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NYOBOLT LIMITED

PRODUCTION OF PRODUCT A

BEST AVAILABLE TECHNIQUES (BAT) ASSESSMENT (REDACTED)

JULY 2024

wardell armstrong

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JULY 2024

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APPENDICES

1 INTRODUCTION

1.1.1 Nyobolt Ltd ("Nyobolt") have commissioned Wardell Armstrong in preparing an environmental permit application for their pilot facility, which will produce product A which will supply the EV battery sector, located in Haverhill, Suffolk.

1.1.2 Nyobolt are seeking an environmental permit to allow for the production of product A powder, which will supply the battery manufacturing sector to be used as an anode material for fast-charging lithium batteries. It is anticipated that the facility will eventually produce up to 900 tonnes of product A per year.

1.1.3 The address of the facility is Unit 1a and b, Homefield Road, Homefield Industrial Estate, Haverhill, CB9 8QP.

1.1.4 The production of metal oxides is a listed activity within Schedule 1, Section 4.2 (a) (v) of the Environmental Permitting Regulations 2016, and therefore an installation permit is required.

1.1.5 This report provides the Best Available Techniques (BAT) assessment and demonstrates how the new facility will comply with the BAT in line with the European Commission BREF Note on Speciality Inorganic Chemicals. This is considered the most appropriate BREF Note due to the relatively small quantities of substance to be produced, and production to an appropriate specification to meet the end use of redistribution back into the automotive sector. The Environment Agency guidance '*How to Comply with you Environmental Permit Additional Guidance for: The Inorganic Chemicals Sector (EPR 4.03)*' which includes indicative BAT and guidance for activities regulated under Schedule 1, Section 4.2 (a) (v) has been used as the basis for this assessment.

2 COMPLIANCE WITH BAT – PRODUCTION OF INORGANIC CHEMICALS

2.1.1 Table 2.1 below describes how the site will comply with BAT as set out in the European Commission BREF Note on Speciality Inorganic Chemicals. This assessment has been based on the indicative BAT set out in the guidance document 'Environment Agency guidance for the Inorganic Chemical Sector EPR 4.03'. This has been supplemented with BAT set out in the BREF note where applicable.

	Table 3.1 Compliance with indicative BAT for the Production of Inorganic Chemicals	
Guidance Section	**Consideration**	**Measures implemented**
1 . MANAGING YOUR ACTIVITIES		
1.1 Environmental Performance Indicators	BAT is to monitor and benchmark environmental performance, and review this at least once a year. Plans for minimising environmental impacts should be incorporated into on-going Improvement Programmes.	Nyobolt Ltd will implement and maintain an Environmental Management System, (EMS) and may look to seek ISO accreditation. The EMS will be reviewed every six months. Nonconformities, recommendations for improvements and observations identified will be recorded and completed within specific timeframes. Environmental objectives will be set annually and monitored and reviewed six monthly by Nyobolt. The proposed facility is under development and at each stage of the commissioning process this will be reviewed, and improvements made as necessary. The facility will operate with the core aim of producing product A powder to the appropriate specification and standard to be introduced into the battery manufacturing sector. It is expected that up to 2.5 tonnes of product A will be produced daily, however the site will be a pilot facility, where there will be a degree of flexibility and benchmarking of the process required. Nyobolt will recycle and recover solid inorganic material at every step of the process. Therefore, only negligible amount of waste is expected to arise from the process.
1.2 Accident Management	BAT is to consider ways to reduce the risks and consequences of accidents, and whether or not they are covered by the COMAH regime.	An Accident Management Plan has been prepared as part of the Amenity and Accident Risk Assessment. The AMP sets out the control measures which will be in place to minimise the risk of accidents, or minimise the impact from accidents if they do occur. It is understood that the activities carried out at the pilot facility are not required to be covered by the COMAH regime.

1.3 Energy Efficiency	BAT is to assess the environmental impact of each process and choose the one with the lowest environmental impact.	Nyobolt's processes have been assessed as having a low environmental impact. The process comprises the processing of two compounds, niobium pentoxide and tungsten trioxide. There are no additions of further chemicals, rather a series of mechanical and manual processes including milling, mixing, drying, baking, deagglomeration and blending. The abatement systems have been designed around the process, in that fugitive emissions of particulate matter will be captured and filtered through HEPA filtration systems. There is little scope to reduce the environmental impact further to that which is proposed. Section 3 of this report provides the expected water usage, section 4 provides the raw material usage, section 5 provides the anticipated energy usage and section 6 provides commentary on waste minimisation. The wider environmental benefits from production of the end product will be substantial, in that the product A will be utilised in the electric vehicles and wider battery sector, to provide fast-charging batteries and systems.
1.4 Efficient use of raw materials and water	BAT is to reduce the use of all raw materials and intermediates, substitute less harmful materials or those which can be more readily abated and when abated lead to substances that are more readily dealt with, understand the fate of by-products and contaminants and their environmental impact.	<u>Raw Materials</u> Raw material selection is fixed by the chemistry and chemical engineering design of the process. The two substances used as main precursors are fundamental to the production of product A in the pilot facility, and will only be used in the required quantities in order to execute the process and achieve the final product. The quality and composition of the raw materials will be periodically checked with suppliers to ensure that raw materials used will be checked every four years by reference to manufacturer's data to ensure that raw materials with low environmental impact are being used. Checks will also be carried out whenever a raw materials supplier is changed. Section 4 of this Report provides further detail of the properties, use of and volumes of raw materials. <u>Water Usage</u> Annual water usage in the process is 2,280m³. Water is supplied from the mains water supply to the building.

		A water meter is installed to monitor water use. Records will be kept of water usage and these will be reviewed annually with targets set for reduction where appropriate. Water use will be reviewed at least once every four years to assess whether any improvements can be made.
1.5 Avoidance, recovery and disposal of wastes	BAT is to demonstrate that the chosen routes for recovery or disposal represent the best environmental option. Consider avenues for recycling back into the process or reworking for another process wherever possible. BAT is where you cannot avoid disposing of waste, provide a detailed assessment identifying the best environmental options for waste disposal.	Waste from the process will be minimal and will mainly arise from the cleaning of tanks, collected fines in the filtration system. Occasionally, small amounts of aqueous non-hazardous slurry waste can be collected from the process during tank cleaning or sampling. Nyobolt is already in touch with Anglian Water with regards to the correct disposal of such waste. If necessary, Nyobolt will collect such waste in IBCs and then filtered, precipitated or /flocculated to result in a solid product A waste and clean water. The procedure for flocculation is in development will be developed if required. Additionally, Nyobolt plans to recover waste at every stem and reintroduce the solids back into the process to maximize the efficiency of the process.
2. OPERATIONS		
2.1 Design of a new process	BAT is to design the process using suitable techniques to prevent pollution and to minimise it at source. Suitable techniques should be reviewed throughout the process including the design of the process, storage and handling of raw materials, products and wastes, plant systems and equipment, reaction stage, separation and isolation, purification and/or final product preparation, chemical process controls, analysis.	The process has been designed to contain and control particulate emissions from the processing plant and equipment, with appropriate abatement fitted at each process point which has potential for escape of emissions. Niobium pentoxide and tungsten trioxide will be processed without additives/chemicals to form product A with no other chemicals generated. The abatement systems have been designed to capture fugitive particulate emissions from the movement of materials within the facility and during processing. Accidental dust formation while powder is loaded/unloaded will be captured by local extraction HEPA filtration units. Non-routine/unplanned emission releases (e.g. spillages, shutdowns, off-specification products will be managed in accordance with the Accident Risk Assessment. The end product will be product A produced to the required standard to be used in the lithium-ion battery sector. Both initial ingredients and the end product will be

		subject to quality assurance checks to ensure the purity of the materials is adequate for the intended use. Wastes arising from the process are expected to comprise of an aqueous slurry waste from tank cleaning. Nyobolt is in touch with Anglian Water with regards to the correct disposal of such waste. While the preferred route is re-using the slurry and have zero waste, Nyobolt is prepared to purify the aqueous waste via filtration/flocculation to result in a solid product A waste and clean water, should Anglian Water require it. To this end, Nyobolt will carry out sampling and analyses of wastes to determine which route is more environmentally appropriate. Additionally, Nyobolt will analyse whether particulates collected in the particulate abatement systems can be reintroduced back into the production process.
2.2 Storage and handling of raw materials, products and wastes	BAT is to store reactive chemicals in such a way that they remain stable, such as under a steady gas stream, for example. If chemical additions are necessary then tests should be carried out to ensure the required chemical composition is maintained. Inhibitors may also be added to prevent reactions. BAT is to vent storage tanks to a safe location. BAT is to use measures to reduce the risk of contamination from large storage tanks. In addition to sealed bunds, use double-walled tanks and leak detection channels. BAT is to use HAZOP studies to identify risks to the environment for all operations involving the storage and handling of chemicals and wastes. Where the risks are identified as significant, plans and timetables for improvements should be in place.	The raw materials used in the process are inert and are insoluble in water. The materials will be stored separately in sealed bags/containers in dedicated storage areas. The process itself is to form new substance from initial materials through a series of processes, producing a stable product.
2.3 Plant systems and equipment	BAT is to formally consider potential emissions from plant systems and equipment and have plans and timetables for improvements, where the potential for substance or noise pollution from plant systems and equipment has been identified. BAT is to carry out systematic HAZOP studies on all plant systems and equipment to identify and quantify risks to the environment. BAT is to choose vacuum systems that are designed for the load and keep them well maintained, and to install sufficient instrumentation to detect reduced performance and to warn that remedial action should be taken.	Emissions from the plant and equipment to be used has been assessed and show that the potential environmental impact is very low. Plant and equipment is state-of-the-art and will be maintained in accordance with manufacturer's recommendations. Any faults or damage to equipment will be repaired by a suitably qualified engineer.

2.4 Reaction Stage	BAT is to have a clear understanding of the physical chemistry, evaluate options for suitable reactor types using chemical engineering principles. BAT is to select the reactor system from a number of potentially suitable reactor designs – conventional stirred tank reactor (STR), process-intensive or novel-technology - by formal comparison of costs and business risks against the assessment of raw material efficiencies and environmental impacts for each of the options. BAT is to undertake studies to review reactor design options based on process-optimisation where the activity is an existing activity and achieved raw material efficiencies and waste generation suggest there is significant potential for improvement. The studies should formally compare the costs and business risks, and raw material efficiencies and environmental impacts of the alternative systems with those of the existing system. The scope and depth of the studies should be in proportion to the potential for environmental improvement over the existing reaction system. BAT is to maximise process yields from the selected reactor design, and minimise losses and emissions, by the formalised use of optimised process control and management procedures (both manual and computerised where appropriate). BAT is to minimise the potential for the release of vapours to air from pressure relief systems and the potential for emissions of organic solvents into air or water, by formal consideration at the design stage - or formal review of the existing arrangements if that stage has passed.	The process does not require chemical reactors. The process form new substance from initial materials through a series of steps, producing a stable product. The facility is a pilot facility which will seek to apply over ten years of research into practice.
Minimisation of liquid losses from reaction systems	BAT is to use the following features that contribute to a reduction in waste arisings from clean-outs: • Low-inventory continuous throughput reactors with minimum surface area for cleaning. • Minimum internals such as baffles and coils in the reactor. • Smooth reactor walls, no crevices. • Flush bottom outlet on reaction vessels. • All associated piping to slope back to the reactor or to a drain point. • Sufficient headroom under the reactor for collection of all concentrated draining in drum sor other suitable vessel, if necessary. • Minimal pipework, designed to eliminate hold-up and to assist drainage. • Pipework designed to allow air or nitrogen blowing.	Initial step is to mix and mill water with solid inorganic materials, followed by drying. Further steps include baking to form the new material and deagglomeration of solid material. There are no additional organic additives or chemicals added to the process, and no chemical reactions which require reaction vessels/reactors. Equipment and pipework will have smooth internal surfacing which will enable effective clean outs. The process is limited to the two initial ingredients with little product change out.

	• System kept warm during emptying to facilitate draining. • HAZOP studies used to assess the potential for the choking of lines by high-melting-point material. • Campaigns sequenced so that cleaning between batches is minimised. • Campaigns made as long as possible to reduce the number of product change-overs. • Where a complete clean is necessary, use cleaning methods that minimise the use of cleaning agents, (e.g. steam-cleaning, rotating spray jets or high-pressure cleaning) or use a solvent which can be re-used. • Consider use of disposable plastic pipe-liners. • Eliminate or minimise locations for solids to settle-out. • Consider duplicate or dedicated equipment where it can reduce the need for cleaning that is difficult.	
Minimisation of vapour loss	BAT is to review your operating practices and review vent flows to see if improvements need to be made. BAT is to consider opportunities to enhance the performance of abatement systems.	
2.5 Separation Stage		There are no liquid-liquid separations within the process, which is centred around combing solid materials into one material. Liquid (water) is separated from the solids (mixed niobium pentoxide and tungsten trioxide) through evaporation.
2.6 Purification Stage	BAT is to aim to produce the maximum concentration of solvent in gas to allow recovery of solvents during drying.	There is no defined purification stage as part of the production process.
2.7 Chemical Process Controls	BAT is to monitor the relevant process controls and set with alarms to ensure they do not go out of the required range.	
2.8 Analysis	BAT is to analyse the components and concentrations of by products and waste streams to ensure correct decisions are made regarding onward treatment or disposal. Keep detailed records of decisions based on this analysis in accordance with management systems.	
3. EMISSIONS AND MONITORING		

3.1 Point source emission to air	Formally consider the information and recommendations in the BREF on Common Waste Water and Waste Gas Treatment/ Management Systems in the Chemical Sector (see Reference 1, Annex 2) as part of the assessment of BAT for point-source releases to air, in addition to the information in this note. 2. The benchmark values for point source emissions to air listed in Annex 1 should be achieved unless we have agreed alternative values. 3. Identify the main chemical constituents of the emissions, including VOC speciation where practicable. 4. Assess vent and chimney heights for dispersion capability and assess the fate of the substances emitted to the environment.	Baking of the metal oxide powder under ambient pressure forms product A. This does not involve or generate any chemicals, and no organic additives are to be used. No hazardous substances nor particulates have been detected during emission testing. Air is extracted to outside of the building via 500mm diameter stainless steel ducts which are approximately 10m above the ground. The H1 Screening Tool assessment has been carried out to assess the emissions to air.
3.2 Point source emission to water	BAT is to control all emissions to avoid a breach of water quality standards as a minimum and use appropriate measures to minimise water use and emissions to water.	There are no point source emissions to water.
3.3 Point source emissions to land	BAT is to use appropriate measures to minimise emissions to land.	There are no point source emissions to land.
3.4 Fugitive emissions: Fugitive emissions to air	BAT is to identify all potential sources and develop and maintain procedures for monitoring and eliminating or minimising leaks. BAT is to choose vent systems to minimise breathing emissions (for example pressure/ vacuum valves) and, where relevant, should be fitted with knock-out pots and appropriate abatement equipment. BAT is to use the following techniques (together or in any combination) to reduce losses from storage tanks at atmospheric pressure: • maintenance of bulk storage temperatures as low as practicable, taking into account changes due to solar heating etc. • tank paint with low solar absorbency • temperature control • tank insulation • inventory management • floating roof tanks • bladder roof tanks • pressure/vacuum valves, where tanks are designed to withstand pressure fluctuations • specific release treatment (such as adsorption condensation	Mixing/milling of materials is carried out by adding powder from bags to water. Dust emissions can be controlled by sealing all connections between bags and vessels. Any accidentally released dust can be captured by HEPA-filtered local extractor systems with a movable arm, by each station. This avoids any spills or dust escaping. All equipment used for powder processing will be fitted with containment, mobile and house HEPA filtration systems. Following the baking step (Stage 5), the material is then deagglomerated in a continuous process. Potential dust formation points have been identified, such as the feed points of equipment, and these will be blocked and dust extracted to avoid escape or release of particulate matter. Exits of the deagglomeration equipment will be sealed. Fines are collected in filtration systems (both stationary and mobile). Blending is the final step of the process to produce the product A. This is carried out in a large, sealed metal vessel. Once completed, the material is discharged into a bag/container via a sealed valve with a HEPA filtration system to capture any accidental escape of dust.

		Packaging of the final product is carried out by transferring the contents of the vessel into a large bag. Any dust escaping when disconnecting hoses is extracted into a house filtration system or mobile HEPA extraction unit.
3.4 Fugitive emissions: Fugitive emissions to surface water, sewer and groundwater	BAT is to provide hard surfacing in areas where accidental spillage or leakage may occur, e.g. beneath prime movers, pumps, in storage areas, and in handling, loading and unloading areas. The surfacing should be impermeable to process liquors. BAT is to drain hard surfacing of areas subject to potential contamination so that potentially contaminated surface run-off does not discharge to ground. BAT is to hold stocks of suitable absorbents at appropriate locations for use in mopping up minor leaks and spills, and dispose of to leak-proof containers. BAT is to take particular care in areas of inherent sensitivity to groundwater pollution. Poorly maintained drainage systems are known to be the main cause of groundwater contamination and surface/above-ground drains are preferred to facilitate leak detection (and to reduce explosion risks). BAT is to consider additional measures could be justified in locations of particular environmental sensitivity. Decisions on the measures to be taken should take account of the risk to groundwater. BAT is to carry out surveys of plant that may continue to contribute to leakage should also be considered, as part of an overall environmental management system. In particular, you should consider undertaking leakage tests and/or integrity surveys to confirm the containment of underground drains and tanks.	The facility is located inside a building, and flooring comprises of impermeable surfacing throughout, impervious to spillages of materials or liquids.
3.5 Odour	BAT is to manage the operations to prevent release of odour at all times.	The facility will process metal oxides, in which odour is not considered to be an issue.
3.6 Noise and Vibration	BAT is to install particularly noisy machines such as compactors and pelletisers in a noise control booth or encapsulate the noise source. BAT is to where possible, without compromising safety, fit suitable silencers on safety valves. BAT is to minimise the blow-off from boilers and air compressors, for example during start up, and provide silencers.	A Noise survey has been undertaken and appropriate noise attenuation is being installed around the milling/mixing equipment. The noise survey and noise attenuation design is provided in Appendices 1, 2 and 3 of this report.
3.7 Monitoring		

Monitoring and reporting of emissions to air	BAT is to carry out an analysis covering a broad spectrum of substances to establish that all relevant substances have been taken into account when setting the release limits. The need to repeat such a test will depend upon the potential variability in the process and, for example, the potential for contamination of raw materials. Where there is such potential, tests may be appropriate. BAT is to monitor more regularly any substances found to be of concern, or any other individual substances to which the local environment may be susceptible and upon which the operations may impact. This would particularly apply to the common pesticides and heavy metals. Using composite samples is the technique most likely to be appropriate where the concentration does not vary excessively. BAT is to monitor releases of substances that are more difficult to measure and whose capacity for harm is uncertain, particularly when combined with other substances, then "whole effluent toxicity" monitoring techniques can be appropriate to provide direct measurements of harm, for example, direct toxicity assessment.	Emissions testing has been carried out and the results are appended to the H1 Technical Note provided with the permit application. This report also details the monitoring point from the stack from the furnace. The H1 screening tool assessment has concluded that the emissions to air do not present a significant risk to the environment and no further air quality modelling is required.
Monitoring and reporting of waste emissions	BAT is to monitor and record: • the physical and chemical composition of the waste • its hazard characteristics • handling precautions and substances with which it cannot be mixed	Small amounts of aqueous non-hazardous slurry waste may occasionally arise during cleaning or sampling. Nyobolt will endeavour re-using this to have zero waste. Nyobolt is already in touch with Anglian Water with regards to the correct disposal of such waste, should this be the preferred route. If necessary, Nyobolt will collected such waste in IBCs and then filtered, precipitated or /flocculated to result in a solid product A waste and clean water. The procedure for flocculation is in development will be developed if required. Residual waters will be disposed of at a suitably licensed facility, or Nyobolt may seek to obtain a Trade Effluent Discharge Consent.
Environmental monitoring beyond the installation	BAT is to consider the following when drawing up proposals when environmental monitoring is needed: • determinants to be monitored, standard reference methods, sampling protocols • monitoring strategy, selection of monitoring points, optimisation of monitoring approach • determination of background levels contributed by other sources • uncertainty for the employed methodologies and the resultant overall uncertainty of measurement	The facility is wholly within a building as part of a research and development complex. Emissions will be contained within the building (i.e. fugitive particulate matter emissions) and mobile/local extraction systems will collect any particulate matter arising from the process. Point source emissions to air will be monitored in accordance with respective standards.

	• quality assurance (QA) and quality control (QC) protocols, equipment calibration and maintenance, sample storage and chain of custody/audit trail • reporting procedures, data storage, interpretation and review of results, reporting format for the provision of information.	
Process Variables	BAT is to identify those process variables that may affect the environment and monitor as appropriate.	Initial ingredients will be monitored for contaminants where there is inadequate supplier information. Energy consumption will be monitored and reviewed every four years. Water usage will be monitored.

3 USE OF WATER

3.1.1 Annual water usage in the process is 2,280m³. Water is supplied from the mains water supply to the building.

3.1.2 A water meter is installed to monitor water use. Records will be kept of water usage and these will be reviewed annually with targets set for reduction where appropriate.

3.1.3 Water use will be reviewed at least once every four years to assess whether any improvements can be made.

4 USE OF RAW MATERIALS

4.1.1 Raw material selection is fixed by the chemistry and chemical engineering design of the process. The substances used as raw materials are fundamental to the production of the final product at the pilot facility, and will only be used in the required quantities in order to execute the process and achieve the final product.

4.1.2 The quality and composition of the raw materials will be periodically checked with suppliers to ensure that raw materials used will be checked every four years by reference to manufacturer's data to ensure that ingredients with low environmental impact are being used. Checks will also be carried out whenever a raw materials supplier is changed.

4.1.3 Raw materials used will be reviewed on an annual basis.

4.1.4 An indicative list of the materials to be used in the process is provided in Table 4.1 below. Both niobium pentoxide and tungsten trioxide are relatively benign elements which are not hazardous, but their dust presents irritation to eyes and skin.

Table 4.1: Expected Raw Material Usage

Material	Expected amount to be used per year	Volume to be stored and storage method	Use of Material	Hazardous properties[1]
Niobium pentoxide	600 tonnes	To be confirmed	Material is mixed with tungsten trioxide	Not considered hazardous but can cause irritation to eyes and skin in powdered form
Tungsten trioxide	300 tonnes	To be confirmed	Mixed with niobium pentoxide and then both materials undergo drying, forming and baking, deagglomeration and blending.	Not considered hazardous but can cause irritation to eyes and skin in powdered form

[1] Hazardous properties derived from European Chemicals Agency (Substance Information - ECHA (europa.eu))

4.1.5 Niobium pentoxide and tungsten trioxide will be delivered in sealed containers and placed in the dedicated storage area. Niobium pentoxide and tungsten trioxide will meet the required quality standards in order to produce product A to the required end use specification.

5 USE OF ENERGY

5.1 *Compliance with BREF Note on Energy Efficiency*

5.1.1 In order to comply with the BAT conclusions on energy efficiency, Nyobolt Ltd will have an energy efficiency and management system incorporated into their Environmental Management System. This will include a commitment from senior managers to use energy efficiently and to seek to reduce carbon emissions where possible. Nyobolt Ltd are committed to complying with all energy efficiency legislation.

5.1.2 Communications will be made to staff to raise awareness of the energy policy and encourage employee engagement.

5.1.3 Energy use will be reviewed at least once every four years and targets for efficiencies will be set, seeking continuous improvement and reduction in emissions.

5.1.4 Where new plant is being purchased energy efficiency will be an important consideration and all processing plant, lighting and HVAC systems will be designed with expert input to ensure the most efficient schemes are adopted. This will include optimising layouts, assessing correct sizing of motors and using variable speed drives where appropriate and effective.

5.1.5 All plant will be part of the planned preventative maintenance programme and will be properly maintained so as to operate without excessive use of energy. Staff will receive training so that procedures are followed correctly and idling of plant or inefficient loads are avoided.

5.1.6 All energy use will be recorded so that quantitative comparisons can be made and energy savings can be properly assessed.

5.2 *Specific Energy Consumption*

5.2.1 Electricity will be used to power the processing equipment including the furnace, supplied from the national grid. An assessment of the energy consumption will be reviewed on a periodic basis as required by the environmental permit. An energy efficiency plan will be developed and implemented within one year of issue of the environmental permit.

5.2.2 To allow benchmarking and assessment of progress against any energy efficiency targets that are set the specific energy consumption will be calculated each year. An initial assessment of electricity usage is provided in Table 5.1 below.

Table 5.1: Energy Consumption		
Energy Source	Units/year as delivered MWh	At primary source unit MWh/year
Electricity from mains supply	16,099	38,637.56
Total MWh	**16,099**	**38,637.56**
Notes: * When electricity from the national grid is utilised there are losses from the grid between the power station and the plant. Environment Agency guidance requires that a conversion factor of 2.4 is used to account for this. https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming#greenhouse-gases-impact-of-your-emissions		

5.3 *Specific Energy Requirements*

5.3.1 The specific energy consumption (SEC) for the facility is defined as kWh per tonne of material produced. This will enable a like for like comparison between data for one year and another and allow a benchmark to be set and improvement to be measured. The calculation of the SEC, using available data, will be made over the duration of a year and will be calculated as follows:

$$SEC = \frac{\text{total primary energy consumption (kWh)}}{\text{Total amount of product produced (tonnes)}}$$

5.3.2 The calculation of SEC will be completed on an annual basis and will be included within the annual review. Table 5.2 below provides a prediction of SEC for the first year of operations at the site. It is based on the anticipated output of 1 tonne of product A produced per day and a total energy consumption of 38.6KWhper annum.

Table 5.2: Projected Specific Energy Consumption for the First Year of Operation			
Year	Total Energy Consumption (kWh)	Total product A produced (tonnes)	Projected SEC for year (kWh/tonne)
1	38.6	900	0.043

5.3.3 Table 5.3 below provides the potential carbon dioxide emissions associated with the permitted activities.

Table 5:3 Annual Carbon Dioxide Emissions from Energy Use

Energy source	Primary Energy Usage (MWh)	Conversion factor & CO_2 factor	CO_2 (tonnes per annum)
Electricity	34,058.85	5,653.65	5,653.65
TOTAL	**34,058.85**	**5,653.65**	**5,653.65**

* Conversion factor used 0.166, taken from Environment Agency Guidance: https://www.gov.uk/guidance/assess-the-impact-of-air-emissions-on-global-warming#greenhouse-gases-impact-of-your-emissions

5.4 *Energy Efficiency Measures*

5.4.1 Nyobolt will implement measures to ensure that a high standard of energy efficiency is maintained and will strive towards continuous improvement wherever practicable.

5.4.2 All equipment will undergo preventive maintenance in accordance with the manufacturer's recommendations to ensure its efficiency and environmental credentials are preserved as far as possible.

5.4.3 The electrical supply for the site also provides heating, lighting and does not form part of the permitted activities. Staff will be trained to ensure that unnecessary energy losses are minimised by switching off equipment when not in use.

5.4.4 Regular maintenance of all equipment will be carried out to ensure efficient operation.

6 WASTE MINIMISATION

6.1.1 Waste from the process will be minimal and will mainly arise from the cleaning of tanks, collected fines in the filtration system and delivery of raw materials.

6.1.2 Wastes arising from the process are expected to comprise of an aqueous slurry waste from tank cleaning. Nyobolt is in touch with Anglian Water with regards to the correct disposal of such waste. While the preferred route is re-using the slurry and have zero waste, Nyobolt is prepared to purify the aqueous waste via filtration/flocculation to result in a solid product A waste and clean water, should Anglian Water require it. To this end, Nyobolt will carry out sampling and analyses of wastes to determine which route is most environmental.

6.1.3 Additionally, investigations into whether product A fines collected in the in-house cyclone filtration system can be reintroduced back into the production process to minimise losses of raw materials in the process.

6.1.4 Nyobolt will work with the raw material supplies to reduce packaging (e.g. raw materials delivered in bags rather than drums).

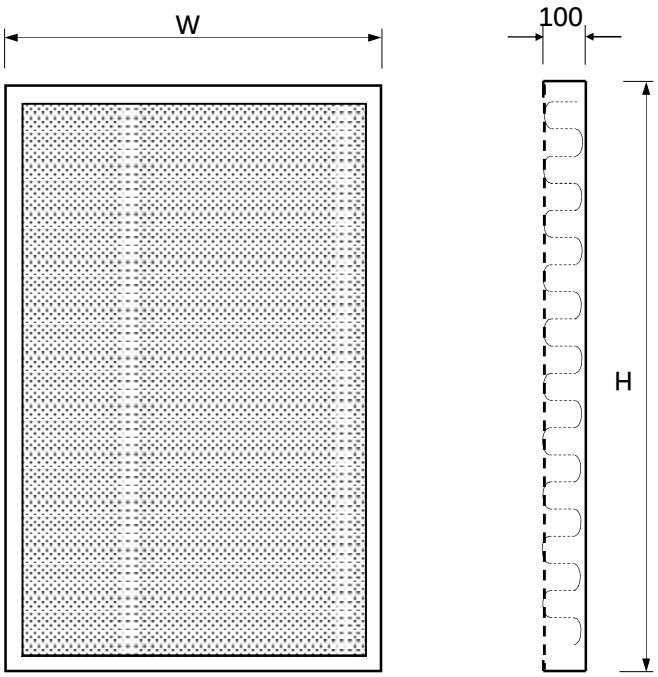
APPENDICES

DATA SHEET E60E

ACOUSTIC ENCLOSURE PANEL MODEL EP100/UF

IMPORTANT : THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED AND CERTIFIED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

DIMENSIONS



ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX BS EN ISO 10140-2 : 2021

63	125	250	500	1000	2000	4000	8000	HZ
14	20	26	39	49	52	48	44	dB

SOUND ABSORPTION BS EN ISO 354 : 2003

63	125	250	500	1000	2000	4000	8000	HZ
.15	0.6	1.0	1.0	1.0	1.0	0.9	0.75	-

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE

PANELS WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, BRACKETS, FIXINGS OR MASTIC UNLESS OTHERWISE STATED.

PANELS MORE THAN 1800 WIDE OR 2500 HIGH MAY BE MANUFACTURED IN SECTIONS FOR ON SITE ASSEMBLY.

SPECIFICATION

THE ACOUSTIC ENCLOSURE PANEL COMPRISES A COMBINATION OF SOUND ABSORBENT MATERIALS AND HIGH MASS BARRIERS CONTAINED WITHIN A METAL CASING HAVING AN PLAIN OUTER AND PERFORATED INNER FACE, OFFERING EXCELLENT SOUND REDUCTION AND ABSORPTION PROPERTIES.

PANELS ARE CONSTRUCTED FROM PRE-GALVANISED SHEET STEEL AS STANDARD.

THE OUTER CASING IS FORMED FROM PLAIN SHEET METAL AND INSIDE FACE FROM PERFORATED METAL.

PANELS CONTAIN A FIBROUS SOUND ABSORBENT INFILL THAT IS NON-SHEDDING, NON-COMBUSTIBLE, NON-HYGROSCOPIC AND CHEMICALLY INERT. THE INFILL IS FACED WITH GLASS CLOTH TO PREVENT FIBRE MIGRATION.

THE CASING CAN BE SUPPLIED WITH A PERIMETER FLANGE FOR FIXING ADJACENT SECTIONS TOGETHER, FIXING THE PANELS INTO THE BUILDERSWORK OPENING OR FIXING INTO THE FRAMEWORK OF AN ACOUSTIC ENCLOSURE (OPTION F).

POLYESTER POWDER FINISH AVAILABLE (SUFFIX P)

SUFFIX

P - POLYESTER POWDER COAT

F - PERIPHERAL FIXING FRAME

X - SPECIAL CONSTRUCTION, REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

BUILDERSWORK

THE W AND H DIMENSIONS GIVEN ON THE CERTIFIED EQUIPMENT SCHEDULE ARE AS MANUFACTURED.

ADEQUATE CLEARANCE MUST BE ALLOWED WHEN CONSTRUCTING THE BUILDERSWORK OPENING, MIN 10mm IS RECOMMENDED.

WEIGHT

ACTUAL WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE.

APPROXIMATE WEIGHT: 35kg/M^2.

STANDARD SIZES

THERE ARE NO STANDARD SIZES. PANELS ARE MANUFACTURED TO ORDER

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Project: Nyobolt Haverhill - Dry Mill

Date: 03/04/2024

Location	Position	63hz	125hz	250hz	500hz	1khz	2khz	4khz	8khz	NR Level	Comments
Dry Mill - Front		80	73.3	77.5	80.2	86.4	79	84.8	79.3	89	1m away from Soldberg filter, 1.5m from floor.
Dry Mill - Right		67.3	73.1	76	82.9	90.4	82.2	84.6	86.1	90	1m away from unit, 1.5m from floor.
Dry Mill - Left		67.9	67.1	74.7	76.7	81.7	76.4	82.8	83.6	88	1m away from unit, 1.5m from floor.
Dry Mill - Back Right		79.8	74.1	76.2	81.1	88.3	80.2	88.1	81	92	1m away from unit, 1.5m from floor.
Dry Mill - Back Left		85.8	78.9	75.9	77.4	77.7	76.6	82.6	86.4	92	1m away from unit, 1.5m from floor.
Guardtech office - directors office		49.8	50.1	49.8	46.8	45.8	34.3	33.7	31.6	46	2m away from internal wall connecting to Nyobolt, 1.5m from floor
Guardtech office - open office		53.2	49.2	44.8	42.7	37.8	36.7	33.5	27.2	40	2m away from internal wall connecting to Nyobolt, 1.5m from floor

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- Left		67.9	67.1	74.7	76.7	81.7	76.4	82.8	83.6	88	1m away from unit, 1.5m from floor.
- Back Right		79.8	74.1	76.2	81.1	88.3	80.2	88.1	81	92	1m away from unit, 1.5m from floor.
- Back Left		85.8	78.9	75.9	77.4	77.7	76.6	82.6	86.4	92	1m away from unit, 1.5m from floor.
Guardtech office - directors office		49.8	50.1	49.8	46.8	45.8	34.3	33.7	31.6	46	2m away from internal wall connecting to Nyobolt, 1.5m from floor
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