DOUGLAS BRIGGS PARTNERSHIP
INTEGRATED ARCHITECTURE AND TOWN PLANNING

New Tank and Alterations to Coldstore To enable the installation of Combined Heat and Power (CHP) System at

Donaldsons Nursery, Marsh Farm, Vinnetrow Road, Chichester, PO20 1QD

1. Objectives

- To make the best use of natural resources and existing infrastructure.
- To reduce the carbon footprint of the business
- To achieve *the above* in a way that is not significantly harmful to the landscape or the local community.
- To build upon the existing successful soft fruit enterprise, meet customer demands and ensure long term viability.
- To continue to produce soft fruit using the highly sustainable method of harnessing energy from the sun.

2. Socio-Economic Context

Success of British Soft Fruit Farming

Britain has the perfect climate to grow and produce the best-flavoured soft and stone fruits in the world.

The flavour and unique quality of British soft fruits makes them eagerly awaited by consumers. Each year, as more and more consumers turn to home-grown fruits, demand has been rising.

While fruits such as strawberries and raspberries were once associated with the height of summer, modern growing methods have enabled an extended season from April to December.

To meet supermarket and consumer demands soft fruit has to be grown to very precise quality specifications and The Summer Berry Company (TSBC) have pioneered techniques of combining glasshouse, polytunnels and open field production to propagate and grow new varieties and cultivars and extend fruiting seasons for raspberries, strawberries and other soft fruits.

The use of glasshouses, polytunnels, combined with the development of early and late fruiting varieties, also offer British customers an alternative to imports from Spain and California and allows TSBC to grow produce to meet UK demands throughout the year.

Consumers are familiar with the concepts of food miles, freshness, sourcing locally and are becoming resistant to the need to import food from overseas when it can be produced around Chichester in our unique micro-climate.

As demand for consumer strawberries and raspberries has increased, the demand for the applicant's has increased with fruit grown on the Chichester plain being judged as some of the best quality available in the UK.

The Importance and Benefits of integrated soft-fruit production

The British soft fruit industry is one of the major agricultural success stories.

British-grown soft fruits, such as strawberries and raspberries, have become an important and successful rural business. Berries now represent the most important market in which UK fruit growers are involved. Sales in UK supermarkets of home-grown berries have increased significantly in the last four years.

TSBC has pioneered the use of glasshouses and polytunnels, together with the development of new varieties and cultivars allowing UK farmers to guarantee continuity of supply throughout an extended season to the extent that strawberries and raspberries are now regarded as a standard shopping basket fruit along with bananas, apples and citrus.

Growing a soft fruit crop requires high level farming skills, management and equipment with an integrated system of propagation, indoor, protected and outdoor growing conditions, working together to provide crops to meet consumer demands.

Retailers (mostly the large supermarket chains) demand high levels of continuity of supply even when weather conditions change. Retailers need to be confident in the reliability of supply for their operating regimes. Supermarkets represent 85% of the British soft fruit retail business so demands for high quality fruit and prompt, consistent deliveries throughout an extended season must be met if a fruit farmer is to have a viable business.

Need for facilities.

The Summer Berry Company (TSBC) has become established as one of the leading soft fruit growers in the South of England with sites at; Groves Farm, Colworth; Donaldsons Nursery and Leythorne Nursery on Vinnetrow Road and; Kives Farm, producing the highest quality Strawberries, Raspberries, Blackberries, Blueberries, Gooseberries and Redcurrants attracting the custom of the leading high quality retailers in the UK.

TSBC are committed to the creation and development of a high quality soft fruit production business on the Chichester Plain and have worked over the years to secure land and glasshouse assets that it requires to achieve this. The purchase of the majority of the glasshouses at Leythorne and Donaldsons Nurseries on Vinnetrow Road demonstrates this commitment.

The applicants operate 16.8Ha of glasshouses at Donaldsons Nursery producing Strawberries, blackberries, raspberries and blueberries for supermarket customers.

The applicant's facilities are spread across two sites with a packhouse and ancillary buildings around a loading yard (Donaldson's Unit 1) serving Blocks A, H, J and K 8.3Ha of glasshouses on the West side and a packhouse and vernalising store at a loading yard (Donaldson's Unit 2) serving Blocks B and C 8.5Ha of glasshouses on the East side.

In operating glasshouses, the applicants are familiar with harnessing the power of the sun to grow their crops and the glasshouse structures are used to extend the soft-fruit season to compliment the produce grown at the applicant's open field sites using existing established UK supply chains to supply UK customers, supplanting imports of soft fruits from other countries, reducing food miles and thus the carbon impact of food production.

Crops are sown in the glasshouses in late December with harvests in March-June and then September to early December, at each end of the traditional UK soft-fruit season. To achieve the optimum growing regime glasshouses are heated , humidity carefully managed and specialist fans employed to provide the optimum growing environment.

The applicant's current conventional heating system, while efficient has been affected by increases in the cost of gas and the fans, automated vents and other glasshouse operations are reliant on the electrical power from the National Grid with supply failures disrupting business productivity.

To make their facilities more sustainable, the applicants have identified potential cost and carbon benefits from generating Power and Heat on site using a Combined Heat and Power (CHP) system incorporating Heat Pump and CO^2 capture technology.

The use of a CHP system will enable greater independence and reduce the glasshouse operations power demand on the national grid while opening the opportunity to 'export' surplus low emission energy to the National Grid.

In addition, the CHP system enables the use of CO^2 captured from the generators to supply a CO^2 enriched atmosphere within the glasshouse that improves crop growth and further reduces the CO^2 emissions to the atmosphere and carbon footprint of the glasshouse heating system.

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3. Site Context

Consent was granted for a packaging store serving the existing glasshouses at Donaldsons Nursery in March 2013 (NM/13/00236/FUL) on the South side of the loading yard.

An application to remove Condition 4 to enable chilled storage within the approved storage building was granted in July 2016 and the building was converted to a coldstore with the installation of chillers and cold-wall paneling and served as a veralising store for the applicant's raspberry propogation.

Due to expansion in coldstore facilities at other sites within the applicant's ownership, the size required is greatly reduced, enabling the location of a plant room for the CHP equipment to be located within the West half of the existing building

It is proposed to locate the majority of the equipment required for the CHP system within the partly redundant Vernalising coldstore building on the South side of the Donaldson's Unit 2 loading yard adjacent to the B-Block Glasshouse with the intent of supplying heat and power to the glasshouse blocks within Donaldson's Unit 1 and Unit 2.

Part of the coldstore will be retained in the East half of the existing building for vernalising the amount of raspberry canes propogated at Leythorne Nursery.

4. Proposals

The proposed CHP system will provide heat for the glasshouse and electricity for glasshouse operations that together with sophisticated Heat Pump technology is predicted to reduce the carbon footprint for heating the glasshouses by around 30% with surplus 'low emission' electricity sold to the national grid.

CO^2 from the flue gas will be captured and used to fertilize plants in an enriched environment within the glasshouse structures to improve crop yields and significantly reduce the CO^2 released to the outside atmosphere and further reduce the carbon footprint of the glasshouse operations.

The existing building is ideally located between Donaldson's Units 1 and 2 Glasshouses, on the South side of the existing Donaldson's Unit 2 yard with access to power, gas and existing heating mains serving the B and C-Block glasshouses to the East and A, H, J and K-Block glasshouse to the West of the public bridleway.

Evaporator units are located on the East side of the yard between the existing Donaldson's Unit 2 packhouse, glasshouse, clodstore and the existing reservoir on the West side of the yard is used as a heat-sync for the Heat Pumps that operate as both a Water Source and Air Source Heat Pumps, powered by electricity generated by the CHP units.

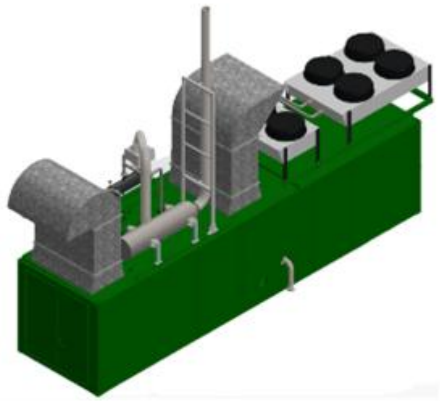
In addition to the alterations to the coldstore required to accommodate the CHP plant, a third water storage vessel is required as a 'buffer tank' to store heated water to meet peak demands and reduce the peak loads on the CHP units is located to the North side of the Unit 2 Packhouse.

5. *Layout*

The primary elements of the CHP system are shown on the application drawings and a description of each is as follows:-

Coldstore Plant Room

CHP Units



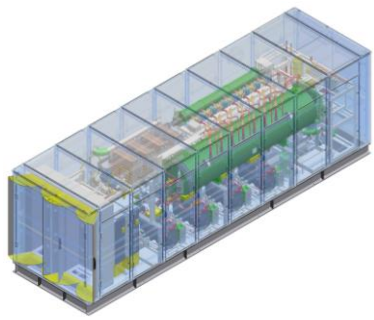
2 containerized CHP units are located in the West end of the plant room comprising Gas powered engines connected to electricity generators all within shipping style containers producing 1,500kW (V12) and 1,000kW (V8) of electricity.

Heat generated by the CHP engines is used to provide heating for the glasshouses and Electricity used for glasshouse operations and the two Heat Pumps to meet peak heating demand with surplus electricity generated sold to the national grid.

SCR Units

Flue gas emissions are regulated by EA and MCPD environmental permits and the 2 CHP Units are connected to 2 exhaust gas recovery and Selective Catalytic Reduction (SCR) units that remove contaminants, recover heat and harvest CO^2 from the flue gas that is used in the glasshouse through a CO^2 fertilizer system that provides an enhanced growing environment for the crops.

Heat Pumps



2 contanerised Heat Pumps are located at the East end of the plant room, using electrical power to recover heat from the Air via the Evaporators located in the yard and from water via a heat sync within the existing reservoir to the West side of the yard.

Flues, Vents and Access Doors

Two flues are located on the North side of the coldstore building. Attenuated air vents are provided to feed combustion cooling air to the containerized units. Additional Doors are provided on the North and West elevations of the coldstore to enable the containerized units to be installed / replaced and will remain closed during normal operation. Existing pedestrian access doors are provided to give access for service personnel.

External Plant

Evaporators and CHP Cooler Units

Two heat pump evaporators and one CHP cooling evaporator are located on the East side of the yard between the packhouse and coldstore buildings. The evaporators provide the air source for the Heat Pumps in a similar way to a domestic Air Source Heat Pumps (ASHP). The existing chiller unit and compressor enclosure are retained to operate the retained section of the coldstore building.

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Transformer

A mains electricity transformer is located within a fenced enclosure at the West end of the coldstore building to provide power to the two Heat Pumps and up to 1MW of surplus power to the National Grid when required.

Balancing Tank

Two existing 500,000L tanks are located to the North of the existing Packhouse.

A third 15m diameter, 12m tall 'buffer tank' is proposed to provide 2,000,000L of additional heat storage to reduce and balance loads on the CHP units and meet peak heating demands for the glasshouses.

Pipes

A combination of above ground and underground pipes are required to connect; the Heat Pumps to the heat-sinc within the reservoir; hot water to the reservoir and hot water to the existing glasshouse structures, as well as the gas supply and electrical connections for the installation.

The use of underground pipework is minimized to enable ease of maintenance and laid in ducts for service protection.

6. *Amount & Scale*

Data sheets for the primary items identified above are included in the appendix

The CHP units have a peak generation capacity of 2.5MW of electrical power and 2.7MW of thermal output

The Heat pumps draw electrical power from the CHP unit using Air source and Water Source heat-syncs have a peak thermal output of 1.25MW and the proposed Buffer Tank provides 2 million litres of additional hot water storage, sized to meet the existing glasshouse heating needs.

7. *Sound Attenuation*

The CHP and Heat Pump Units are located within insulated shipping style containers that are designed as noise attenuated structures with access for maintenance and repair and ducted openings for combustion and ventilation air, flue and power connections

While the units are installed within insulated containers that could be located outside, the repurposing of the existing coldstore building enables the collocation of the majority of the ancillary plant within the same building enabling further attenuation to be installed to limit noise break-out.

The air source evaporators require an external installation and have been located on the East side of the existing yard between the existing Packhouse and Coldstore, adjacent to the Glasshouse.

The nearest noise sensitive receptors (NSR) to the coldstore building are at Marsh Farm Cottage and nos 1-4 Green Lane, 110m to the East and Marsh Farmhouse 140m to the South West.

8. *Air Quality Assessment and Ventilation/Extraction Statement*

The CHP and Heat Pump Units are located within insulated shipping style containers that are designed as noise attenuated structures with access for maintenance and repair and ducted openings for combustion and ventilation air, flue and power connections.

Each CHP Unit is connected to an exhaust gas recovery and Selective Catalytic Reduction (SCR) units that removes contaminants, recover heat and harvest CO^2 from the flue gas.

Flue gas emissions are regulated by the Environment Agency (EA) with the installation subject to a Medium Combustion Plant Directive (MCPD) Permit covering SO2, NO2 and Dust/particulates emissions regulated by the Environment Agency.

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9. Appearance and Landscape Considerations

The location is well screened from public vantage points outside the site by existing glasshouses and buildings on the Runcton Horticultural Development Area.

An existing footpath is located between Donaldson's Unit1 and Unit 2 glasshouses along the West edge of the existing Reservoir to the West of the application site.

An existing hedge is located adjacent to the footpath and a reservoir (NM/12/03279/AGR) on the area of land between the Donaldson's Unit 2 loading yard and footpath, providing further natural screening.

The majority of the CHP system has been located within the existing repurposed coldstore building situated to the South of the existing Unit 2 loading yard on the North side of the access road to the Marsh Farm composting facility.

Alterations to the building include additional doors to facilitate the installation of the containerized CHP and Heat Pump Units. Externally, two flues and 4 attenuated ventilation ducts and will not significantly affect the building's appearance.

The external evaporators are an industry standard type and have been located on the East side of the existing yard between the existing coldstore building and packhouse and are not readily visible to anywhere other than within the site.

The buffer tank has been located between two existing tanks to the North of the Donaldson's Unit 2 packhouse and while taller than the glasshouse structures around it, is centrally located between the Unit 1 and Unit 2 glasshouses

Whilst it is acknowledged that the buffer tank will be visible from the footpath, the tank will be seen in context with the adjacent tanks and against a backdrop of the existing glasshouses and other agricultural buildings, having a comparatively minor impact on the experience of walkers using the path.

It is also considered that the local plan allocation of the application site as a HDA is a material consideration and there are several locations where the footpath passes closer to buildings than is proposed.

10. Biodiversity, Ecology and Wildlife Statement

The installation of the CHP and Heat Pump units repurposes part of the existing coldstore building that due to its nature is unlikely to provide roosting opportunities for Birds, Bats or Owls.

The evaporator units are located on the East side of a busy loading yard in constant use in relation to the glasshouse activities.

The installation of the Buffer Tank does not require the removal of any existing structures or buildings or any planting likely to provide roosting opportunities for birds or mammals.

It is considered very unlikely that the proposed installation of CHP system in the locations identified would result in the loss of or harm to any protected species or habitat.

11. Habitats Regulations Assessment Information

The proposals are unlikely to affect any protected species, are in excess of 3km from the nearest European designated site (Pagham Harbour RAMSAR) and do not involve any development that involve; Combustion processes greater than 50MW, waste or composting discharges or foul waste treatment giving rise to a nitrate discharge.

Due to the nature of the development it is considered that the proposals would not give rise to a relevant adverse or cumulative impact within the impact risk zones of; or risks having a significant effect on; a European protected site.

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12. Access and Highway Considerations

After installation, the CHP system will only require access for inspection and maintenance with the large doors used to install the containerized units, closed during normal operation.

There are no known environmental constraints on this site to restrict or impede accessibility.

The proposals do not involve any changes to the existing arrangements to the site.

13. Flood Risk and Drainage Assessment

The existing site is not in areas identified as being at risk of flooding (Zone 1) and the area of the development is significantly less than 1Ha.

No change is proposed to the existing surface water drainage system, no foul water drainage is required.

14. Sustainable Construction and Design Statement

The proposed Combined Heat and Power (CHP) installation falls within the definition of renewable technology and forms part of the applicant's strategy to improve the sustainability and climate change resilience of their existing horticultural operations to reduce the carbon footprint of the crops they produce.

Resource and energy efficiency Water Efficiency

Providing a robust and reliable power source and taking opportunities to maximize efficiency of existing infrastructure is part of the applicant's strategy that led to the identification of a suitable CHP unit to meet their needs and reduce the carbon footprint of their glasshouse operations.

On Site Renewable Energy

The CHP units will provide electrical power to existing facilities on-site reducing the glasshouse operation's electrical power demand from the National Grid and powering two new Heat Pump units that provide additional heating for the glasshouses when required with around a 30% reduction in CO^2 emissions, further reduced by using the captured CO^2 to fertilise the crops in the glasshouse.

Hot water is stored in a buffer tank to serve the glasshouse heating and as a Grid-connected CHP system, surplus electrical power is not stored on site but will be exported to the National Grid to provide a low-carbon power source for local consumers.

Reducing the need to travel

The applicant's horticultural enterprise produces quality fruit at times of year when soft fruit cannot be grown in open fields. Without crop protection imported soft fruit would dominate our supermarket shelves, with the potential for higher prices following Brexit and the increase in transport costs.

Adapting to climate change

Making provision for a diverse range of power supplies is part of the applicant's strategy for increasing their resilience to climate change and while powered by mains Gas, the CHP Units are ready to be adapted to Hydrogen with minimal alteration, ensuring that their horticultural enterprise has an increased level of power security so they may continue to contribute towards national food security.

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15. Planning Context

Permitted Development

The proposals are for a CHP unit Water and Air Source Heat Pumps within a site that is not a dwellinghouse or a block of flats or within the curtilage of the same.

The Town and Country Planning (General Permitted Development)(England) Order 2015 as amended, grants permission under Schedule 2, Part 14:-

Class M – The installation, alteration or replacement of a microgeneration water source heat pump within the curtilage of a building other than a dwellinghouse or a block of flats.

Class O – installation, alteration or replacement of a flue, forming part of a microgeneration combined heat and power system, on a building other than-
(a) a dwellinghouse or block of flats; or
()b) a building situated within the curtilage of a dwellinghouse or block of flats.

While the Water Source elements of the Heat Pump fall within Class M, the Air Source elements do not and due to the centralization of technology for the glasshouse site, the power output of the CHP plant at 2.5MW exceeds the threshold of Condition O.1(a), thus not falling within Class O and planning permission will be required.

National Planning Policy Framework, updated December 2023

It is considered that proposals constitute sustainable development which accords with current policy. Sustainable development is understood to be identified as follows;

7. The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs[4]. At a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection[5].

In the NPPF the Government have identified the following as important;

8. ...the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways…

*a) **an economic objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*

*b) **a social objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*

*c) **an environmental objective** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

It is considered that the proposed CHP unit meet many of these objectives in particular making prudent use of natural resources, minimising waste and pollution and mitigating and adapting to climate change, by providing a low carbon heating source that provides a reliable and robust electrical power source, reducing the carbon footprint of glasshouse operations.

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10. So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development

11. Plans and decisions should apply a presumption in favour of sustainable development

For decision-taking this means:
c) approving development proposals that accord with an up-to-date development plan without delay; or
d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:
i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or
ii any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole;

The proposals accord with the development plan and the presumption in favour of the development applies.

Building a strong, competitive economy
85. Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future…
Supporting a prosperous rural economy
88. Planning policies and decisions should enable:
a) the sustainable growth and expansion of all types of business in rural areas…
b) the development and diversification of agricultural and other land-based rural business…

85. Planning policies and decisions should recognise that sites to meet local business and community needs in rural areas may have to be found adjacent to or beyond existing settlements…..

The proposed CHP unit serves an existing horticultural enterprise and will provide power for the glasshouse operations undertaken within the glasshouses providing a robust diversified and adaptable low-carbon power source to support the existing horticultural businesses making efficient use of good quality agricultural land for the efficient production of food.

Planning for climate change
163. When determining applications for renewable and low carbon development, local planning authorities should:
a)not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognize that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and
b) approve the application if its impacts are (or can be made) acceptable [54]…

164. In determining planning applications, local planning authorities should give significant weight to the need to support energy efficiency and low carbon heating improvements to existing buildings, both domestic and non-domestic (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights)….

The proposed CHP unit provides through co-generation and CO^2 capture/fertilization, utilizing Heat Pumps and low carbon energy close to the energy use and contribute directly to a reduction in the production of greenhouse gasses involved in the efficient production of horticultural produce from this site.

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Chichester Local Plan Key Policies 2014-2029

The Chichester Local Plan was adopted in 2015 and forms part of the statutory 'development plan' for the area in relation to the requirement of Section 70(2) of the Town and Country Planning Act 1990 as amended by Section 38(6) of the Planning and Compulsory Purchase Act 2004 that *"if regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise."*

Policy 1 repeats the definition of the presumption in favour of sustainable development at paragraph 14 of the NPPF where applications that accord with policy will be approved, unless material considerations indicate otherwise but also provides a commitment that "*When considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development.... It will always work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible*"

Policy 2 defines a settlement hierarchy and development strategy favouring development within towns and large villages in sustainable locations and notes that *"Development in the Rest of the Plan Area outside the settlements listed above is restricted to that which requires a countryside location or meets an essential local rural need or supports rural diversification in accordance with Policies 45-46"*

Donaldsons Nursery is located within the Runcon Horticultural Development Area (HDA) and the proposals conform to policies 32 and 45.

Policy 3 sets out the strategy for how *"Sustainable growth of the local economy will be supported through the provision of a flexible supply of employment land and premises to meet the varying needs of different sectors....Planning to accommodate the development needs of key local employment sectors, including the horticultural industry (see Policy 32)"*

The proposed CHP units, Heat Pumps and Buffer Tank provide low carbon power and heat to meet the specific operational needs of an existing horticultural business, conforming to Policy 32.

Policy 9 requires development to *"Make effective use of existing infrastructure, facilities and services, including opportunities for co-location and multi-functional use of facilities"*

The proposed CHP units, Heat Pumps and Buffer Tank improve the efficiency and reduces the carbon emissions to make efficient use of specialist facilities already at the nursery.

Policy 32 sets out 7 criteria for Horticultural Development within Horticultural Development Areas (HDAs) and an additional 4 criteria for development outside these allocated zones.

"Within HDAs

Large scale horticultural glasshouses will continue to be focused within the existing Horticultural Development Areas at Tangmere and Runcton. The Sidlesham and Almodington Horticultural Development Areas will continue to be the focus for smaller scale horticultural glasshouses.

Within designated Horticultural Development Areas, as shown on the Policies Map, planning permission will be granted for new glasshouse, packhouse and polytunnel development where it can be ***demonstrated that the following criteria (1-7) have been met:"***

1. *"There is no significant adverse increase in noise levels resulting from machinery usage, vehicle movement, or other activity on the site, which would be likely to unacceptably disturb occupants of nearby noise sensitive properties or be likely to cause unacceptable harm to the enjoyment of the countryside;"*

   The proposed CHP units are enclosed within an existing building and will not significantly increase noise levels on the site.

2. *The proposal does not generate unacceptable levels of soil, water, odour or air pollution and there is no significant adverse impact resulting from artificial lighting on the occupants of nearby sensitive properties or on the appearance of the site in the landscape;*

   The proposed CHP units, Heat Pumps and Buffer Tank will contribute to a reduction in CO2 generation from the site and does not generate unacceptable levels of soil, water, odour or air pollution at the site.

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3 *New planting is sufficient to benefit an improvement to the landscape and increases the potential for screening;*
New planting would be inappropriate for the installation of this CHP system.

4 *Adequate vehicular access arrangements exist or will be provided from the site to the road network to safely accommodate vehicle movements without detriment to highway safety or result in unacceptable harm to residential amenity;*
Adequate vehicular access to Donaldsons Nursery already exists for the installation of the CHP units, Heat Pump and materials to construct the buffer tank, once installed the plant will only require inspection for maintenance and repair purposes.

5 *The height and bulk of development, either individually or cumulatively, does not damage the character or appearance of the surrounding countryside, and mitigation measures are included to address any detrimental effects e.g. in order to mitigate the height and bulk of new horticultural structures;*
The CHP units and Heat Pumps have been located within an existing building and the Buffer Tank has been positioned close to the centre of an existing established horticultural site, surrounded on all sides by substantial glasshouse structures.

6 *It can be demonstrated that adequate water resources are available or can be provided and appropriate water efficiency measures are included; and*
The proposed CHP units and Heat Pumps do not require any water resources beyond those already on site.

7 *Acceptable surface water drainage capacity exists or can be provided as part of the development including sustainable drainage systems or water retention areas.*
The existing surface water drainage arrangements are unaffected by the proposals.

The proposed CHP units, Heat Pump and Buffer Tank will serve an existing established horticultural enterprise and comply with all 7 criteria for development within HDAs .

Policy 40: Sustainability Statement
Policy 40 gives 10 criteria to meet:-

1. How the proposal aims to protect and enhance the environment, both built and natural. Where this is not possible, how any harm will be mitigated;
2. The proposal achieves a minimum of 110 litres per person per day including external water use;
3. New development complies with Building for Life Standards or equivalent replacement national minimum standards, whichever are higher by ensuring it is accessible to all, flexible towards future adaptation in response to changing life needs, easily accessible to facilities and services; and takes into account the need for on-site waste reduction and recycling;
4. Where appropriate, the proposals apply sound sustainable design, good environmental practices, sustainable building techniques and technology, including the use of materials that reduce the embodied carbon of construction and the use of re-used or recycled materials;
5. Energy consumption will be minimised and the amount of energy supplied from renewable resources will be maximised to meet the remaining requirement, including the use of energy efficient passive solar design principles where possible;
6. The proposals include measures to adapt to climate change, such as the provision of green infrastructure, sustainable urban drainage systems, suitable shading of pedestrian routes and open spaces and drought resistant planting/landscaping;
7. The historic and built environment, open space, and landscape character will be protected and enhanced;
8. The natural environment and biodiversity will be protected and/or where appropriate provision will be made for improvements to biodiversity areas and green infrastructure;
9. The development is appropriate and sympathetic in terms of scale, height, appearance, form, siting and layout and is sensitively designed to maintain the tranquillity and local character and identity of the area; and

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10. The reduction of the impacts associated with traffic or pollution (including air, water, noise and light pollution) will be achieved, including but not limited to the promotion of car clubs and facilities for charging electric vehicles.

While the majority of these criteria are only applicable to housing development, the proposed CHP system applies sound sustainable design principles to minimize energy consumption and maximize renewable resources to enable an existing, established land-based horticultural business to operate in an improved and more sustainable way, providing a robust and reliable power supply and reduce by around 30% the carbon footprint of providing home grown food for the UK market cutting down on imported food, reducing 'food miles' and assisting with the move to a low carbon economy.

Policy 45 states that *"Within the countryside, outside Settlement Boundaries, development will be granted where it requires a countryside location and meets the essential, small scale, and local need which cannot be met within or immediately adjacent to existing settlements.*

The proposed CHP units, Heat Pumps and Buffer Tanks will serve an existing established horticultural enterprise within a designated Horticultural Development Area.

*Planning permission will be granted for sustainable development in the countryside where it can be **demonstrated that all the following criteria have been met:"***

1. *"The proposal is well related to an existing farmstead or group of buildings, or located close to an established settlement;"*
   The proposed CHP units and Heat pumps are located within an existing building and the Buffer Tank is situated close to the centre of an established horticultural site surrounded by glasshouse structures
2. *"The proposal is complementary to and does not prejudice any viable agricultural operations on a farm and other existing viable uses; and"*
   The proposed CHP units, Heat Pumps and Buffer Tank will provide low carbon power and heating for horticultural activities within the existing glasshouses and do not prejudice horticultural operations on the site.
3. *"Proposals requiring a countryside setting, for example agricultural buildings, ensure that their scale, siting, design and materials would have minimal impact on the landscape and rural character of the area."*
   The proposed CHP units and Heat pumps are located within an existing building and the Buffer Tank is situated close to the centre of an established horticultural site surrounded by glasshouse structures

16. Conclusion

Since converting the Nursery from the production of cut flowers to soft fruit production to meet UK demand for soft fruit early and late in the season, this Horticultural Enterprise has proved very successful and expanded to occupy most of the glasshouses on the site.

The applicants are at the fore-front of soft-fruit production and seek innovations and practices that will improve the efficiency and sustainability of their horticultural enterprise.

In operating glasshouses, the applicants are familiar with harnessing the power of the sun to grow their crops. However, to make their facilities more sustainable, the applicants have identified potential cost and carbon benefits from generating power through the heating of their Glasshouse with a Combined Heat and Power (CHP) unit.

The CHP Units will provide a lower carbon means of providing heating for the glasshouse growing environment and generate electrical power that when no used for the glasshouse operations will be available for export to the national grid

In addition to the benefits of co-generation and microgeneration close to the point of use, Heat Pumps are used to improve the efficiency of the glasshouse heating and the CO^2 from the flue gas will be used to fertilize plants in an enriched environment within the glasshouse structures to improve crop yields and significantly reduce the CO^2 released to the outside atmosphere and thereby the carbon footprint of the food produce grown at the nursery.

It is only the heating output of the system, air source heat pump and buffer tank that prevents the proposed CHP system from meeting the requirements to qualify as permitted development under GPDO schedule 2, part 14, Class M and Class O.

The applicant has described the proposals in detail and how with reference to policies in the National Planning Policy Framework (NPPF) and the current Development Plan, the proposed CHP plant complies with policy objectives and meets the definition of sustainable development.

In view of the compliance with planning policies outlined above and the significant reductions in the carbon footprint of the food production provided by the glasshouse operations on the site that will result from the CHP installation, these application proposals represent sustainable development and should be supported.

DOUGLAS BRIGGS PARTNERSHIP
INTEGRATED ARCHITECTURE AND TOWN PLANNING

APPENDIX A

17. Appendix A - Local Validation List

1. Affordable housing statement – not applicable
2. Air Quality Assessment – **See Statement**
3. Area of Outstanding Natural Beauty (AONB) Statement – not applicable
4. Biodiversity and Ecological Assessments – **See Statement**
5. CIL / S106 terms – CIL Form_1 included - not CIL Liable development
6. Flood Risk Assessment – Not applicable (under 1Ha Flood Zone 1)
7. Flood Risk Sequential and Exception Tests – Not applicable
8. Drainage Assessments – Not applicable (no change to drainage proposed)
9. Heritage Statement – not applicable
10. Interim Policy Statement Justification – not applicable
11. Land contamination assessment – not applicable
12. Lighting assessment – not required (No external lighting proposed)
13. Mineral Infrastructure Statement – not applicable (Not Major Application)
14. Noise assessment – **See Statement**
15. Overheating Ventilation Assessment – Not applicable
16. Odour Assessment – Not applicable
17. Plans and drawings – included with application
18. Planning Statement – **See Statement**
19. Retail Sequential Test and Impact Assessment – not applicable
20. Structural Survey & Conversion Method Statement – not applicable
21. Sustainable Construction and Design Statement - **See Statement**
22. Transport Assessment, Statement and Road Safety Audit – not applicable
23. Travel Plan – not applicable
24. Parking Assessment – not applicable
25. Tree survey & Method Statement – not applicable
26. Ventilation/Extraction statement – **See Statement**

APPENDIX B
Equipment Data Sheets

18. *Appendix B Contents*

- Combined Heat and Power (CHP) Units (Containerised and within Plant Room)
- Selective Catalytic Reduction (SCR) Units (Within Plant Room)
- Heat Pumps (Containerised and within Plant Room)
- Evaporators
- CHP Coolers

DOUGLAS BRIGGS PARTNERSHIP

INTEGRATED ARCHITECTURE AND TOWN PLANNING

CHP Unit 1

Technical Data Sheet		**MTU 12V4000 GS**		
93800053020_V01_en_GB		**GG12V4000D1**		
Voltage / Frequency	V / Hz	**400**	**/**	**50**
Cooling water temperature (in / out)	°C		**78 / 92**	
NOx emissions (dry, % O_2)	mg/m³ i.N.		**< 500**	
Mixture cooler 1st stage water temperature (in)	°C			
Mixture cooler 2nd stage water temperature (in)	°C		**43**	
Exhaust gas temperature	°C		**420**	
Catalytic converter			**not included**	
Special equipment				
Elevation above sea level	m / mbar	**100**	**/**	**1000**
Combustion air temperature	°C		**25**	
Relative combustion air humidity	%		**30**	
Standard specifications and regulations			**VDE-AR-N 4110**	
Energy balance	**%**	**100**	**75**	**50**
Electrical Power [2) 3)]	kW	1521	1141	761
Energy input [4) 5)]	kW	3443	2645	1871
Thermal output total [6)]	kW	788	576	403
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]	kW	788	576	403
Thermal output mixture cooler 1st stage [6)]	kW			
Thermal output mixture cooler 2nd stage [6)]	kW	115	79	49
Exhaust heat (120 °C) [6)]	kW	(742)	(624)	(498)
Engine power ISO 3046-1 [2)]	kW	1560	1171	784
Generator efficiency at power factor = 1	%	97.5	97.5	97.1
Electrical efficiency [4)]	%	44.2	43.1	40.7
Total efficiency	%	88.6	88.5	88.8
Power consumption [7)]	kW			
Combustion air / Exhaust gas				
Combustion air volume flow [1)]	m³ i.N./h	5849	4413	2959
Combustion air mass flow	kg/h	7553	5699	3821
Exhaust gas volume flow, wet [1)]	m³ i.N./h	6142	4640	3118
Exhaust gas volume flow, dry [1)]	m³ i.N./h	5509	4155	2774
Exhaust gas mass flow, wet	kg/h	7814	5904	3962
Exhaust temperature after turbocharger	°C	420	453	512
Reference fuel [8)]				
Natural gas			CH_4 >95 Vol.%	
Sewage gas			not applicable	
Biogas			not applicable	
Landfill gas			not applicable	
Fuel requirements [9)]				
Minimum methane number	MN		72	
Range of heating value: design / operation range without power derating	kWh/m³ i.N.		10.0 - 10.5 / 8.3 - 11.0	
Exhaust gas emissions [5) 8)] Compliance with emissions standards only for ≥ 761 kWel				
NOx, stated as NO_2 (dry, % O_2)	mg/m³ i.N.	< 500		
CO (dry, % O_2)	mg/m³ i.N.	< 1000		
HCHO (dry, % O_2)	mg/m³ i.N.	< 120		
VOC (dry, % O_2)	mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging				
Number of cylinders / configuration		12	/	V
Engine type			12V4000L64FNER	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm³		57.2	
Mean piston speed	m/s		10.5	
Compression ratio			12.5	
BMEP at nominal engine speed min-1	bar	21.8		
Lube oil consumption [10)]	dm³/h	0.27		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	
Generator				
Rating power (temperature rise class F) [11)]	kVA		2152	
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) [12)]			0.8 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10 / ± 5	
Engine cooling water system				
Coolant temperature (in / out), design	°C	78 / 92		
Coolant flow rate, constant [13) 14)]	m³/h	52.4		
Pressure drop, design [14)] Cv value [13) 15)]	bar / m³/h	1.9	/	38.6
Max. operation pressure (coolant before engine)	bar		6.0	
Exhaust gas heat exchanger (EGHE)				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant [13) 14)]	m³/h			
Pressure drop, design [14)] Cv value [13) 15)]	kPa / m³/h		/	
Min. coolant flow rate / min. operation gauge pressure	m³/h / bar		/	
Max. operation pressure (coolant water)	bar			

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CHP Unit 1

Technical Data Sheet **MTU 12V4000 GS**
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mtu onsite energy

Mixture cooler 1st stage, external					
Coolant temperature (in / out), design		°C			
Coolant volumetric flow, design, constant 13) 14)		m³/h			
Pressure drop, design 14)	Cv value 13) 15)	bar / m³/h		/	
Min. coolant flow rate / min. operation gauge pressure		m³/h / bar		/	
Max. operation pressure before mixture cooler		bar			
Mixture cooling 2nd stage, external					
Coolant temperature (in / out), design		°C	43 / 46.1		
Coolant volumetric flow, design, constant 13) 14)		m³/h	34.3		
Pressure drop, design 14)	Cv value 13) 15)	bar / m³/h	0.48	/	50.6
Max. operation pressure before mixture cooler		bar		6	
Heating circuit interface					
Engine coolant temperature (in / out), design		°C			
Heating water temperature (in / out), design		°C			
Heating water flow rate, design 14) 16)		m³/h			
Pressure drop, design 14)	Cv value 15) 16)	bar / m³/h		/	
Max. operation gauge pressure (heating water)		bar			
Room ventilation					
Genset ventilation heat 17)		kW		86	
Inlet air temperature: (min./design/max.)		°C		20 / 25 / 30	
Min. engine room temperature 18)		°C		15	
Max. temperature difference ventilation air (in / out)		K		20	
Min. supply air volume flow rate (combustion + ventilation) 19)		m³ i.N./h		18000	
Gearbox		**%**	**100**	**75**	**50**
Efficiency		%	-	-	-
Starter battery					
Nominal voltage / power / capacity required		V / kW / Ah		24 / 9 / --	
Filling quantities					
Lube oil for engine		dm³		280	
Coolant in engine		dm³		200	
Coolant in mixture cooler		dm³		20	
Heating water for plate heat exchanger 20)		dm³			
Lube oil for gearbox		dm³			
Gas regulation line					
Nominal size / gas pressure min. - max. (at gas regulation line inlet)		DN / mbar - mbar	80	/	150 - 250

Engine sound level 21) (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level

Frequency	Hz	**63**	**125**	**250**	**500**
Sound pressure level	dB	83.3	87.4	88.6	91.3
Frequency	Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level	dB	90.1	87.3	92.9	103.9
Linear total sound pressure level	Lin dB	104.9			
A-weighted total sound pressure level	dB(A)	104.5			
A-weighted total sound power level	dB(A)	123.9			

Undampened exhaust noise 21) (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level

Frequency	Hz	**63**	**125**	**250**	**500**
Sound pressure level	dB	118.5	120.3	110.8	102.2
Frequency	Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level	dB	92.9	92.3	92.1	82.5
Linear total sound pressure level	Lin dB	122.8			
A-weighted total sound pressure level	dB(A)	108.4			
A-weighted total sound power level	dB(A)	121.4			

Dimensions (aggregate)		
Length	mm	~ 5100
Width	mm	~ 2000
Height	mm	~ 2300
Gross weight (dry weight)	kg	~ 13500 (~ 13000)
Power derating		
Elevation		specific to the project
Combustion air temperature		specific to the project
Mixture cooler coolant temperature (in)		specific to the project
Methane number		specific to the project
Boundary conditions and consumables		
Systems and consumables have to conform to the following actual company standards:		A001072

1) Normal cubic meter at 1013 mbar and T = 273 K
2) Prime power operation will be designed specific to the project
3) Generator gross power at nominal voltage, power factor = 1 and nominal frequency
4) According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency
5) Emission values during grid parallel operation
6) Thermal output at layout temperature; tolerance +/- 8 %
7) Power consumption of all electrical consumers which are mounted at the module / genset
8) Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions
9) Functional capability
10) Reference value at nominal load (without amount of oil exchange)
11) Generator (at nominal power) max. 1000 m height of location and max. 40 °C intake air temperature; else power derating
12) Max. allowable cos phi at nominal power (view of producer)
13) Stated values for cooling fluid composition 65% water and 35% glycol, adaption for use of other cooling fluid composition necessary
The system design must consider the tolerance.
14) Pressure loss at reference flow rate
15) The Cv value declares the volumetric flow in m³/h at a pressure drop of 1 bar. Min. and max. flow rate limits are defined.
16) Stated values for pure water, adaption for other cooling fluid composition necessary
17) Only generator- and surface losses
18) Frost-free conditions must be guaranteed
19) Amount of ventilation air must be adapted to the gas safety concept
20) Assemblies including pipe work
21) All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798.
Resonance effects of the connected exhaust line can influence the exhaust noise sound pressure level
22) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'

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CHP Unit 2

ROLLS ROYCE

Technical Data Sheet **MTU 8V4000 GS**

TD_0413_L64_999_50_500_EN_SI_V2	GG8V4000D1			
Voltage / Frequency	V / Hz	**400**	**/**	**50**
Cooling water temperature (in / out)	°C		**77 / 90**	
NOx emissions (dry, 5 % O_2)	mg/m³ i.N.		**< 500**	
Mixture cooler 1st stage water temperature (in)	°C			
Mixture cooler 2nd stage water temperature (in)	°C		**43**	
Exhaust gas temperature	°C		**427**	
Catalytic converter			**not included**	
Special equipment				
Elevation above sea level	m / mbar	**100**	**/**	**1000**
Combustion air temperature	°C		**25**	
Relative combustion air humidity	%		**30**	
Standard specifications and regulations			**VDE-AR-N 4110**	

Energy balance	**%**	**100**	**75**	**50**
Electrical Power [2) 3)]	kW	999	749	500
Energy input [4) 5)]	kW	2260	1740	1235
Thermal output total [6)]	kW	1012	799	596
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]	kW	522	387	265
Thermal output mixture cooler 1st stage[6)]	kW			
Thermal output mixture cooler 2nd stage [6)]	kW	68	47	32
Exhaust heat optional (120 °C) [6)]	kW	(490)	(412)	(331)
Engine power ISO 3046-1 [2)]	kW	1027	772	519
Generator efficiency at power factor = 1	%	97.3	97.0	96.3
Electrical efficiency [4)]	%	44.2	43.1	40.4
Total efficiency	%	89.0	89.0	88.7
Power consumption [7)]	kW			
Combustion air / Exhaust gas				
Combustion air volume flow [1)]	m³ i.N./h	3770	2842	1925
Combustion air mass flow	kg/h	4870	3671	2487
Exhaust gas volume flow, wet [1)]	m³ i.N./h	3962	2990	2030
Exhaust gas volume flow, dry [1)]	m³ i.N./h	3543	2667	1801
Exhaust gas mass flow, wet	kg/h	5036	3799	2577
Exhaust temperature after turbocharger	°C	427	460	521
Reference fuel [8)]				
Natural gas			CH_4 >95 Vol.%	
Sewage gas			not applicable	
Biogas			not applicable	
Landfill gas			not applicable	
Fuel requirements [9)]				
Nominal rated methane number	MN		72	
Range of heating value: design / operation range without power derating	kWh/m³ i.N.		10.0 - 10.5 / 8.0 - 11.0	
Exhaust gas emissions [5) 8)] Compliance with emissions standards only for ≥ 500 kWel				
NOx, stated as NO_2 (dry, 5 % O_2)	mg/m³ i.N.	< 500		
CO (dry, 5 % O_2)	mg/m³ i.N.	< 1000		
HCHO (dry, 5 % O_2)	mg/m³ i.N.	< 120		
VOC (dry, 5 % O_2)	mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging				
Number of cylinders / configuration		8	/	v
Engine type			8V4000L64FNER	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm³		38.13	
Mean piston speed	m/s		10.5	
Compression ratio			12.5	
BMEP at nominal engine speed min-1	bar	21.5		
Lube oil consumption [10)]	dm³/h	0.18		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	
Generator				
Rating power (temperature rise class F) [11)]	kVA		1625	
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) [12)]			0.8 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10 / ± 5	
Engine cooling water system				
Coolant temperature (in / out), design	°C	77 / 90		
Coolant flow rate, constant [13) 14)]	m³/h	37.23		
Pressure drop, design [14)] Cv value [13) 15)]	bar / m³/h	1.9	/	27.4
Max. operation pressure (coolant before engine)	bar		6	
Exhaust gas heat exchanger (EGHE)				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant [13) 14)]	m³/h			
Pressure drop, design [14)] Cv value [13) 15)]	kPa / m³/h		/	
Min. coolant flow rate / min. operation gauge pressure	m³/h / bar		/	
Max. operation pressure (coolant water)	bar			

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mtu A Rolls-Royce solution

DOUGLAS BRIGGS PARTNERSHIP
INTEGRATED ARCHITECTURE AND TOWN PLANNING

CHP Unit 2

Technical Data Sheet **MTU 8V4000 GS**

TD_0413_L64_999_50_500_EN_SI_V2		GG8V4000D1				
Mixture cooler 1st stage, external						
Coolant temperature (in / out), design		°C				
Coolant volumetric flow, design, constant [13) 14)]		m³/h				
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h		/		
Min. coolant flow rate / min. operation gauge pressure		m³/h / bar		/		
Max. operation pressure before mixture cooler		bar				
Mixture cooling 2nd stage, external						
Coolant temperature (in / out), design		°C	43 / 44.6			
Coolant volumetric flow, design, constant [13) 14)]		m³/h	39.0			
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h	0.84	/		43.6
Max. operation pressure before mixture cooler		bar		6		
Heating circuit interface						
Engine coolant temperature (in / out), design		°C				
Heating water temperature (in / out), design		°C				
Heating water flow rate, design [14) 16)]		m³/h				
Pressure drop, design [14)]	Cv value [15) 16)]	bar / m³/h		/		
Max. operation gauge pressure (heating water)		bar				
Room ventilation						
Genset ventilation heat [17)]		kW		58		
Inlet air temperature: (min./design/max.)		°C		20 / 25 / 30		
Min. engine room temperature [18)]		°C		15		
Max. temperature difference ventilation air (in / out)		°C		20		
Min. supply air volume flow rate (combustion + ventilation) [19)]		m³ i.N./h		12000		
Gearbox		**%**	**100**	**75**		**50**
Efficiency		%				
Starter battery						
Nominal voltage / power / capacity required		V / kW / Ah		24 / 9 / --		
Filling quantities						
First filling quantity lube oil / refilling amount lube oil		dm³		220 / 200		
Coolant in engine circuit		dm³		135		
Coolant in mixture cooler		dm³		15		
Heating water for plate heat exchanger [20)]		dm³				
Lube oil for gearbox		dm³				
Gas regulation line						
Nominal size / gas pressure min. - max. (at gas regulation line inlet)		DN / mbar - mbar	80	/		115 - 250
Engine sound level [21)] (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level						
Frequency		Hz	**63**	**125**	**250**	**500**
Sound pressure level		dB	79.3	89.1	90.0	92.6
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	92.2	89.2	88.8	100.0
Linear total sound pressure level		Lin dB	102.3			
A-weighted total sound pressure level		dB(A)	101.0			
A-weighted total sound power level		dB(A)	120.0			
Undampened exhaust noise [21)] (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level						
Frequency		Hz	**63**	**125**	**250**	**500**
Sound pressure level		dB	102.1	118.4	110.3	106.1
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	101.4	99.5	93.4	84.1
Linear total sound pressure level		Lin dB	119.4			
A-weighted total sound pressure level		dB(A)	109.0			
A-weighted total sound power level		dB(A)	121.5			
Dimensions (aggregate)						
Length		mm		~ 4100		
Width		mm		~ 1900		
Height		mm		~ 2300		
Gross weight (dry weight)		kg		~ 12000 (~ 11500)		
Power derating						
Elevation				specific to the project		
Combustion air temperature				specific to the project		
Mixture cooler coolant temperature (in)				specific to the project		
Methane number				specific to the project		
Boundary conditions and consumables						
Systems and consumables have to conform to the following actual company standards:				A001072		

1) Normal cubic meter at 1013 mbar and T = 273 K
2) Prime power operation will be designed specific to the project
3) Generator gross power at nominal voltage, power factor = 1 and nominal frequency
4) According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency
5) Emission values during grid parallel operation
6) Thermal output at layout temperature; tolerance +/- 8 %
7) Power consumption of all electrical consumers which are mounted at the module / genset
8) Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions
9) Functional capability
10) Reference value at nominal load (without amount of oil exchange) oil density set to 860g/l
11) Generator (at nominal power) max. 1000 m height of location and max. 40 °C intake air temperature; else power derating
12) Max. allowable cos phi at nominal power (view of producer)
13) Stated values for cooling fluid composition 65% water and 35% glycol, adaption for use of other cooling fluid composition necessary
The system design must consider the tolerance.
14) Pressure loss at reference flow rate
15) The Cv value declares the volumetric flow in m³/h at a pressure drop of 1 bar. Min. and max. flow rate limits are defined.
16) Stated values for pure water, adaption for other cooling fluid composition necessary
17) Only generator- and surface losses
18) Frost-free conditions must be guaranteed
19) Amount of ventilation air must be adapted to the gas safety concept
20) Assemblies including pipe work
21) All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798.
22) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'

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A Rolls-Roy solution

Heat Pumps

Operating principles

In addition to using a neutral and natural refrigerant for the planet, PowerCO$_2$OL products integrate the latest innovative technology in order to enhance the energy efficiency and to minimize the carbon footprint linked to their use. The PowerCO$_2$OL differentiates itself from a standard transcrtitical solution in the following way:

Modulating vapor ejector

- On this range of machines there is no HP (high pressure) valve or MP (medium pressure) valve. The modulating vapor ejector recovers the energy from the high pressure circuit (coming from the gas cooler) to pre-compress the vapors coming from the MT consumers into the liquid receiver. Thus the ejectors replace the HP valve

Intermediate compression stage

- The MP stage compressor suction is entirely connected to the receiver. There is no MP expansion device. The pre-compression achieved by the ejectors allows to reduce the MP stage compressor work thus their electrical consumption

Suction line heat exchanger (SLHX)

- Each rack has its own heat exchanger to subcool the refrigerant exiting the gascooler and to generate superheat reducing the risk of liquid droplets going into the compressor

Semi-flooded mode

- The use of ejectors allows the MT evaporators operation to be in semi-flooded mode
- To benefits of the semi flooded mode, expansion valve with adapted orifice, set with 1 or 2K superheat are required. Standard evaporators can be used, no need of special coil for flooded mode

CO_2 pump

- The CO_2 pump is located after the liquid receiver, it is activated to compensate the limited pressure uplift achieved by the ejectors under certain outside temperature/pressure conditions (Winter without heat recovery or intermediate seasons). The pump ensures thus a regular supply to the MT consumers expansion valve
- The CO_2 pump is not operating continuously, it is enabled by the controller only if there is a risk that the expansion valve cannot provide enough cooling capacity

Heat recovery

- CO_2 and its excellent thermodynamic properties including high discharge gas temperatures, allows to recover up to 100% of the heat generated and on a continuous basis at high temperature. These features mean the system can simultaneously produce heat for space/floor heating and domestic hot water through several heat exchangers. Various configurations are possible with or without bypass gas-cooler and must be equipped with a set of anti boiling bypass valves. Pressure drop on water side calculated lower than 50 kPa

PLC Controller

- Intuitive HMI graphical display with easy access to running parameters and set points making commissioning, fine tuning and trouble shooting easier
- Built in methods for calculating and displaying cooling capacity, COP, generated heat etc. The PowerCO$_2$OL PLC controller helps to improve the installation and energy savings. Cooling/Heat recovery power and energy the connectivity of the installation (individual and combined) are calculated by using compressor polynomials, results are shown as values but also in a live Ph-log diagram
- Compatible with the main communication protocol networks (Modbus, Canbus, Bacnet...)

Receivers:

- Horizontal receiver
- Insulated with 19mm Armaflex
- Safety valves on 3-way change over valve connected to a common discharge header

Auxiliary condensing unit

- Recommended only when using plate and gasket evaporator heat exchanger with 60 bar max service pressure

Heat Pumps

Applications / Configurations / Temperatures

PowerCO$_2$OL: a solution adapted to all your needs

MT = Medium Temperature | LT = Low Temperature | DX = Direct Expansion

Configurations	PowerCO$_2$OL MT DX	PowerCO$_2$OL MT Chiller	PowerCO$_2$OL MT+LT DX	PowerCO$_2$OL LT DX	PowerCO$_2$OL MT Chiller + LT DX	PowerCO$_2$OL MT (DX+Chiller) +LT DX
Applications	Power 1	Power 2	Power 3	Power 4	Power 5	Power 6
Distribution center	✓	✓	✓	✓		
Warehouse	✓	✓	✓	✓		
Hypermarket	✓	✓	✓			
Food processing	✓	✓	✓	✓	✓	✓
Tunnel freezer			✓	✓		
Heating	✓	✓	✓	✓	✓	✓
Air conditioning		✓				
Sport venues	✓	✓				
Ice rink	✓	✓				

Configuration	Power 1	Power 2	Power 3	Power 4	Power 5	Power 6
Cooling capacity MT* (kW)	200-1500	200-1250	350-1100	-	300-900	300-900
Cooling capacity LT* (kW)	-	-	100-700	200-700	100-700	100-700
Heating capacity (kW)	2200	1950	1650	1350	1400	1400
MT compressors	8	8	6	6	6	6
LT compressors	0	0	6	6	6	6

* @-6°C(MT)/-32°C(LT)/37°C (gas cooler outlet) for DX configuration
@-8/-4°C(Chiller)/37°C (gas cooler outlet) for Chiller
@+4°C(MT)/ 30-85°WC Water temp for heat reclaim

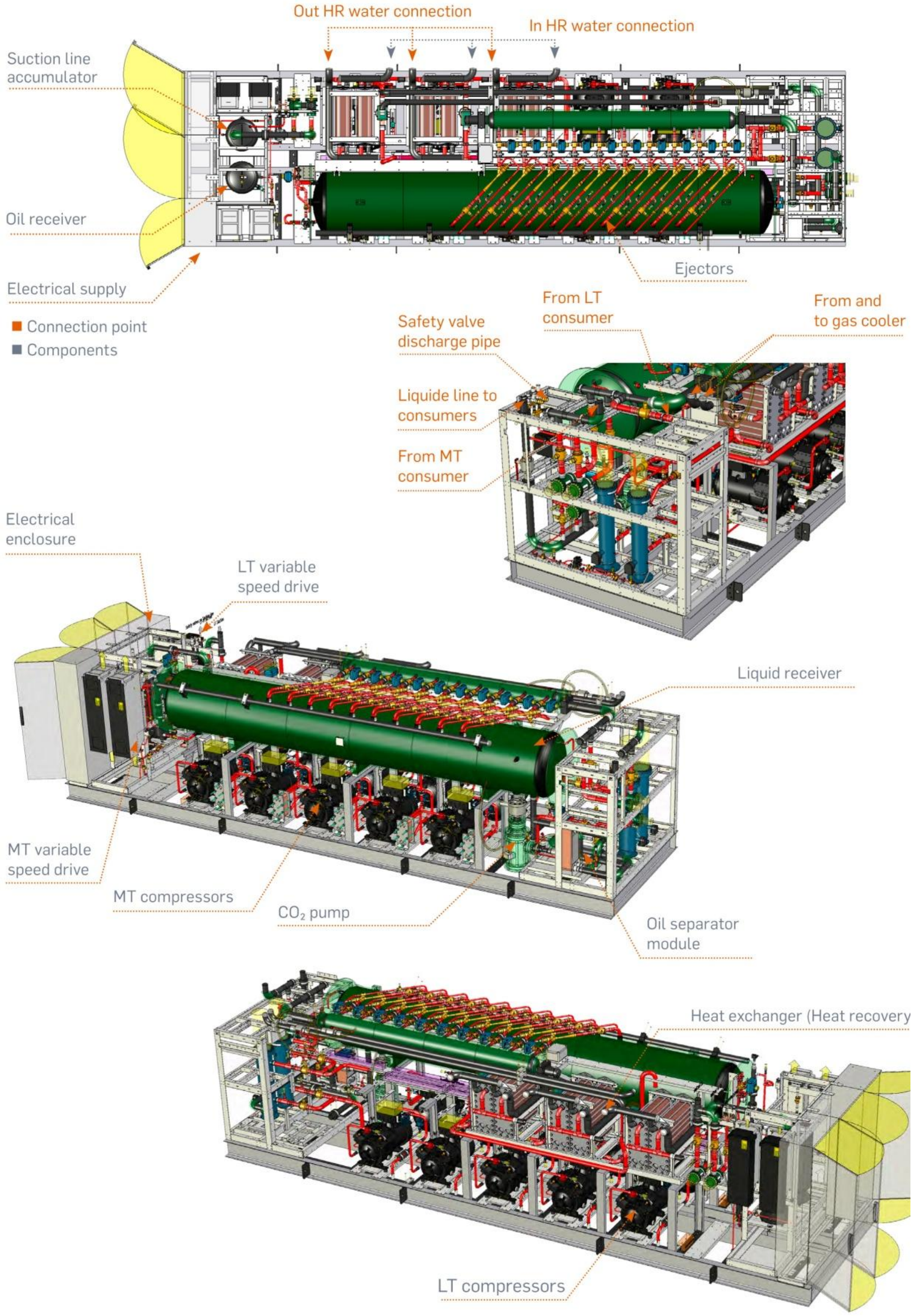
Temperature range

Ambient condition	Gascooler outlet	Evaporating temperature		PowerCO$_2$OL MT DX (Power 1)	PowerCO$_2$OL MT Chiller (Power 2)	PowerCO$_2$OL MT+LT DX (Power 3)	PowerCO$_2$OL LT DX (Power 4)	PowerCO$_2$OL MT Chiller + LT DX (Power 5)	PowerCO$_2$OL MT (DX+Chiller) +LT DX (Power 6)
-35°C to +43°C	Min: +5°C/40bar Design point: +38°C/97bar Max: +45°C/102 bar	MT	Min.	-20°C	-20°C	-20°C	optimized by control	-20°C	-20°C
			Design point	-4°C	-4°C	-4°C		-4°C	-4°C
			max.	+4°C	+4°C	+4°C		+4°C	+4°C
		LT	Min.			-45°C	-45°C	-45°C	-45°C
			Design point			-32°C/ -4°C	-32°C/ -4°C	-32°C/ -4°C	-32°C/ -4°C
			max.			-20°C	-20°C	-20°C	-20°C

Note: Power5: Open flash + separate Chiller module.

Heat Pumps

Components and connection points



Heat Pump Evaporators

Gas cooler & Evap DX heat pump S-GGD 090.5B/2x7.E

Capacity:	378.0 kW[1]	**Refrigerant:**	**CO_2 (R744)**[2]
		Evaporation temp.:	-12.0 °C
Air flow:	192558 m^3/h[3]	Superheating:	5.0 K
Air inlet:	-4.0 °C 85 %	Condensing temp.:	-7.0 °C
Altitude:	0 m	Subcooled temp.:	-8.0 °C
Air velocity:	1.4 m/s	Mass flow:	5199 kg/h
Condensate:	110.00 kg/h	Pressure drop:	0.66 bar / 0.91 K

Fans (EC):	14 Piece(s) 1~230V 50-60Hz	Noise pressure level:	45 dB(A)[4]
Data per motor (nominal data):		at a distance of:	10.0 m
Speed:	530 min-1	Noise power level:	78 dB(A)
Capacity (el.):	0.42 kW	ErP:	Compliant[5]
Current:	1.85 A[6]		

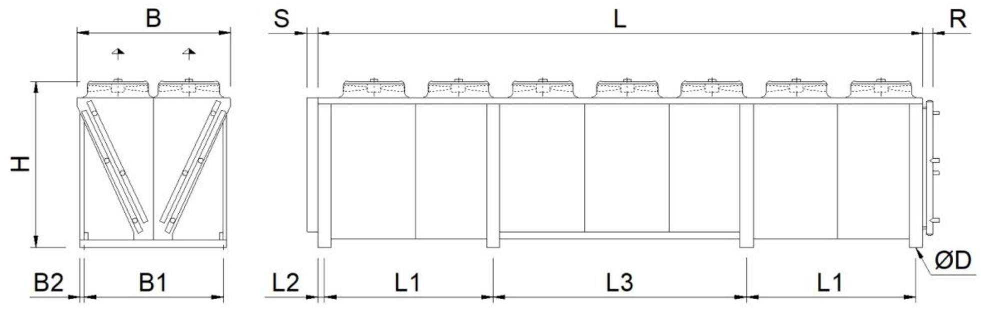
Total el. power consumption:	--	Energy efficiency class:	--

Casing:	Galv. Steel, RAL 7035	Tubes:	high-strength copper[7]
Surface:	2669.4 m^2	Fins:	AlMg[7]
Tube volume:	282.5 l	Connections per unit:	
Fin spacing:	4.40 mm	Inlet connection:	4 x 41.3 mm K65
Passes:	6/8	Outlet:	4 x 33.7 mm V2A
Dry weight:	Approx. 3500 kg[8]	Distributions:	
Max. operating pressure:	130.0 bar	PED classification:	Category I, module A[9]
Capillaries:	8.0 x 1.00 * 1000 mm	Distr. press. drop:	0.1 bar
Dimensions:[8]			
Length:	9224 mm		
Width:	2300 mm		
Height:	2532 mm[8]		
No. of legs:	8		

(S = Special coil, Special fan VT03067U.1 1~230V 5060Hz

Heat Pump Evaporators

S-GGD 090.5B/2x7-U100/4P.E For calculation only!Reference: FS



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L	=	8959 mm	B	=	2300 mm	H	=	2532 mm
R	=	245 mm	L1	=	2505 mm	L2	=	77 mm
L3	=	3795 mm	B1	=	2093 mm	B2	=	50 mm
S	=	20 mm	ØD	=	17 mm			

Attention: Drawing and dimensions not valid for all accessory options!

Accessories	Piece(s)
Repair switch (single-speed), fans wired to front seperately	14
Special design	1
Extra accessories	
Heat pump application	1
Special circuitry for heat pumps	1
8 mm capillary connector 100-0001339479	84
Reversable unit: TOP (venturi=GC inlet); BOTTOM (suction=GC-outlet)	1
C4 related bolts, nuts and rivets in V2A / 304	1
Capillaries bundled with UV-resistant zip-ties	4
Mounting and wiring (Control cabinet, Fan, Repair switch)	1
Air_Inlet_Hood_for_V-shapes_V.02_adjustable - without insulation - (for flow and defrost optimization)	1
EC fans with motor management GMMnext EC Controller + GPD + Modbus	1
x (5209266) Power Distribution Block 3ph+N 16A	1
x (5209041) Circuit Breaker 1ph+N, 6A	14
x (5215219) Interface Module for Modbus Type GMMnext EC/08-24	1
x (5209039) Circuit Breaker 1ph+N, 6A	1
(5209007) GPD Güntner Power Distribution Housing (Plastic) 400x300x132 [mm]	1

Important remarks / explanatory notes:

(1) Calculations and capacity tests are based on the following standards: condensers/gas coolers EN 327, evaporators/air coolers EN 328, dry coolers EN 1048.

(2) Fluid group 2 according to pressure equipment directive 2014/68/EU

(3) Additional pressure drop for casing and mounted parts is not taken into account.

(4) According to the enveloping surface method defined in EN 13487/EN 9614-1; tolerance = +2 dB(A). Applies only for AC fans, AC fans with sine control and EC fans. Noise caused by other control methods, water spraying systems or sound reflexions occurring at the installation site are not taken into account and may result in an increased sound pressure level.

(5) This unit is equipped with fans that meet the efficiency requirements of Directive 2009/125/EC (ErP Directive).

(6) The current consumption can differ in dependence of the air temperature and of the variations of system voltage according tc the VDE guidance.

(7) The unit may not be suitable for very corrosive atmospheres (close to shores, in smoke rooms, etc.). For further information see program menu "?", "Material recommendations brochure", or ask your sales partner.

(8) Dimensions and weights are not valid for all possible options! They may differ for units with accessories or special units (S-...).

(9) Piping (DN = 39.3 mm, TSmax = 150 °C, gaseous). Final classification according to pressure equipment directive 2014/68/EU during order processing.

DOUGLAS BRIGGS PARTNERSHIP
INTEGRATED ARCHITECTURE AND TOWN PLANNING

CHP Cooler Units

TECHNICAL DATA :

Thermal characteristics:

- Capacity :	**212,07 kW / 182400 kcal/h**
- Fluid :	Ethyl. Glycol 40%
- Fluid inlet temperature :	45,0 °C
- Fluid outlet temperature :	42,0 °C
- Fluid flow :	67,7 m3/h
- Pressure drop of model :	**1,19 mWG**
- Air inlet temperature :	35,0 °C

Aeraulic / Electrical / Acoustic characteristics :

Altitude :	0 m
- Air flow :	94410 m3/h
- Rotation speed :	870 rpm
- Sound level at 10 m (*) :	54* / 48** dB(A)
- Sound power (Lw) :	86dB(A)
- Number of motors :	6
- Maximum input power :	6x1430 W
- Real input power :	6x1267 W
- Maximum current :	6x2,8 A
Energy class :	D
- Voltage :	400V/3/50 Hz

Coil characteristics :

- Internal volume tubes circuit :	180 dm3
- Surface area :	1107 m²
- Fin spacing :	2,12 mm

Dimensional characteristics :

- Connection(s) inlet/outlet :	1xDN100/1xDN100 Same side
- Modele lengh/Width/Height :	4842/2310/1347 mm
- Packing lot lengh/Width/Height :	5520/2250/960 mm
- Net weight :	1000 kg
- Gros weight :	1134 kg

(*) measured at a line-of-sight to reflecting parallelepiped surface (According to standart EN 13487).
(**) measured at fan blade level, in a free field on a reflective surface.
(*) et (**) are given as an example. Only the acoustic pressure spectrum and Lw value, are contractually binding.

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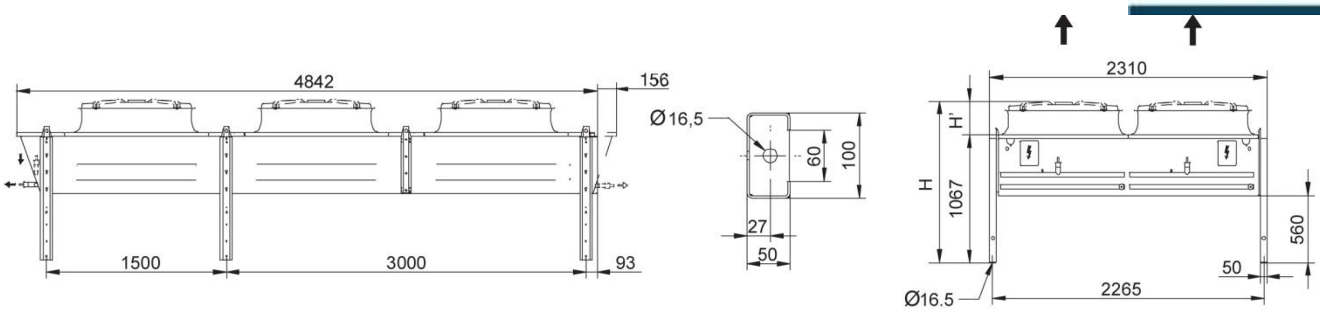
DOUGLAS BRIGGS PARTNERSHIP
INTEGRATED ARCHITECTURE AND TOWN PLANNING

CHP Cooler Units



H=1397

Sound prectrum :

Hz	63	125	250	500	1000	2000	4000	8000	Lw (dB(A))
Delta	65,7	65,2	73,4	78,8	82	79,2	75,9	70,8	86
Star	57,6	58,9	64,1	70,9	73,3	73,5	67,6	59,7	78,2

Warning: For vertical air direction : Unit without drain.
Warning: For horizontal air direction : Unit not entirely purgeable and without drain.
In these case, provide a special circuiting (Please, specify when ordering).

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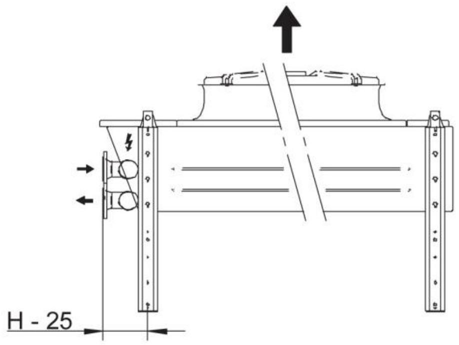
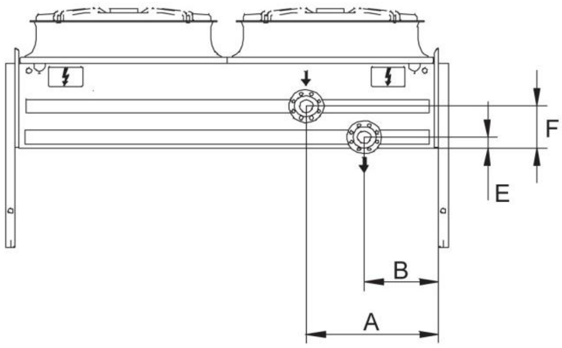
LENNOX EMEA





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