Barry Thermosets Plant

Environmental Permit Variation Application
EPR/PP3238LX/V002

Bakelite Synthetics UK Limited

Project number: 60679876

3rd May 2022

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Position
1	20th April 2022	Initial draft	Helen Watson	Project Manager
2	3rd May 2022	Final	Helen Watson	Project Manager

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Tables

1. Non – Technical Summary

This document presents the supporting information for a normal variation to the Environmental Permit (reference: EPR/PP3238LX) for the Barry Thermosets Plant, operated by Bakelite Synthetics UK Ltd (the 'Installation'). The Installation is located at Sully Moors Road, Barry, South Glamorgan, Wales, CF64 5YU.

The Environmental Permit Variation is being submitted to enable the operation of two new emergency diesel generators installed at the Installation to act as a back-up power supply in the event of grid failure, to enable safe shut down of operations. Previously, back-up power was provided to the Installation by an adjacent Centrica Barry Power Station, however this has been decommissioned requiring the Installation to install its own independent back-up supply. The back-up supply installed comprises two 1.2MW thermal input containerised generators, which have a self-contained diesel supply.

Although the generators are to be use for emergency use only, they will require regular testing to ensure that they remain fit for purpose to operate when needed. The testing regime will result in a run times of less than 50 hours per year, and therefore it is considered that the generators are exempt from the requirements of Schedule 25B of the Environmental Permitting Regulations (England and Wales) 2016 (as amended) Regulations ("EP Regulations"), however they do still fall under the Medium Combustion Plant (MCP) requirements of Schedule 25A of the EP Regulations, and as such, the diesel generators are to be added to the existing Environmental Permit as an additional Directly Associated Activity (DAA).

Due to the limited testing times of the emergency generators, the annual average impacts from the emissions to air are predicted to be "insignificant". Although the short-term impacts cannot be screened out as "insignificant" using the H1 tool, due to the limited likelihood and duration of operation of the generators, it is considered that there is no likelihood that the relevant National Air Quality Standards could be breached.

With the previous arrangement of back-up power from the adjacent power station, there was no requirement for the emergency power supply for the 20 years in which the agreement was in place, and therefore it is considered very unlikely that the emergency diesel generators will ever be required for their back-up supply purpose.

This application therefore seeks to add the operation of the emergency generators as a Directly Associated Activity, under a Simple Bespoke MCP application.

2. Introduction

This document supports a normal Environmental Permit variation application submitted by Bakelite Synthetics UK Limited under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (the "EP Regulations"), to enable the installation and operation of two new emergency diesel generators, at the Barry Thermosets Plant Installation (Environmental Permit reference EPR/PP3238LX). The Installation is located at Sully Moors Road, Barry, South Glamorgan, Wales, CF64 5YU. Figure 1 (Appendix A) shows the Installation's location.

Bakelite Synthetics UK Limited is an Upper Tier COMAH site, and its production of industrial polymers and resins (as Schedule 1 listed activities under Section 4.1 Part A(1)(a)(viii) and Section 4.1 Part A(1)(a)(ii)) involves processes that have safety critical controls which could be negatively affected by a loss of electrical supply. Previously a back-up supply facility was provided by the adjacent Centrica Barry Power Station, however this has been decommissioned. In order to ensure continuity of supply to the safety critical controls in the event of a power failure, the Installation has therefore installed its own independent back-up supply.

The two new emergency diesel generators have a thermal input of 1.2MW_{th} each, therefore introducing an additional thermal input of 2.4MW_{th} to the Installation. The current Environmental Permit for the Installation contains two boilers for steam generation, listed in Table S1.1 of the Permit as a Directly Associated Activity (DAA). The existing boilers originally had a total thermal input of 18.8MW_{th}, however following the closure of the adjacent Zeon Chemicals plant, which previously took steam from the Installation, the boilers have been derated down to a total thermal input of 9.72MW_{th} as their full steam generation capacity is no longer required.

Following the installation of the two new emergency diesel generators the Installation's total thermal input is now 12.12MW_{th}, and therefore well below the 20MW_{th} threshold in the EP Regulations for a Schedule 1 Part B listed activity.

The diesel generators are classed as Medium Combustion Plant (MCP) and Specified Generators under the EP Regulations, Schedule 25A and 25B respectively, however given that the generators are intended for emergency use only, they will only be required to operate for limited periods each month to ensure they remain fit for their back-up power purpose. The testing regime will result in a run times of less than 50 hours per year, and therefore the generators are classed as exempt Specified Generators, however they do still fall under the requirements of MCP and as such, the diesel generators are to be added to the Environmental Permit as an additional DAA.

Although this application is being made as a normal variation to the Environmental Permit for the Installation, as the application is only adding a MCP the MCP charges have been applied to the application, in line with pre-application advice provided by Natural Resources Wales.

With the previous arrangement of back-up power from the adjacent power station, there was no requirement for the emergency power supply for the 20 years in which the agreement was in place, and therefore it is considered very unlikely that the emergency diesel generators will ever be required for their back-up supply purpose.

2.1 Proposed Operations

The two new emergency generators are diesel-powered compression ignition engines – Perkins 2506A-E15TAG2 units, with a thermal input of 1.2MW_{th} each. A datasheet for the diesel generators is provided in the Appendix B.

The emergency generators are located in the centre of the Installation, shown in Figure 2 (Appendix A). They are to be used for emergency use only in the event of loss of electrical supply to the Installation, to ensure continued operation of safety critical equipment. Therefore, they are not intended for day-to-day use although they will require regular testing to ensure that they function as necessary in the event of an emergency. The proposed testing regime comprises of running alternate generators each month for 30 minutes at a time. In addition, there will be an annual test, where both generators are run concurrently for up to two hours.

They have a close-fitting acoustic enclosure with integrated diesel storage to enable 24 hours runtime in the event of an emergency in order to ensure safe shut down of plant.

This Environmental Permit Variation application covers the following proposed activities:

Table 2-1: Schedule 25A Listed Activities

Activity listed in Schedule 25 of the EP Regulations	Description of Activity	Limits of Specified Activity
Schedule 25A – An MCP with a rated thermal input more than or equal to 1MW and less than 50MW.	Combustion of diesel in an Emergency Generator to provide emergency back-up power.	Routine testing operations to ensure generators are fit for purpose, and in the event of loss of site power to enable safe shut-down of Installation operations.

2.1.1 Type of Environmental Permit Required

The diesel generators are classed as MCP and Specified Generators under the EP Regulations, Schedule 25A and 25B respectively, however given that the generators are intended for emergency use only, they will only be required to operate for limited periods each month to ensure they remain fit for their back-up power purpose. The testing regime will result in a run times of less than 50 hours per year, and therefore the generators are exempt Specified Generators, however they do still fall under the requirements of MCP and as such, the diesel generators are to be added to the existing Environmental Permit as an additional DAA.

A H1 Screening Assessment has been carried out in order to determine the appropriate type of MCP Permit application for the emergency diesel generators. The full details of the assessment are provided in Section 4.2, with the H1 screening tool being provided in Appendix C.

The long-term impacts of the testing regime can be screened as “insignificant” in accordance with the H1 screening criteria. Although the short-term impacts are not screened as “insignificant”, due to the minimal operation of the emergency generators, it would not be possible for the testing regime to result in an exceedance of the hourly National Air Quality Strategy (NAQS) objective for NO_2, which allows for up to 18 exceedances per year. Monthly testing will only be carried out for 30 minutes at a time with only one generator being tested each month at only 30% load, and the annual two-hour test, where both generators run at increased load is significantly less than 18 hours.

The emergency generators are located in the centre of the Installation, surrounded by high buildings and storage tanks. The emissions are vented from the roof of the generator container, with no elevated stack as such, to release the emissions at height. This means that the initial dispersion and grounding of the emissions plume from the generators would largely occur onsite and in the vicinity of the units, with limited potential for the plume to travel and directly impact upon off-site sensitive receptors. The Installation boundary is over 200m from the generators at its closest point (to the north or south), however the direction of the prevailing wind is from the southwest, and therefore the distance to the Installation boundary with the prevailing wind is over 400m to the northeast, and there are no human health receptors in this direction. The H1 tool does not take account of distances to receptors, or the potential impacts of surrounding site structures on dispersion and only predicts the maximum ground level impacts from a source, using simplistic dispersion factors which are very conservative.

As already stated, there has been no requirement for the emergency power supply for the last 20 years and therefore it is considered very unlikely that the emergency diesel generators will ever be required for their back-up supply purpose, and therefore run for longer than the routine testing proposed.

On this basis, this Environmental Permit Variation application has been made as a Simple Bespoke MCP application, as it is considered that detailed dispersion modelling is not required to support the application.

3. Operating Techniques

3.1 Technical Standards

The key requirements of the MCP Directive are to achieve the emission limits placed on the emissions to air from the combustion plants and undertake the associated periodic monitoring and reporting of the emissions.

As the emergency generators operate for less than 500 hours per year, they are exempt from the emission limit values required for MCP, and therefore routine monitoring of the emissions is not required. The plant will operate in accordance with the applicable Sector Guidance, namely:

- "Develop a Management System: Environmental Permits" [1].
- "Control and Monitor Emissions for your Environmental Permit" [2].
- "Medium Combustion Plant and Specified Generator Permits: How to Comply" [3].

3.2 Process Description

The emergency generators have been sized to meet the appropriate electrical load to meet the requirements of the safety critical plant at the Installation. The emergency generators comprise two Perkins 2506A-E15TAG2 compression ignition engines. The power inputs of the generators are shown in Table 3-1.

Table 3-1: Details of the Emergency Generators

MCP Reference	Emission Point Reference	Approximate Grid Reference (x, y)	Engine Type	Thermal Input (MW_{th})
Gen 1	A20	314497, 168210	Perkins 2506A-E15TAG2	1.2
Gen 2	A21	314500, 168214		1.2

Emergency diesel generators are fast response plant that can be brought online quickly in the event of a loss of off-site power to provide power to safety critical equipment, ensuring that Installation operations can be brought under control, or shut down safely to ensure that an incident does not occur. The generators are connected to the internal electrical distribution system and also to the electrical grid, but this is solely for testing purposes and no electricity is exported.

To ensure that the generators are fit for purpose routine testing will be carried out. The generators will be tested for 30 minutes at 30% load, with alternate generators tested each month. On this basis, each generator will be tested for a maximum of three hours, i.e. a total of six hours per year for the two generators.

In addition, an annual two-hour test will be carried out, with the two generators operating together at 110% load. During the month when the two-hour test is carried out, the routine 30-minute test will not be carried out. Therefore, in total over a year, the maximum operation of a single generator will be less than five hours, or less than 10 hours of operation in total for the two generators. A log will be maintained in the event that the emergency generators are operated as a result of a loss of off-site power, recording the number of hours of operation.

The emergency generators will be fuelled by Green D+, a renewable biodiesel comprising a flexible mix of vegetable oils and waste fats. The fuel storage is located in the base of the generator container, with integral bunding, and has been sized to enable 30 hours of continuous operation. With the routine testing, this will allow for 24 hours of emergency operation (if required) to be carried out requiring only

[1] Develop a management system: Environmental Permits, EA, Published: 1 February 2016, Last updated: 20 April 2021, available at: https://www.gov.uk/guidance/develop-a-management-system-environmental-permits

[2] Control and monitor emissions for your environmental permit, EA, Published 1 February 2016, Last updated 17 May 2021, available at: https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit

[3] Medium Combustion Plant and Specified Generator Permits: How to Comply, EA, Natural Resources Wales, Department for Environment, Food & Rural Affairs, and Welsh Government, Published: 15 July 2019, available at: https://www.gov.uk/guidance/medium-combustion-plant-and-specified-generator-permits-how-to-comply

one fuel delivery per year. The storage capacity is 3,000 litres per generator, therefore 6,000 litres in total.

They have a close-fitting acoustic enclosure, with noise attenuation to 80dBA@1m at 100% load. Their location in the centre of the Installation ensures that there is limited potential for noise nuisance off-site.

3.3 Emissions to Air

The main emissions to air from the emergency generators would be:

- Oxides of nitrogen (NO_x) comprising nitric oxide (NO) and nitrogen dioxide (NO_2); created by the chemical combination of atmospheric oxygen and nitrogen within the high temperature combustion zone; and
- Particulate Matter (PM_{10}); and
- Carbon monoxide (CO).

Due to the low sulphur content of the Green D+ fuel (<5ppm) emissions of sulphur dioxide are expected to be very low, and therefore have not been considered further.

The emergency generators would introduce two new emission points (A20 (Gen 1) and A21 (Gen 2)) to the Environmental Permit.

As previously stated, due to the limited running hours of the generators, they are not required to meet either MCP or specified generator emission limit values. Other than primary combustion controls therefore, there is no secondary abatement in place to control emissions to air.

The manufacture provided emissions are shown in Table 3-2. Note, that the flow rate provided represents the maximum flow rate, as no data was provided for flow rates at lower loads. However, the use of the maximum flow rate results in a worst-case release rate for use in the H1 assessment for the long term impacts and therefore is considered to be very conservative.

Table 3-2: Emissions Data for the Generators (Each Generator)

Scenario	Effective Stack Height (m)	Stack Diameter (m)	Flow Rate (Am^3/s)	Temp (°C)	O_2 Content (%)	H_2O Content (%)	Flow Rate (Nm^3/s)	Substance	Conc^{n} (mg/m^3) [1]	Release Rate (g/s)
110% load	0	0.20	1.6	500	12.1	10	0.7	Oxides of nitrogen	1,357	1.0
								Carbon monoxide	63	0.05
								Particulates	2.6	0.002
30% load	0	0.20	1.6	500	12.1	10	0.7	Oxides of nitrogen	1,758	0.0015
								Carbon monoxide	78	0.00007
								Particulates	8.5	0.000007

[1] Corrected to 15% O_2

The 30% load release rate has been factored to account for 10 hours of routine testing operation per year, and this has been used in the H1 assessment detailed in Section 4.2.

Extractive emissions monitoring will be carried out every 500 hours of operation, or every 3 years, whichever occurs sooner, if required by the permit.

3.4 Management Systems

The operator has an Environmental Management System (EMS) in place, compliant with the requirements of ISO14001:2015 and this is regularly reviewed to ensure that the requirements of the "Develop a Management System: Environmental Permits" [4] guidance are undertaken.

The management system identifies systems and procedures that minimise the risk of pollution and harm to human health, which may arise from the operation, maintenance, accidents, incidents and non-conformances at the Installation.

The management system and supporting procedures are applicable to all staff, contractors and visitors. Written procedures clearly describing responsibilities, actions and communication channels are available for operational personnel dealing with emergencies.

Internal reviews of the management system (or relevant parts therein) are undertaken at least on an annual basis or in the event of a change in operations / site processes.

Internal audits are undertaken to ensure compliance with the management system, the relevant legal requirements, the environmental and management performance and to identify preventative / corrective actions to minimise the risk of a breach / non-compliance. The findings of such reviews and audits are communicated to all staff and relevant external contractors and, where appropriate, improvement works / corrective actions are implemented. All internal reviews, audits, amendments to the management system and implemented improvement measures are recorded for reference and inspection purposes.

3.5 General Maintenance

The operator has appointed an appropriately qualified contractor to carry out regular maintenance activities. The generators have a dedicated maintenance schedule, which has been incorporated into the overall maintenance plan for the Installation. The generators would be maintained to ensure optimum electrical efficiency and to minimise excessive emissions generation.

3.6 Raw Materials

The use of hazardous materials within the Installation has been eliminated by design where possible, and minimised where it is not practical to eliminate them.

The main raw material is the biodiesel used for firing the generators, which will be stored in the bunded fuel storage tanks which are integrated into the generator containers, containing up to 3,000 litres per generator.

Small quantities of hazardous materials, including maintenance chemicals (mainly oils), may be stored in appropriate storage areas. However, it is considered more likely that any materials required for maintenance works will be brought to site by the maintenance contractors and removed following completion of maintenance works.

3.7 Waste

Minor quantities of waste may be generated from maintenance works and will be stored in a dedicated storage area. Waste storage areas at the Installation have appropriate signage to mark containers of hazardous and non-hazardous waste are bunded.

All waste produced on site would be managed appropriately in line with the waste hierarchy and the Waste Framework Directive.

[4] Develop a management system: Environmental Permits, EA, Published: 1 February 2016, Last updated: 20 April 2021, available online at: https://www.gov.uk/guidance/develop-a-management-system-environmental-permits, accessed on 07th July 2021

4. Environmental Risk Assessment

EA guidance [5], requires an assessment of the emissions to air to support an MCP application if it requires a Bespoke permit application (i.e. not a Standard Rules permit) and meets the following screening criteria:

- < 2 km from a designated Site of Special Scientific Interest (SSSI) for any fuel; and
- < 5 km from a designated Special Protection Area (SPA), Special Area of Conservation (SAC) or Ramsar site if the fuel is natural gas or low sulphur diesel.

There is one SPA, SACs and Ramsar site identified within 5km of the Installation and three SSSIs within 2km of the Installation. Table 4-1 lists the ecologically sensitive sites identified within the screening distances, and their locations are shown on Figure 3 (see Appendix A).

Table 4-1. Sensitive Ecological Receptors within Screening Distance of the Installation

Receptor ID	Receptor Name	Type of Receptor	Distance from the Installation (km) and Direction
E1	Hayes Point to Bendrick Rock	SSSI	0.2km Southwest
E2	Cog Moors	SSSI	1.2km Northeast
E3	Sully Island	SSSI	1.9km Southeast
E3	Severn Estuary (at Sully Island)	Ramsar, SPA	1.9km Southeast
E4	Severn Estuary	SAC	4.1km East

The MCP Directive requires an assessment of emissions to air only, therefore only these have been addressed in this application. No emissions from the generators to water, sewer or land have been assessed.

4.1 H1 Assessment Methodology

According to the EA's Risk Assessment Guidance, it is possible to screen out "insignificant" emissions and those emissions where further assessment is not required, based on the National Air Quality Standard (AQS) objectives for each pollutant.

Screening of the emissions is achieved by applying the simplified dispersion factors contained within the EA's H1 Access database tool to the emissions from the Installation. These dispersion factors are applied, based on the effective stack height of each emission source and are used to estimate the ground level concentration per unit release of pollutant.

The effective stack height for the emergency generators has been assumed to be zero metres, as defined in the EA's Risk Assessment methodology, which states that where stacks are less than three metres above the height of the building they are located, the effective stack height is zero. Each of the emergency generators has a dedicated exhaust which is located on the top of the generator housing, with no stack as such.

In order to determine the significance of the emissions from the emergency generators to air, the EA's Risk Assessment Methodology details NAQS objectives for numerous pollutant species that can be released from process activities. The pollutant species that have been assessed for the generators include:

- Nitrogen oxides (NOx);
- Carbon monoxide (CO); and
- Particulates (PM_{10})

[5] Medium combustion plant: apply for an environmental permit, EA, Published: 15 July 2019, Last updated: 4 October 2019, available online at: https://www.gov.uk/guidance/medium-combustion-plant-apply-for-an-environmental-permit

The current EA's Risk Assessment methodology includes NAQS objectives for NO_2, PM_{10} and CO emissions for the protection of human health; with separate Critical Levels in place for NOx impacts at ecological sites.

The NAQS objectives and Critical Levels are referred to as Environment Assessment Levels (EALs) within the H1 methodology and screening tool (and therefore throughout the remainder of this section). The EALs relevant to the assessment are shown in Table 4-2.

Table 4-2: EALs Relevant to the Assessment

Pollutant	EAL (µg/m^3)	Averaging Period	Not to be Exceeded More Than
Nitrogen dioxide (NO_2)	40	Annual	Not applicable
	200	1-hour	18 times per year (i.e. 99.79th percentile of hourly results)
Oxides of Nitrogen (NOx)	30	Annual	Not applicable
	75	24-hour	100th percentile
Particulate matter (PM_{10})	40	Annual	Not applicable
	50	24-hour	35 times per year (i.e. 90.4th percentile of daily results)
Particulate matter ($PM_{2.5}$)	20*	Annual	Not applicable
Carbon monoxide (CO)	30,000	1-hour	Not applicable
	10,000	8-hour (running mean)	Not applicable

The predicted ground-level PCs calculated within the H1 tool have been compared against the relevant EALs, to determine the significance of the long-term and short-term impacts from the emergency generators. The significance of impacts has been assessed following the EA's Risk Assessment guidance criteria as summarised below.

4.1.1 First Stage of Screening of Emissions

The total Process Contribution (PC) is defined as having an "insignificant" impact where:

- PC <= 1% of the EAL for long term releases; and
- PC <= 10% of the EAL for short term releases.

4.1.2 Second Stage of Screening of Emissions

For those PCs not screened as "insignificant" at the first stage of screening, an estimate of the predicted environmental concentration (PEC) is made, by adding the PC to an appropriate estimate of the background concentration, where the short-term background concentration is assumed to be represented by twice the annual mean background concentration. The PEC can then be compared with the appropriate EAL to determine whether the emission could result in exceedance of an EAL.

The PEC is defined as having an "insignificant" impact where:

- PEC < 70% of the EAL for long term releases; and
- PC < 20% of the short-term EAL minus twice the long-term BC for short term releases.

4.2 H1 Assessment Inputs

The emission concentration data used in the H1 screening assessment was provided by Bakelite for the Perkins Series 2506A-E15TAG2 Diesel Engines, and the release airflow rates and temperatures have been taken from the appropriate Engine datasheet. The emissions included in the assessment are shown in Table 3-2.

No other site sources of emissions have been considered in the H1 assessment, on the advice of Natural Resources Wales, as these have previously been assessed and are considered to be insignificant.

The scenarios assessed are:

Short-term Impacts

Short-term impacts have been based on the two emergency generators operating at 110% load together and assuming continuous operation throughout the year. It is understood that the generators will only be tested together once per year for a maximum of two hours.

Long-term Impacts

It is understood that one emergency generator will be tested each month for 30 minutes, with alternate generators tested each month. On this basis (and including the two hours test detailed for short-term impacts), each generator will be tested for a maximum of five hours per year, or ten hours testing in total for the two emergency generators. The monthly testing will be carried out at 30% load.

For the purpose of the H1 assessment, the annual average concentration has been factored to take account of the maximum 10 hours operation per year, although this has been assumed to be 10 hours for each generator, in order to be conservative.

4.3 H1 Assessment Results

The completed H1 Access electronic database is included in Appendix C. A summary of the results is provided in Table 4-3 and Table 4-4.

Table 4-3: H1 Assessment Results – 1st Stage of Screening

Substance	Long Term NAQS (µg/m³)	Short Term NAQS (µg/m³)	Long Term			Short Term		
			PC (µg/m³)	% PC of NAQS	>1% of NAQS	PC (µg/m³)	% PC of NAQS	>1% of NAQS
Nitrogen dioxide (human health)	40	200	0.31	0.8%	No	2,752	1,376	**Yes**
Oxides of nitrogen (NOx) (ecological receptors)	30	75	0.44	1.5%	**Yes**	7,862	10,483	**Yes**
Carbon monoxide	-	10,000	-	-	-	364	3.7%	No
Particulate (PM_{10})	40	50	0.002	0.005%	No	15.1	30.2%	**Yes**

It can be seen from Table 4-3 that long-term impacts of NO_2 and PM_{10} can be screened out from requiring further assessment as being "insignificant" at the first stage of screening, as can short-term impacts of CO.

Long- and short-term emissions of NOx and short-term impacts of PM_{10} cannot be screened as "insignificant" at the first stage of screening, and therefore have been carried through to the second stage.

The background concentrations of NO_2 and PM_{10} have been derived from the Defra background maps, produced for this purpose [6] for the location of the Installation (NGR 314500, 168500). The results of the second stage of screening are shown in Table 4-4.

Table 4-4: H1 Assessment Results – 2nd Stage of Screening

Substance	Backg'd Concn (µg/m³)	Long Term				Short Term		
		PC (µg/m³)	PEC (µg/m³)	% PEC of NAQS	>70% of NAQS	PC (µg/m³)	% PC of headroom (NAQS – Backg'd)	>20% PC of headroom
Nitrogen dioxide (human health)	14.2	-	-	-	-	2,752	1,604	**Yes**

[6] https://uk-air.defra.gov.uk/data/laqm-background-home

Substance	Backg'd Conc^{n} (µg/m^3)	Long Term				Short Term		
		PC (µg/m^3)	PEC (µg/m^3)	% PEC of NAQS	>70% of NAQS	PC (µg/m^3)	% PC of headroom (NAQS – Backg'd)	>20% PC of headroom
Oxides of nitrogen (NOx) (ecological receptors)	19.6	0.44	20.0	66.8	No	7,862	21,949	**Yes**
Particulate (PM_{10})	12.3	-	-	-	-	15.1	59.5	**Yes**

Table 4-4 shows that the long-term impacts of NOx for ecological receptors can be screened as not requiring any further assessment at the second stage, however the short-term NOx impacts for ecological receptors is over the 20% threshold. Given that the nearest ecological site to the Installation is 450m from the location of the emergency generators, and the conservative nature of the assessment assuming continuous operation for short term impacts, when actually routine testing will not occur for more than 2 hours, it would not be possible for the emergency generators to exceed the 24-hour NOx EAL at ecological receptors. It is also considered that no further assessment of NOx is required.

The short-term impacts show large potential exceedances of the NO_2 EAL and although exceedances are not predicted for PM_{10}, the % PC of the headroom is greater than the 20% threshold.

The hourly EALs for NO_2 and PM_{10} are National Air Quality Strategy objectives that are not to be exceeded for more than 18 and 35 times per year respectively. As the proposed testing regime for the generators is for only two hours, once per year, the hourly objectives for these species could not be exceeded during routine testing operations.

However, although the planned routine testing times are short, the emergency generators are designed to run for a finite short period when called upon for emergency purposes, with fuel supplies to enable 24-hour operation, if required. Back-up power has never been required at the Installation, as previously described, and therefore it is considered highly unlikely that the emergency generators would be required to be run for this purpose. However, the safety critical nature of the operations carried out at the Installation, requires the provision of a back-up supply.

On the basis of the H1 assessment carried out and given the very short proposed run times, the relatively small size of the generators, their location within the centre of the Installation compared to the location of actual receptors, it is not considered necessary to carry out detailed dispersion modelling to support this application.

Appendix A - Figures

Figure 1 – Site Location

Figure 2 – Installation Boundary and Generator Location

Figure 3 - Location of Receptors

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LEGEND
Site Operational Boundary

NOTES

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60679876

SHEET TITLE
Site Location

SHEET NUMBER
Figure 1

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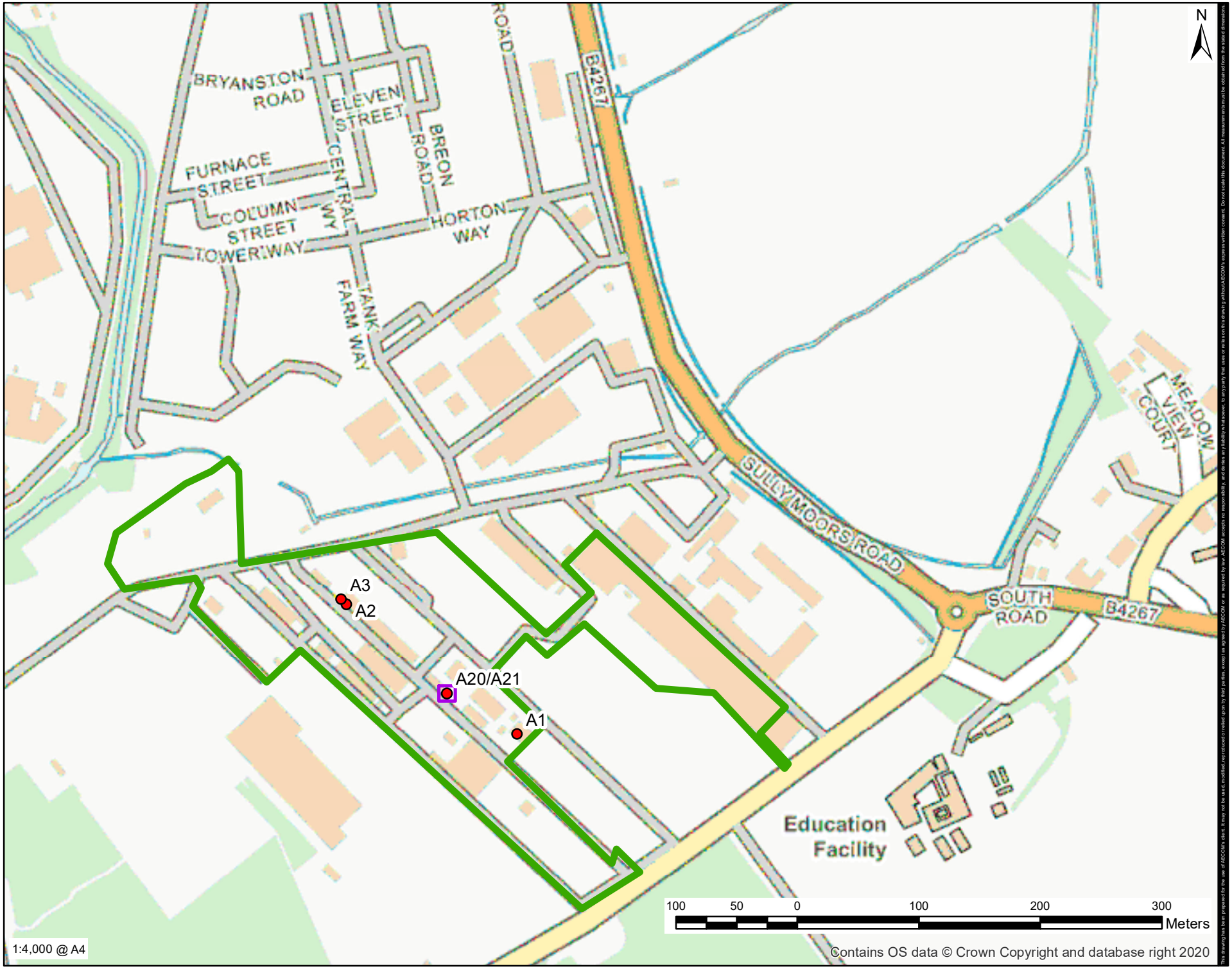

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LEGEND
- Source
- Emergency Generators Location
- Site Operational Boundary

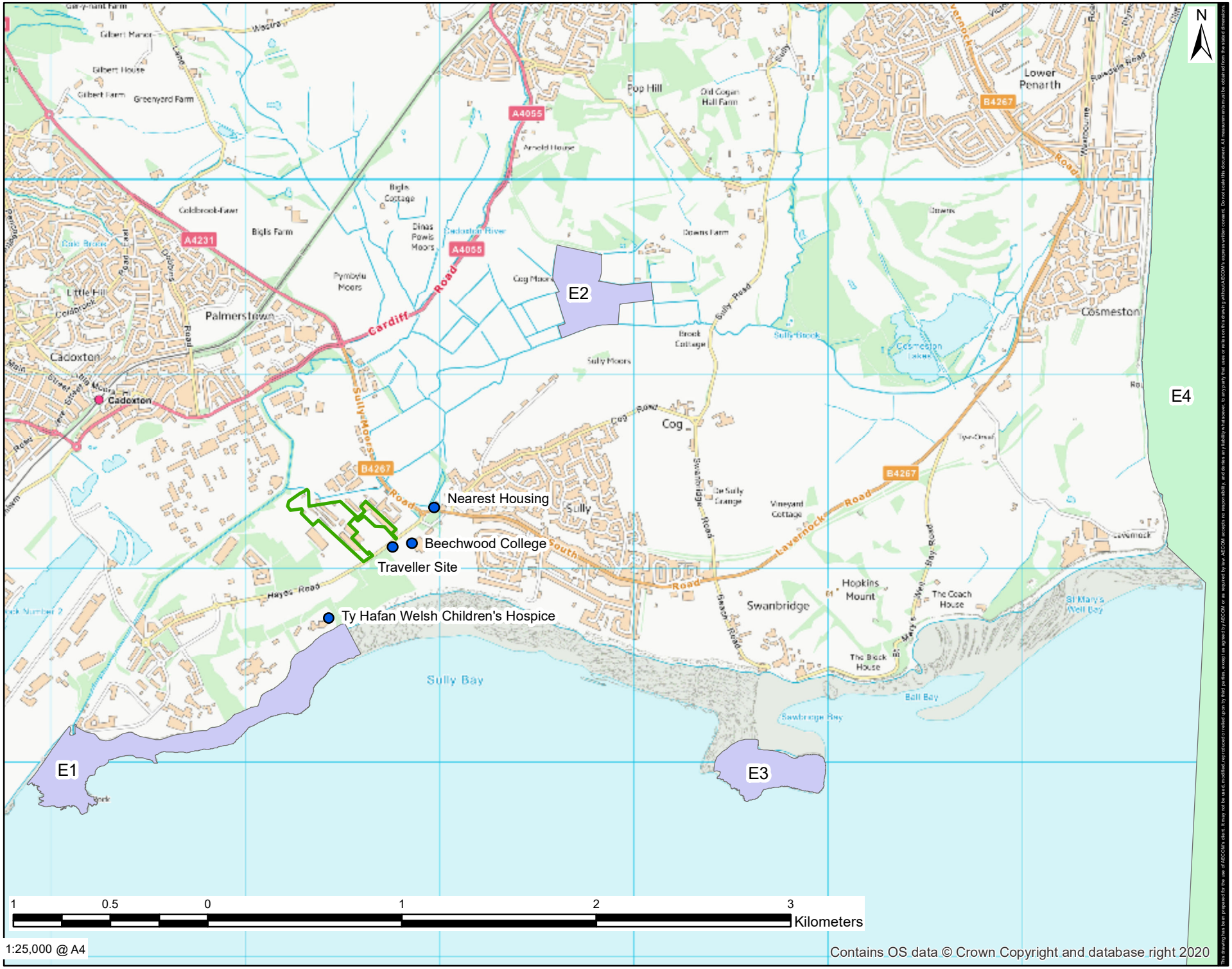
NOTES

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60679876

SHEET TITLE
Installation Boundary and Emission Point Location

SHEET NUMBER
Figure 2



Revision: Rev No. Drawn: EU Checked: HWApproved: MWDate: 06/04/2022

Filename: C:\Users\elisa.uginet\Documents\Bakelite\BakeliteFig3.mxd

AECOM

PROJECT
Environmental Permit Variation Application

CLIENT
Bakelite Synthetics UK Limited

CONSULTANT
AECOM Limited
12 Regan Way
Chetwynd Business Park
Chilwell
Nottingham, NG9 6RZ
www.aecom.com

LEGEND
- Human Health Receptor
- SSSI
- SAC
- Site Operational Boundary

NOTES

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60679876

SHEET TITLE
Sensitive Receptors

SHEET NUMBER
Figure 3

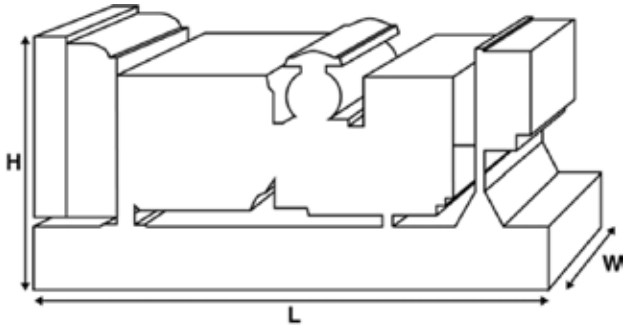
Appendix B - Engine Data Sheet

P550-3_SA

Output Ratings

Voltage, Frequency		Prime	Standby
400/230 V, 50 Hz	kVA	500	550
	kW	400	440
	kVA		
	kW		

Ratings at 0.8 power factor.
Please refer to the output ratings technical data section for specific generator set outputs per voltage.



Dimensions and Weights

Length	mm	3800 (149.6)
Width	mm	1131 (44.5)
Height	mm	2215 (87.2)
Weight (Dry)	kg	3641 (8027)
Weight (Wet)	kg	3699 (8155)

Ratings in accordance with ISO 8528, ISO 3046, IEC 60034, BS5000 and NEMA MG-1.22.
Generator set pictured may include optional accessories.

Prime Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation to the annual hours of operation and this model can supply 10% overload power for 1 hour in 12 hours.

Standby Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The alternator on this model is peak continuous rated (as defined in ISO 8528-3).

Standard Reference Conditions

Note: Standard reference conditions 25°C (77°F) Air Inlet Temp, 100m (328 ft) A.S.L. 30% relative humidity.
Fuel consumption data at full load with diesel fuel with specific gravity of 0.85 and conforming to BS2869: 1998, Class A2.

FG Wilson offer a range of optional features to allow you to tailor our generator sets to meet your power needs.
Options available include:

- Upgrade to CE Certification
- A wide range of Sound Attenuated Enclosures
- A variety of generator set control and synchronising panels
- Additional alarms and shutdowns
- A selection of exhaust silencer noise levels

For further information on all of the standard and optional features accompanying this product please contact your local Dealer or visit:

www.fgwilson.com

P550-3_SA

Ratings and Performance Data

Engine Make		Perkins	
Engine Model:		2506A-E15TAG2	
Alternator Make		FG Wilson	
Alternator Model:		FG29A400	
Control Panel:		FG100	
Base Frame:		Heavy Duty Fabricated Steel	
Circuit Breaker Type:		3 Pole MCCB	
Frequency:		50 HZ	60 HZ
Engine Speed: RPM	rpm	1500	
Fuel Tank Capacity:	litres (US gal)	888 (234.58)	
Fuel Consumption Prime	litres (US gal)/hr	97.2 (25.7)	
Fuel Consumption Standby	litres (US gal)/hr	107.4 (28.4)	

Engine Technical Data

No. of Cylinders		6
Alignment		IN LINE
Cycle		4 STROKE
Bore	mm (in)	137 (5.4)
Stroke	mm (in)	171 (6.7)
Induction		TURBOCHARGED AIR TO AIR CHARGE COOLED
Cooling Method		WATER
Governing Type		ELECTRONIC
Governing Class		ISO 8528 G2
Compression Ratio		16.0:1
Displacement	L (cu. in)	15.2 (927.6)
Moment of Inertia:	kg m^2 (lb/in^2)	4.29 (14660)
Voltage		24
Ground		Negative
Battery Charger Amps		70
Engine Weight Dry	kg (lb)	1633 (3600)
Engine Weight Wet	kg (lb)	1714 (3779)

Engine Performance Data		50 Hz	60 Hz
Engine Speed	rpm	1500	
Gross Engine Power Prime	kW (hp)	451 (605)	
Gross Engine Power Standby	kW (hp)	495 (664)	
BMEP Prime	kPa (psi)	2405 (346)	
BMEP Standby	kPa (psi)	2640 (379.8)	

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Fuel System

Fuel Filter Type:			Replaceable Element		
Recommended Fuel:			Class A2 Diesel		
Fuel Consumption at		110 % Load	100 % Load	75 % Load	50 % Load
50 Hz Prime:	l/hr (US gal/hr)	107.4 (28.4)	97.2 (25.7)	73.6 (19.4)	52.8 (13.9)
50 Hz Standby	l/hr (US gal/hr)	-	107.4 (28.4)	80.3 (21.2)	56.9 (15)
60 Hz Prime	l/hr (US gal/hr)				
60 Hz Standby	l/hr (US gal/hr)	-			

(Based on diesel fuel with a specific gravity of 0.82 and conforming to BS2869 classA2,EN590

Air System

		50 Hz	60 Hz
Air Filter Type:		Non Canister	
Combustion Air Flow Prime	m^3/min (cfm)	35.8 (1264)	
Combustion Air Flow Standby	m^3/min (cfm)	36.6 (1293)	
Max. Combustion Air Intake Restriction	kPa	6.2 (24.9)	

Cooling System

		50 Hz	60 Hz
Cooling System Capacity	l (US gal)	58.1 (15.3)	
Water Pump Type:		Centrifugal	
Heat Rejected to Water & Lube Oil: Prime	kW (Btu/min)	147 (8360)	
Heat Rejected to Water & Lube Oil: Standby	kW (Btu/min)	165 (9383)	
Heat Radiation to Room*: Prime	kW (Btu/min)	56.2 (3196)	
Heat Radiation to Room*: Standby	kW (Btu/min)	62.5 (3554)	
Radiator Fan Load:	kW (hp)	13.7 (18.4)	
Radiator Cooling Airflow:	m^3/min (cfm)	476.4 (16824)	
External Restriction to Cooling Airflow:	Pa (in H2O)	125 (0.5)	

*: Heat radiated from engine and alternator
Designed to operate in ambient conditions up to 50°C (122°F).
Contact your local FG Wilson Dealer for power ratings at specific site conditions.

Lubrication System

Oil Filter Type:		Eco, Full Flow
Total Oil Capacity:	l (US gal)	62 (16.4)
Oil Pan Capacity:	l (US gal)	53 (14)
Oil Type:		API CI4 15W-40
Oil Cooling Method:		WATER

Exhaust System

		50 Hz	60 Hz
Maximum Allowable Back Pressure:	kPa (in Hg)	6.8 (2)	
Exhaust Gas Flow: Prime	m^3/min (cfm)	94 (3320)	
Exhaust Gas Flow: Standby	m^3/min (cfm)	98 (3461)	
Exhaust Gas Temperature: Prime	°C (°F)	500 (932)	
Exhaust Gas Temperature: Standby	°C (°F)	550 (1022)	

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Alternator Physical Data

No. of Bearings:	1
Insulation Class:	H
Winding Pitch:	2/3
Winding Code	R1
Wires:	12
Ingress Protection Rating:	IP21
Excitation System:	SHUNT
AVR Model:	A106 MKII

* dependant on voltage code selected

Alternator Operating Data

Overspeed: rpm		2250
Voltage Regulation: (Steady state)	%	+/- 1.0
Wave Form NEMA = TIF:		50
Wave Form IEC = THF:	%	2
Total Harmonic content LL/LN:	%	3
Radio Interference:		EN61000-6
Radiant Heat: 50 Hz	kW (Btu/min)	27.5 (1564)
Radiant Heat: 60 Hz	kW (Btu/min)	

Alternator Performance Data 50 Hz:

Voltage Code		415/240 V	400/230 V	380/220 V	
			230 V		
Motor Starting Capability*	kVA	1115	1030	950	
Short Circuit Capacity**	%	300	300	300	300
Reactances	Xd	3.317	3.571	3.759	
	X'd	0.122	0.131	0.138	
	X"d	0.118	0.118	0.124	

Alternator Performance Data 60 Hz

Voltage Code						
Motor Starting Capability*	kVA					
Short Circuit Capacity**	%	300	300	300	300	300
Reactances	Xd					
	X'd					
	X"d					

Reactances shown are applicable to prime ratings.

*Based on 30% voltage dip at 0.6 power factor.

** With optional independant excitation system (PMG / AUX winding)

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Output Ratings 50 Hz

	Prime		Standby	
Voltage Code	kVA	kW	kVA	kW
415/240V	500	400	550	440
400/230V	500	400	550	440
380/220V	475	380	546.3	437.04
230/115V	500	400	550	440
220/127V				
220/110V				
200/115V				
240V				
230V				
220V				

Output Ratings 60 Hz

	Prime		Standby	
Voltage Code	kVA	kW	kVA	kW
480/277V				
440/254V				
416/240V				
400/230V				
380/220V				
240/139V				
240/120V				
230/115V				
220/127V				
220/110V				
208/120V				
240/120				
220/110				

P550-3_SA

Dealer Contact Details

Documentation

Operation and maintenance manual including circuit wiring diagrams.

Generator Set Standards

The equipment meets the following standards: BS5000, ISO 8528, ISO 3046, IEC 60034, NEMA MG-1.22.

Warranty

The warranty for this product in prime applications is 12 months from date of start-up, unlimited hours (8760).
For standby applications the warranty period is 24 months from date of start-up, limited to 500 hours per year.

FG Wilson manufactures product in the following locations:
Northern Ireland • Brazil • China • India
With headquarters in Northern Ireland, FG Wilson operates through a Global Dealer Network.
To contact your local Sales Office please visit the FG Wilson website at www.fgwilson.com.

Appendix C – H1 Assessment Tool

(Software)

Appendix D – List of Relevant Company Personnel (Active Only)

Bakelite Synthetics UK Limited

Company number: 00867053

Registered Office Address: Bakelite Synthetics Sully Moors Road, Sully, Penarth, Wales, CF64 5YU

Date Incorporated: 20 December 1965

Details of Relevant Persons (Active only)

Name (Last name, First name)	Designation	Date of Birth	Appointed on
Boninsegni, Laura	Secretary		30 April 2021
Aucoin, Jean-Paul	Director	July 1971	1 November 2017
Baker, John Vincent	Director	July 1963	1 February 2011
Brueren, Rob Jacobus Johannes Joseph	Director	October 1967	30 April 2021
Hynes, Christopher Douglas	Director	October 1971	30 April 2021
Welfoot, Julian St John	Director	July 1976	30 April 2021

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