability
a.	Material recovery	Solvents are recovered from the distillation residues by evaporation.	Applicability may be restricted when the energy demand is excessive with regards to the quantity of solvent recovered.
b.	Energy recovery	The residues from distillation are used to recover energy.	Generally applicable.

Kindly specify which of the following techniques shall be applied in order to improve the environmental performance of the regeneration of spent solvent.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique	Yes/No
a) Material recovery	
b) Energy recovery	

4.4.2. Emissions to air

BAT 47
In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use a combination of the techniques given below.

Technique	Description	Applicability

Kindly specify which of the following techniques shall be implemented in order to reduce emission of organic compounds to air.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

				Technique		Yes/No
a.	Recirculation of process off-gases in a steam boiler	The process off-gases from the condensers are sent to the steam boiler supplying the plant.	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.	a)	Recirculation of process off-gases in a steam boiler	
b.	Adsorption	See Section 6.1.	There may be limitations to the applicability of the technique due to safety reasons (e.g. activated carbon beds tend to self-ignite when loaded with ketones).	b)	Adsorption	
c.	Thermal oxidation	See Section 6.1.	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.	c)	Thermal oxidation	
d.	Condensation or cryogenic condensation	See Section 6.1.	Generally applicable.	d)	Condensation or cryogenic condensation	
e.	Wet scrubbing	See Section 6.1.	Generally applicable.	e)	Wet scrubbing	
<p>The BAT-AEL set in Section 4.5 applies.</p> <p>The associated monitoring is given in BAT 8.</p>				<p>Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).</p>		
<p>4.5 BAT-AEL for emissions of organic compounds to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and the regeneration of spent solvents</p>						

Table 6.9 BAT-associated emission level (BAT-AEL) for channelled emissions of TVOC to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and the regeneration of spent solvents

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Parameter	Unit	BAT-AEL ⁽¹⁾ (Average over the sampling period)
TVOC	Mg/Nm ³	5-30
<p>⁽¹⁾ The BAT-AEL does not apply when the emission load is below 2 kg/h at the emission point provided that no CMR substances are identified as relevant in the waste gas streams, based on the inventory mentioned in BAT 3.</p>		
<p>Kindly specify the emission limit for TVOC which can be achieved using the proposed technology.</p>		

4.6 BAT conclusions for the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil

4.6.1. Overall environmental performance

<p>BAT 48 In order to improve the overall environmental performance of the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil, BAT is to use all of the techniques given below.</p>	<p>Kindly specify how each of the following techniques is or shall be implemented in order to improve overall environmental performance. Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.</p> <table border="1" data-bbox="1142 1321 2047 1361"> <thead> <tr> <th>Technique</th> </tr> </thead> <tbody> <tr> <td> </td> </tr> </tbody> </table>	Technique	
Technique			

Technique		Description	Applicability
a.	Heat recovery from the furnace off-gas	Recovered heat may be used, for example, for preheating of combustion air or for the generation of steam, which is also used in the reactivation of the spent activated carbon.	Generally applicable.
b.	Indirectly fired furnace	An indirectly fired furnace is used to avoid contact between the contents of the furnace and the flue-gases from the burner(s).	Indirectly fired furnaces are normally constructed with a metal tube and applicability may be restricted due to corrosion problems. There may be also economic restrictions for retrofitting existing plants.
c.	Process-integrated techniques to reduce	This includes techniques such as: — control of the furnace temperature and of the	Generally applicable.

a) Heat recovery from the furnace off-gas	
b) Indirectly fired furnace	
c) Process-integrated techniques to reduce emissions to air	

	emissions to air	rotation speed of the rotary furnace; — choice of fuel; — use of a sealed furnace or operation of the furnace at a reduced pressure to avoid diffuse emissions to air.		
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4.6.2. Emissions to air

BAT 49

In order to reduce emissions of HCl, HF, dust and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Kindly specify which technique(s) shall be implemented to reduce emissions of HCl, HF, dust and organic compounds to air.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique	Description
a. Cyclone	See Section 6.1. The technique is used in combination with further abatement techniques. See Section 6.1.
b. Electrostatic precipitator (ESP)	
c. Fabric filter	
d. Wet scrubbing	
e. Adsorption	
f. Condensation	
g. Thermal oxidation (1)	

Technique	Yes/No
a) Cyclone	
b) Electrostatic precipitator (ESP)	
c) Fabric filter	
d) Wet scrubbing	
e) Adsorption	
f) Condensation	
g) Thermal oxidation	

(¹) Thermal oxidation is carried out with a minimum temperature of 1 100 °C and a two-second residence time for the regeneration of activated carbon used in industrial applications where refractory halogenated or other thermally resistant substances are likely to be present. In the case of activated carbon used for potable water- and food-grade applications, an afterburner with a minimum heating temperature of 850 °C and a two-second residence time is sufficient (see Section 6.1).

The associated monitoring is given in BAT 8.

4.7 BAT conclusions for the water washing of excavated contaminated soil

4.7.1. Emissions to air

BAT 50

In order to reduce emissions of dust and organic compounds to air from the storage, handling, and washing steps, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a) Adsorption	See Section 6.1.
b) Fabric filter	
c) Wet scrubbing	

The associated monitoring is given in BAT 8.

Kindly specify which of the following techniques shall be implemented in order to reduce emissions of dust and organic compounds to air together with details of the associated monitoring in line with BAT 8.

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique	Yes/No
a) Adsorption	
b) Fabric filter	
c) Wet scrubbing	

4.8 BAT conclusions for the decontamination of equipment containing PCBs

4.8.1. Overall environmental performance

BAT 51

In order to improve the overall environmental performance and to reduce channelled emissions of PCBs and organic compounds to air, BAT is to use all of the techniques given below.

Kindly specify how the following techniques shall be implemented in order to improve the overall environmental performance and reduce channelled emissions of PCBs and organic compounds to air? Kindly specify associated monitoring details in line with BAT 8.

Technique		Description
a.	Coating of the storage and treatment areas	This includes techniques such as: — resin coating applied to the concrete floor of the whole storage and treatment area.
b.	Implementation of staff access rules to prevent dispersion of contamination	This includes techniques such as: — access points to storage and treatment areas are locked; — special qualification is required to access the area where the contaminated equipment is stored and handled; — separate 'clean' and 'dirty' cloakrooms to put on/remove individual protective outfit.
c.	Optimised equipment cleaning and drainage	This includes techniques such as: — external surfaces of the contaminated equipment are cleaned with anionic detergent; — emptying of the equipment with a pump or under vacuum instead of gravity emptying;

Not applicable; wastes regulated via this BAT conclusion are not accepted at this facility.

Technique
a) Coating of the storage and treatment areas
b) Implementation of staff access rules to prevent dispersion of contamination
c) Optimized equipment cleaning and drainage
d) Control and monitoring of emissions to air

		<ul style="list-style-type: none"> — procedures are defined and used for filling, emptying and (dis)connecting the vacuum vessel; — a long period of drainage (at least 12 hours) is ensured to avoid any dripping of contaminated liquid during further treatment operations, after the separation of the core from the casing of an electrical transformer. 						
d.	Control and monitoring of emissions to air	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — the air of the decontamination area is collected and treated with activated carbon filters; — the exhaust of the vacuum pump mentioned in technique c. above is connected to an end-of-pipe abatement system (e.g. a high-temperature incinerator, thermal oxidation or adsorption on activated carbon); — the channelled emissions are monitored (see BAT 8); — the potential atmospheric deposition of PCBs is monitored (e.g. through physico-chemical measurements or biomonitoring). 		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td data-bbox="1144 555 2045 592">e) Disposal of waste treatment residues</td> </tr> <tr> <td data-bbox="1144 592 2045 919" style="height: 200px;"></td> </tr> <tr> <td data-bbox="1144 919 2045 957">f) Recovery of solvent when solvent washing is used</td> </tr> <tr> <td data-bbox="1144 957 2045 1337" style="height: 238px;"></td> </tr> </table>	e) Disposal of waste treatment residues		f) Recovery of solvent when solvent washing is used	
e) Disposal of waste treatment residues								
f) Recovery of solvent when solvent washing is used								

e.	Disposal of waste treatment residues	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — porous, contaminated parts of the electrical transformer (wood and paper) are sent to high-temperature incineration; — PCBs in the oils are destroyed (e.g. dechlorination, hydrogenation, solvated electron processes, high-temperature incineration). 	
f.	Recovery of solvent when solvent washing is used	Organic solvent is collected and distilled to be reused in the process.	
The associated monitoring is given in BAT 8.			

5. BAT conclusions for the treatment of water-based liquid waste

Unless otherwise stated, the BAT conclusions presented in Section 5 apply to the treatment of water-based liquid waste, and in addition to the general BAT conclusions in Section 1.

5.1 Overall environmental performance

BAT 52

In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).

Description

Monitoring the waste input, e.g. in terms of:

- bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge));
- feasibility of emulsion breaking, e.g. by means of laboratory-scale tests.

Kindly specify what type of monitoring will be carried out for the waste input?

Waste water monitoring processes are evaluated to determine the efficiency of the process e.g. COD. Breaking-up of emulsions are not foreseen in the process.

5.2 Emissions to air

BAT 53

In order to reduce emissions of HCl, NH₃ and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Adsorption	See Section 6.1.
b. Biofilter	
c. Thermal oxidation	
d. Wet scrubbing	

Kindly specify which of the following technique(s) is or shall be implemented in order to reduce emissions of HCl, NH₃ and organic compounds.

The system includes an acid scrubber with the purpose to precipitate NH₃ to the indicated levels which will enable us to achieve odour levels as indicated in the table.

Technique	Yes/No

Table 6.10 : BAT-associated emission levels (BAT-AELs) for channelled emissions of HCl and TVOC to air from the treatment of water-based liquid waste

Parameter	Unit	BAT-AEL ⁽¹⁾ (Average over the sampling period)
Hydrogen chloride (HCl)	mg/Nm ³	1-5
TVOC		3-20 ⁽²⁾

(1) These BAT-AELs only apply when the substance concerned is identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.
 (2) The upper end of the range is 45 mg/Nm³ when the emission load is below 0.5 kg/h at the emission point.

The associated monitoring is given in BAT 8.

a) Adsorption	No
b) Biofilter	Yes
c) Thermal oxidation	No
d) Wet scrubbing	Yes

Kindly specify the emission level for HCl and TVOC which can be achieved by the proposed technology,

Kindly refer to the following techniques in order to select the most appropriate technique for the proposed operations and associated pollutants.

6. Description of techniques		
6.1. Channelled emissions to air		
Technique	Typical pollutant(s) abated	Description
Adsorption	Mercury, volatile organic compounds, hydrogen sulphide, odorous compounds	Adsorption is a heterogeneous reaction in which gas molecules are retained on a solid or liquid surface that prefers specific compounds to others and thus, removes them from effluent streams. When the surface has adsorbed as much as it can, the adsorbent is replaced or the adsorbed content is desorbed as part of the regeneration of the adsorbent. When desorbed, the contaminants are usually at a higher concentration and can either be recovered or disposed of. The most common adsorbent is granular activated carbon.

Biofilter	Ammonia, hydrogen sulphide, volatile organic compounds, odorous compounds	<p>The waste gas stream is passed through a bed of organic material (such as peat, heather, compost, root, tree bark, softwood and different combinations) or some inert material (such as clay, activated carbon, and polyurethane), where it is biologically oxidised by naturally occurring microorganisms into carbon dioxide, water, inorganic salts and biomass.</p> <p>A biofilter is designed considering the type(s) of waste input. An appropriate bed material, e.g. in terms of water retention capacity, bulk density, porosity, structural integrity, is selected. Also important are an appropriate height and surface area of the filter bed. The biofilter is connected to a suitable ventilation and air circulation system in order to ensure a uniform air distribution through the bed and a sufficient residence time of the waste gas inside the bed.</p>
Condensation and cryogenic condensation	Volatile organic compounds	<p>Condensation is a technique that eliminates solvent vapours from a waste gas stream by reducing its temperature below its dew point. For cryogenic condensation, the operating temperature can be down to -120 °C, but in practice it is often between -40 °C and -80 °C in the condensation device. Cryogenic condensation can cope with all VOCs and volatile inorganic pollutants, irrespective of their individual vapour pressures. The low temperatures applied allow for very high condensation efficiencies which make it well-suited as a final VOC emission control technique.</p>
Cyclone	Dust	<p>Cyclone filters are used to remove heavier particulates, which 'fall out' as the waste gases are forced into a rotating motion before they leave the separator.</p> <p>Cyclones are used to control particulate material, primarily PM10.</p>
Electrostatic precipitator (ESP)	Dust	<p>Electrostatic precipitators operate such that particles are charged and separated under the influence of an electrical field. Electrostatic precipitators are capable of operating under a wide range of conditions. In a dry ESP, the collected material is mechanically removed (e.g. by shaking, vibration, compressed air), while in a wet ESP it is flushed with a suitable liquid, usually water.</p>
Fabric filter	Dust	<p>Fabric filters, often referred to as bag filters, are constructed from porous woven or felted fabric through which gases are passed to remove particles. The use of a fabric filter requires the selection of a fabric suitable for the characteristics of the waste gas and the maximum operating temperature.</p>
HEPA filter	Dust	<p>HEPA filters (high-efficiency particle air filters) are absolute filters. The filter medium consists of paper or matted glass fibre with a high packing density. The waste gas stream is passed through the filter medium, where particulate matter is collected.</p>
Thermal oxidation	Volatile organic compounds	<p>The oxidation of combustible gases and odorants in a waste gas stream by heating the mixture of contaminants with air or oxygen to above its auto-ignition point in a combustion chamber and maintaining it at a high temperature long enough to complete its combustion to carbon dioxide and water.</p>

Wet scrubbing	Dust, volatile organic compounds, gaseous acidic compounds (alkaline scrubber), gaseous alkaline compounds (acid scrubber)	The removal of gaseous or particulate pollutants from a gas stream via mass transfer to a liquid solvent, often water or an aqueous solution. It may involve a chemical reaction (e.g. in an acid or alkaline scrubber). In some cases, the compounds may be recovered from the solvent.
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6.2. Diffuse emissions of organic compounds to air		
<i>Technique</i>	<i>Typical pollutant(s) abated</i>	<i>Description</i>
Leak detection and repair (LDAR) programme	Volatile organic compounds	<p>A structured approach to reduce fugitive emissions of organic compounds by detection and subsequent repair or replacement of leaking components. Currently, sniffing (described by EN 15446) and optical gas imaging methods are available for the identification of leaks.</p> <p>Sniffing method: The first step is the detection using hand-held organic compound analysers measuring the concentration adjacent to the equipment (e.g. using flame ionisation or photo- ionisation). The second step consists of enclosing the component in an impermeable bag to carry out a direct measurement at the source of the emission. This second step is sometimes replaced by mathematical correlation curves derived from statistical results obtained from a large number of previous measurements made on similar components.</p> <p>Optical gas imaging methods: Optical imaging uses small lightweight hand-held cameras which enable the visualisation of gas leaks in real time, so that they appear as 'smoke' on a video recorder together with the normal image of the component concerned, to easily and rapidly locate significant organic compound leaks. Active systems produce an image with a back-scattered infrared laser light reflected on the component and its surroundings.</p> <p>Passive systems are based on the natural infrared radiation of the equipment and its surroundings.</p>

Measurement of diffuse VOC emissions	Volatile organic compounds	<p>Solar occultation flux (SOF): The technique is based on the recording and spectrometric Fourier Transform analysis of a broadband infrared or ultraviolet/visible sunlight spectrum along a given geographical itinerary, crossing the wind direction and cutting through VOC plumes.</p> <p>Differential absorption LIDAR (DIAL): This is a laser-based technique using differential absorption LIDAR (light detection and ranging), which is the optical analogue of radio wave-based RADAR. The technique relies on the backscattering of laser beam pulses by atmospheric aerosols, and the analysis of the spectral properties of the returned light collected with a telescope.</p>
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6.3 Emissions to water		
<i>Technique</i>	<i>Typical pollutant(s) targeted</i>	<i>Description</i>
Activated sludge process	Biodegradable organic compounds	The biological oxidation of dissolved organic pollutants with oxygen using the metabolism of microorganisms. In the presence of dissolved oxygen (injected as air or pure oxygen), the organic components are transformed into carbon dioxide, water or other metabolites and biomass (i.e. the activated sludge). The microorganisms are maintained in suspension in the waste water and the whole mixture is mechanically aerated. The activated sludge mixture is sent to a separation facility from where the sludge is recycled to the aeration tank.
Adsorption	Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX	Separation method in which compounds (i.e. pollutants) in a fluid (i.e. waste water) are retained on a solid surface (typically activated carbon).
Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide	Organic compounds are oxidised to less harmful and more easily biodegradable compounds. Techniques include wet oxidation or oxidation with ozone or hydrogen peroxide, optionally supported by catalysts or UV radiation. Chemical oxidation is also used to degrade organic compounds causing odour, taste and colour and for disinfection purposes.
Chemical reduction	Reducible dissolved non-	Chemical reduction is the conversion of pollutants by chemical reducing agents into

	biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))	similar but less harmful or hazardous compounds.
Coagulation and flocculation	Suspended solids and particulate-bound metals	Coagulation and flocculation are used to separate suspended solids from waste water and are often carried out in successive steps. Coagulation is carried out by adding coagulants with charges opposite to those of the suspended solids. Flocculation is carried out by adding polymers, so that collisions of microfloc particles cause them to bond to produce larger flocs. The flocs formed are subsequently separated by sedimentation, air flotation or filtration.
Distillation/rectification	Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents	Distillation is a technique to separate compounds with different boiling points by partial evaporation and recondensation. Waste water distillation is the removal of low-boiling contaminants from waste water by transferring them into the vapour phase. Distillation is carried out in columns, equipped with plates or packing material, and a downstream condenser.
Equalisation	All pollutants	Balancing of flows and pollutant loads by using tanks or other management techniques.
Evaporation	Soluble pollutants	The use of distillation (see above) to concentrate aqueous solutions of high-boiling substances for further use, processing or disposal (e.g. waste water incineration) by transferring water to the vapour phase. It is typically carried out in multistage units with increasing vacuum, to reduce the energy demand. The water vapours are condensed, to be reused or discharged as waste water.
Filtration	Suspended solids and particulate-bound metals	The separation of solids from waste water by passing them through a porous medium, e.g. sand filtration, microfiltration and ultrafiltration.
Flotation		The separation of solid or liquid particles from waste water by attaching them to fine gas bubbles, usually air. The buoyant particles accumulate at the water surface and are collected with skimmers.
Ion exchange	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals	The retention of undesired or hazardous ionic constituents of waste water and their replacement by more acceptable ions using an ion exchange resin. The pollutants are temporarily retained and afterwards released into a regeneration or backwashing liquid.
Membrane bioreactor	Biodegradable organic compounds	A combination of activated sludge treatment and membrane filtration. Two variants are used: a) an external recirculation loop between the activated sludge tank and the membrane module; and b) immersion of the membrane module in the aerated

		activated sludge tank, where the effluent is filtered through a hollow fibre membrane, the biomass remaining in the tank.
Membrane filtration	Suspended solids and particulate-bound metals	Microfiltration (MF) and ultrafiltration (UF) are membrane filtration processes that retain and concentrate, on one side of the membrane, pollutants such as suspended particles and colloidal particles contained in waste waters.
Neutralization	Acids, alkalis	The adjustment of the pH of waste water to a neutral level (approximately 7) by the addition of chemicals. Sodium hydroxide (NaOH) or calcium hydroxide (Ca(OH) ₂) may be used to increase the pH, whereas sulphuric acid (H ₂ SO ₄), hydrochloric acid (HCl) or carbon dioxide (CO ₂) may be used to decrease the pH. The precipitation of some pollutants may occur during neutralisation.
Nitrification/denitrification	Total nitrogen, ammonia	A two-step process that is typically incorporated into biological waste water treatment plants. The first step is aerobic nitrification where microorganisms oxidise ammonium (NH ₄ ⁺) to the intermediate nitrite (NO ₂ ⁻), which is then further oxidised to nitrate (NO ₃ ⁻). In the subsequent anoxic denitrification step, microorganisms chemically reduce nitrate to nitrogen gas.
Oil-water separation	Oil/grease	The separation of oil and water and subsequent oil removal by gravity separation of free oil, using separation equipment or emulsion breaking (using emulsion breaking chemicals such as metal salts, mineral acids, adsorbents and organic polymers).
Sedimentation	Suspended solids and particulate-bound metals	The separation of suspended particles by gravitational settling.
Precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus	The conversion of dissolved pollutants into insoluble compounds by adding precipitants. The solid precipitates formed are subsequently separated by sedimentation, air flotation or filtration.
Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable organically bound halogens (AOX), hydrocarbons	The removal of purgeable pollutants from the aqueous phase by a gaseous phase (e.g. steam, nitrogen or air) that is passed through the liquid. They are subsequently recovered (e.g. by condensation) for further use or disposal. The removal efficiency may be enhanced by increasing the temperature or reducing the pressure.

6.4 Sorting Techniques

Air classification	Air classification (or air separation, or aeraulic separation) is a process of approximate sizing of dry mixtures of different particle sizes into groups or grades at cut points ranging from 10 mesh to sub-mesh sizes. Air classifiers (also called windsifters) complement screens in applications requiring cut points below commercial screen sizes, and supplement sieves and screens for coarser cuts where the special advantages of air classification warrant it.
All-metal separator	Metals (ferrous and non-ferrous) are sorted by means of a detection coil, in which the magnetic field is influenced by metal particles, linked to a processor that controls the air jet for ejecting the materials that have been detected.
Electromagnetic separation of non-ferrous metals	Non-ferrous metals are sorted by means of eddy current separators. An eddy current is induced by a series of rare earth magnetic or ceramic rotors at the head of a conveyor that spins at high speed independently of the conveyor. This process induces temporary magnetic forces in non-magnetic metals of the same polarity as the rotor, causing the metals to be repelled away and then separated from the other feedstock.
Manual separation	Material is manually separated by means of visual examination by staff on a picking line or on the floor, either to selectively remove a target material from a general waste stream or to remove contamination from an output stream to increase purity. This technique generally targets recyclables (glass, plastic, etc.) and any contaminants, hazardous materials and oversized materials such as WEEE.
Magnetic separation	Ferrous metals are sorted by means of a magnet which attracts ferrous metal materials. This can be carried out, for example, by an overband magnetic separator or a magnetic drum.
Near-infrared spectroscopy (NIRS)	Materials are sorted by means of a near-infrared sensor which scans the whole width of the belt conveyor and transmits the characteristic spectra of the different materials to a data processor which controls an air jet for ejecting the materials that have been detected. Generally NIRS is not suitable for sorting black materials.
Sink-float tanks	Solid materials are separated into two flows by exploiting the different material densities.
Size separation	Materials are sorted according to their particle size. This can be carried out by drum screens, linear and circular oscillating screens, flip-flop screens, flat screens, tumbler screens and moving grates.
Vibration table	Materials are separated according to their density and size, moving (in slurry in the case of wet tables or wet density separators) across an inclined table, which oscillates backwards and forwards.
X-ray systems	Material composites are sorted according to various material densities, halogen components, or organic components, with the aid of X-rays. The characteristics of the different materials are transmitted to a data processor which controls an air jet for ejecting the materials that have been detected.

6.5 Management techniques	
Accident management plan	The accident management plan is part of the EMS (see BAT 1) and identifies hazards posed by the plant and the associated risks and defines measures to address these risks. It considers the inventory of pollutants present or likely to be present which could have environmental consequences if they escape.
Residues management plan	A residues management plan is part of the EMS (see BAT 1) and is a set of measures aiming to 1) minimise the generation of residues arising from the treatment of waste, 2) optimise the reuse, regeneration, recycling and/or recovery of energy of the residues, and 3) ensure the proper disposal of residues.

ERA's comments to WSM's BAT comparison	WSM comments dated 28.11.2019	ERA's 2nd review – January 2020	WSM comments dated 05.02.2020
<p><u>BAT No. 2 –</u></p> <p>(h) WSM to provide further information on how it is being ensured that the quality of the treated RDF output considers the expectations of the final waste disposal/ recovery facilities. This shall include details on the selection of metal wires/ plastic cables for holding together the baled waste.</p>	<p>The site uses the model Likon 500H manufactured by PAAL to bale all high calorific value outputs. The metal wire used has a diameter of 4mm and complies to DIN EN 10016-2.</p>	<p>Whilst noting the equipment and material used to produce the high calorific value output destined for disposal, WSM are to provide time-frames by when such waste will be rendered suitable for export to waste recovery facilities.</p>	<p>Following the launch of the Bottle Collection Refund Scheme, Wasteserv Malta shall re-assess the situation and carry out a waste characterisation exercise to determine the quality and quantity of the 'new' high CV waste being produced at the site. With this information WSM will carry out a market research to determine the viability options of exporting the output to recovery sites.</p>
<p><u>BAT No. 7 – 12, 17</u> – WSM to provide an updated EMP as requested through the Compliance and Enforcement Directorate.</p>	<p>Last email communication on the EMP with ERA confirmed that detection limit is sufficient.</p>	<p>Noted.</p>	
<p><u>BAT No. 16</u> – WSM to provide further details on how the height and pressure of the flare design have been optimised.</p>	<p>The flare mechanism is of the enclosed type, implying that the flame is housed inside the chimney structure, meeting performance and emission standards.</p> <p>Pressure – the gas pressure is continuously monitored by pressure switches. If the minimum pressure is not met the solenoid valves shut down the flare.</p>	<p>Noted.</p>	

The height of the flare is 8.5m and is designed to burn biogas with a calorific value of < 6.0kWh/m³ (>3.5kWh/m³) and soot content of < 300ppm. The operating temperature of the flare is 1000°C. If the temperature exceeds the limit of 1200°C, the flare is shut down. This ensures that no undesirable product is formed as indicated in the table below.

Undesirable Product	Mechanism of Formation
CO	Complete oxidation requires T >850 C and residence time of >0.3 seconds throughout the flame.
Partially Oxidised HC	T >850C throughout the flame to prevent the formation of these species through unwanted molecular rearrangements.
Dioxins and Furans	
PAH	
NOx	Formed at >1200C by oxidation of N ₂ , Also formed within the flame by the oxidation of nitrogenous NMVOC

BAT No. 20 – With reference to the status I.P item 7 according to the submitted “Improvement Programme Status Update”, WSM to confirm that no discharges to the sewer or the environment take place. Applicant to note that direct/ indirect discharges to

Noted. WSM is currently finalising a proposal in view of entering into a Voluntary Agreement with WSC.

Noted.

<p>the public sewer network shall be carried out in accordance with the requirement of the Water Services Corporation and any applicable Public Sewer Discharge Permit. In view that indirect discharges to the sewer are envisaged, applicant is to indicate the expected emission limit values associated with the proposed abatement techniques in table 6.2.</p>			
<p><u>BAT No. 25</u> – WSM to clarify whether the installation of a fabric filter for the mechanical treatment of waste can be applied. If so, kindly provide timeframes for installation and commissioning. Otherwise, WSM to provide justification as to why it is not applicable.</p>	<p>WSM deems that there is no need for a fabric filter given that it invested in two biofilters at each site in which dust particles are contained there-in.</p>	<p>Noted.</p>	
<p><u>BAT No. 31 & 34</u> – Kindly note that for future monitoring, measurements are to be reported in mg/Nm³ in line with table 6.5. In this regard, kindly revise the emissions levels which the proposed technique(s) is expected to achieve.</p>	<p>Readings are submitted in mgC/m³ as this is a normalized aggregate reading from different captured sources of VOCs. Wasteserv indicated, in its first submission, that “Average TVOC readings (post air treatment) during the period January to June 2019 was 1.33mgC/Nm³.”.</p>	<p>Whilst acknowledging that “Readings are submitted in mgC/m³ as this is a normalized aggregate reading from different captured sources of VOCs”, ERA requires the final result to be expressed in mg/Nm³ in order to enable comparison with the relevant BAT-AELs for channelled emissions from the biofilter and scrubber. This is also the format of the units specified in EN 12619, which is specified in the BAT Conclusions and in the EMP dated October 2019.</p>	<p>Noted. WSM shall change the specs in the next EMP tender to reflect the new requirements. Submitted readings are in line with Table 2.6.2 of the existing permit.</p>

<p><u>BAT No. 34</u> – In view that the BAT AEL range for channelled emissions of dust is 2-5 mg/Nm³, applicant is to either revise the expected emission limit values and/or emission abatement techniques in order to achieve such emission concentrations.</p>	<p>WSM is analysing the emission dust levels particularly as areas in the environ are engaged in excavation works. The biofilters installed are able to meet the required limits.</p> <p>The EMP submitted for review by ERA includes the necessity to monitor channelled emissions of dust.</p>	Noted.	
<p><u>BAT No. 37</u> –</p> <p>(a) Applicant is to provide further details on the semi-permeable membrane providing a certain degree of the shelter to the compost storage area. This shall explain the types of material used, extent and location of covered area.</p> <p>(b) Further details on the adaptation measures to meteorological conditions are required.</p>	<p>All digest produced by the AD plant is housed in the compost shed which has walls on the sides and impermeable roof. Effect of meteorological conditions is limited.</p>	Noted.	
<p><u>BAT No. 53</u> – WSM to specify the emission level for HCl and TVOC which can be achieved by the proposed technology making specific reference to the waste stream that is being considered.</p>	<p>TVOCs are being monitored on a quarterly basis. Average VOC reading from Biofilter vent is calculated to be 1.33mgC/Nm³.</p> <p>HCl monitoring doesn't apply to our plant as it is identified as not relevant in the waste gas stream.</p>	Noted.	

ANNEX 7: Statutory Consultation Process

Annex II: Feedback received following the Statutory Consultation carried out for the renewal application of (IP0007/13/A) for Malta North Waste Treatment Plant

Timeframes: 18th October 2019 – 4th November 2019

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
External Consultees Feedback					
Environmental Health Directorate	<p>This Directorate would like to submit the following comments/recommendations regarding this proposal:</p> <ol style="list-style-type: none"> 1. No water runoff or litter is to exit the scheme. 2. Pest Control 3. Unpredicted impacts and nuisances which may arise from this operation and that may have a significant adverse effect on public health are to be immediately addressed by the applicant and the necessary mitigation measures taken; 	Noted by ERA, to be included as conditions in the IPPC permit.	/	/	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	4. Complaints lodged by the public regarding any adverse impacts/nuisances should be immediately addressed by the applicant. All complaints lodged and actions taken are to be recorded and such records are to be readily available to the Competent Authorities when requested.				
Malta Competition and Consumer Affairs Authority	No feedback provided	N/A	/	/	
Malta Resources Authority	No feedback provided	N/A	/	/	
Planning Authority	The circulation route shown in Attachment 1 in CHPs section generally corresponds to approved drawing PA 1294/12/703B. The	With regards to Attachment 1, applicant is to provide updated drawings.	An updated site plan is submitted as 'Attachment 1'.	Noted	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	detail of the treatment plants in attachment 1 is not clear and could not be properly assessed through comparison with approved permit drawings. Layout shown in Attachment 2 in CHPs section generally corresponds to approved drawing PA 1294/12/670A.				
Regulatory for Energy and Water Services	The Regulator for Energy and Water Services (REWS) has received a number of documents by weTransfer from Joseph Agius of Wasteserv Malta. Once again it is pointed out by the REWS that Generators /fuel storages are being operated on the site Malta North Waste Treatment Plant and	Applicant is to provide a layout plan showing the location of fuel storage areas utilised by equipment/vehicles within the MNWTP site boundary. Provide update to the status of	Location of the fuel tanks can be found in 'Attachment 2'. Wasteserv is appointing a competent technical	Whilst noting the MCP registration of both CHPs, applicant is to provide the rated thermal input in	Rated Thermal Input (MW _{Th}): CHP1:4.143, CHP2:2.87 Generators(MW _{Th}): G1:0.27,G2:0.57 Boiler(MW _{Th}):0.667

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	<p>these are not registered by the Regulator under Subsidiary Legislation 545.22.</p> <p>The document entitled 2019 05 Malta North IPPC renewal v1.1.pdf mentions fuel storages and drip trays in the improvement programme table. It is the onus of the operator to contact the REWS on enquiry@rews.org.mt or by enquiring at our Licensing office (address below) to duly register these Generators and fuel storages without delay.</p> <p>Another point on the Generators: It is requested that the operator confirms, that the other two back up</p>	<p>registration of all fuel storage areas.</p> <p>With reference to the existing boiler unit next to both CHP plants, applicant is to provide its rated thermal input (MWth) and submit a Medium Combustion Plant Registration is its RTI is equal to or greater than 1MWth.</p>	<p>person to submit the required documentation.</p> <p>Details of the thermal input of MCPs have been submitted to ERA as part of the registration process of the plants.</p>	<p>MW_{th} of each generator and the AD boiler.</p>	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	diesel generators of 270kW and 570 KW are only used for back-up and are not synchronised with the grid.				
+Civil Protection Department	Submission of CPD requirements for such a facility through the enclosed document; Annex 3.	The submitted document shall be included in the permit as an approved document, whilst being enforced by CPD.	Noted.	/	
Water Services Corporation	As regards the improvement programme, I can confirm that we had discussions with WasteServ with respect to a possible Voluntary Undertaking agreement however the status of the permit is still pending. A few issues in	Permit conditions will require WSM to obtain a Discharge Permit and submit a plan to WSC on how and when will the effluent generated in the	Noted. WSM is currently finalising a proposal in view of entering into a Voluntary Agreement with WSC.	Noted.	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	<p>the effluent being discharged have been mitigated by WasteServ over the past year or so however other parameters/issues still persist. Apart from pressing WasteServ in obtaining a Discharge Permit, I would add as a condition that they should submit a plan to WSC on how and when will the effluent generated in the Malta North Plant be in line with the legal requirements and thus reach full compliance with the Sewer Discharge Control Regulations.</p> <p>In the BAT document I would add BOD and COD/BOD ratio (for both</p>	<p>Malta North Plant be in line with the legal requirements and thus reach full compliance with the Sewer Discharge Control Regulations.</p>			

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	inlet and outlet) under BAT 7. In my opinion these tests should be performed on a daily basis for the waste water being treated and effluent being generated by the SBR. Other parameters and testing frequencies should remain as stipulated.				
OHSa	In the documents submitted I could not find any reference to the Control of Major Accident Hazards (COMAH) regulations L.N. 179/2015. I see that there is storage of biogas and fuel for the generators and waste itself is considered a dangerous substance under COMAH. The applicant is required to submit the maximum	Applicant to provide details as requested by OHSa.	The amount of chemicals / flammables stored at the site are below the levels indicated in Tier 1 and hence, outside the scope of the regulation. Further details may	Noted.	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	amounts of dangerous substances present on site at any given time and their classification under COMAH.		<p>be obtained from WSM's Senior Manager HSE.</p> <p>The amount of biogas stored on site is 1.8t, below the 10t limit indicated in tier 1 of the directive.</p>		
Internal Consultees Feedback					
Environmental Assessment Unit	In one of the documents by Wasteserv dated May 2019, it is stated that there will be no variations to the existing permit. As long as operations remain within the proposal as assessed	This application is being considered as a renewal of the existing permit. Any variations to the currently permitted	/	/	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	<p>in the EIA Update carried for the said facility, there are no EIA related issues.</p> <p>Should there be any variations from those approved, EAU would need to be informed accordingly.</p>	<p>activities will be considered through the IPPC variation process including any internal and external consultations as may be required.</p>			
Biodiversity & Water Unit	No feedback provided.		/	/	
Air quality & Waste Unit <i>Air Quality Team</i>	Requested to monitor emissions to air from the anaerobic digester and present the resultant annual emission loads.	Will be addressed through permit conditions and an environmental monitoring proposal is currently being reviewed by ERA through the Compliance and	/	/	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
		Enforcement Directorate.			
<p>Air quality & Waste Unit</p> <p><i>Waste team</i></p>	<p>Below please find comments from the Waste Team on the renewal application for MNWTP.</p> <p>On BAT 2 – Waste Characterisation As per Council Decision 2003/33/EC, the procedure for the acceptance of waste at landfills should follow three steps:</p> <ol style="list-style-type: none"> 1. Basic Characterisation; 2. Compliance Testing; and 3. On-site verification. 	<p>Although MNWTP carried out pre-treatment prior to final disposal at landfill, this application does not include landfilling activities.</p> <p>The obligations for landfill are regulated by ERA through the IPPC permitting of landfills.</p>	/	/	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
	<p>The Waste acceptance procedures being described by the applicant refer only to Step 3 above. The applicant is to provide information as to how the waste being accepted is fulfilling all the criteria in the abovementioned Council Decision (e.g. checking of analysis documents from waste producers).</p>				
<p>Air quality & Waste Unit</p> <p><i>Noise team</i></p>	<p>Upon discussions with ADI on the environmental monitoring programme, it was agreed that the potential for weekend surveys would be scoped when undertaking the next round of noise monitoring.</p>	<p>The environmental monitoring proposal is to be amended accordingly.</p>	<p>/</p>	<p>/</p>	

Comment received by	Feedback	ERA reply and comment	WasteServ Malta Ltd. reply 28.11.2019	ERA's reply – January 2020	WasteServ Malta Ltd. reply 05.02.2020
Compliance & Enforcement Directorate	No comments.	N/A	/	/	