The Island Site

Air Quality Verification Report

Bowmer + Kirkland

Job No:	1020044
Doc ref:	TIS-CDL-ZZ-XX-RP-AQ-40201
Revision:	P03
Revision date:	22 October 2024

Project title	The Island Site	**Job number**
Report title	Air Quality Verification Report	1020044

Document revision history.

Revision ref	Issue date	Purpose of issue / description of revision
P01	27 August 2024	Initial Draft For Team Comments
P02	05 September 2024	Final Issue
P03	22 October 2024	Regulatory Amendments

Document validation (latest issue)

22/10/2024	22/10/2024	22/10/2024
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Executive summary

Cundall has been requested to assist in the discharge of Planning Condition 13b in support of the redevelopment of Land Bounded by John Dalton Street, Ridgefield, Bow Street And South King Street, Manchester, which has been granted approval for the planning application, Ref 130553/FO/2021[2]. The condition states that:

'Prior to occupation of the development any agreed mitigation measures shall be implemented and verified as such in writing by the City Council as local planning authority and shall remain in situ whilst the use or development is in operation.'

The condition has been imposed to secure a reduction in air pollution from traffic or other sources in order to protect existing and future residents from air pollution, pursuant to policies EN16, SP1 and DM1 of the Core Strategy.

A ventilation strategy has been set out which demonstrates that building will be mechanically ventilated, with fresh air being drawn into the building from via risers extended to roof top level. The building management system has the ability to switch to natural ventilation during occupied periods as part of a strategy to meet Manchester City Council's Net Zero Carbon target by 2038. The use of natural ventilation will reduce heating, ventilation and air conditioning operating periods and hence energy and carbon consumption. The system also offers the benefit of providing out of hours purge ventilation. For ground floor shell and core spaces, future tenants will be responsible for providing adequate filtration, odour and noise control to suit their fit-out and to discharge any planning conditions imposed on their fit-out with reference to EMAQ Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (2018). For the office floors, particulate filters have been incorporated into the air handling units. The specification for MERV13/F7 type filters would typically reduce PM_{10} by 80% and $PM_{2.5}$ by 65%, delivering levels of <5 ug/m^3 $PM_{2.5}$ and <10 ug/m^3 PM_{10}. Not only will this meet Manchester City Council's current health targets, but also the more aspirational WHO targets, thereby helping to fulfil pledges made as part of the regional BreathLife initiative. Filter performance will be monitored using the Building Management System and by regular inspection, with pressure drops across the filters being used to trigger remedial action. This could include cleaning or replacement of filters; the filter maintenance specification document is appended to this report.

A life safety generator has been included to provide emergency power during incidents such as fires, in order to assist with building evacuation. The location of the generator and emissions point on the north east of the building has been optimised to aid dispersion of any emissions away from the building as prevailing winds for the local area are typically south and south westerly. The life safety generator will only ever run in a real-life emergency or in test scenarios. During a real-life emergency, the AHU is automatically shut down with dampers closed, so there will be no ingress of emissions into the building. For routine testing, there will be a monthly and annual testing regime put in place, with 3rd party maintenance every 6 months. Any testing of the life safety generator will be undertaken during daytime hours only (Monday to Friday 10:00 to16:00) without the air handling unit in operation.

Space provision has been made for a future tenant generator at ground level, with the flue discharging 2.7-3.6 m above ground level on the eastern façade. It is anticipated that any air quality impacts and specific planning requirements of future installations will be addressed by the future tenant once further details are known.

Measures to reduce transport related emissions have been incorporated into the design of the development. No car parking has been allocated on-site, thereby minimising vehicle emissions. Additional measures have been included to improve facilities for walking and cycling including new pedestrian areas and secure cycle parking and facilities for cyclists provided within the basement. A travel plan has been submitted to monitor and encourage the use of sustainable transport modes by end users, and this will be maintained throughout the lifetime of the development.

In conclusion, this report has examined potential sources of pollution with potential to impact existing and users, including existing transport and point sources surrounding the development, impacts of combustion sources and operation phase traffic generation. Mitigation measures to reduce air pollution impacts during the lifetime of the development have been outlined, thereby fulfilling the requirements of Planning Condition 13b. It is therefore recommended that this condition can now be fully discharged.

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1.0

Introduction

1.0 Introduction

1.1 Purpose of Report

Cundall have prepared and submitted an Air Quality Assessment Report[1] in support of a proposed development for Land Bounded by John Dalton Street, Ridgefield, Bow Street And South King Street, Manchester. Following approval of the planning application by Manchester City Council (Ref 130553/FO/2021[2]), construction of the proposed development is now nearing completion, and several planning conditions must be discharged prior to occupation. These include Planning Condition 13, of which Part B stipulates that:

'Prior to occupation of the development any agreed mitigation measures shall be implemented and verified as such in writing by the City Council as local planning authority and shall remain in situ whilst the use or development is in operation.'

Reason: To secure a reduction in air pollution from traffic or other sources in order to protect existing and future residents from air pollution, pursuant to policies EN16, SP1 and DM1 of the Core Strategy.

This report has been compiled in support of discharge of the above planning condition.

1.2 Development Overview

Planning permission has been provided for demolition of the existing buildings and structures and the erection of a 10-storey plus basement office building (Use Class E(g)), with flexible ground floor and basement uses (Use Class E) and a rooftop garden, works to facilitate the pedestrianisation of the southern part of Ridgefield and other associated works.

The site extends to approximately 0.13 hectares and is located at the heart of Manchester City Centre. The site comprises a rectangular block of buildings bound by John Dalton Street to the south, South King Street to the north, Bow Street to the east and Ridgefield to the west. Three existing buildings are located within the site boundary comprising:

- Old Colony House (25,968 square feet), a vacant 7 storey building comprising office accommodation with a vacant former restaurant at ground floor level. The building fronts onto South King Street;
- 5 Ridgefield (11,748 square feet), a 3-storey building comprising a former restaurant use at basement and ground floor level and vacant offices at first and second floors. The site fronts onto Ridgefield and Bow Street; and,
- Grange House (17,309 square feet), a 6-storey building comprising ground floor retail/restaurant/office use with vacant upper floors formerly in office use. The building fronts onto John Dalton Street.

The buildings vary in age and character and are no longer fit for purpose as office accommodation. A significant proportion of the accommodation is currently vacant and/or underutilised.

The site is located within the St Ann's Square Conservation Area and adjacent to the Albert Square Conservation Area. None of the buildings within the site are listed, see Figure 1-1.

[1] Land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester. Air Quality Assessment. See: https://pa.manchester.gov.uk/online-applications/files/40921EDBC4972B351240780D13B5B7E6/pdf/130553_FO_2021-AIR_QUALITY_ASSESSMENT-1704642.pdf. Accessed 23rd August 2024.

[2] 130553/FO/2021 Demolition of the existing buildings and structures and the erection of a 10-storey plus basement office building (Use Class E(g)), with flexible ground floor and basement uses (Use Class E) and rooftop amenity space, works to facilitate the pedestrianisation of the southern part of Ridgefield and other associated works. See https://pa.manchester.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=QTPZ57BCHJ100. Accessed 23rd August 2024.

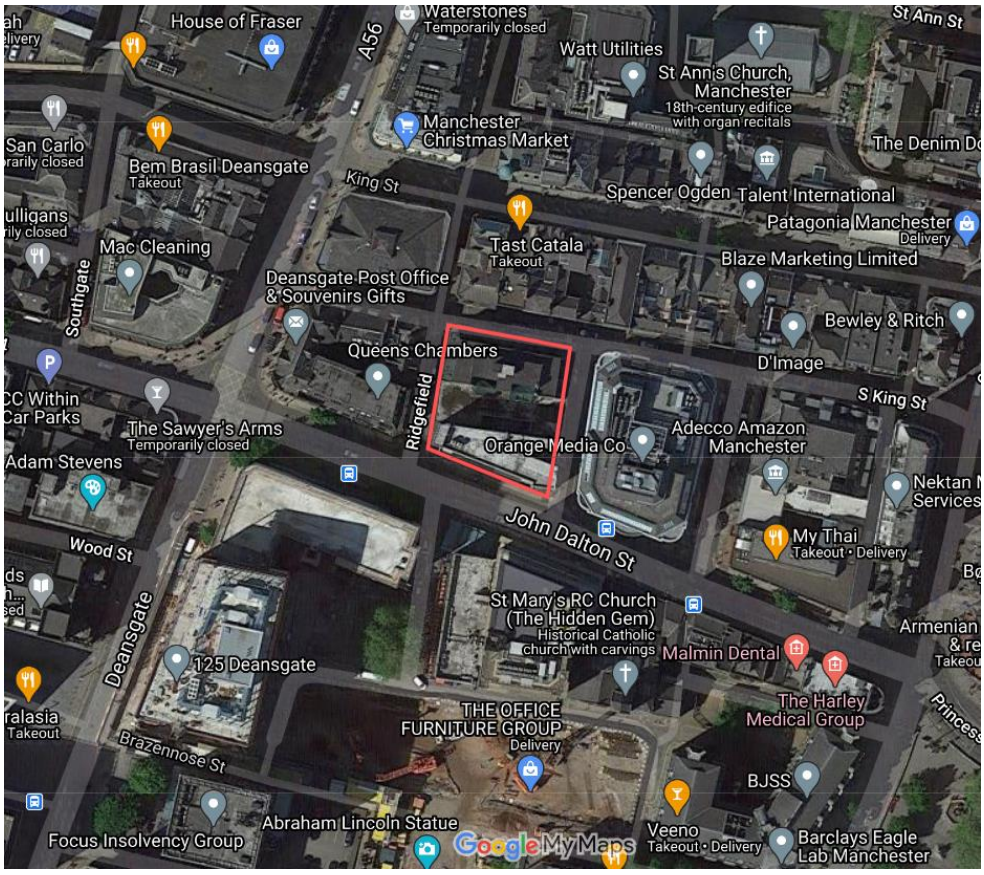


Figure 1-1: Location of the Development Site (Courtesy of Google Maps)

In summary, the proposals include:

- The demolition of three existing buildings; Grange House, 5 Ridgefield and Old Colony House
- Erection of a 10-storey plus basement office building (Use Class E(g)), with flexible ground floor and basement uses (Use Class E) and a rooftop garden.
- Basement level: Bikes, WCs, showers, changing facilities, lockers, drying room, support space (office back of house (BOH)) and multifunctional amenity space (exact type to be confirmed) and plant space.
- Ground level: Open plan entrance with reception to include main reception and 2 no. units (potentially single operator for the whole ground floor space) Space to be highly flexible and vibrant with blurred boundaries between users.
- Levels 1-8: Workspace with associated CAT A Mechanical and Electrical plant line of demise

1.3 Summary of Key Factors Relating to Air Quality

The air quality assessment[3] undertaken in support of the original planning application noted that the development lies within Greater Manchester's Air Quality Management Area (AQMA), which was declared due to exceedances of the annual mean nitrogen dioxide (NO_2) objective, and that existing conditions within the study area indicate that there is potential for nitrogen dioxide (NO_2) concentrations in the wider area to exceed the National Air Quality Objective threshold levels.

Air quality conditions for future site users of the development were provided within the assessment report and are summarised as follows:

[3] Cundall (2021) Land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester, Air Quality Assessment, Ref: TIS-CDL-ZZ-XX-RP-AQ-40220-AQAvD, Revision D, 9th June 2021

- 2019 Modelled NO_2: <30 µg/m^3; 2019 monitored 40.8 µg/m^3;
- 2019 modelled PM_{10}: <14 µg/m^3 and monitored PM_{10}: <31 µg/m^3;
- 2019 modelled $PM_{2.5}$: <9 µg/m^3 and monitored $PM_{2.5}$ <13 µg/m^3;

Note that there have been general UK improvements in air quality since 2019 delivered by the implementation of progressive reductions in engine emissions, and these concentrations are therefore likely to be representative of 'worst-case' conditions. The assessment indicated that there is potential for slight exceedances of annual mean NO_2 concentrations at building facades at ground floor level, and in particular on the southern façade, John Dalton Street, A34.

Manchester City Council in their planning response highlighted that Mechanical Ventilation with Heat Recovery (MVHR) intakes should be positioned away from the busier road (John Dalton Street) and highlighted the requirement for flues to terminate at least 1m above the eaves level and/or any openable windows/ventilation intakes of nearby properties. The requirement for internal ducting in risers that terminate at roof level was also highlighted. It was requested that flue discharge points for any diesel generators should be located at roof level, and at least 1m above the parapet.

A site visit was undertaken on 1st August 2024 to collect background information to support the compilation of this Air Quality Verification Report.

1.4 Scope of Report

The Verification Report examines potential sources of pollution with potential to impact existing and future residents, including existing transport and point sources surrounding the development, impacts of combustion sources within the development, and operation phase traffic generation; it sets out how mitigation measures, including the building ventilation strategy, will be applied and maintained throughout the lifetime of the development to minimise impacts on existing receptors and end-users of the development.

2.0

Building Ventilation Strategy

2.0 Building Ventilation Strategy

2.1 Overview

This section is reproduced from the Building Ventilation and Maintenance Strategy[4] and Control Systems BMS Technical Submittal for The Island, Manchester[5]. The ventilation strategy has been designed in accordance with the requirements of the Building Regulations Approved Document F and associated CIBSE guidance documents and provides an overview of design features for the new building, including central plant, Cat A office floors, future office fit-out Cat B allocations, back of house (BOH) strategies, and the anticipated future fitout of retail / commercial shell and core units.

The office areas are served by Landlord plant, with primary ductwork routed within service risers located around the core. The plant and distribution ductwork are split to reflect the potential two tenant split on each floor. A typical core layout is shown in Figure 2-1.

In addition to Landlord risers there are dedicated tenant risers provided, which offer flexibility for future tenants to install additional ventilation systems as part of the CAT B fit-out, which may include supplementary ventilation systems, kitchen extracts systems etc.

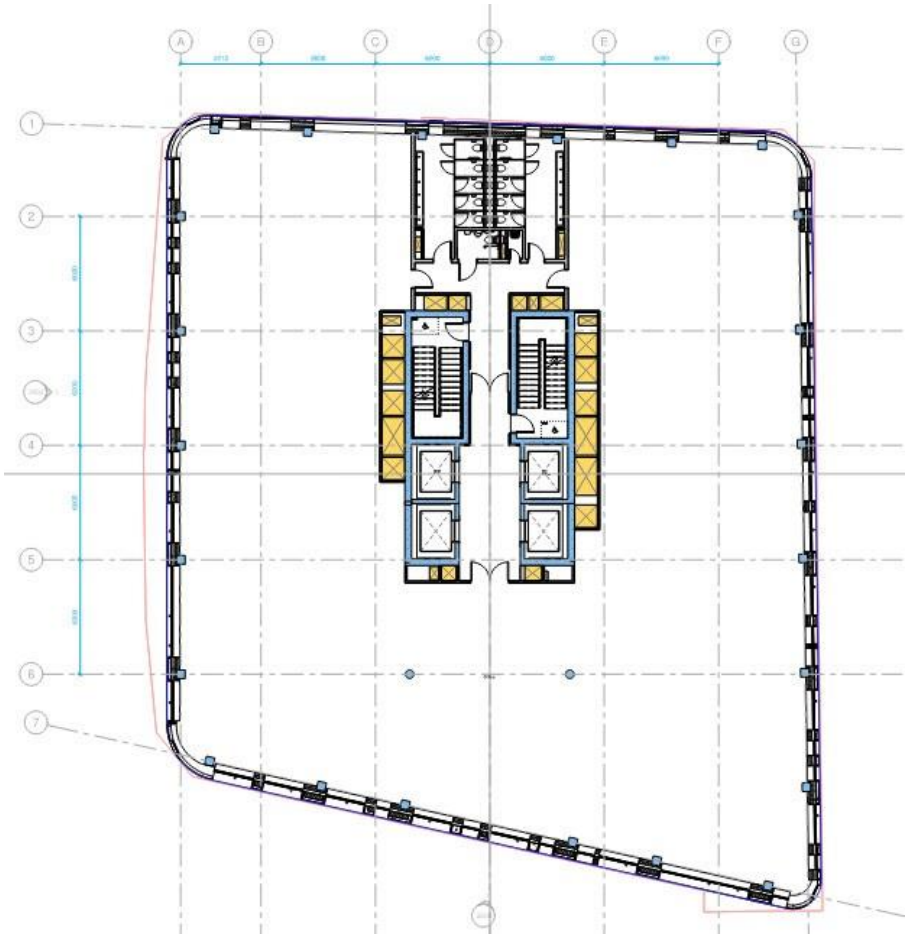


Figure 2-1: Typical Office Core

[4] Land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester. Ventilation and Maintenance Strategy. Cundall (January 2022)

[5] Technical Submission for Control System BMS. NG Bailey (29/09/2023)

2.2 Office Strategy

2.2.1 Overview

The office will be mechanically ventilated and has the ability to use natural ventilation during occupied periods as part of a strategy to meet Manchester City Council's Net Zero Carbon target by 2038. The use of natural ventilation will reduce Heating, Ventilation and Air Conditioning (HVAC) operating periods and hence energy & carbon consumption. The system also offers the benefit of providing out of hours purge ventilation as well.

Either way, the fresh air requirements set out in Building Regulations and British Council for Offices (BCO) can be met by the mechanical ventilation system and the windows can remain closed to suit tenant preferences.

2.2.2 Landlord Plant

Mechanical supply & extract ventilation to the building is provided via 5 No. packaged Air Handling Units (AHUs), 4No. located within the screened plant area at main roof level and 1No. in the basement level.

The ventilations zones are as follows:

- Level 9: Office (alternatively will form part of Level 1-8 Office East ventilation system)
- Level 1-8: Office East
- Level 1-8: Office West
- Basement amenity and 2No. units at ground level
- Basement bikes, WCs, showers, changing facilities, lockers, drying room (Air Handling Unit (AHU) in the basement)

Separation between intake and discharge to and from plant has been maximised to prevent re-circulation.

Ventilation risers are incorporated into the primary core design to allow fresh air supply and extract ductwork to be routed from roof level and down the building to serve each tenant demise on each office floor, ground and basement level.

The systems are designed to deliver fresh air and minimise internal pollutants (and ingress of external polluted air into the building). The office systems are to be designed to achieve as the recommended BCO flow rates.

2.2.3 Office Floors Plates

Within the office areas a hybrid system of mechanical ventilation and opening windows will be adopted to maintain the internal conditions. Feedback indicators located in the office space will provide notification when occupants can utilise the windows to assist with the ventilation.

Fresh air supply will be delivered into each tenant demise on each office floor via Variable Air Volume (VAV) control dampers to allow a variable air volume to maintain the desired CO_2 levels. Balanced extract to the roof AHUs is provided via core risers.

Fresh, filtered, air will be drawn in from roof level and delivered to the back of the Fan Coil Units (FCUs) mounted at high level within ceiling voids or within exposed soffit areas.

2.2.4 Tenant Plant

To facilitate future Cat B fit-outs, dedicated riser and plant space has been allocated within the scheme to allow office tenants to install supplementary ventilation plant to serve their demise such as:

- 1No. tenant to have full kitchen / restaurant on any floor, located on the east elevation.
- 1No. tenant to have conference facilities at 8th floor only.

Tenants will be responsible for obtaining permission for any additional ventilation/ cooking extraction systems required from the Environmental Health team at Manchester City Council.

2.2.5 Particulate Filtration Requirements

Greater Manchester has confirmed its commitment to tackling air pollution by becoming the UK's first member of the World Health Organisation (WHO), Climate and Clean Air Coalition, and UN Environment-led 'BreatheLife' cities network – with a pledge to meeting strict WHO air quality targets by 2030[6].

As such, the development is targeting a reduction of particulate matter to the following thresholds:

- PM_{10}- annual mean 20g/m^3 (current WHO interim target, aspirations to eventually reduce to 15 µg/m^3)
- $PM_{2.5}$-annual mean 10ug/m^3 (current WHO interim target, aspirations to eventually reduce to 5 µg/m^3)

The air quality assessment[3] submitted in support of the planning application concluded that particulate concentrations outside the building were likely to fall between the following concentrations[1]:

- PM_{10}- annual mean 14-31ug/m^3
- $PM_{2.5}$-annual mean 9-13ug/m^3

MERV13/F7 type filters would typically reduce PM_{10} by 80% and $PM_{2.5}$ by 65%, delivering levels of <5 ug/$m^3$$PM_{2.5}$ and <10ug/m^3 PM_{10}. Not only will this meet Manchester City Council's current health targets, but also the more aspirational WHO targets, thereby providing some level of future proofing. These filters have been specified for use within the development.

Operation and condition of the filters is typically inspected every 6 months. The pressure drop across filters is monitored via the Building Management System and an alarm will be raised once the set value is exceeded, triggering a requirement to clean/replace filters. A schedule for maintenance of the air quality filters is included within Appendix A.

For general day to day surveillance, monitoring of fine particulate concentrations (PM_{10} and $PM_{2.5}$ fractions) and also total volatile organic compounds (TVOCs) will be provided for the tenant areas, one per floor. Each unit will contain a display being fitted to advise the tenants of the air quality within each tenant area. The units will be powered from the BMS panel and communicate via a Modbus communications network.

The BMS will generate alarms for each tenant space if the concentrations of particulates exceed certain thresholds.

- Alarm level for PM_{10} will be set at 15 µg/m^3
- Alarm level for $PM_{2.5}$ will be set at 5 µg/m^3

In the event the BMS detects an alert, a critical alarm will be logged on the system supervisor so that appropriate remedial action can be taken. In addition, levels will be logged on the supervisor at 15 minute intervals and average values in rolling 24 hours will be available.

2.3 Ground & Basement 'Shell and Core' Spaces

2.3.1 General Ventilation

Flexible ground floor and basement uses (Use Class E) are likely to be let as 'shell and core' for future fit-out by retail / commercial unit tenant. To allow a maximum flexibility future tenants at ground level are to have an option to install local ventilation to suit their requirements as part of their fitout works or utilise the landlords central mechanical ventilation system. Branches from the general supply and extract ducts will be left capped outside the unit for future extension by the tenant.

As part of the new building base build design, perimeter louvres are to be introduced for use by the retail / commercial tenants on all elevations at ground floor level. Louvres are primarily to be high level strips / bands with elements of full height louvres.

Louvre provisions at ground floor are proposed for use by retail / commercial tenants for general fresh air intake and extract discharge, as necessary.

[6] See: https://breathelife2030.org/breathelifecity/greater-manchester/. Accessed 23rd August 2024.

Future tenants will be responsible for providing adequate filtration, odour and noise control to suit their fit-out and to discharge any planning conditions imposed on their fit-out.

2.3.2 Restaurant / Coffee Shop

It is understood that one of the ground floor units could be a restaurant and the other a coffee shop. The future tenants will be responsible for installing catering ventilation systems to suit their requirements.

Extract from kitchen canopies (1No.) will be routed within the riser space allocation to roof level where plant space allowance is made for a kitchen extract fan.

Extract from coffee shop to be discharged to outside locally via the Back of House façade louvres.

Make-up air will be provided to catering facilities is via perimeter louvres.

The future tenant will be required to ensure adequate odour and noise control is provided to any kitchen facilities which are installed as part of their fit-out works.

The scoring methodology from EMAQ Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (2018)[7] is to be used as a means of determining odour control requirements such as carbon filtration, UV filters or ozone.

Generally, the proposed ventilation strategies for the retail / commercial units will be as follows:

- General ventilation (fresh air supply and extract)
- MVHR units, located within their demise, ducted to the façade louvres.
- Toilet extract
- Extract fans, located within their demise, ducted to the façade louvres.
- Kitchen ventilation (extract and make-up air)
  - Bifurcated extract fan, located within their demise or roof level, ducted to roof level with discharge cowl.
  - Supply fan make-up, located within their demise, ducted to either roof (small system) of façade louvres.

2.4 Miscellaneous

The following ventilation strategies will be adopted within the new building to various ancillary areas:

- Toilet Cores
  – Extract fans at roof level, ducted down dedicated risers to each floor.
    - 6 l/s per toilet extract rate, with attenuated make-up air from the lift lobby.

- Lift Lobbies
  – Natural infiltration
    - Air drawn across the space due from the toilet extract.

- Back of House
  – Local MVHRs providing supply & extract, ducted to perimeter louvres.
    - Changing / showers: 6 Ac/hr
    - Toilets: 6 l/s per WC and 15 l/s per shower
    - Refuse: natural ventilation

[7] Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems. EMAQ (2018). See: https://docs.planning.org.uk/20220503/61/RABEWWNYI2D00/rw0v1c5r0ferbjix.pdf. Accessed 23rd August 2024.

- Front of House
  – Reception: Mechanical ventilation / Natural infiltration to suit occupancy.

3.0

Operation Phase Combustion Plant Emissions

3.0 Operation Phase Combustion Plant Emissions

3.1 Life Safety Generator

3.1.1 Overview

A Life Safety Generator will be located on the roof of the building within the Life Safety Generator compound adjacent to the Life Safety Switch room. The model installed is an Enrogen Model EG 200 B 200 kVA 160kW unit powered by a Baudouin 6M16G220/5 diesel engine. Technical data sheets for the life safety generator and diesel genset are provided in Appendices B and C.

3.1.2 Location

The life safety generator is located in the north-east corner on the roof of the building as shown in drawing TIS-NGB-ZZ-XX-DR-N-5111 dated 12/12/2023 and reproduced in Appendix D, see Figure 3-1 below. The location of the generator and emissions point on the north-east of the building has been optimised to aid dispersion of any emissions away from the building as prevailing winds for the local area are typically south and south westerly (See Figure 3-3).



Figure 3-1: Location of Life Safety Generator



Figure 3-2: Location of Life Safety Generator and AHU Intake

As illustrated by Figure 3-2, the separation distance between the generator exhaust and the AHU intake is approximately 5-6m, which is below the targeted distance of 10 m, due to roof layout constraints. The distance to nearest openable windows is >=10m. The life safety generator will only ever run in a real-life emergency or in test scenarios. During a real-life emergency, the AHU is automatically shut down with dampers closed, so there will be no ingress of emissions into the building. Any testing of the life safety generator would be undertaken during daytime hours only (Monday to Friday 10:00 to16:00), with a restriction on the usage of the roof gardens, and without the AHU in operation.

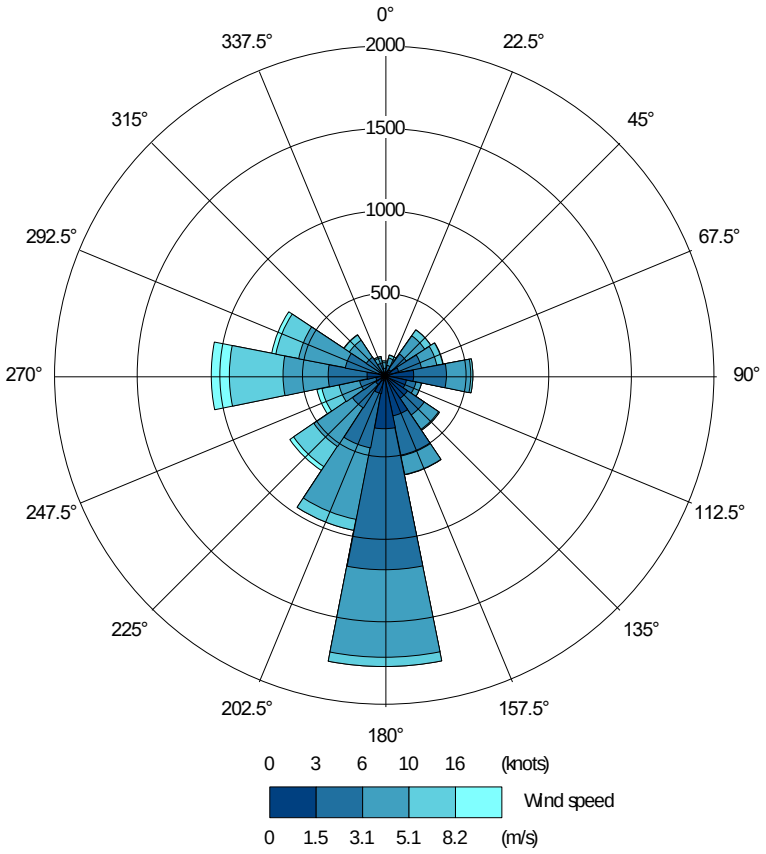


Figure 3-3: Manchester Airport Meteorological Wind Rose, 2022

3.1.3 Emission Considerations

Standby Diesel Generators and generators under 1 MW thermal output (generally ~300 KVA), by legislation, do not need to comply with the Medium Combustion Plant Directive (MCPD). The selected genset falls under both criteria at 200 kVA and is also for standby use.

In such cases the engines are referred to as "non-emissionised" or "fuel optimised" and have no emissions controls, i.e., emissions data is not published.

The life safety generator will only ever run in a real-life emergency or in test scenarios. During a real-life emergency, the AHU is automatically shut down with dampers closed, so there will be no ingress of emissions into the building.

Testing scenarios are covered in the paragraph below.

3.1.4 Commissioning, Maintenance and Testing Considerations

The generator commissioning was planned in for 24th September 2024. As advised by Enrogen as a minimum there would generally be a monthly offload run and a yearly onload run with 3rd party maintenance every 6 months.

Any testing of the life safety generator would be undertaken during daytime hours only (Monday to Friday 10:00 to16:00), with a restriction on the usage of the roof gardens, and without the AHU in operation.

3.2 Provision for Tenant Operated Standby Diesel Generators

Space provision has been made for a future tenant generator at ground level (Appendix E), with the flue discharging 2.7-3.6 m above ground level on the eastern façade. It is anticipated that any air quality impacts and specific planning requirements of future installations will be addressed by the future tenant once further details are known.

4.0

Operation Phase Transport Emissions

4.0 Operation Phase Transport Impacts

4.1 Transport Assessment

Mode Transport have produced a Travel Statement[8] to support the planning application, and this summarises key information relevant to the reduction of transport related pollution emissions during the lifetime of the development.

- The site is located to take full advantage of the sustainable transport modes, with easy access by walking, cycling, bus, light rail and rail;
- It is proposed to introduce a full-time pedestrianisation of Ridgefield along the boundary of the site, which has been agreed in principle with Manchester City Council Highways;
- Servicing and delivery will take place from a proposed loading bay on South King Street;
- Secure cycle parking and facilities for cyclists will be provided within the basement of the scheme;
- No car parking has been allocated on-site as there is ample car parking available in surrounding public car parks;
- Based on agreed trip rates, the proposed use is expected to generate 37 and 38 two-way trips during the AM the PM peak hours respectively; and considering the low number of trips generated, the development will have a minimal impact on the local highway network. Actual traffic flows on surrounding road links are therefore likely to fall below the Institute of Air Quality Management (IAQM) threshold of 100 Annual Average Daily Traffic (AADT) recommended for developments within AQMAs. At this level, resulting air quality impacts on surrounding sensitive receptors are not expected to be significant.

4.2 Travel Plan

Mode Transport have produced a Travel Plan[9] to support the planning application, and this outlines measures to be taken to reduce travel related impacts and associated pollutant emissions during the lifetime of the development.

The plan targets a reduction in single occupancy vehicle (SOV) trips. Individual modal share targets are outlined in Table 4-1. Due to the limited control over modes of travel adopted by visitors, targets are not set specifically for these site users, however, it is noted that there will be residual benefits to visitors as well as employees.

Mode of Travel	Mode Share Targets By Timescales					
	Baseline	Year 1	Year 2	Year 3	Year 4	Year 5
Single Occupancy Vehicles	34%	32%	30%	28%	26%	24%
Sustainable Travel Modes	66%	68%	70%	72%	74%	76%

Table 4-1: Provisional Mode Share Targets

These targets aim to achieve a 10% mode shift from SOV trips to sustainable travel modes (and corresponding 10% uplift in sustainable modes) during the first five years of occupation. The baseline mode share will be confirmed as part of initial baseline Employee Travel Survey. At this stage, these are interim percentages based upon the multimodal trip calculations from Census 2011 data.

All data collected will be in accordance with local authority standards, to ensure that the Travel Plan is accurately monitored and that targets are being met as set out above. Note, however, that mode share targets may be subject to future revision as the results of ongoing monitoring become available.

[8] Mode Transport Planning (2021) Land bound by John Dalton Street, Ridgefield, Bow Street and South King Street, Manchester-Transport Statement. (May 2021). See https://pa.manchester.gov.uk/online-applications/files/DE358EC9E2D2CCEE6E14D13113001206/pdf/130553_FO_2021-TRANSPORT_STATEMENT-1685155.pdf. Accessed 23/08/2024.

[9] Mode Transport Planning (2024) Island – Manchester City Centre Travel Plan. (May 2024). See: https://pa.manchester.gov.uk/online-applications/files/A9A0B02494CD977BF7BC93050957E1E8/pdf/CDN_24_0478-TRAVEL_PLAN-2548142.pdf. Accessed 23/08/2024.

Measures set out in the Travel Plan include the following:

- Staff promotion and marketing, including display boards, newsletters, E-groups and forums.
- Distribution of travel packs to staff containing information on bus and train time tables, cycling and walking routes, journey planners and local car share schemes.
- Set up of travel database, to be initiated with employee travel survey and periodically updated to provide metrics to measure success of sustainable travel measures.
- Measures to encourage walking and cycling.
- Promotion of public transport, including provision of discounted travel cards
- Promotion of local car share, car hire schemes and local taxi services

The Travel Plan will be monitored and reviewed on an annual basis, providing feedback to facilitate ongoing refinement of the plan and to measure the level of success in meeting identified targets using key performance indicators. An Action Plan setting out how this will be achieved during the full operation phase of the development is set out in Table 4-2,

Measure	Responsibility	Timescale
Appointment of TPC	Occupier	Prior to first occupation
Provision of sustainable travel information	Travel Plan Coordinator	Upon occupation / ongoing
Undertake baseline Employee Travel Survey	Travel Plan Coordinator	Within 3 months of first operation
General promotion of sustainable travel opportunities and measures	Travel Plan Coordinator	Ongoing
Monitor usage of internal cycle parking	Occupier / Travel Plan Coordinator	Ongoing
Undertake Further Employee Travel Surveys	Travel Plan Coordinator	Ongoing

Table 4-2: Action Plan for Implementation of Travel Plan

5.0

Conclusions

5.0 Conclusions

Cundall has been requested to assist in the discharge of Planning Condition 13b in support of the redevelopment of Land Bounded by John Dalton Street, Ridgefield, Bow Street And South King Street, Manchester, which has been granted approval for the planning application, Ref 130553/FO/2021[2]. The condition states that:

'Prior to occupation of the development any agreed mitigation measures shall be implemented and verified as such in writing by the City Council as local planning authority and shall remain in situ whilst the use or development is in operation.'

The condition has been imposed to secure a reduction in air pollution from traffic or other sources in order to protect existing and future residents from air pollution, pursuant to policies EN16, SP1 and DM1 of the Core Strategy.

A ventilation strategy has been set out which demonstrates that building will be mechanically ventilated, with fresh air being drawn into the building from via risers extended to roof top level. The building management system has the ability to switch to natural ventilation during occupied periods as part of a strategy to meet Manchester City Council's Net Zero Carbon target by 2038. The use of natural ventilation will reduce HVAC operating periods and hence energy & carbon consumption. The system also offers the benefit of providing out of hours purge ventilation. For ground floor shell and core spaces, future tenants will be responsible for providing adequate filtration, odour and noise control to suit their fit-out and to discharge any planning conditions imposed on their fit-out with reference to EMAQ Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (2018). For the office floors, particulate filters have been incorporated into the AHUs. The specification for MERV13/F7 type filters would typically reduce PM_{10} by 80% and $PM_{2.5}$ by 65%, delivering levels of <5 ug/$m^3$$PM_{2.5}$ and <10ug/m^3 PM_{10}. Not only will this meet Manchester City Council's current health targets, but also the more aspirational WHO targets, thereby providing some level of future proofing. Filter performance will be monitored using the BMS and by regular inspection, with pressure drops across the filters being used to trigger remedial action, which could include cleaning or replacement of filters. The filter maintenance specification document is appended to this report.

A life safety generator has been included to provide emergency power during incidents such as fires, in order to assist with building evacuation. The location of the generator and emissions point on the north-east of the building has been optimised to aid dispersion of any emissions away from the building as prevailing winds for the local area are typically south and south westerly. The life safety generator will only ever run in a real-life emergency or in test scenarios. During a real-life emergency, the AHU is automatically shut down with dampers closed, so there will be no ingress of emissions into the building. For routine testing, there will be a monthly and annual testing regime put in place, with 3rd party maintenance every 6 months. Any testing of the life safety generator will be undertaken during daytime hours only (Monday to Friday 10:00 to16:00) without the AHU in operation.

Space provision has been made for a future tenant generator at ground level, with the flue discharging 2.7-3.6 m above ground level on the eastern façade. It is anticipated that any air quality impacts and specific planning requirements of future installations will be addressed by the future tenant once further details are known.

Measures to reduce transport related emissions have been incorporated into the design of the development. No car parking has been allocated on-site, thereby minimising vehicle emissions. Additional measures have been included to improve facilities for walking and cycling including new pedestrian areas and secure cycle parking and facilities for cyclists provided within the basement. A travel plan has been submitted to monitor and encourage the use of sustainable transport modes by end users, and this will be maintained throughout the lifetime of the development.

In conclusion, this report has examined potential sources of pollution with potential to impact existing and users, including existing transport and point sources surrounding the development, impacts of combustion sources and operation phase traffic generation. Mitigation measures to reduce air pollution impacts during the lifetime of the development have been outlined, thereby fulfilling the requirements of Planning Condition 13b. It is therefore recommended that this condition can now be fully discharged.

6.0

Glossary

6.0 Glossary

Abbreviation	Clarification
AADT	Average Annual Daily Traffic
AHU	Air Handling Unit
AQMA	Air Quality Management Area
BOH	Back of House
BCO	British Council for Offices
CO_2	Carbon Dioxide
FCU	Fan Coil Unit
HVAC	Heating, Ventilation and Air Conditioning
IAQM	Institute of Air Quality Management
MVHR	Mechanical Ventilation With Heat Recovery
NO_2	Nitrogen Dioxide
PM_{10}	Fine particulates of aerodynamic diameter less than 10 microns
$PM_{2.5}$	Fine particulates of aerodynamic diameter less than 2.5 microns
SOV	Single Occupancy Vehicle
VAV	Variable Air Volume

Table 6-1: Glossary

Appendices

Appendices

Appendix A Filter Maintenance Schedule

5.3.3 AIR CONDITIONING AND VENTILATION

Principal business risks

Loss of air handling plant supplying heated or cooled, humidified or de-humidified, filtered air to occupied space or processes. Loss of ventilation could cause staff discontent particularly in peak summer and winter.

Typical single points of failure:

- Any one air handling unit, such as bearing failure, or motor/inverter failure
- Loss of low temperature hot water (LTHW) to frost/reheat coil (in winter)
- Loss of chilled water to coils (in summer)
- Pressurisation unit failure
- Insufficient cooling capacity at times of high external temperature, particularly where increasing loads (such as addition of IT equipment) are added to work areas, or where condenser performance has sufficiently deteriorated.
- Controls failure
- Smoke sensor and fire dampers.

5.3.3.1 Fans

5.3.3.2 Filters

5.3.3.3 Ductwork and air distribution

5.3.3.4 Terminal units

5.3.3.5 Unit type air conditioning

5.3.3.6 Fan coil units

5.3.3.1 FANS

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Bearings	Bearing failure or seizure due to insufficient lubrication, dirt inside bearing cover, degradation of the lubricant	Asset deterioration inefficient operation and failure	Temperature check of bearings. Vibration test. Lubricate where appropriate			✓	
Bearings	Bearing failure/seizure due to misalignment of shaft	Reduced component life leading to plant failure	Temperature check of bearings. Vibration test. Check shaft alignment			✓	✓
Impeller	Corrosion, build up of dirt, cracks, damage	Fan imbalance, vibration and fatigue failure	Monitor for undue noise and vibration			✓	
Fan casing	Casing failure due to corrosion	Inefficient operation	Inspect and clean as required			✓	
Pulleys, couplings, anti-vibration mountings	Vibration, loose components	Reduced component life leading to plant failure	Monitor vibration. Check fixing of components			✓	
Belts	Wear and tear and damage of drive components and belt stretching, misalignment of drives	Belt and bearing wear, noise, drive not transmitting correct torque, vibration	Check the condition of belts and drive components			✓	

5.3.3.2 FILTERS

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Filter elements, frames, gaskets and seals (Other than auto roll types)	Damage, distortion or deterioration	Bypass of unfiltered air, asset deterioration	Check the condition of the filter elements, frames, fasteners, housing, gaskets and seals for deterioration, distortion or damage. Ensure that there is no bypass of unfiltered air.	When change of filter elements are due			
Filter elements for the removal of dust (such as filters, and panel filters)	Saturation by contaminants	Increased pressure drop, dust carry over, increased power consumption	Check pressure drop across filter and change or clean filter elements as recommended by the manufacturers	On inspection affected by environment			
Manometer or differential pressure device	Damaged manometers or those not containing fluid. Failure of differential pressure sensing devices	Inability to monitor the pressure drop	Check the operation and condition of device			✓	
Auto-roll filters	Failure of various components	Increased pressure drop	[1]Check the condition and operation of the filter media and rolling mechanism			✓	
Electrostatic and adsorption type filters	See manufacturer's instructions	See manufacturer's instructions	See manufacturer's instructions	See manufacturer's instructions			

[1] Check the condition and operation of automatic roll filters as follows:

- Ensure that the pressure differential across the filter does not exceed the maximum allowed, check whether the velocity of the roll is correctly set.
- Check filter housings, frames and supports
- Check the operation and condition of the spooling motor
- Ensure that all mechanisms are free to rotate without undue friction and that the media is free to traverse
- Inspect spools, chains and sprockets for wear/tension and lubricate as necessary
- Check the operation of warning mechanism
- Check remaining filter media and establish whether to replace

5.3.3.3 DUCTWORK AND AIR DISTRIBUTION

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Access doors	Air leakage, risk of panel falling	Air leakage	Inspect for security and loose panels				✓
Attenuators	Increased noise from ductwork, environmental pollution from sound insulation fibres	Noise, pollution	Inspect internally repair surface of sound insulation where required				✓
Ductwork system – general	Leakage, deterioration, damage, structural failure, blockage	Safety hazards, asset damage or deterioration, operational failures, such as obstructions to air flow	[1] Carry out an overall inspection of the condition of the ductwork system			✓	
Ductwork – internal cleanliness	Dust, debris, deposits and growth of biological matter	Health hazards	Inspect inside the ductwork, test for cleanliness and clean as appropriate	Follow guidance published by authoritative bodies			
Intake and discharge louvres	Damage, deterioration, blockage, presence of unhygienic debris in the vicinity of intake	Obstructions to air flow, health hazards	[2] Inspect inside the ductwork, test for cleanliness and clean as appropriate			✓	
Proportional dampers (manually operated and power operated dampers)	Distortion, deformation, deterioration of various parts, failure of actuating mechanism or linkage	Damper failing to operate correctly	[3] Check the operation and condition of the damper			✓	
Proportional dampers (manually operated and power operated dampers)	Deposits and contaminants	Failure to open or close properly	Check for contaminants such as deposits, dust as debris and clean the damper as recommended by the manufacturer			✓	
Proportional dampers (manually operated and power operated dampers)	Good house keeping Excessive friction	Failure to open or close properly	Lubricate moving parts as recommended by the manufacturer			✓	
Fire and smoke dampers	Distortion, deformation, deterioration of various parts, failure of actuating mechanism or linkage	Damper failing to operate correctly, fire hazards	4 Check the operation and condition of the dampers	6 monthly (unless otherwise required by legislation, applicable codes or fire authority)			

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Fire and smoke dampers	Deposits and contaminants	Failure to open or close properly	Check for contaminants such as deposits, dust as debris and clean the damper as recommended by the manufacturer	6 monthly (unless otherwise required by legislation, applicable codes or fire authority)			
Fire and smoke dampers	Good housekeeping Excessive function	Failure to open or close properly	Lubricate moving parts as recommended by manufacturer	6 monthly (unless otherwise required by legislation, applicable codes or fire authority)			
Flexible connections	Air leakage, damage	Air leakage	Inspect visually for damage, deterioration, corrosion				✓
Insulation	Damage, deterioration, missing insulation	Unsatisfactory internal environment (too hot, too cold)	Inspect visually for damage, deterioration, corrosion				✓
Linkages and motorised dampers	Unable to function	Unable to function	Check for wear, lubricate				✓
Louvres, bird and insect screens	Reduced or excessive air flow	Air filters and air handling plant damaged, reduced plant efficiency, no ventilation	Clean and remove debris. Check and repair damage				✓
Terminal outlets (grilles and diffusers)	Outlets damaged or incorrectly set	Poor air flow, draughts, poor image	Examine for damage, leakage, dirt, incorrect setting				✓
Volume control dampers	Unsatisfactory internal conditions	Incorrect air volume	Check damper position, ease of movement, security of locking device				✓

[1] Inspect the ductwork system for general for safety, security and condition:

- Check the structural integrity of the system and ensure that duct supports and hangers are secure
- Check the condition of ductwork for damage and deterioration. Ensure that ductwork is not subject to conditions that will cause deterioration, for example, rain penetration
- Check joints for leakage and ensure that flanges and bolts are tight. Check for signs of corrosion or deterioration
- Check access doors. Ensure that they are free from distortion and leaks. Ensure that door edge-seals are secure and undamaged
- Check the condition of insulation
- Check flexible connects and joints for damage and air tightness
- Ensure that the ductwork does not vibrate excessively when the plant is running
- Check the internal condition of ductwork for blockages [2](Note that this may be done with the internal inspection of ductwork to check cleanliness).

[2] Inspect the condition of intake and discharge louvres:

- Check the condition of intake louvres, discharge louvres, bird/vermin protection mesh screens and cowls for damage, deterioration and corrosion
- Check for obstructing debris and any blockages. Intake and discharge should be clear and unobstructed
- Check the areas adjacent to air intakes for unhygienic debris and clean as appropriate.

[3] Check the operation and condition of the dampers:

- Check for freedom of movement of all moving parts
- Observe the operation of the actuator and damper when activated by the control signal
- Ensure that the actuator operates correctly over the signal range, opens and closes as required, and is free from defects, binding or misalignment
- Test the fail-safe operation of any dampers
- Check the condition of any blade edge-seals
- Check actuators (including linkage) and ensure that there are no obvious flaws or deficiencies, such as excessive rust or deformation
- Check all moving parts such as blades, shafts, bearing and pivots for wear and freedom of movement
- Check the damper in general is in good condition and not rusted, bent or blocked such that successful close would be prevented
- Ensure that the frame is free from racking or distortion
- Ensure that the blades do not bind on the frame or jamb seals
- Ensure that the damper blades are not rusted, bent or twisted
- Ensure that the actuator linkage is not loose such that successful opening and close would be prevented
- Ensure that all linkages, connecting bars and operating mechanisms are properly aligned and fit
- Check the operation of any micro-switches.

[4] Check the operation and condition of the fire and smoke dampers:

- Drop test the fire damper as recommended by the manufacturer
- Test the operation of the actuator and damper when activated by the control signal
- Test the fail-safe operation of the damper
- Ensure that the damper opens fully and fully close through its operational cycle. Check the condition of any blade edge-seals
- Check blades in the closed position and ensure tight closure
- Inspect the fusible link and other actuators (including linkage) and ensure that there are no obvious flaws or deficiencies, such as excessive rust or deformation
- Check all moving parts such as blades, shafts, bearings and pivots for wear and freedom of movement
- Check the damper is in good condition and not rusted, bent or blocked such that successful close would be prevented
- Ensure that the frame is free from racking or distortion
- Ensure that the blades do not bind on the frame or jamb seals
- Ensure that the damper blades are not rusted, bent or twisted
- Ensure that the actuator linkage is not loose such that successful opening and close would be prevented
- Ensure that all linkages, connecting bars and operating mechanisms are properly aligned and fit
- Observe the operation of motors/actuators through their complete cycle and check for defects, binding or misalignment.

5.3.3.4 TERMINAL UNITS

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Good housekeeping, filters, fans and motors, heating and cooling coils, strainers, ductwork connections, grilles and diffusers, condensate trays and drainage and electrical system	Corrosion, abuse, falling dust and debris	Asset deterioration safety problems	Inspect the overall operations and physical condition, security and integrity of the installation			✓	✓
Dampers and linkage	Loss of performance	Loss of performance	Check for the correct operation and condition. Clean and lubricate where appropriate as recommended by the manufacturers			✓	✓
Induction units - nozzles	Loss of performance	Loss of performance	Check the primary air nozzles and clean if necessary			✓	✓

5.3.3.5 UNIT TYPE AIR CONDITIONING

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Compressor	Motor or compressor failure	Insufficient or no cooling	Check suction and discharge pressures and temperatures			✓	
Compressor	Burned out due to power supply fluctuations and incorrect operation	Unit down	Inspect electrical connections			✓	
Compressor	Liquid refrigerant in compressor crankcase due to crankcase heater failure, incorrect setting or failure of the expansion valve	Unit down	Inspect crankcase heater, suction and discharge pressures and temperatures			✓	
Compressor	Liquid refrigerant flooding back to compressor due to incorrect setting or failure of the expansion valve, or over charge of refrigerant	Unit down, possible compressor damage	Inspect suction and discharge pressures and temperatures Inspection of operating conditions			✓ On going	
Compressor	Discharge pressure too low due to shortage of refrigerant, leaking compressor discharge valves, condenser water too cold	Inefficient operation, lack of cooling, possible unit down	Inspection suction and discharge pressures, valves and refrigerant charge levels			✓	
Compressor	Discharge pressure too high due to fouled condenser, refrigerant overcharge, non-condensable gas in system	Inefficient operation, lack of cooling, possible unit down	Inspection suction and discharge pressures, valves and refrigerant charge levels Clean condenser Inspect sight glasses			✓ On going	
Compressor	Suction pressure too low due to shortage of refrigerant, evaporator under-loaded, liquid line strainer clogged, expansion valve plugged/too small, oversized compressor	Inefficient operation, lack of cooling, possible unit down	Inspection suction and discharge pressures, valves and refrigerant charge levels			✓	

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Compressor	Suction pressure too high due to evaporator overloaded, refrigerant overcharge, expansion valve stuck open/too large, leaking compressor suction valves, evaporator too large	Inefficient operation, lack of cooling, possible unit down	Inspect suction and discharge pressures and refrigerant charge levels			✓	
Condenser	Inefficient heat transfer due to insulation from scale	Inefficient operation, lack of cooling, possible unit down	Inspect and clean condenser as required			✓	
Evaporator	Coil iced due to defrost control/valve problems, restricted hot-gas bypass line, defrost element burned out, drain line constricted	Inefficient operation, lack of cooling, possible unit down	Inspect control items, electrical connections			✓	
Evaporator	Freezes due to moisture in the system	Inefficient operation, lack of cooling, possible unit down	Inspect for leaks in refrigerant system Inspect sight glasses			✓ On going	
Evaporator	Coils and/or fins damaged, corded or airways blocked requiring cleaning or replacement	Inefficient operation, lack of cooling, possible unit down	Inspect coils and fins, clean as required	6 monthly (dependant on local conditions)			
Evaporator	Iced up	Inefficient operation, lack of cooling,	Check controls. Check system for leaks			✓	
Evaporator	Fins damaged or corroded	Inefficient operation, lack of cooling,	Inspect coils and fins, clean as required			✓	

5.3.3.6 FAN COIL UNITS AND UNIT TYPE AIR CONDITIONERS

Maintenance of Fan Coil Units and Unit Type Air Conditioners

1. **Fan coil units:** A fan coil is considered as a terminal unit in a system that provides heating and/or cooling. The basic components of a fan coil unit incorporate a fan and motor, an air filter, a cooling or heating coil or both cooling and heating coils, controls and a casing to house these components.

2. Often the units, especially the single coil models, come with an option to include a supplementary electrical heating element. A drip tray is provided to collect condensate from the cooling coil. A pump is sometimes provided or provision made for it to remove the water. Units may also incorporate strainers and air-vents that may require maintenance.

3. Control systems associated with fan coil units may include temperature sensors and thermostats, control and monitoring hardware and software including time controllers and controlled devices such as control valves, on/off switches etc. The components, operation and control of fan coil units and their maintenance requirements usually vary with the proprietary nature of the equipment.

4. Typical components that require maintenance consideration are:

   - Casing
   - Fan and motor
   - Heat exchanger
   - Condensate tray
   - Filter
   - Strainers
   - Air vents
   - Controls.

   Preventive maintenance requirements for controls and optional components e.g. electric heating element, pump for removing condensate are not covered in this section. Generic maintenance requirements components which are common to many building services plant and equipment are included elsewhere, for example maintenance requirements for pumps are covered in section 5 and maintenance requirements for controls are given in section 5.

5. There is a wide range of types of fan coil units for example, above ceiling, ceiling cassettes, suspended, floor recessed, wall recessed, and wall mounted and free standing. The location of the unit can significantly affect maintenance decisions, as the cost and disruption of maintaining a ceiling unit can be much higher than a wall mounted unit. Wherever possible the maximum number of tasks should be carried out during a single visit to minimise disruption and cost.

6. The general integrity of the unit and installation should be periodically checked to ensure its general safety and security particularly where the units are mounted above an occupied area and important operational areas. Particular attention should be given to the security and integrity of fixings, suspensions etc. and also for potential water leaks. Water leaks into the occupied/operational areas can cause serious business disruptions and / asset damage.

7. The fan and the motor - these are the only moving parts (other than controls) within the unit. The most common type of fan used is of centrifugal configuration. Bearings, particularly in smaller units, are usually sealed for life. Motors normally have a long life expectancy, typically 50,000 to greater than 90,000 operating hours. Fans and motors used in fan coil units generally require little maintenance under good design, manufacture, installation and operational conditions. Build up of dust and dirt can be a problem as it could affect motor ventilation. Generic preventive maintenance requirements for fans are given in section 5.

8. The environment in which the unit is operating plays a significant part in the maintenance of the fan coil units. Problems such as corrosion and clogging of grilles, diffusers, coils and filters are normally caused by the local environmental conditions such as corrosive atmospheres, humidity, dust and other impurities in conditioned space. For example, the presence of dust and high humidity can cause deposits on coils and other heat exchanger surfaces causing the need for frequent cleaning. Units that take external air will also be susceptible to corrosion and require frequent cleaning depending on the cleanliness of the external environment.

9. Condensate must effectively drain down from drip trays. Dirt and debris collected in the system may fall into the trays and block the drains. Pressure drops in long drain pipe runs can also offer resistance to effective flow of water. Water stagnation and / or prolonged moist conditions can be conducive to the growth of biological matter that can be harmful to health if carried away with the air stream. These may foul the tray and the drain system causing smells and blockages. Periodic cleaning and disinfection of the condensate drip trays and pipework is recommended to prevent health risks that can arise from the growth of biological

matter and to prevent fouling up the drainage system. The frequency of such cleaning should be determined locally giving due consideration to the risk to health and the potential fouling up of the system.

10. **Unit type air conditioners:** Unit type air conditioners covered in this section are stand-alone units which provide cooling in buildings using direct expansion type evaporators. There is a variety of such equipment types, for example, free standing, wall or window mounted, ceiling cassette type, portable and ducted. Smaller units generally come with refrigeration units with hermetic type compressors. Their construction may be as a single unit or in two pieces where the condenser is mounted separately from the main unit.

11. The components of such air conditioning units which require maintenance include:

- Casing
- Grilles and louvres
- Filters
- The refrigeration system
- Cooling fan (air)
- Condenser cooling fan
- Condensate tray and drainage system
- Controls
- Electrical supply.

12. The components, operation and control of these units and their maintenance requirements may vary with the proprietary nature of the equipment. Generic maintenance requirements components which are common to many building services plant and equipment are included elsewhere, for example maintenance requirements for fans are covered in section 5 and maintenance requirements for controls are given in section 5.

13. Evaporator (air side) corrosion and fouling: The environment in which the unit is operating also plays a significant part in the maintenance of self-standing air conditioning units. Contaminants such as dust, dirt and grease from the conditioned space can accumulate on evaporator coils and fins causing a reduction in heat transfer. Adverse environmental conditions e.g. corrosive contaminants in air and high humidity, can also promote corrosion and deterioration of coils and fins.

14. Condenser units placed outside the building may be subjected to adverse weather and environmental conditions resulting in problems such as airside corrosion, other forms of deterioration, accumulation of dust and dirt and blockage. Units operating in the vicinity of exhausts from industrial and commercial processes

(e.g. kitchen extracts emitting large amounts of fat) can be particularly vulnerable to such contaminants and may require more frequent cleaning. Adequate airflow around the condenser should be considered when installing the unit as per manufacturer's recommendations.

15. For preventive maintenance of the refrigeration system, follow the principles stated for Chillers. Smaller self contained air conditioning units usually have hermetic type compressors that require little or no maintenance. Fans and motors in these units also generally require little maintenance as their bearings are usually of sealed type. Providing that they are properly designed, installed and operated, these units should provide long service life subject to good housekeeping e.g. kept in clean condition and free from blockages to air flow.

16. Fan coil units and stand alone air conditioning units: Some of these units have the option for supplying fresh air to the conditioned space. In this case, it is necessary to ensure that the fresh air supply is free from obstructions and operates as intended.

The following table provides an assessment of the criticality issues associated with preventive maintenance for fan coil units and unit type air conditioners.

Criticality Issue	Significance of Failure	
Health and safety & legislation	Low	However malfunction of any fresh air supply system and/or water stagnation in drip trays can cause health and safety problems
Business criticality	Low	Normally low unless there is a single unit serving an operationally critical application. However, leakage of water into an occupied or operationally critical area can cause serious business disruptions and/or costs.
Occupant comfort	Low to High	Low to high depending on the number of units serving an area
Client image and status	Low to High	Low to high depending on the importance of occupant comfort and the number of units serving the area
Asset life	Low	Low
Environment & sustainability	Low	Usually low

5.3.3.6 FAN COIL UNITS

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Fan coil unit – general condition including fixings, mountings and ducting elements	Corrosion, abuse, falling dust and debris	Asset deterioration, safety problems	[1] Inspect the overall operational and physical condition and security and integrity of the installation	When other tasks are carried out			
Casings, grilles and diffusers	Corrosion, dust, link and other impurities	Asset deterioration, loss of performance	Inspect the condition particularly for corrosion and build up of deposits or anything restricting the air flow. Clean and repair as necessary			✓	
Air filters and filter frames	Blocked filter due to dust or other deposits. Deterioration of the frames due to corrosion	Loss of performance Asset deterioration	Check the condition. Clean or replace filter as appropriate			✓	
Heat exchanger (air side)	Corrosion, deterioration, damage to fins and coils, clogged of coils and fins with lint, deposits and dust	Asset deterioration, water leaks, reduced heat transfer, loss of performance	Inspect coils. Clean and repair as appropriate as recommended by the ,manufacturer			✓	
Heat exchanger (water side)	Water side scale deposits, blockages and corrosion	Asset deterioration, water leaks, reduced heat transfer, loss of performance	Check for signs of corrosion. Check for evidence of scale deposits and other blockage.			✓	
Condensate tray and the drain system	Corrosion, water stagnation, inadequate drainage	Health and safety problems, leakage of water into the occupied space that could cause business operational problems or asset damage, health and safety problems due to bacterial growth	[3] Check the condensate drip tray, pipework and pumps. Clean and disinfect as appropriate.	Monthly during cooling season			
Heating and cooling coils	Corrosion	Asset deterioration, water leaks, loss of performance	Check the condition. Check for corrosion and for sign of leaks			✓	
Air vents	Airlocks in heater / cooling coils. Correct design and installation should reduce this problem	Loss of performance	Vent air from cooling and heating coils			✓	

Component	The failure mode addressed and its cause or other reason for maintenance	Consequence of Failure	Preventive Action	Generic Frequency (Months)			
				1	3	6	12
Strainers	Dirt in the water systems can clog up coils	Loss of performance	Clean the strainers			✓	
Air vents	Airlocks in heating and cooling coils. Correct design and installation should reduce this problem	Loss of performance	Vent air from cooling and heating coils			✓	
Strainers	Dirt in water systems can clog up coils	Loss of performance	[4] Clean strainers			✓	
Fan and motor	Build up of dust and dirt. Loose or wear and tear of any belts can affect performance	Fan or motor failure causing loss of performance of asset loss	[5] Observe the operational and physical condition of the fan, the motor and any belt drives. Note any undue noise, smells, presence of dust and lint				✓
Controls	Follow manufacturers recommendations	Follow manufacturers recommendations	Follow manufacturers recommendations	Follow manufacturers recommendations			

[1] Check the overall operational and physical condition and general safety and security of the installation of the fan coil unit:

- Check the integrity of fixings, suspensions and mountings
- Check for signs of corrosion, deterioration, damage or abuse
- Check for any unusual noise and vibration
- Check for signs of water or air leakage
- Check the condition of any ductwork and pipework attachments including the connection of flexible connections/ducting
- Ensure that any (optional) fresh air supply arrangement is free from obstruction and operates as intended.

[2] For units that operate all year round, carry out this activity twice a year. Otherwise, for example, for heating only units, carry out once a year, preferably at the beginning of the season.

[3] Check the condensate drip tray, pipework and any pumps

- Check the condition of drip tray for signs of corrosion, damage, and leaks. Clean or repair as appropriate
- Check pipework and connections for damage, deterioration and corrosion. Check for leaks
- Check the drip tray and pipework for signs of stagnation of water
- Inspect the drip tray and pipework for growth of biological matter. Clean and disinfect drip tray and pipework as appropriate
- Check for foreign material that could cause blockage. Remove any foreign matter that could cause blockage
- Ensure the free flow of condensate in the drain system.
- Ensure the correct operation of any pumps
- Where traps are fitted ensure that they are left sealed with water.

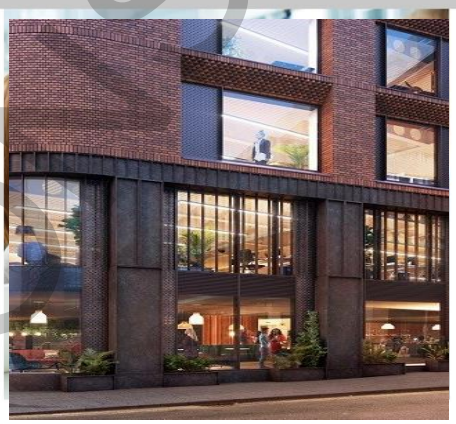
[4] The frequency with which the strainer has to be cleaned depends on the overall condition of the distribution piping system. However, cleaning is recommended at every season change (summer/winter).

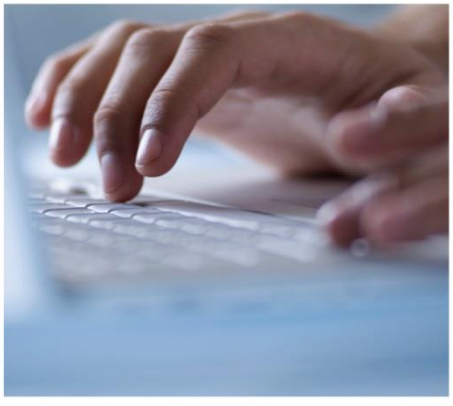
[5] Any build-up of dust and lint should be cleaned with a brush and/or vacuum cleaner and bearings oiled and greased as recommended by the manufacturers. Any belt drives require inspection for wear and tear and deterioration and checking for correct tension as recommended by the manufacturer. See section 4.1 for preventive maintenance requirements of fans and section 6.1 for the preventive maintenance requirements of motors.

Appendix B Enrogen Model EG 200 B Technical Specification

NG BAILEY
The Island
Technical Submission
TIS-NGB-ZZ-ZZ-TS-E-0008 C02
Life Safety Generator

FOR CONSTRUCTION




BOWMER + KIRKLAND

TECHNICAL SUBMISSION FOR – Life Safety Generator

SUMMARY

Technical Submission No.	TIS-NGB-ZZ-ZZ-TS-E-0008
Revision:	C02
Package Description:	Life Safety Generator
Package Equipment:	Life Safety Generator
Proposed Supplier:	Enrogen
Supplier Address:	Electricity Building, Blenheim Road, Pocklington Road, York. YO42 1NR
Building Locations:	Roof Level in Generator compound
Compliance with Specification:	Yes
NGB Contact:	Alan Oakes
NGB Contact Tel:	07870 550 391
NGB Contact E-mail:	Alan.oakes2@ngbailey.co.uk
Raised By:	Alan Oakes
Date Raised:	21/11/2023
Response Required By:	05/12/2023

FOR CONSTRUCTION

OVERVIEW

DESCRIPTION:

This technical submittal is for Life Safety Generator which shall be located on the roof of The Island project, and shall be located within the Life Safety Generator compound adjacent to the Life Safety Switchroom. Due to the Generator being soley for the use in the event of Fire Life Safety, the dB(A) level for the Generator is more relaxed and as such the Generator shall be rated at 79-80dB(A). The Generator shall be rated at 200Kva 3 phase, 400/230v 50Hz @0.8PF. The ls Generator shall be complete with Fuel Polishing as required, and a spill kit shall be provided. The Generator is in line with Cundall Schematic the rating is 200kVA and shall control FLS and critical items as per Cundall Schematic TIS-NGB-ZZ-XX-DR-E-6100_Rev-P03 Equipment being protected as follows

1) DB/TN/COMMS-A - **Critical Item**
2) Smoke Extract Panel Basement - **FLS**
3) DB/LL/COMMS-A - **Critical Item**
4) DB/LS/09 - **Critical Item**
5) Fire Fighting Lift 02 - **FLS**
6) Smoke Extract Fan (N) - **FLS**
7) Smoke Extract Fan (S) - **FLS**

Response to previous comments has been included aa **Appendix A** at the back of this document

With regards to the flue below is a screen shot from the generator specialist which I presume answers the query regarding the flue, as stated the generator fan shall move the emissions no need for a flue.

Hi Chris,

We have allowed for a complete genset (unsure what the flue fan & flue is as the set is roof mounted? - don't even know what a flue fan is for an exhaust flue). There is a fan on the engine which will help to push the exhaust emissions.

Acoustics, this is where we have offered a std set + the extra to reduce lower noise.

Kevin

SUPPORTING DOCUMENTS

DOCUMENTS:

1. Alternator 200KVA Data sheet
2. QD-S-1 - Genset New Warranty Declaration Rev C
3. 40003199a Technical Brief & Compliance statement

FOR CONSTRUCTION

LIST OF ATTACHMENTS:	Y
SAMPLE INCLUDED (Y/N):	N
COMPLIANT WITH SPECIFICATION (Y/N):	Y

APPROVAL STATUS

CLIENT T/A COMMENTS:				
STATUS:	A	B	C	(Please Circle)
MADE BY:				
DATE:				

STATUS KEY

A – Approved

B – Approved with comments

C – Rejected with comments

FOR CONSTRUCTION

ENROGEN

New UK Built Generators from the Power Solutions People

Technical Brief & Compliance Statement

Project	The Island-Generator
Enrogen Reference No	40003199a
Customer Reference No	25725
Scope of Supply	Diesel Generator & Associated Equipment
Quotation Prepared By	Kevin Griffiths



AMPS MEMBER

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FOR CONSTRUCTION

ENROGEN

New UK Built Generators from the Power Solutions People

1. TECHNICAL SPECIFICATION

1 x 200kVA Standby Rated Generator- Each built as follows:

GENERATOR	UK Built, New and Unused diesel generator, Enrogen Model EG 200 B powered by a Baudouin 6M16G220/5 Diesel engine coupled to a Weg 250SI10AI Alternator with a Prime output of 200 kVA 160 kW (220kVA Standby) 400/230V, 3ph, 0.8PF, 50Hz, 1500RPM.
ENGINE	Heavy duty industrial diesel engine Manufactured in accordance with B.S.S. 5514 and generally to such International standards as D.I.N. E.I.C., N.E.M.A. On prime rated units the engine is capable of providing a 10% overload for a minimum of ONE hour in any 12 hour period. Mechanical compliant to ISO 8528-5 class G2
GOVERNOR	Electronic compliant to ISO 8528-5 class G2
ELECTRICAL SYSTEM	12 V.D.C electrical system complete with energise to run shutdown solenoid. Oil pressure and water temperature shut down switches and gauge senders.
ENGINE PROTECTION	Low oil pressure, High water temperature and overspeed protections are provided as std.
FILTERS	Filters are provided for: Fuel oil/ Lubricating oil/ Air intake
COOLING SYSTEM	Radiator and cooling fan complete with protection guards, designed to cool engine at specified output in air-on temperature up to 50°C.
COOLANT HEATER	The unit is fitted with a 240V coolant heater to be powered from a remote AC supply. This will keep the engine at optimum starting and load acceptance temperatures.
STARTING	The engine is arranged for starting by means of an axial starter motor engaging on a toothed ring on the flywheel.
BATTERIES	Starter batteries are of high capacity, maintenance free lead acid type & come complete with leads.
CHARGING	Charging of these batteries is provided by means of an engine driven charge alternator and a constant potential battery charger mounted within the control panel.
ALTERNATOR	Heavy Duty Brushless design screen protected, fan ventilated, drip-proof, self exciting in accordance with IP22. Fitted with heavy duty long life bearings, lubricant packed for 4000 hours operation. Constructed in accordance with B.S.S.5000 part 99.
EXCITATION	Alternator IPMG (similar to PMG) Excitation, recommended for heavy motor starting
REGULATION	Digital Voltage regulation is maintained within the limits of + or - 1 to 2 % from no load to full load including cold to hot variations at any power factor between 0.8 lagging and unity and inclusive of a speed variation of 4.5%.nominal voltage is set.
INSULATION	Stator and rotor insulation is Class "H" standard.
SUPRESSION	Radio and television suppression is provided to comply with B.S.S. 800/1983.
BASEFRAME	The complete generating set is mounted as a whole on a heavy duty steel baseframe.
ANTI-VIBRATION MOUNTS	The engine & alternator assembly is isolated from the baseframe using rubber anti-vibration mounts. This will reduce the level of vibration transmitted to the base and the surrounding area.
EXTERNAL ANTI-VIBRATION MOUNTS	Building Anti-Vibration Mounts installed externally under the generator base recommended for roof top installation. (Vibration & seismic report to be supplied)

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FOR CONSTRUCTION

COUPLING	The engine is directly coupled to the alternator by means of an SAE flange so there is no possibility of misalignment after prolonged use.
GUARDS	The fan, fan drive and battery charging alternator drive are fully guarded for personnel protection. A stone guard protects the radiator core from accidental damage.
CONTROL PANEL	Plant mounted auto start capable control panel based on the Deep Sea 6110 with the following facilities:

INDICATION FOR
Generator volts P-P and P-N
Generator amps L1, L2, L3
Generator Hz
Engine oil pressure
Engine water temperature
Plant battery volts
Engine hours run
Engine Canbus Data (If Applicable)
Engine Canbus Diagnostic Fault Code Data (If Applicable)

ALARMS/SHUTDOWN WITH GRAPHIC INDICATION ON LCD DISPLAY

Emergency Stop	SHUTDOWN	LCD
Low oil pressure	SHUTDOWN	LCD
High engine temperature	SHUTDOWN	LCD
Low/High DC battery Volts	ALARM	LCD
Charge fail	ALARM	LCD

CONTROL (pushbuttons)
Manual Mode/ Auto Mode/ Start/ Stop
Alarm Mute/ Information Page Select

BMS EXPANSION BOARD (Deepsea 2157)
Volt-Free outputs for the following:

- Generator Running
- Low Fuel
- Fail to Start
- Battery Charger failure (low battery voltage)
- Coolant Heater failure
- Emergency shutdown
- Common Alarm

CIRCUIT BREAKER	3 Pole 315A Moulded case circuit breaker is mounted on the machine in a steel enclosure complete with removable gland plates.
BASE FUEL TANK	12 Hours @ 100% load Integral Base fuel tank mounted within the base frame of the generating set complete with contents indicator, filler neck and drain fittings.
RETENTION BUND	The tank is fully bunded in compliance with DEFRA requirements.
FUEL POLISHER	Tank mounted Fuel polisher with a Racor Filter and a circulating pump. The system is automatic & manual.
LOW LEVEL SENSOR	Base Fuel tank low fuel level switch linked to the control panel.
FUEL HAND PUMP	Tank mounted semi-rotary hand fill pump with 5m of hose.

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FOR CONSTRUCTION

OIL SPILL KIT	Spill Kit Includes: 1 x Reusable carry bag. 20 Metres of barrier tape. 2 x Cable ties. 2 x Disposal sacks. 2 x Pair of disposable Dura touch gloves. 1 x Vented safety goggles. 30 x Oil only dimple pads. 4 x 1.2 Metre oil only socks.

ADDITIONS

FUEL	First Fill of Fuel & fuel for Test
FACTORY TEST	Factory acceptance Test with 2 Hr Heat run with a Resistive Loadbank
TRANSPORT	Delivery to site and off-load kerbside (Positioning excluded)
SITE TEST	Site acceptance Test with 2 Hr Heat run with a Resistive Loadbank (Assumed 25m of Cables on the same level as the generator connection point – loadbank positioning excluded)
INTEGRATED SITE TESTING	One day attendance for Site Integration Testing with training the same day.

Specification may change or modified during design and build, notification will be supplied prior to commencement.

2. COMPLIANCE STATEMENT

This Tender Return complies with the supplied 1020044-SPC-MEP-001 MEP Stage 3 Performance Specification, Section(s) 3.1.7 - Resiliance/Back-up, 6.8.1 - Life Safety Generator apart from the following clarifications.

Item	Description	Response
6.8.1 Life Safety Generator	The generator is to be installed within an acoustic standard enclosure, with acoustic performance as required as per the Stage 3 Acoustics Report.	There is no reference to the Life Support Generator that will operate under emergency conditions (eg Fire) & planned maintence. We have offered options of 80dBA @ 1mtr & 75dBA @ 1mtr.
	The generator is to be rated at 300kVA as a minimum	As requested, the set is rated at 200kVA Prime rated,
	Undertake a load assessment of all equipment connected to the life-safety generator. This is to be based upon the final selection of manufacturers equipment. Utilise this information to confirm the final generator size and provide a suitable installation that is fit for purpose.	We have not been involved with the load assessment but assumed it has been done by others and taking into account of the lift regeneration on fall.

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FOR CONSTRUCTION

ENROGEN
Diesel Generators

Enrogen Warranty Statement

This is a warranty which applies to Electric Power Generation Products manufactured by Enrogen Ltd (herein after referred to as "the company") or its distributors or agents. The products are warranted against defects in material and workmanship for a period of twelve months from the date of initial start-up or 18 months from the date of ready for shipment ex-factory, which ever occurs soonest. This warranty coverage is applicable to the first end user of the generating set only.

The Company's Responsibilities
If a defect in material or workmanship arises during the warranty period the company will during normal working hours and through a place of business of Enrogen. Dealer, or other source approved by the Company.

- Replace or at the company's discretion repair the defective parts.
- Provide for reasonable and customary labour costs to correct the defect, including labour to disconnect and reconnect the product to its attached equipment, mounting and support systems and support systems supplied by a third party.
- Provide for the cost of service supplies such as coolant, oil and filters made serviceable by the defect.
- Provide travel labour, up-to 4 hours and 250 miles round trip, if the engine is inoperative due to a defect and in the opinion of the Company, it cannot be reasonably be transported to an appropriate service location.

The User's Responsibilities
The user is responsible for:

- Installing and operating the generating set in accordance with the manufacturers instructions.
- Returning the Warranty Registration Form to the Dealer or Enrogen within 45 Days of delivery
- Reporting and making the equipment available for repair as soon as the defect has become apparent.
- Ensuring the initial start-up is performed by an authorised representative of the company or its Dealers. In exceptional circumstances, the said start-up will be waived, but only if a Pre Delivery inspection has been completed. In such circumstances, warranty will be adjudged to have commenced one month and terminated 13 months from date of shipment by the company.
- Accepting the company's sole judgement as to whether the faulty part is defective in material or workmanship.
- Labour costs, except as stated under "The Company's Responsibilities," including costs incurred in removing and replacing the product. However, consideration will be given in certain circumstances.
- The costs and risks for transportation/shipping and other charges associated with the replacement of the repair parts.
- Any costs in excess of the purchase price of the product.
- Other miscellaneous costs including but not limited to travel, mileage, lodging, taxes, telephone calls, overtime, etc., except as stated under "The Company's Responsibilities."
- Completing outstanding payment for the purchase of equipment, parts or service relating to the equipment under warranty.
- Providing reasonable effort to notify and discuss with Enrogen Technical details of the fault from the site location, such as, but not limited to, alarm information, operating circumstances and requests to operate.

Warranty Limitations
The warranty does not cover:

- Defects due to the user's improper installation, maintenance or use.
- Travel Labour is only provided upto 500 hours operation (see Gold Warranty)
- Baudouin powered products parts warranty is limited to 500hrs Per annum
- Alterations or repairs not authorised by the company in writing.
- Any operation in excess of the company's rating or outside the stated site conditions.
- Normal wear and tear.
- Any product specific hours limitations stipulated by the respective engine manufacturer.
- Additional warranties available on Enrogen sub components are not covered under Enrogen warranty. The user can seek these directly with the component supplier, but no historical liability to Enrogen is permitted.

Gold Warranty (If Purchased)
Removes the limitation cap on operating hours in regard to labour travel costs for the duration of this warranty statement. Not Available for Baudouin powered products

Extended Time Warranty (If Purchased)
Equipment deemed to have in extended time warranty will follow these terms. The period of cover will be detailed in the Warranty Extension Form provided only by the Company.

This warranty is expressly in lieu of all other warranties, express or implied, including, but not limited to, any warranty of merchantability or fitness for a particular purpose. All warranties which exceed the aforementioned obligations are hereby disclaimed by the company and excluded from this warranty. The company shall, under no circumstances, be held liable for any special direct, indirect, incidental or consequential damages. All claims made under this warranty should be made by contacting your local distributor or agent or the company who will outline the administration and scope.

FOR CONSTRUCTION

DATA SHEET
Synchronous Alternator

Customer	: Enrogen 200KVA Data sheet (Max	Notes:	
Customer reference	:		
Product line	: AG10-250SI10AI	Product code	: 14418535
Area classification	: Safe		1010264379

General data

Frame (IEC)	: 250	Degree of protection	: IP23
Insulation Class	: 180°C (H)	Mounting style	: B15T
Total Harmonic Distortion (no load)	: ≤ 3%	Number of poles	: 4
Stator winding pitch	: 2/3	Type of Pole	: Salient
Altitude	: up to 1000 m.a.s.l	Nominal rotation - 50 Hz	: 1500 rpm
Number of Leads	: 12	Nominal rotation - 60 Hz	: 1800 rpm
Power factor	: 0.8 to 1.0	Overspeed	: 2250 rpm
Excitation system	: Brushless with Auxiliary Coil	Alternator mass	: 644 kg
Cooling	: IC01	Overload	: 1.1x In per 1h each 6h
		Momentary Overload	: 1.5x In per 30s

	Frequency and number of phases	50 Hz						60 Hz					
		Three-phase				Single-phase		Three-phase				Single-phase	
Voltages (V)	Y connection	**380**		**400**		-		**380**		**440**		**480**	-
	YY connection	190		200		-		190		220		240	-
	Δ connection	220		230		-		220		254		277	-
	ΔΔ connection	110		115		-		110		127		138	-
	Single phase low zig-zag or single phase delta	-		-		190 - 200		-		-		-	220 - 240
Output power (kVA)	ΔT=80°C (Ta=40°C)	168		168		97.0		168		186		208	108.0
	ΔT=105°C (Ta=40°C)	192		192		110.9		190		217		238	125.0
	ΔT=125°C (Ta=40°C)	**210**		**210**		**121.2**		**210**		**233**		**260**	**135.0**
	ΔT=150°C (Ta=40°C)	230		230		132.8		230		250		290	144.0
	ΔT=163°C (Ta=27°C)	240		240		138.6		240		260		295	150.0
Electrical data (FP=0.8 / ΔT=125°C / Ta=40°C) Satured reactances values	(%) Xd Direct axis synchronous reactance	479.6		390.2		639.43		571.4		456.8		414.6	609.11
	(%) X'd Direct axis transient reactance	18.3		14.9		24.4		21.8		17.4		15.8	23.24
	(%) X"d Direct axis subtransient reactance	13.1		10.7		17.5		15.6		12.4		11.3	16.6
	(%) Xq Quadrature axis sync. reactance	132.6		107.9		176.82		158.0		126.3		114.6	168.43
	(%) X"q Quadrature axis subtrans. reactance	10.5		8.5		14.0		12.5		10.0		9.0	13.28
	(%) X2 Negative sequence reactance	17.1		13.9		22.82		20.4		16.3		14.8	21.71
	(%) X0 Zero sequence reactance	2.2		1.8		2.92		2.6		2.1		1.9	2.77
	(ms) T'd Direct axis trans. short circ. time constant	66.1		53.8		88.18		78.8		63.0		57.2	84.0
	(ms) T"d Direct axis sub. short circ. time constant	1.7		1.4		2.32		2.1		1.7		1.5	2.21
	(ms) T'do Transient open circuit time constant	1319		1073		1758.45		1571		1256		1140	1675.07
	(ms) T"do Subtrans. constant of opened circuit	2.4		1.9		3.18		2.8		2.3		2.1	3.03
	(ms) Ta Short circuit time const. of armature	11		9		14.59		13		10		9	13.9
	(V) uc Full load excitation voltage	49.3		46.9		49.29		37.3		38.7		41.6	38.66
	(A) ic Full load excitation current	4.0		3.9		4.05		3.1		3.2		3.4	3.18
	(A) ic No load excitation current	0.7		0.8		0.88		0.5		0.7		0.8	0.88
	(A) Icc Sustained short-circuit current	734		734		979.31		946		946		946	1260.98
	Kcc Short-circuit ratio	0.43		0.35		0.58		0.52		0.41		0.37	0.55
Efficiency (%)	Power factor	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0
	25% of load	91.2	93	91.4	93.2	83.9	85.6	91.4	93.1	91.4	93.1	91.3	93.1	84.1	85.6
	50% of load	92.7	94.4	92.8	94.5	85.2	86.8	92.9	94.5	93.2	94.7	93.2	94.8	85.8	87.2
	75% of load	92.2	94.2	92.5	94.4	84.8	86.6	92.6	94.3	93.1	94.7	93.1	94.8	85.6	87.1
	100% of load	91.4	93.5	91.8	93.9	84	86	91.7	93.7	92.4	94.3	92.6	94.4	85	86.7
	125% of load	90.2	92.6	90.9	93.2	80.8	83.4	90.7	93	91.5	93.6	91.9	93.9	84.2	86.1

Other characteristics

Air flow	: 1.16 m³/s
Exciter stator winding resistance at 20°C	: 12.17 ohm
Stator winding resistance at 20°C	: 0.02664 ohm
Rotor winding resistance	: 1.5 ohm
Stator winding layers	: 2
Inertia WR²	: 2.37 kgm²
NDE Bearing	: 6314 2RS
DE bearing	
Flange	: SAE 1
Coupling disc	: SAE 14

Automatic voltage regulator

Accuracy (stability)	: +/- 0.5%
Rated current	: 5 A
Analog input	: Yes
Digital input	: No
Peak current	: 7 A/10 s
Droop / TC	: Yes
Dynamic recovery	: 8 to 500 ms
U/F	: Yes
Internal voltage adjustment	: +/- 15%
External voltage adjustment	: +/- 10%
Transient recovery time for ΔU=20%	: 500 ms

According to:
IEC 60034
NBR 5117
NEMA MG1
VDE530
ISO 8528
CSA

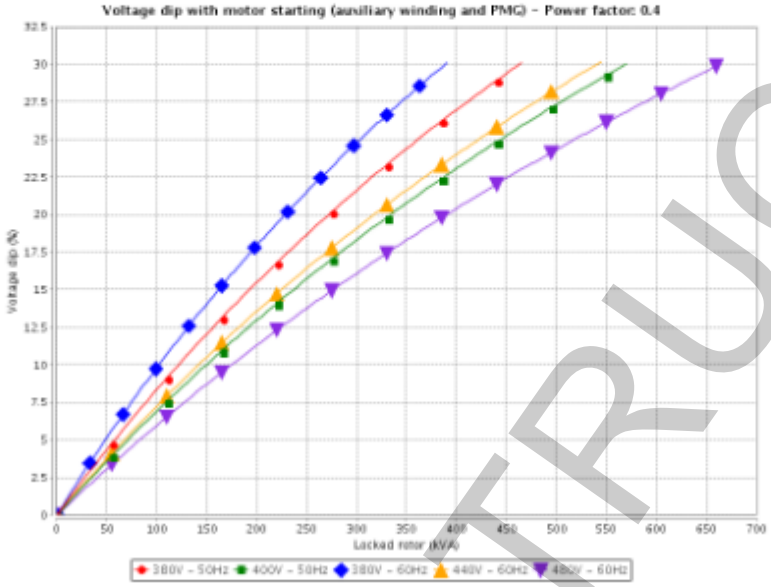
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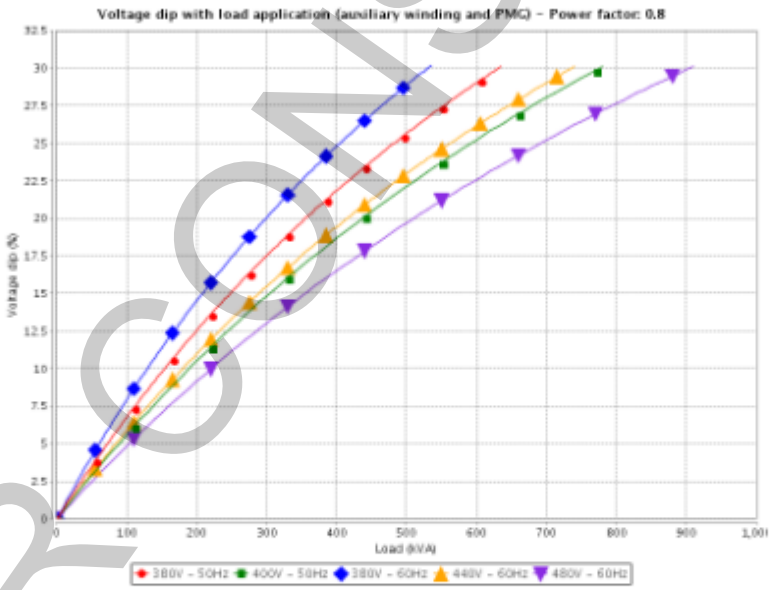
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FOR CONSTRUCTION

DATA SHEET
Synchronous Alternator





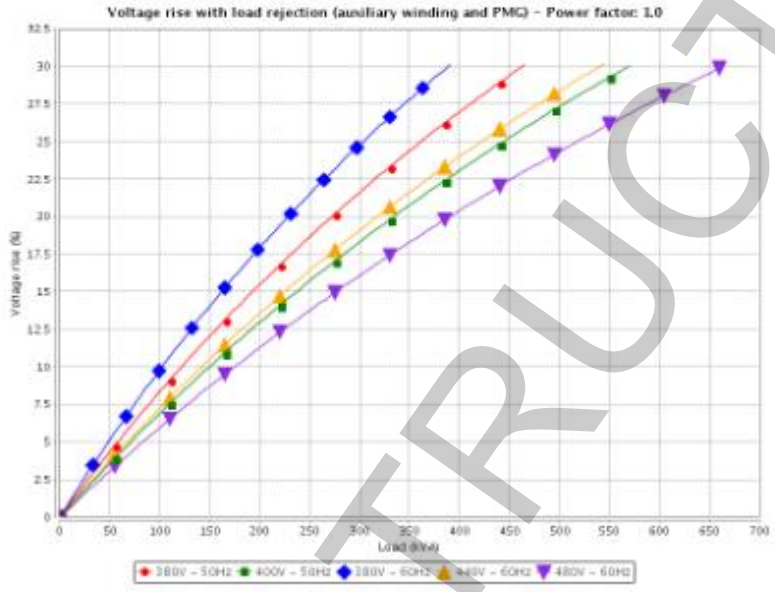
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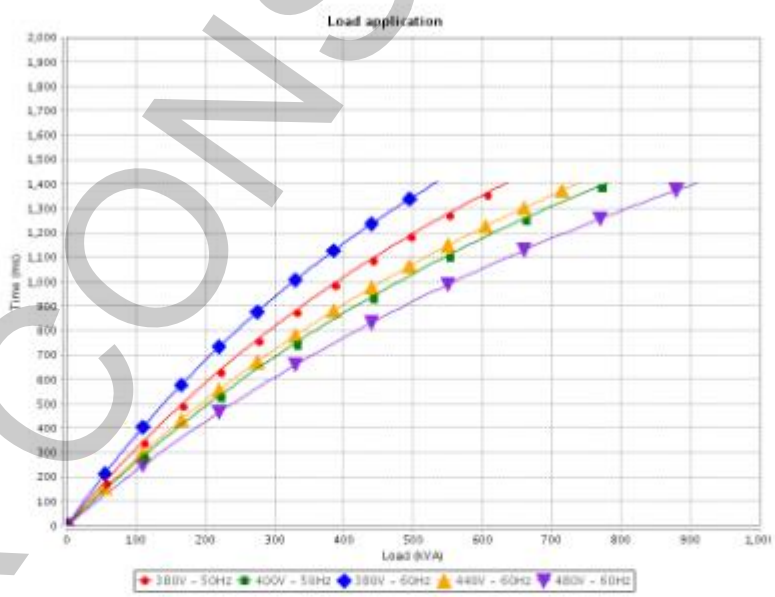
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DATA SHEET
Synchronous Alternator





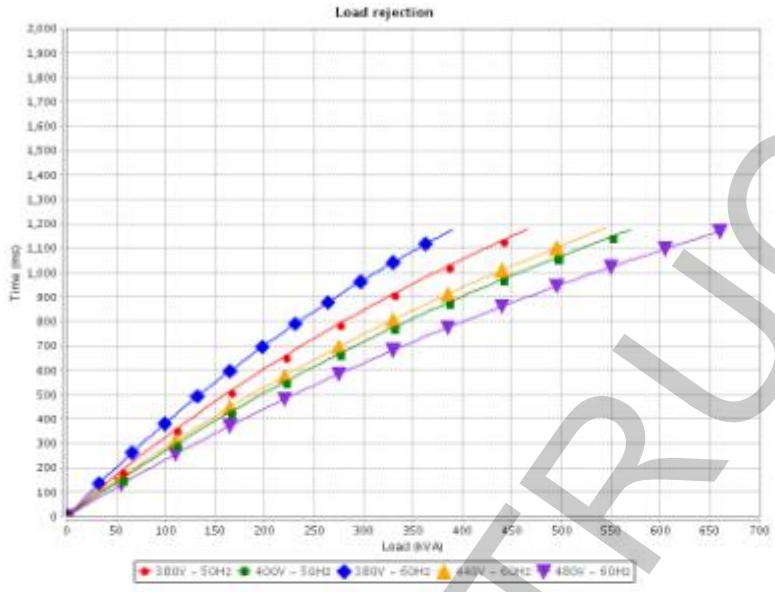
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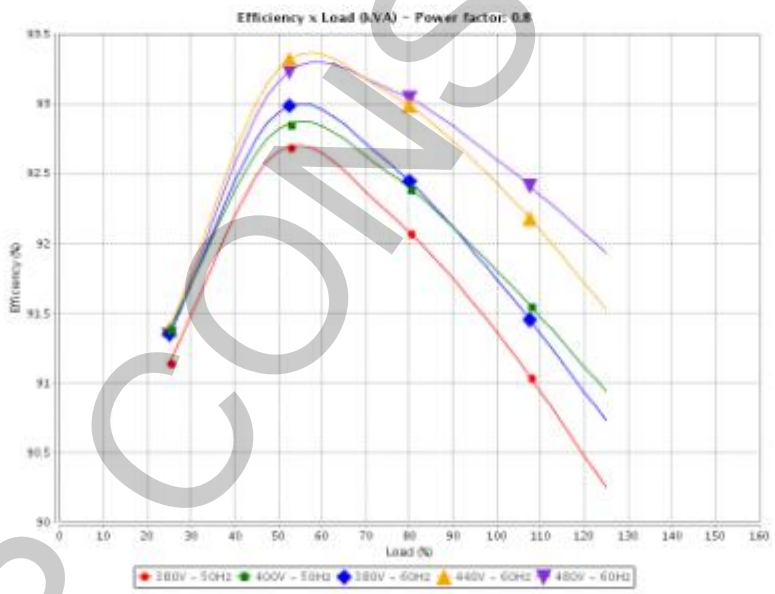
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FOR CONSTRUCTION

DATA SHEET
Synchronous Alternator





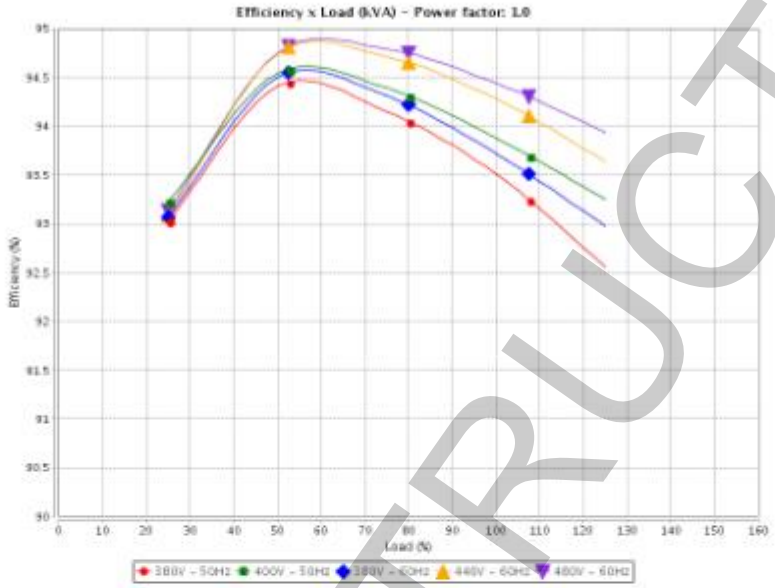
Rev.	Changes Summary	Performed	Checked	Date

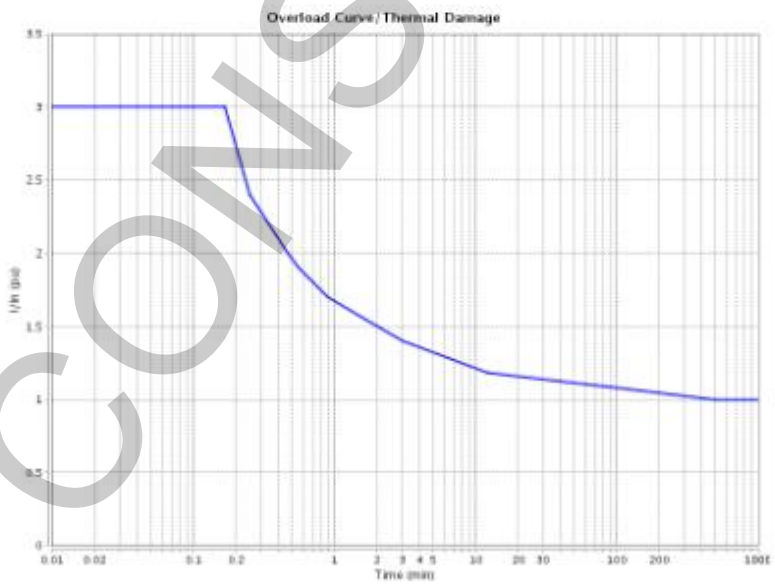
Performed by			
Checked by		Page	Revision
Date	02/08/2021	4 / 6	

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FOR CONSTRUCTION

DATA SHEET
Synchronous Alternator





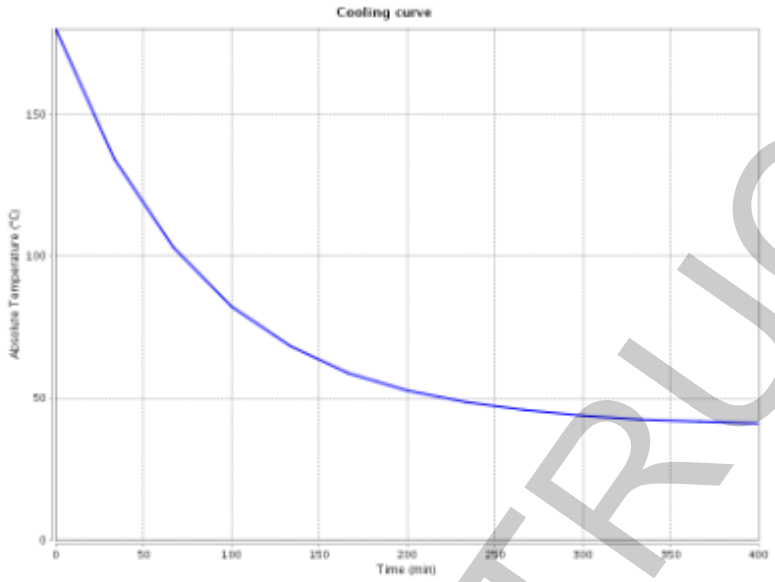
Rev.	Changes Summary	Performed	Checked	Date

Performed by				
Checked by			Page	Revision
Date	02/08/2021		5 / 6	

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FOR CONSTRUCTION

DATA SHEET
Synchronous Alternator

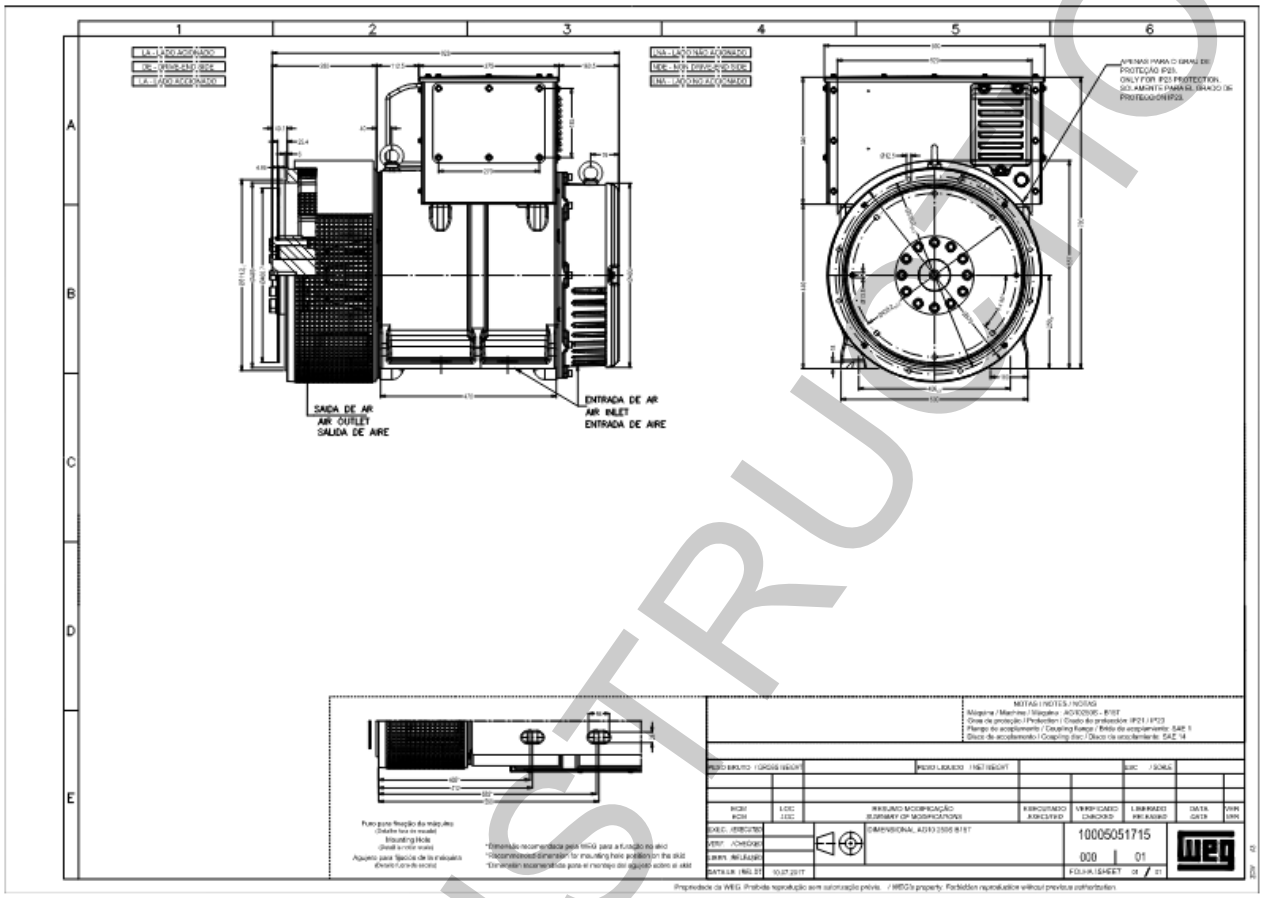


Rev.	Changes Summary	Performed	Checked	Date

Performed by			
Checked by		Page	Revision
Date	02/08/2021	6 / 6	

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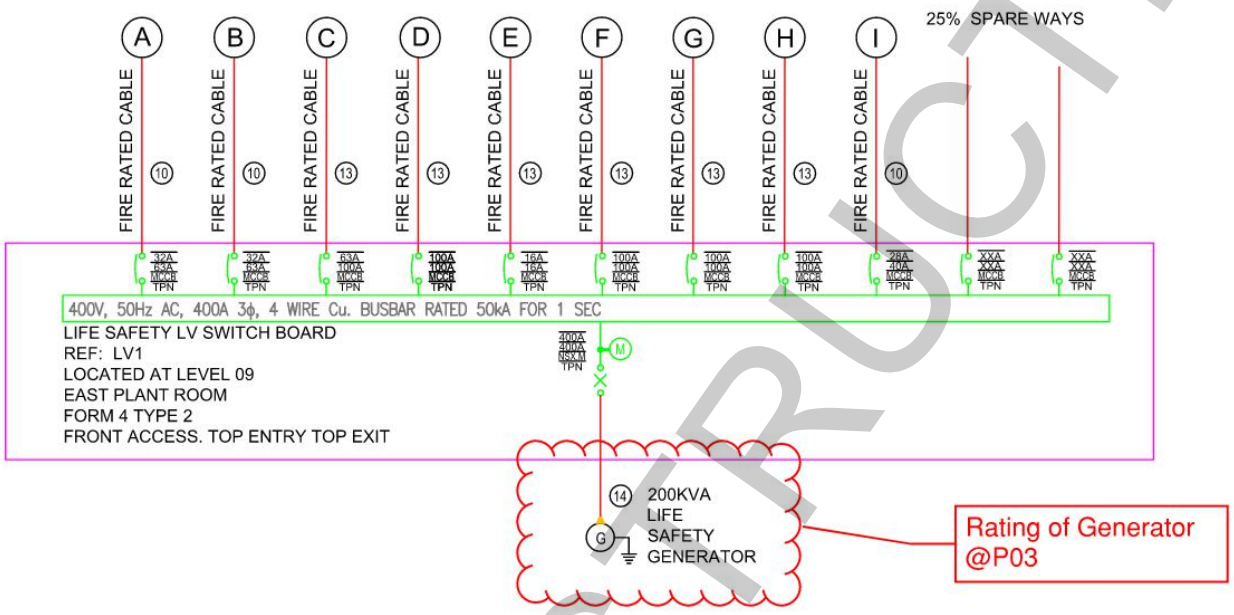
FOR CONSTRUCTION



FOR CONSTRUCTION

APPENDIX A

200KVA detailed on latest Design Schematic TIS-NGB-ZZ-XX-DR-E-6100_Rev-P03



SUPPORTING DOCUMENTS

This is a commercial issue and not Technical therefore should not affect or delay approval

DOCUMENTS:

1. Alternator 200KVA Data sheet
2. QD-S-1 - Genset New Warranty Declaration Rev C
3. ~~40003199a Technical Brief & Compliance statement~~

The ERs requires the generator to be rated at 300kVA minimum. If following detailed design, the 200kVA generator is sufficient for correct operation, the client will want to see the cost saving prior to agreeing to a reduced rating.

The acoustics consultant will need to confirm if the acoustic parameters have been met

Confirmed by email supporting evidence within the document

FOR CONSTRUCTION

Acoustic response from Cundall

[External] RE: 25725-The Island-Generator

DM Daniel Murray <d.murray@cundall.com>
To McGrath, Chris

Reply | Reply All | Forward

Fri 03/03/2023 09:04

You forwarded this message on 30/03/2023 09:23.
Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Hi Chris,

I got the following response from our acoustics team. Came in a bit late hence why I'm sending it now.

"Yes we would usually not count an emergency generator as an item requiring compliance with noise limits so the 80dba suggested seems fine to me."

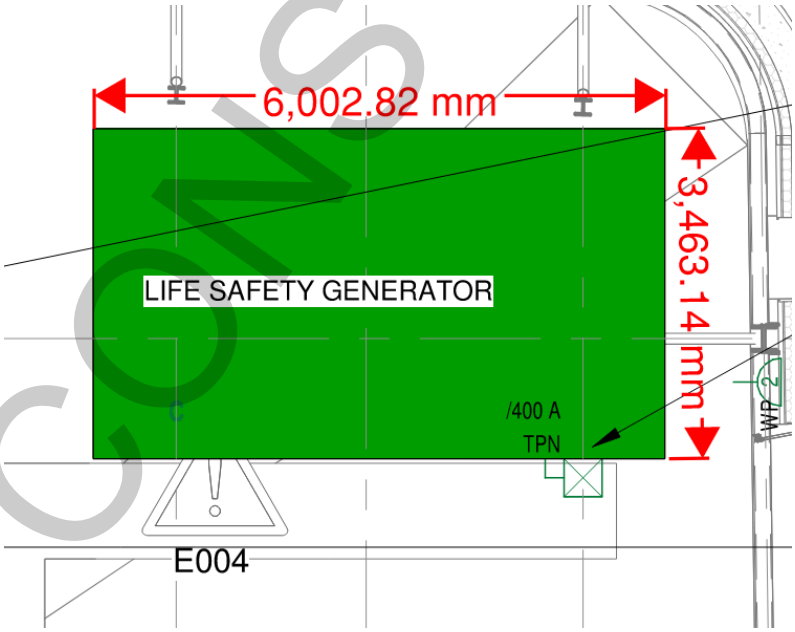
Hope this helps.

Kind regards,
Dan

Daniel Murray
Senior Electrical Engineer
Cundall

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www.cundall.com | People | Ideas | Projects | Twitter | Linkedin | Join

Size of Generator (200kva) 4020mm L x 1450mm W x 2139mm H so fits into area allocated



FOR CONSTRUCTION

Appendix C Baudouin 6M16G220/5 Diesel Engine Data Sheet.

Ratings

RPM	Gross Engine Output		
	COP kWm	PRP kWm	ESP kWm
1500	182	182	200

Basic data

Engine model 6M16G220/5
N° of Cylinders / Valves ..... 6 / 12
Cylinders arrangement ..... In line
Bore x Stroke (mm) ..... 126 x 130
Displacement (L) 9.726
Thermodynamic Cycle ..... Diesel 4 stroke
Cooling System ..... Liquid (water + 50% antifreeze)
Injection System ..... Direct
Fuel System ..... Mechanical Pump
Aspiration ..... Turbocharged and Aftercooled
Compression ratio ..... 17 : 1
Flywheel housing ..... SAE 1
Flywheel ..... 14"
N° of teeth on flywheel ring gear 136
Inertia of flywheel (kg/m²) 1.84
Inertia of crankshaft (kg/m²) 0.39
Emission standard ..... N/A
Overall Dimensions with radiator (Length x Width x Height) (mm) ..... 2075 x 1041 x 1259
Engine dry weight (kg) 1050
Engine wet weight (includes oil, coolant) (kg) 1123

DPK-TDS-EN-6M16-0000-18-09-21 Moteurs Baudouin reserve the right to modify these specifications, without notice. Document not contractual.

Air intake system

Air intake temperature rise (°C) ..... ≤ 15
Air intake restriction clean filter (mBar) ..... ≤ 35
Air intake restriction dirty filter (mBar) ..... ≤ 70
Recommended air flow @ PRP (m³/min) 13.2
Recommended air flow @ ESP (m³/min) 14.2
Min. diameter of intake pipe (mm) 100

Intercooling system

Intercooler heat dissipating capacity @ PRP (kJ/s) 17.2
Intercooler heat dissipating capacity @ ESP (kJ/s) 20.9
Max. intake temperature @ 25°C ambient temperature (°C) 55
Max. difference between intake temperature and ambient temperature (°C) ..... ≤ 30
Max. intake pressure drop of intercooler (mBar) 120

Cooling system

System designed for ambient temperature up to (°C) 50
Min. inside diameter of coolant outlet pipe (mm) 45
Coolant capacity of radiator and pipes (L) 22
Coolant alarm (shutdown) temperature (°C) 105
Thermostat opening temperature / full open temperature (°C) ..... 71 / 82
Min. pressure in cooling system (Bar) 0.5
Coolant capacity of the engine (L) 22

Exhaust system

Max. exhaust back pressure (mBar) 60
Max. exhaust temperature before turbocharger (°C) ..... ≤ 700
Max. exhaust temperature after turbocharger (°C) ..... ≤ 600
Exhaust flow @ PRP (m³/min) 36.02
Exhaust flow @ ESP (m³/min) 38.15
Min. diameter of exhaust pipe (mm) 100
Max. bending moment of exhaust gas exit flange (Nm) 10

DPK-TDS-EN-6M16-0000-18-09-21 Moteurs Baudouin reserve the right to modify these specifications, without notice. Document not contractual.

Lubrication system

Oil capacity Low / High (L) ..... 22 / 26
Oil pressure in normal condition idle speed (Bar) ..... 1.3 - 2.8
Oil pressure in normal condition at 1500 Rpm (Bar) ..... 3.5 - 5.8
Lowest oil pressure alarm (shutdown) (Bar) 1
Max. oil temperature (°C) 105
Oil flow (L/min) 118
Oil fuel consumption ratio based on engine fuel consumption data ..... ≤ 0.2 %
Total system capacity (including filters) (L) 30

Noise

Diesel engine noise (Acoustic power level) (dB(A)) 113.1

Fuel system

Governor ..... Electronic
Max. restriction at fuel pump inlet (Bar) 0.5
Max. fuel return restriction (Bar) 0.5
Max. fuel inlet temperature (°C) 70
Fuel supply flow (L/hr) 169
Min. pressure of fuel pump (Bar) 1.3
Min. diameter of inlet pipe (mm) 12
Min. diameter of return pipe (mm) 12

Electrical system

Electrical system voltage (negative to ground) (Vdc) 24
Starter power (kW) 5.4
Battery charger current (A) 55
Max. electric resistance of starting circuit (Ω) 0.004
Min. sectional area of wire (mm²) 50
Min. cold start temperature without auxiliary starting device (°C) ..... - 10
Min. cold start temperature with auxiliary starting device (°C) ..... - 30

DPK-TDS-EN-6M16-0000-18-09-21 Moteurs Baudouin reserve the right to modify these specifications, without notice. Document not contractual.

Heat balance test data (with ambient temperature 28 °C)

Total heat dissipation @ ESP (kJ/s) 259.7

Performance data

Mean Piston Speed (m/s) 6.5

BMEP (Bar) 16.45

Fan absorbed power (kW) 11

Fuel consumption

Rating	gr/kWh	L/hr
100% ESP	193	46.3
100% PRP	193.8	42.1
75% PRP	193.9	31.6
50% PRP	201.6	21.9
25% PRP	226.1	12.3
	Fuel consumption tolerance + 3 %	

Ratings definitions

Emergency Standby Power (ESP)
Emergency Standby Power is the maximum power available for a varying load for the duration of a main power network failure. The average load factor over 24 hours of operation should not exceed 70% of the engine's ESP power rating. Typical operational hours of the engine is 200 hours per year, with a maximum usage of 500 hours per year. This includes an annual maximum of 25 hours per year at the ESP power rating. No overload capability is allowed. The engine is not to be used for sustained utility paralleling applications.

Prime Power (PRP)
Prime Power is the maximum power available for unlimited hours of usage in a variable load application. The average load factor should not exceed 70% of the engine's PRP power rating during any 24 hour period. An overload capability of 10% is available, however, this is limited to 1 hour within every 12 hour period.

Continuous Power (COP)
Continuous Power is the maximum power available for an unlimited period of use at a constant load factor. No overload capability is allowed.

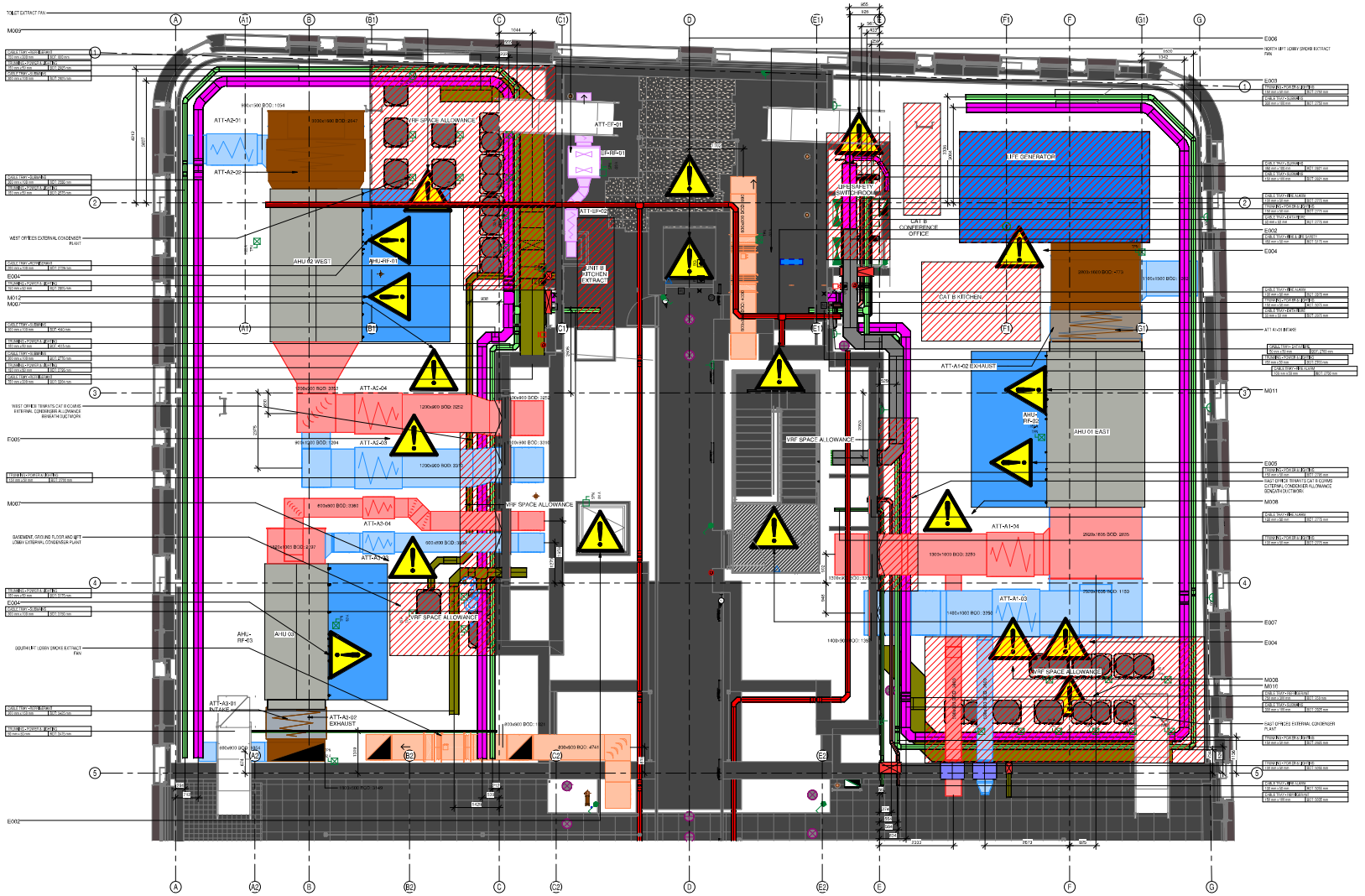
1) All ratings are based on operating conditions under ISO 8528-1, ISO 3046, DIN6271. Performance tolerance of ±5%.
2) Test conditions : 100 kPa, 25°C air inlet temperature, relative humidity of 30%, with fuel density 0.84 kg/L. Derating may be required for conditions outside these; please contact the factory for details.
3) 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 and optional equipment.

DPK-TDS-EN-6M16-0000-18-09-21 Moteurs Baudouin reserve the right to modify these specifications, without notice. Document not contractual.

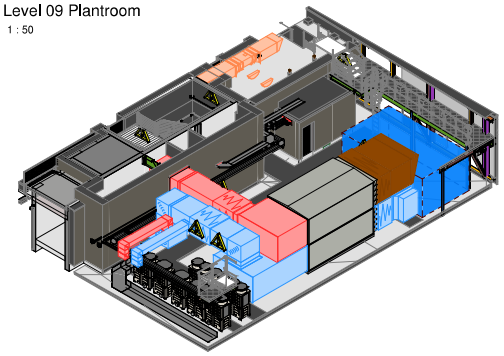
Appendix D Schematic Showing Position of Life Safety Generator on Roof of Building

C01

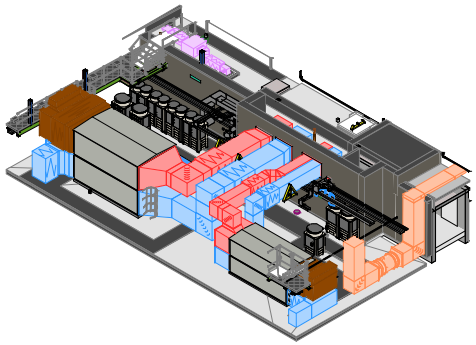
TIS-NGB-ZZ-XX-DR-N-5111



1 Level 09 Plantroom
1 : 50



2 Plant Area - East



3 Plant Area - West

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

For details of site wide and general risks to be read in conjunction with these notes, refer to the following documents:

No specific SHE risks have been identified for the contents of this drawing.

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND ENGINEERING SERVICES DRAWINGS, SPECIFICATIONS, SCHEDULES AND PROJECT SPECIFIC DOCUMENTS.
2. ALL PLANT AND EQUIPMENT IS TO BE INSTALLED TO MANUFACTURER'S RECOMMENDATIONS, ALLOWING FULL ACCESS FOR COMMISSIONING, MAINTENANCE AND REMOVAL/REPLACEMENT.
3. ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED.
4. DO NOT SCALE FROM THIS DRAWING.
5. THIS DRAWING SHOWS ELEMENTS FROM CONTRACTOR DESIGN PORTIONS, FOR COORDINATION PURPOSES ONLY. FINAL DESIGN RESPONSIBILITY FOR CPD ITEMS REMAINS WITH NGB.
6. ACCESS SHALL BE PROVIDED IN ALL DUCTWORK FOR INSPECTION, MAINTENANCE AND COMMISSIONING IN ACCORDANCE WITH HVCA DW 143 AND HVCA TR19.
7. DUCTWORK TO BE TESTED AND CLEANED IN ACCORDANCE WITH HVCA TR19 STANDARD.
8. VOLUME CONTROL DAMPERS IN ACCORDANCE WITH HVCA DW/ 144 ARE TO BE PROVIDED TO ALL DUCTWORK BRANCHES.
9. ALL FINAL DUCTWORK CONNECTIONS TO GRILLES SHALL BE VIA HARD CONNECTION. NO FLEXIBLE DUCTING TO BE USED WHERE DUCTWORK IS EXPOSED. ABOVE CEILING FLEXIBLE DUCTWORK TO HAVE A MAXIMUM LENGTH OF 300mm.
10. THE USE OF ANY DOOR TRANSFER GRILLS WITHIN FIRE PARTITIONS SHALL BE CONFIRMED WITH BUILDING CONTROL PRIOR TO DESIGN TO CONFIRM THE TYPE OF GRILLE REQUIRED.
11. THE CONTRACTOR IS TO ENSURE ANY DUCTWORK PASSING THROUGH FIRE RATED WALLS IS PROVIDED WITH A FIRE DAMPER TO SUIT THE RATING OF THE FIRE WALL.
12. ALL DUCTWORK TO BE INSULATED IN ACCORDANCE WITH THE MECHANICAL SPECIFICATION.
13. WHERE ATTENUATORS ARE SHOWN THESE ARE TO BE SIZED TO MEET THE REQUIRED NR VALUES OUTLINED WITHIN THE MECHANICAL SPECIFICATION.
14. CONTROL WIRING SHALL NOT BE RUN NEXT TO POWER WIRING A MINIMUM SPACE OF 300MM BETWEEN BOTH CONTROL AND POWER CABLES SHALL APPLY.
15. FIRE STOPPING IS TO BE PROVIDED AT ALL INSTANCES WHERE PIPEWORK PASSES THROUGH A FIRE COMPARTMENT. ALL PIPES THROUGH WALLS, FLOORS & CEILINGS TO BE SLEEVED & FITTED WITH PIPE COVERS.
16. ALL PIPE WORK SHALL BE INSULATED IN ACCORDANCE WITH THE SPECIFICATION. THE INSULATION SHALL INCLUDE ANY ALUMINUM HAMMER CLAD FINISH INCLUDING ALL THE NECESSARY FITTINGS AND SECURING BANDS.
17. REFRIGERANT GAS AND LIQUID PIPEWORK IS TO BE INSTALLED FROM EACH FCU TO ASSOCIATED CONTROL DEVICE AS SET OUT IN THE MECHANICAL SPECIFICATION AND SCHEMATIC.
18. ALL SECONDARY DUCTWORK FROM FCU'S TO BE 200Ø DIAMETER, MOUNTED AT 2995 TO BOTTOM OF DUCT (INCLUDING INSULATION).
19. ALL HEIGHTS OF INSTALLATIONS ARE CALCULATED BASED ON SPECIFIED LAYOUT LEVEL (NOT FROM AFL - ABOVE FINISHED FLOOR LEVEL) WITH OUT INCLUDED INSULATION THICKNESS.
20. THIS DRAWING INCLUDES ELEMENTS OF CONTRACTOR DESIGN PORTIONS, SHOWN FOR COORDINATION PURPOSES ONLY. DESIGN RESPONSIBILITY FOR THESE PACKAGES REMAINS WITH THE CONTRACTOR.
21. ALL OFFICE AREA SWIRL DIFFUSERS TO BE MOUNTED AT 2600 UNLESS STATED OTHERWISE. REFER TO ARCHITECT'S REFLECTED CEILING PLAN FOR SITTINGS OUT.

Rev	Description	Date

NG Bailey

Client: THE ISLAND SITE (GENERAL PARTNER) LIMITED

Contract: The Island Site

Design Manager: J.Cornes

Checked By: M Edwards

Title: Plantroom Layout Level 09 & 10 (Roof)

Issued By: J Casterton

Issue Date: 12/12/23

Status: A1 - Approved & Accepted

Scale: As indicated

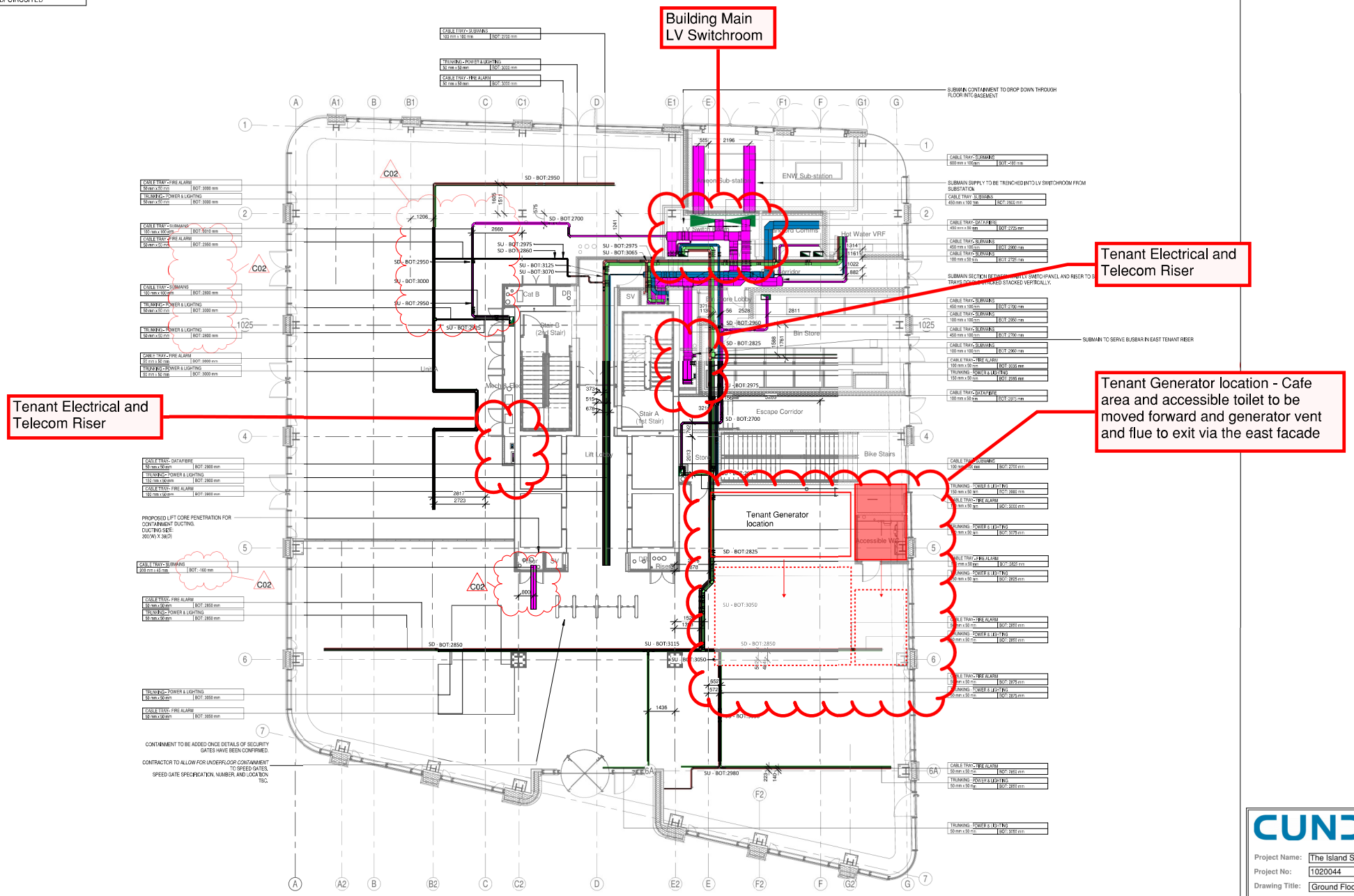
Sheet Size: A0

Rev: C01

Drawing No: TIS-NGB-ZZ-XX-DR-N-5111

Appendix E Schematic Showing Ground Floor Tenant Allocation

FINAL SIZING TO BE REVIEWED ONCE EQUIPMENT HAS BEEN SELECTED/ CIRCUITED



CUNDALL

Project Name:	The Island Site
Project No:	1020044
Drawing Title:	Ground Floor Tenant Allocation
Drawing No.:	CDL-SK-04
Rev:	00
Drawn By:	d.hiscocks
Date:	3/8/2024
Checked By:	
Scale:	
Verified By:	

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