

	Value normally open / Value normally closed, respectively.
	Air Assistance Valve, minimum 25mm whirl energy centre.
	Alarm Bypass Valve, to close when pressure increases.
	Balancing Valve - with measuring points at both ends for positive isolation from IM Hydraulics STOP range.
	Circulation Valve, with self-energising measuring points and positive isolation from IM Hydraulics STOP range.
	2-port butterfly-type control valve.
	Drain Off Cock - Blocks Grand Stand valve's Hysterisis.
	3-port Drain Valve.
	Flow Measuring Device, as per BS7016 for safety for the purpose of Flow measurement and isolation only. Valve to be fully open. Isolation Valve for Flushing Equipment Connection - as per CV capped off or closed to allow cleaning. Isolation Valve - Full bore ball valve with quarter turn wheel (below 50mm) and full wheel lever (above 50mm) and double O-ring seal for leak-tightness. Locatable Isolation Valve - as per IV, with pressure for feedback.
	2-port seat-type modulating control valve.
	3-Port seat-type mixing valve.
	Non-Return Valve.
	Pressure Independent Control Valve - with measuring points and modulating control from IM Hydraulics FUSION range.
	Reduced Pressure Zone valve.
	Safety Valve, high lift type, fixed relief setting (not adjustable).
	Automatic Air-Vacuum Valve.
	Change in Pipe Size.
	Expansion Valve.
	Flowline Connection Under rubber bellows from Page Pipeline Supply (with UTR).
	Flowline Hose, metal braided.
	Flow Measuring Orifice from IM Hydraulics MFCO range.
	Single Head Pump.
	Strainer - Y-type strainer, stainless steel mesh, dN205 with 50/75mm mesh, dN205 with 3/16-inch mesh, from Hysterisis.
	Tunnel.

SENSORS/GAUGES

	Differential Pressure Sensor.
	Flow Sensor, as supplied with heat meter.
	Heat Meter, equipped with communication options as labelled, from Danfoss Gammeter 1100 series.
	Analyse Pressure Gauge, Bourdon tube type, 150mm gauge diameter, 38° connection, with syphon loop and isolation gauge handle.
	Temperature Probe Pocket.
	Analyse Temperature Gauge, Bimetal type, 100mm-gauge diameter, either in port or isolation gauge design from Brannan Thermometers.
	High-Temperature Resistant In Port Pocket, with isolation valve and handle, with at least 0.25°C.
	High-limit temperature sensor.

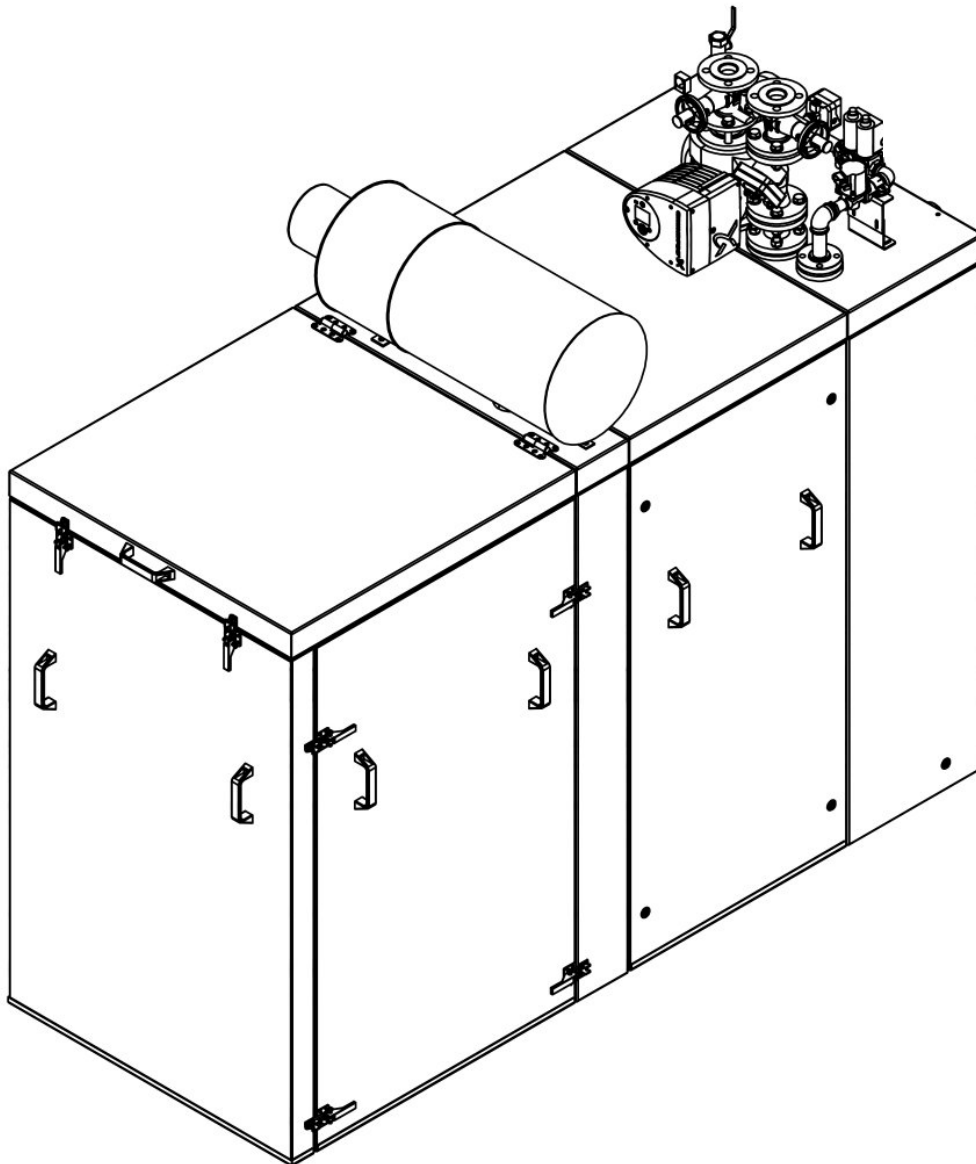
	PIPE SIZE	Pipe Flow Characteristics		
	VELOCITY / PRESSURE DROP			
ISSUED FOR AS-BUILT STATUS FOLLOWING NO FURTHER COMMENTS FROM ARMDORE AGAINST THE CONSTRUCTION SITE DRAWING.				
Rev	Date	Description	Drawn	Chkd
AS	16.09.2004	AS-BUILT	PM	JM
C5	10.03.2010	ARM removed. Energy centre ARM added (Boltz valves amended. Pump relocated. C4 and C5 removed. Orders to be issued to ARM)	PM	EAH
C3	24.03.2011	Updated to include Mews & Annex addition	EJ	
C2	13.02.2010	Construction Issues	AC	JH
C1	15.12.2009	Construction Issues	MDJ	JC
Rev	Date	Description	Drawn	Chkd
AS	16.09.2004	AS-BUILT	Scale: 1:1	Size: A0
C5	10.03.2010	Drawn: MDJ	Chkd: JC	
Original issue Date: 15.11.2010				
		BUILDING SERVICES DESIGN CONSULTANTS 26-27 The Hill, Northfield, Gravesend Kent, DA14 5EU www.whitecode.co.uk 014732 289977 E: design@whitecode.co.uk		
Title: ENERGY CENTRE SCHEMATIC				
Project: HORNSLEY TOWN HALL			Rev: AB	
Client: ARMDORE			Drawn: AB	
Dwg Number: 10087-M-04-BM-0007				

Technical specification

R-GEN 50/100 NG

Ultra low NO_x emission levels

< 40 mg/kWh (0% O₂) *



Design:

50 kW el.
400 V / 50 Hz
natural gas
Hi = 10,25 kWh/Nm³
NO_x < 40 mg/Nm³
Exhaust cooling to 35 °C

* Based on the energy input of the gas (calculated by higher heating value).

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Subject to technical changes!

Note: Figure on cover page may differ

1 Genset

	50 %	75 %	100 %	Load
Electrical power	25	38	50	kW ⁽⁵⁾
Recoverable thermal output	66	82	100	kW ^{(2), (8)}
Energy input	92	118	145	kW ⁽¹⁾
Efficiencies electrical	27,2	31,7	34,5	% ⁽¹⁾
Efficiencies thermal	71,4	69,4	68,6	% ^{(1), (2), (8)}
Efficiencies total (el. + th.)	98,6	101,1	103,0	% ^{(1), (2), (8)}
CHP coefficient	0,38	0,46	0,50	^{(1), (2), (8)}

	NOx	CO	HCHO	
Exhaust emissions without catalytic converter	< 6500	< 6500	< 60	mg/Nm ³ ^{(4), (6)}
Exhaust emissions with catalytic converter *	< 40	< 150	< 20	mg/Nm ³ ^{(4), (6)}

Engine surface noise **	98,2	dB(A) ⁽⁷⁾
-------------------------	------	----------------------

1.1 Engine

Engine manufacturer	MAN	
Engine type	E 0834 E 302	
Type	row	
No. of cylinders	4	
Operating method	4-stroke	
Combustion process	$\lambda = 1$	
Engine displacement	4580	ccm
Bore	108	mm
Stroke	125	mm
RPM	1500	1/min
ISO standard power (mech.)	54	kW
compression ratio	13 : 1	
average effective pressure	9,4	bar
average piston speed	6,3	m/s
body of balance wheel	SAE 2	
Direction of rotation (based on balance wheel)	left	
tooth rim with number of teeth	129	
Engine dead weight	430	kg

* With appropriate catalyst configuration! NOx emission based on catalyst in new condition.

1.2 Generator (utility planning data)

Manufacturer	Emod	
Type	WKASYG 250/4-330T-GG	
Generator type	Asynchronous, directly coupled	
Starting current (with frequency converter)	< 40	A
Rated speed	1517	1/min
Frequency	50	Hz
mechanical fuel shutoff	53	kW
Effective electrical power	50	kW
Apparent electrical power (compensated / uncompensated)	52 / 60	kVA
Rated generator current (compensated / uncompensated)	75 / 87	A
Rated generator voltage ($\pm 10\%$)	400	V
Cooling water inlet/outlet temperature (max.)	70 / 75	°C
Short-circuit current $I_k''^3$	0,87	kA
Power factor $\cos \varphi$ (compensated / uncompensated)	0,96 ind. / 0,83 ind.	
Generator circuit breaker	100	A
Additional section switch (VDE-AR-N 4105)	100	A
Efficiency (full load) at $\cos \varphi = 0,83$	94,8	%
Mass moment of inertia	0,84	kg · m ²
Ambient air temperature	85	°C
Stator circuit	Dreieck	
Protection class	IP 54	
Generator weight	630	kg
Compensation	Optional	
Engine startup	Available	

2 Mixture composition

2.1 Combustion air

Combustion air mass flow	180	kg/h
Combustion air volume flow (25 °C, 1013 mbar)	152	m ³ /h

2.2 Fuel

Fuel requirements in accordance with 'TA-004 Gas'

Reference methane number - minimum methane number	80 / 80	
Combustible mass flow	11,4	kg/h ⁽¹⁾
Combustible volume flow	14,2	Nm ³ /h ^{(6), (1)}
Gas pressure at rated load min. *	20	mbar
Gas flow pressure at rated load max. *	100	mbar

* At the inlet to the gas regulation line

3 Integrated heat extraction

3.1 Heating circuit

Heating water requirements in accordance with 'TA-002 Heating circuit'

Heating water volume flow	3 - 10	m ³ /h
Generator heat	2	kW
Exhaust gas heat up to 35 °C	52	kW ⁽⁸⁾
Heating water return temperature (max)	70	°C
Heating water flow temperature (max) **	85	°C
Safety valve	3	bar
Pressure reserve ca. *	300	mbar

3.2 Engine circuit

Coolant requirements in accordance with 'TA-001 Coolant'

Coolant heat	46	kW ⁽²⁾
Engine inflow temperature (min.)	80	°C
Engine exit temperature (max.)	88	°C
Balance inflow / exit (max.)	6	K
Recirculated coolant quantity (min.)	7,6	m ³ /h
Operating pressure (max.)	2,0	bar
Safety valve	2,5	bar

* Up to / from module interface

** Heating water supply temperature max. in partial load operation < 85 °C

4. Exhaust system

Exhaust gas temperature downstream of engine	616	°C ⁽³⁾
Exhaust temperature after exhaust heat exchanger	35	°C ^{(3), (8)}
exhaust gas volume flow wet	152	Nm ³ /h ⁽⁶⁾
exhaust gas volume flow dry	125	Nm ³ /h ⁽⁶⁾
exhaust gas mass flow wet	191	kg/h
exhaust gas mass flow dry	168	kg/h
Exhaust back pressure downstream of engine	50	mbar
Pressure reserve approx. *	10	mbar
Exhaust outlet noise after primary muffler **	75	dB ⁽⁷⁾
Safety temperature limiter	100	°C

5 Sound reducing encapsulation

sound encapsulation temperature (max.)	75	°C
sound pressure level ***	55	dB(A)

6 Operating fluids

Lubricating oil approvals, see 'TA-003 Lubricating oil'		
Lubrication oil consumption (max.)	0,30	g/kWh
Filling capacity lubricant (max.)	25	l
Lubricating oil volume auxiliary tank	60	l
Motor circuit coolant fill quantity approx. (module)	19	l
Coolant approvals, see 'TA-001 Coolant'		

7 Electronics and software

Grid protection device	DEIF GPC 2G	
Grid protection software status	> 13141	
Touchscreen display	10	"
Approval (depending on version)	VDE-AR-N 4105	
Protection class Control cabinet	IP 54	
Protection class Power switch cabinet	IP 54	
Switch cabinet environmental temperature	0 - 35	°C
Switch cabinet relative air humidity (max.)	65	%

* From module interface (exhaust heat exchanger / catalytic converter in standard version and new condition)

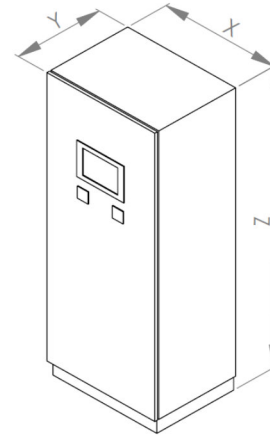
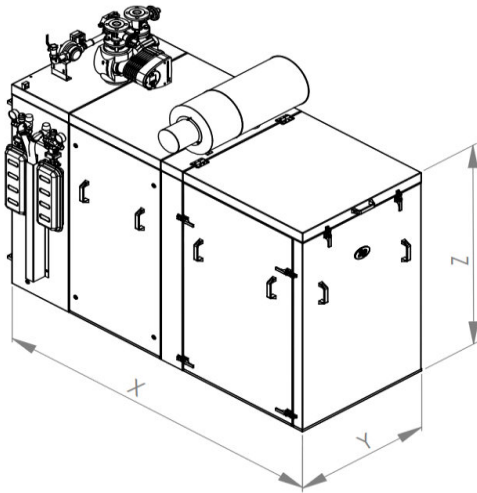
** Total sound power level at full engine load in accordance with DIN 45635-11 Annex A

*** Average sound pressure level under open area conditions at distance of 1 m in accordance with DIN 45635

8 Interfaces

8.1 Dimensions and weights

(Figures may differ)



Length Module	X	2427	mm
Width Module	Y	990	mm
Height Module	Z	1625	mm
Weight Module (without operating fluids)		1350	kg
Weight Module with sound reducing encapsulation		2070	kg
Powder-coated CHP frame		RAL 6002	
Width Control cabinet	X	800	mm
Depth Control cabinet	Y	500	mm
Height Control cabinet	Z	1800	mm
Weight Control cabinet		150	kg
Control cabinet powder coated		RAL 7035	

8.2 Water / gas transfer points

Interfaces Gas	1	"
Interfaces Exhaust	Ø 80	mm
Interfaces Heating circuit	40 / 16	DN / PN

8.3 Electrical connections / utility interface

Grid connection with pre-fuse (customer-provided)	400 V / 50 Hz	
Grid system	TN-S	
Short-circuit proof Icc (max.)	50	kA

8.4 Data interfaces

Remote maintenance access (optional) *	DSL / UMTS (SIM)
Interfaces / Data interfaces (optional):	- Profibus DP - Profinet IO - Modbus RTU - Modbus TCP - Ethernet IP - Hardware signals
Access virtual power plant (optional)	Possible after technical clarification (bus or hardware signals)

* Access for remote maintenance must be provided by the customer

9 Technical boundary conditions

Unless otherwise specified, all data is based on full engine load with the respective indicated media temperatures and subject to technical improvements. The generator output measured at the generator terminals serves as the basis for the delivered electrical power. All power and efficiency specifications are gross specifications. The fuel gas quality must conform to the specifications of 'TA-004 Gas'. The operating fluids and plant system layout must conform to the 'Technical instructions' of 2G.

- (1) Performance conditions in accordance with DIN ISO 3046. Tolerance for specific fuel use amounts to + 5% of nominal performance. Efficiency specifications are based on an engine in new condition. An abatement in efficiency over the service life is reduced with observance of the maintenance requirements.
- (2) The tolerance for usable heat output is +/- 8 % under normal load.
- (3) The tolerance for the exhaust temperature is +/- 8 %.
- (4) Corresponding to a residual oxygen concentration in the exhaust of 5 %
- (5) Electrical generator terminal power at $\cos \phi = 1$.
- (6) Volume specifications for normal status:

Pressure	1013 mbar
Temperature	0 °C
- (7) Standard deviation of reproducibility 4 dB in accordance with DIN EN ISO 3746
- (8) At heating water return temperature of 30 °C.
The heating water supply temperature is approx. 25 °C higher than water return temperature.

Power specifications in this document relate to standard reference conditions.

Standard reference conditions in accordance with DIN ISO 3046-1:

Air pressure	1000 mbar
Air temperature	25 °C
Relative air humidity	30 %

Power reduction

Power reduction due to installation at altitude > 100m a.s.l. and/or air suction temperature > 25°C shall be determined specifically for each project according "TI-049 Load reduction".

Hoval UltraGas (900D) Gas Condensing Boiler

Brief Description / Overview

A floor standing condensing gas boiler module comprising of two identical Hoval UltraGas units, each with a fully modulating pre mix gas burner. Complete with a flue header set combining the flues from each individual boiler into a common exhaust.

The Hoval UltraGas is a single pass, vertical, high water content welded shell and tube boiler. Both the combustion chamber and heat exchanger is fabricated from stainless steel, the boiler shell from carbon steel. Each of the tubes is complete with Alufer® inserts. This finned Aluminium surface on the gas side of the boiler greatly extends the surface area over which heat exchange can take place. This combination ensures compact and optimum heat exchange across the medium.

Each Hoval UltraGas is supplied with an integral fully modulating pre mix gas burner. This incorporates automated ignition, flame supervision and includes a gas pressure limiting device. The boiler shell includes a water pressure sensor that acts as minimum and maximum pressure limiting device. The flue includes a temperature limiting sensor.

Performance

Boiler output (min/max) At Flow/Return of 80/60°C At Flow/Return of 40/30°C	87 - 834 97 - 900	kW kW
Boiler input	89 - 848	kW net calorific value basis
Full Load Boiler Efficiency Part Load Boiler Efficiency (BS EN15502) UK Part L Seasonal Efficiency	88.6 97.3 95.6	% stated gross CV basis.
Standing Loss at 70°C	1500	W
Design Flow/Return ⁽¹⁾	70/40	°C

⁽¹⁾ The boiler outputs and efficiencies are quoted at the standard system temperatures indicated and based on the input as shown. Operating at the specific design flow/return temperature min/max output 88 / 854 kW.

Boiler Operational Parameters

Max Operating ⁽²⁾ / Min operating /Test Pressure	6 / 1 / 9	bar
Flow Rate for 70/40°C Flow/Return,	7.05 25.4	kg/s m³/h
Hydraulic Resistance (at this flow rate)	0.75	kPa
Max Operating Flow Temperature	90	°C
Water content	774	litres
Gas Supply at max output Min – Max supply pressure (after gas filters at burner)	85.1 17.4 - 80	m³/h mbar
Flue Gas at maximum output Mass Flow Flue Gas Temperature at a 60°C return Flue Gas Temperature at a 30°C return Available Overpressure Maximum permitted Under Pressure (Draught)	1408 71 47 60 -50	kg/h °C °C Pa Pa
Emissions NO _x BS EN (15502) ⁽³⁾ CO ₂ content in Flue gases	21 7.9	mg/kWh %

Hoval UltraGas (900D) Gas Condensing Boiler

Boiler Operational Parameters continued...

Electrical Details		
Power Supply operating /control (x2)	230V-1ph-50Hz	
Consumption (max/min) total	1160 – 58	W
Fuse Rating	16	A
Sound Power Level ⁽⁴⁾		
Heating noise (EN 15036 part 1) (room air dependent)	76	dB(A)
Exhaust flue noise radiated from the spigot	75	

⁽²⁾ Permissible maximum safety valve setting 6.7 bar

⁽³⁾ Emission reported dry and corrected to stoichiometric conditions, GCV basis.

⁽⁴⁾ Full octave band information available on request.

Overall Boiler Module Dimensions (with casings)

Width	2240	mm
Height	2100	mm
Depth ⁽⁵⁾	1969	mm
Weight (dry)	1944	kg

⁽⁵⁾ From front casing to flange faces of (optional) connecting hydraulic flow header

Connections

Flow / Return individual boilers	DN 100	PN6
With headers ⁽⁶⁾	DN 125	PN6
Safety Valve Fitting (x2) ⁽⁷⁾	R 2 "	
Gas Connection (x2) ⁽⁸⁾	Rp 2 "	
Condensate Drain (x2)	DN 25	
Flue Spigot Connection	356/358	mm ID/OD

⁽⁶⁾ Flow and Return(s) headers are quoted as an option. These are included as part of the Hydraulic Set. This set includes pipework connecting the two flow connections of each individual boiler and the two return connections of each individual boiler to a common flow and return such that each UltraGas (900D) has a single flow and a single return connection as indicated. The connection sizes are indicated here. The Flow header set also includes a motorised butterfly valve that is used to control the flow through individual boilers in each set.

⁽⁷⁾ Each individual boiler requires a pressure relieving valve fitted by installer.

⁽⁸⁾ Each individual boiler will be supplied with a gas filter to be fitted by the installer in the gas pipe adjacent to the boiler concerned. The pressure drop through the clean gas filter will be 0.6 mbar and system design should accommodate this loss.

Control Operation / Options

Included	• Enabled signal (self modulating) • High Limit Protection • 230V ac Run and Alarm signal • Touchscreen display • Manual Over-ride • Safety Interlock • TopTronic E Heating System Control • Hours Run Indication • Internal Time Clocks • Connection for extra external limit stat, max & min pressure switches.
Option	• 0-10Vdc setpoint or firing rate control • Volt-free contacts • Gateway Module – ModBus TCP/RS485 • Weather Compensation • Online remote monitoring (requires a LAN connection and Gateway module). • Additional Toptronic modules⁽⁹⁾ • Sequencing up to 8 controllers

⁽⁹⁾ Hydraulic system suitability should be discussed with Hoval at Order stage – additional TopTronic modules may be necessary.

The following items are all included:

1. Operating Manual
2. Boiler Casings and support legs
3. TopTronic ®E Control Panel – must be set up by an Approved Hoval Engineer
4. Volt Free enable connection
5. Drain Valve

Note: A safety valve must be fitted, by the installer, on each individual boiler.

All above items will be supplied loose for yourselves to mount and/or assemble, including the boiler control panel, support legs, gas connection pipe, insulation and casings.

Flue gas header & Air Shut Off dampers supplied loose.



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Hornsey Town Hall Average NO_x Calculations Calculations by Katy Venables, BREEAM Assessor

CHP Boiler

Rehema R-Gen 50/100

Nox emissions per unit of heat generated (mg/kWh_{heat}) = $A \times (B / (B + C))$

A = Nox emissions per unit of fuel input (mg/kWh _{fuel input})	40
B = Heat output, kW	100
C = Electrical output, kW	50
Nox associated with Heat Output	26.67 mg/kWh

Gas Boiler

Hoval Gas 900D

Nox	21 mg/kWh
Heat Output kW	834

Total Heat Output	934
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Average	CHP Nox	2.83 mg/kWh
	Gas Boiler Nox	18.57 mg/kWh
		21.40 mg/kWh

References

As Built Energy Centre Schematic ref 10687-M-04-BM-0007

R-Gen-50-100-Technical-Sheet

UltraGas900D_Tech_Sub_Jun21_hornsey

Hornsey Town Hall

Home Quality Mark Beta

Post Construction Site Inspection Report

Prepared for Ardmore

Assessment Reference BREEAM-0081-5787

Revision 1

21st October 2024



WHITECODE
CONSULTING

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Rev No.:	Date:	Status/Comments:	Prepared by:	Position
1	21.10.24	Post Construction	Katy Venables	HQM Assessor

1.0 Introduction

This report has been produced by Whitecode Consulting Ltd who is licensed by BRE to carry out HQM Assessments. The Post Construction review aims to provide evidence obtained from a site inspection to ensure that commitments made during the design process have been implemented in accordance with HQM criteria.

The assessment is registered under HQM Beta and seeks to achieve a 3 Star rating which requires a score of 55% or above.

The site inspections occurred on 8th March 2022 and 21st October 2024 at 10.00am in the presence of Elliot Bacon, Senior Design Manager at Ardmere.

The table below identifies the apartments inspected which represents a cross section of all types and tenures.

Block	Plot Number
Block A	AN01, AN04, AN07, AN46, AN48, AS01, AS06, AS15, AS27, AS41, AS49
Block B	B02, B11, B16, B21, B33, B45, B54
The Mews	PM001, PM102, PM103, PM201, PM202

1.0 Site Context

The proposed development application was granted consent by the Haringey Council in March 2018 (application reference: HGY/2017/2220). The approved planning application includes:

"Refurbishment and change of use of the Hornsey Town Hall from B1 Use and Sui-Generis Use to a mixed use scheme comprising a hotel (Use Class C1), food and beverage uses (Use Classes A3 and A4), community uses (Use Class D1, D2 and Sui-Generis Use) and co-working use (Use Class B1). Use of the Town Hall roof terrace as a bar (Use Class A4). Removal of east wing extension and erection of east wing roof extensions to the Town Hall. Change of use of the ground floor of Broadway Annex Building East to food and beverage use/drinking establishment use (Use Class A3/A4). Provision of 146 residential units (including 11 affordable) comprising: the erection of a 7 storey building; the erection of a part 4, part 5, part 6, part 7 storey building and associated car parking at basement level; change of use of the first and second floors of the Broadway Annexe to residential use and the erection of an extension to the rear of the Broadway Annex; the erection of a residential mews block to the rear of the Broadway Annexe. Alterations and landscaping improvements to the town hall square and open spaces. Provision of cycle parking. Demolition of the Weston Clinic building; courtyard infill extension to the Town Hall; Hornsey Library garage; Library annex and energy centre. Demolition and replacement of metal stairwell to the rear of the Assembly Hall and demolition and replacement of stage hoist structure adjoining the Assembly Hall."

2.0 Site Inspection Findings

Drying Space

Design Specification

Ardmore provided commitment to install drying lines in each apartment.

Visual Inspection

Drying lines have been installed in all bathrooms. The model is consistent with the datasheet provided by Ardmore and provides 5 lines which extends the length of the bath.





Decentralised Energy and Impact on Air Quality

Design Specification

The Feasibility Study confirmed CHP's and PV to be the most suitable LZC technology for the residential blocks.

Visual Inspection

Rehema CHP and Hoval Ultragas gas boiler have been installed in the energy centre. PV was seen on the roofs of Block A and B.





Cycle Storage

Design Specification

Drawings indicated the location of cycle racks provided for each block. Block A and Block B cycle stores are to be located on the lower ground floor and accessed by residents via a lift direct from each floor to the lower ground floor. The Mews would have a shared store with The Broadway Annex, located opposite the Mews building and easily accessible to the residents.

Visual Inspection

Two-tier cycle racks have been installed in Blocks A and B in accordance with design proposals. A gated store has been provided opposite The Mews.



Block A





Block B



The Mews

Recyclable Waste

Design Specification

Design stage specification confirmed concrete slab to the external plant area, permeable tarmacking in the car park and block paving to the pedestrian areas. Boundary protection proposed included timber fence and a mesh fence to the plant enclosure.

Visual Inspection

Each bin store has waste bins for storage of mixed recyclable waste and general waste. Food waste bins were also seen on site but were yet to be moved to the bin store.

All kitchen have internal recycling bins fitted in a base unit cupboard. Bins are consistent with the datasheet provided by Ardmore.



General waste bins



Mixed recycling bins



Food waste bins





Internal recycling bins

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