thornton | reynolds

Project	19-37 Highgate Road	**Date**	7th May 2024
Note	Planning Condition 27	**Rev**	Rev 2
Author	FK		

1 Summary

Planning Condition 27 was previously discharged successfully for the project above based on a previous version of this report dated 8th March 2023, and the subsequent consultations with the council which followed that report's issue .

The choice of air source heat pumps (ASHP) at the time was 2No. Aemerc units which utilised R4101A refrigerant. These were accepted on the basis of a coefficient of performance (COP) exceeding 4.0.

Due to changing market conditions and the impending phasing out of R410A refrigerant, a project decision has been made to make use of alternative Elco air source heat pumps which utilise R32 refrigerant which is more current and unlikely to become obsolete during the lifetime of the equipment. This will guarantee the availability of replacement spare parts and top-up refrigerant charge at reasonable market rates, compared to the original choice of ASHP.

This report demonstrates that the new ASHP equipment has a COP exceeding 4.0 under the same conditions at which the COP of the original ASHP equipment was reported, and that the choice of replacement equipment is not at variance with the council's original requirements. Refer to Sections 2 and 4 for more information.

Other aspects of the project remain unchanged since the previous report was written, except that the contractor's installation drawings are now being used as opposed to the original designer's drawings, therefore this report has been updated to reflect the contractor's latest information.

2 Planning Condition 27

Planning Condition 27 is repeated below for reference:

Planning Condition 27:
Prior to commencement of above-ground works, details, drawings and data sheets showing the location, Seasonal Performance Factor of at least 2.5 and Be Green stage carbon saving of the air source heat pumps and associated equipment to be installed on the building, shall have been submitted to and approved by the Local Planning Authority in writing. The measures shall include the installation of a metering details including estimated costs to occupants and commitment to monitor performance of the system post construction. A site-specific lifetime maintenance schedule for each system, including safe access arrangements, shall be provided. The equipment shall be installed in full accordance with the details approved by the Local Planning Authority and permanently retained and maintained thereafter.

Following previous consultations with the council, and based on an earlier precedent, it was agreed that COP would be accepted as evidence of compliance for Planning Condition 27 in lieu of seasonal performance factor (SPF), provided that the COP was in excess of 4.0

3 Architecture of Dwelling Heating & Hot Water Systems

The ASHP's will provide a closed ambient loop temperature at 25 ° C from which water source heat pumps (WSHP's) installed in individual apartments will extract heat energy for underfloor heating (UFH) and domestic hot water (DHW) generation.

The following information is provided pertaining to the ASHP's

- Drawing showing the location of the ASHP's
- Schematic drawings of the ambient loop heating system
- ASHP technical datasheets from the manufacturer
- Energy metering details
- Maintenance schedule of the system post-construction

4 COP Of Original ASHP's Vs COP of New ASHP's

The original Air Source Heat Pumps (ASHP's) were 2No. NRB 0654 HE Aermec units with a COP of 4.07. Further information on the original ASHP's can be found in Revision 1 of this report which was dated March 8th 2023.

The new alternative ASHP's are 3No. Elco Aerotop L65 units with COP of 4.29 which is higher than that of the original ASHP's under comparable standard conditions.

Please note that the information provided by Elco is more detailed and includes COP values at various compressor loadings. For this project, the compressor loading maximum load will be restricted to around 80% as this also results in superior acoustic performance to prevent noise nuisance to the dwellings in the vicinity of the installation.

The datasheets in Appendix A compare the COP of the original ASHP choice and the COP of the new alternative ASHP. Please refer to the explanatory notes (in text highlighted against a yellow background) within the various document extracts provided, for ease of reference.

Both COP values are reported to BS EN14511 under standard conditions of 35°C/30°C system side water temperature and 7 ° C/6 ° C dry/wet bulb conditions for ambient air, and this is highlighted on the information provided.

5 Technical Information

5.1 ASHP Location

The ASHP's will be located in a roof plant enclosure as shown on Harley Haddow's Drawing 312164-HAH-B1-07-D-M-05970 Revision C01 in Appendix B

The associated Harley Haddow schematic drawings, 312164-HAH-B1-XX-D-M-05690 Revision C01 and 312164-HAH-B1-XX-D-M-05691 Revision C01 , which show energy metering details, are also included in Appendix B. Heat energy meters are shown by the symbol "HM"

5.2 Be Green Stage Carbon Savings

The predicted reduction in regulated emissions achieved through the use of renewable and energy generating technologies is 55.94% based on Part L thermal modelling.

5.3 Metering Details

The WSHP, which generate energy for underfloor heating and domestic hot water generation, are provided one per apartment, therefore the electrical power required is derived from each respective apartment's electrical consumer unit.

The heat energy taken by each WSHP from the ASHP's via the ambient is metered per apartment.

The communal ASHP's are also individually electrically metered. Therefore the overall heat energy taken by each apartment's WSHP from the communal ASHP's ambient loop distribution can be apportioned in accordance with heat energy use recorded by the heat meter which is local to each WSHP. Refer to schematic drawing 312164-HAH-B1-XX-D-M-05690 Revision C01 and 312164-HAH-B1-XX-D-M-05691 Revision C01 in Appendix A for more information.

The annual cost to the occupiers has been estimated based on an electricity tariff of 28.3 p/kWh and on "typical practice" energy consumption values from CIBSE Guide F. The values are for the entire building and are as follows:

UFH + DHW generation	551,970 kWh/yr	£156, 207 per year

(UFH = underfloor heating, DHW = domestic hot water)

5.4 ASHP Maintenance Schedule

A maintenance schedule is include in Appendix C

Appendix A – COP of Original ASHP's vs COP of New ASHP's

ORIGINAL HEAT PUMP CHOICE AND ASSOCIATED COP, REFER TO NOTES BELOW

NRB HA

Size		0282	0302	0332	0352	0502	0552	0602	0604	0652	0654	0682	0702	0704	0752	0754
Cooling performance 23 °C / 18 °C (1)																
Cooling capacity	kW	-	-	-	-	131,3	143,6	166,5	170,4	178,7	198,2	222,3	241,2	231,6	268,1	261,3
Input power	kW	-	-	-	-	34,9	39,4	42,9	47,2	49,0	50,3	54,8	62,4	59,6	73,6	68,8
Cooling total input current	A	-	-	-	-	61,0	66,0	74,0	79,0	80,0	82,0	91,0	101,0	105,0	112,0	115,0
EER	W/W	-	-	-	-	3,77	3,65	3,88	3,61	3,65	3,94	4,06	3,86	3,88	3,65	3,80
Water flow rate system side	l/h	-	-	-	-	22699	24821	28771	29452	30874	34255	38412	41683	40019	46336	45163
Pressure drop system side	kPa	-	-	-	-	48	57	59	73	68	98	81	97	96	102	103
Heating performance 30 °C / 35 °C (2)																
Heating capacity	kW	-	-	-	-	104,2	114,6	128,1	133,6	141,8	154,4	169,0	184,0	177,3	203,5	193,6
Input power	kW	-	-	-	-	25,2	27,6	30,9	32,6	34,4	38,0	41,2	45,8	44,1	50,7	48,5
Heating total input current	A	-	-	-	-	46,0	49,0	54,0	59,0	60,0	69,0	71,0	78,0	80,0	85,0	87,0
COP	W/W	-	-	-	-	4,14	4,16	4,15	4,10	4,12	4,07	4,10	4,02	4,02	4,01	3,99
Water flow rate system side	l/h	-	-	-	-	18004	19795	22128	23077	24492	26674	29206	31801	30649	35173	33469
Pressure drop system side	kPa	-	-	-	-	30	36	35	45	43	60	47	56	56	58	57

(1) Data EN 14511:2018; System side water heat exchanger 23 °C/ 18 °C; External air 35 °C
(2) Data EN 14511:2018; System side water heat exchanger 30 °C / 35 °C; External air 7 °C d.b. / 6 °C w.b.

NRB HE

Size		0282	0302	0332	0352	0502	0552	0602	0604	0652	0654	0682	0702	0704	0752	0754
Cooling performance 23 °C / 18 °C (1)																
Cooling capacity	kW	76,4	85,7	96,8	111,4	126,2	137,5	158,5	160,4	168,9	191,5	214,3	230,5	221,2	253,2	247,4
Input power	kW	20,4	23,1	25,7	31,2	35,9	41,0	45,2	49,8	52,2	51,4	56,4	65,1	62,1	78,2	72,6
Cooling total input current	A	35,0	40,0	45,0	51,0	61,0	67,0	75,0	81,0	82,0	81,0	90,0	102,0	106,0	114,0	117,0
EER	W/W	3,74	3,72	3,77	3,57	3,51	3,36	3,51	3,22	3,24	3,72	3,80	3,54	3,56	3,24	3,41
Water flow rate system side	l/h	13219	14836	16740	19268	21829	23767	27392	27721	29185	33098	37025	39827	38232	43759	42750
Pressure drop system side	kPa	43	55	50	66	44	52	53	64	60	92	75	88	88	91	92
Heating performance 30 °C / 35 °C (2)																
Heating capacity	kW	60,5	70,2	78,9	90,4	104,2	114,6	128,1	133,6	141,8	154,4	169,0	184,0	177,3	203,5	193,6
Input power	kW	13,8	16,1	18,2	21,1	25,2	27,6	30,9	32,6	34,4	38,0	41,2	45,8	44,1	50,7	48,5
Heating total input current	A	26,0	30,0	35,0	40,0	46,0	49,0	54,0	59,0	60,0	69,0	71,0	78,0	80,0	85,0	87,0
COP	W/W	4,38	4,36	4,34	4,28	4,14	4,16	4,15	4,10	4,12	4,07	4,10	4,02	4,02	4,01	3,99
Water flow rate system side	l/h	10456	12125	13636	15617	18004	19795	22128	23077	24492	26674	29206	31801	30649	35173	33469
Pressure drop system side	kPa	27	37	33	43	30	36	35	45	43	60	47	56	56	58	57

(1) Data EN 14511:2018; System side water heat exchanger 23 °C/ 18 °C; External air 35 °C
(2) Data EN 14511:2018; System side water heat exchanger 30 °C / 35 °C; External air 7 °C d.b. / 6 °C w.b.

Original choice of ASHP's

COP of original ASHP's

Standard conditions at which original COP was reported

ENERGY DATA

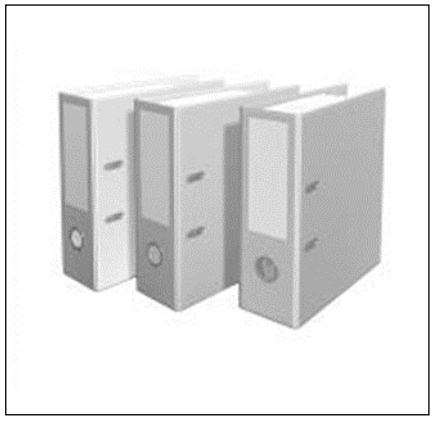
Size			0282	0302	0332	0352	0502	0552	0602	0604	0652	0654	0682	0702	0704	0752	0754
Cooling capacity with low leaving water temp (UE n° 2016/2281)																	
SEER	°	W/W	-	-	-	-	3,92	3,83	3,99	3,70	3,91	3,67	4,14	3,97	3,73	3,88	3,76
	A	W/W	-	-	-	-	4,21	4,14	4,39	3,93	4,20	3,92	4,38	4,27	3,99	4,24	4,06
	E	W/W	4,28	4,32	4,22	4,24	4,17	4,10	4,33	3,86	4,12	3,93	4,35	4,21	3,98	4,16	3,92
	L	W/W	4,10	4,11	4,11	4,00	3,88	3,83	3,93	3,68	3,89	3,64	4,08	3,89	3,70	3,81	3,71
ηsc	°	%	-	-	-	-	154,00	150,00	157,00	145,00	153,00	144,00	163,00	156,00	146,00	152,00	147,00
	A	%	-	-	-	-	165,00	163,00	173,00	154,00	165,00	154,00	172,00	168,00	157,00	167,00	160,00
	E	%	168,00	170,00	166,00	167,00	164,00	161,00	170,00	151,00	162,00	154,00	171,00	165,00	156,00	163,00	154,00
	L	%	161,00	161,00	161,00	157,00	152,00	150,00	154,00	144,00	153,00	143,00	160,00	153,00	145,00	149,00	145,00
UE 813/2013 performance in average ambient conditions (average) - 35 °C - Pdesignh ≤ 400 kW (1)																	
Pdesignh	°	kW	-	-	-	-	88,80	97,30	112,20	116,80	124,50	129,90	144,90	162,80	157,50	182,70	172,10
	A	kW	-	-	-	-	90,20	99,60	112,20	116,80	125,80	135,00	149,00	164,10	157,00	183,30	173,60
	E	kW	53,46	53,46	53,46	78,80	90,20	99,60	112,20	116,80	125,80	135,00	149,00	164,10	157,00	183,30	173,60
	L	kW	52,20	60,22	68,44	78,20	88,80	97,30	112,20	116,80	124,50	129,90	144,90	162,80	157,50	182,70	172,10
ηsh	°	%	-	-	-	-	135,90	139,50	140,40	130,40	140,30	129,50	134,00	137,30	126,30	138,40	128,50
	A	%	-	-	-	-	138,00	142,80	143,20	133,00	143,10	132,10	139,80	141,30	128,00	142,00	133,00
	E	%	158,26	158,26	158,26	152,70	138,50	142,80	143,20	133,00	143,10	132,10	139,80	141,30	128,40	142,00	133,00
	L	%	156,16	152,79	152,22	150,00	135,90	139,50	140,40	130,50	140,30	129,50	134,00	137,30	126,30	138,40	128,50
SCOP	°		-	-	-	-	3,47	3,56	3,58	3,34	3,58	3,31	3,43	3,51	3,23	3,54	3,29
	A		-	-	-	-	3,53	3,65	3,66	3,40	3,65	3,38	3,57	3,61	3,29	3,63	3,40
	E		4,03	4,04	4,03	3,89	3,54	3,65	3,65	3,40	3,66	3,38	3,57	3,61	3,29	3,62	3,40
	L		3,98	3,89	3,88	3,83	3,47	3,56	3,59	3,34	3,58	3,31	3,43	3,51	3,23	3,54	3,29

(1) Efficiencies for low temperature applications (35 °C)

PLANNER MANUAL
Commercial Heat Pump

AEROTOP L

NEW ALTERNATIVE HEAT PUMP CHOICE. REFER TO THIRD PAGE FOR COP INFORMATION



General information

General references to the energy rating of new alternative ASHP's

Features and benefits

AEROTOP L is the new air cooled heat pump, equipped with Full DC Inverter technology and R-32 refrigerant, for outdoor installation. It is available from 20 kW up to 55 kW and is the most effective and valuable solution both in terms of capital investment and running costs.

Energy Efficiency
Class A Eurovent at full load in heating and in cooling.
SCOP up to 4,30, which reaches the A++ class according to EU Regulation 811/2013 (ErP) with low water temperature (LWT 35°C).
SEER up to 4,64 which makes it extremely competitive even com-pared to the cooling only units.
Capacity modulation from 30% to 100%.

Functionality
- Management and production of domestic hot water up to 55 °C
- Climate compensation with outdoor temperature
- Double set-point adjustable
- Additional heating source management

- SILENT mode:
- speed reduction of compressors and fans
- three levels of silence: standard mode, silenced, super silen-ced

Application Versatility
All the main system components are integrated in the unit, assu-ring the best reliability and an easy installation:
- Hydronic assembly with 1 inverter pump

Wide operating range
Outdoor air temperature max / min
heating mode < 30 °C / > -14 °C
domestic hot water mode < 43 °C / > 14 °C
cooling mode < 48 °C / > -10 °C

Flow water temperature max /min
heating mode < 54 °C / > 15 °C
domestic hot water mode < 54 °C / > 15 °C
cooling mode < 20 °C / > 0 °C

Modular design
AEROTOP M has been designed for modularity. It is possible to connect up to 16 units in a local network, reaching a maximum capacity of 960 kW. The combinations can also take place with different capacity units. The modular system, obtained by combining several modules, preserves the strengths of the single module, but multiplies the advantages:
- Increased system efficiency
- Higher reliability
- Simplified handling and installation
- Quick and easy maintenance
- Scalability

Technology
The technical solutions adopted place AEROTOP M on top of its category
- DC inverter technology on compressors and fans
- Electronic expansion valve
- Flow switch
- Hydrophilic battery

Tax credit
Due to its high efficiency, AEROTOP M may be eligible for heat pump subsidies in Your Country

NEW HEAT PUMP CHOICE AND ASSOCIATED COP, REFER TO NOTES BELOW

Performances in heating

Standard conditions at which original COP was reported, for fairness of comparison

Standard to which COP of original ASHP was reported

AEROTOP L 65

New choice of ASHP's

To	Tae (°C) DB/WB	Heating capacity EN14511								COP EN14511							
		Percentage of compressor load								Percentage of compressor load							
C°	C°	100%	90%	80%	70%	60%	50%	min%	40%	100%	90%	80%	70%	60%	50%	min%	40%
25	-10/-11.1	48,8	44,4	43,5	40,3	35,8	31,3	26,5	22,3	3,02	3,20	3,24	3,26	3,24	3,27	3,47	3,54
	-7/-8	54,4	49,0	47,9	44,2	39,2	34,1	28,7	23,9	3,35	3,55	3,60	3,62	3,59	3,60	3,81	3,86
	2/1.1	70,9	62,8	61,1	56,1	49,2	42,4	35,3	28,9	4,31	4,56	4,62	4,63	4,57	4,56	4,76	4,
	7/6	80,0	70,6	68,7	63,0	55,2	47,4	39,3	32,0	4,83	5,11	5,19	5,20	5,12	5,09	5,31	5,
	10/8.2	85,2	75,5	73,4	67,4	58,9	50,6	41,8	34,1	5,12	5,45	5,54	5,55	5,46	5,43	5,66	5,
	18/14	100,1	88,7	86,3	79,2	69,3	59,4	49,0	39,8	5,88	6,36	6,48	6,53	6,47	6,46	6,75	6,
30	-10/-11.1	49,4	44,2	43,1	39,8	35,2	30,6	25,7	21,5	2,77	2,95	3,00	3,02	3,00	3,02	3,20	3,25
	-7/-8	54,8	48,6	47,3	43,6	38,3	33,2	27,7	23,0	3,06	3,27	3,32	3,34	3,31	3,32	3,50	3,54
	2/1.1	70,7	61,9	60,1	55,0	48,0	41,2	34,0	27,6	3,92	4,17	4,24	4,26	4,20	4,18	4,36	4,28
	7/6	79,7	69,6	67,5	61,7	53,8	46,0	37,8	30,6	4,37	4,67	4,75	4,76	4,69	4,67	4,86	4,74
	10/8.2	84,7	74,3	72,1	65,9	57,4	49,0	40,3	32,6	4,62	4,96	5,06	5,08	5,01	4,98	5,18	5,12
	18/14	99,3	87,2	84,6	77,5	67,5	57,6	47,2	38,0	5,31	5,78	5,91	5,97	5,93	5,93	6,19	6,12
35	-10/-11.1	50,1	44,1	42,9	39,4	34,7	30,0	25,0	20,8	2,53	2,69	2,74	2,75	2,73	2,74	2,88	2,91
	-7/-8	55,2	48,4	47,0	43,1	37,7	32,4	26,9	22,2	2,80	2,98	3,03	3,04	3,01	3,00	3,15	3,15
	2/1.1	70,7	61,2	59,2	54,1	47,0	40,1	32,9	26,5	3,55	3,78	3,84	3,85	3,79	3,76	3,91	3,80
	7/6	79,3	68,6	65,3	60,6	52,6	44,7	36,6	29,4	3,96	4,22	4,29	4,31	4,24	4,20	4,35	4,21
	10/8.2	84,3	73,2	70,9	64,7	56,1	47,7	38,9	31,3	4,16	4,48	4,57	4,59	4,52	4,48	4,64	4,55
	18/14	98,6	85,9	83,2	76,0	66,0	56,0	45,7	36,6	4,76	5,21	5,33	5,39	5,34	5,33	5,54	5,45
40	-10/-11.1	50,8	44,2	42,8	39,2	34,3	29,5	24,5	20,2	2,32	2,45	2,49	2,49	2,46	2,45	2,56	2,56
	-7/-8	55,7	48,3	46,7	42,7	37,2	31,8	26,3	21,5	2,56	2,70	2,74	2,75	2,70	2,68	2,79	2,77
	2/1.1	70,7	60,7	58,6	53,4	46,2	39,2	32,1	25,6	3,23	3,41	3,46	3,46	3,39	3,35	3,45	3,31
	7/6	79,2	67,9	65,6	59,7	51,6	43,7	35,6	28,4	3,58	3,80	3,86	3,86	3,79	3,73	3,84	3,68
	10/8.2	83,9	72,4	70,0	63,7	55,1	46,6	37,9	30,2	3,77	4,03	4,10	4,12	4,03	3,98	4,09	3,98
	18/14	98,0	84,9	82,1	74,9	64,8	54,8	44,5	35,4	4,30	4,68	4,79	4,84	4,78	4,75	4,90	4,78
45	-10/-11.1	51,6	44,4	42,8	39,1	34,0	29,1	24,1	19,7	2,12	2,22	2,24	2,24	2,19	2,17	2,25	2,22
	-7/-8	56,4	48,3	46,6	42,5	36,8	31,4	25,8	21,0	2,33	2,44	2,47	2,46	2,41	2,37	2,44	2,40
	2/1.1	70,8	60,3	58,1	52,8	45,6	38,6	31,4	24,9	2,92	3,05	3,09	3,09	3,01	2,95	3,01	2,86
	7/6	79,1	67,4	64,9	59,0	50,8	42,9	34,8	27,6	3,33	3,39	3,44	3,44	3,35	3,28	3,35	3,17
	10/8.2	83,6	71,7	69,3	63,0	54,2	45,7	37,0	29,4	3,39	3,60	3,66	3,66	3,57	3,50	3,57	3,44
	18/14	97,4	84,0	81,2	73,9	63,8	53,8	43,5	34,4	3,84	4,17	4,26	4,29	4,22	4,17	4,28	4,13
50	-10/-11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-7/-8	56,8	48,3	46,6	42,4	36,6	31,1	25,5	20,6	2,12	2,19	2,21	2,20	2,13	2,08	2,13	2,07
	2/1.1	70,8	60,0	57,8	52,5	45,2	38,1	30,9	24,4	2,64	2,73	2,76	2,74	2,65	2,58	2,62	2,47
	7/6	78,8	67,0	64,5	58,5	50,3	42,4	34,3	27,1	2,90	3,03	3,06	3,05	2,95	2,88	2,91	2,74
	10/8.2	83,4	71,3	68,7	62,4	53,7	45,2	36,4	28,8	3,04	3,20	3,25	3,24	3,15	3,07	3,11	2,92
	18/14	96,7	83,3	80,5	73,2	63,1	53,2	42,9	33,8	3,43	3,70	3,78	3,80	3,72	3,65	3,72	3,56
55	2/1.1	70,8	59,9	57,6	52,3	44,9	37,9	30,3	23,8	2,38	2,44	2,45	2,43	2,34	2,27	2,23	2,09
	7/6	78,6	66,7	64,2	58,3	50,0	42,1	33,9	26,8	2,59	2,69	2,72	2,70	2,60	2,52	2,53	2,36
	10/8.2	82,9	70,9	68,4	62,1	53,3	44,8	36,1	28,5	2,71	2,84	2,88	2,87	2,77	2,69	2,70	2,52
	18/14	92,5	82,1	79,9	72,8	62,7	52,8	42,5	33,4	3,13	3,30	3,34	3,35	3,27	3,19	3,24	3,07

Anticipated maximum load on compressor

COP of new ASHP

To [°C]= Leaving internal exchanger water temperature
Tae [°C]= External exchanger return air temperature
Performances in function of the return/flow water temperature differential = 5°C
Heating capacity and COP calculated according to EN 14511:2018
ATTENTION: The data of the heat capacity and COP include defrostings

Standard conditions at which original COP was reported, for fairness of comparison

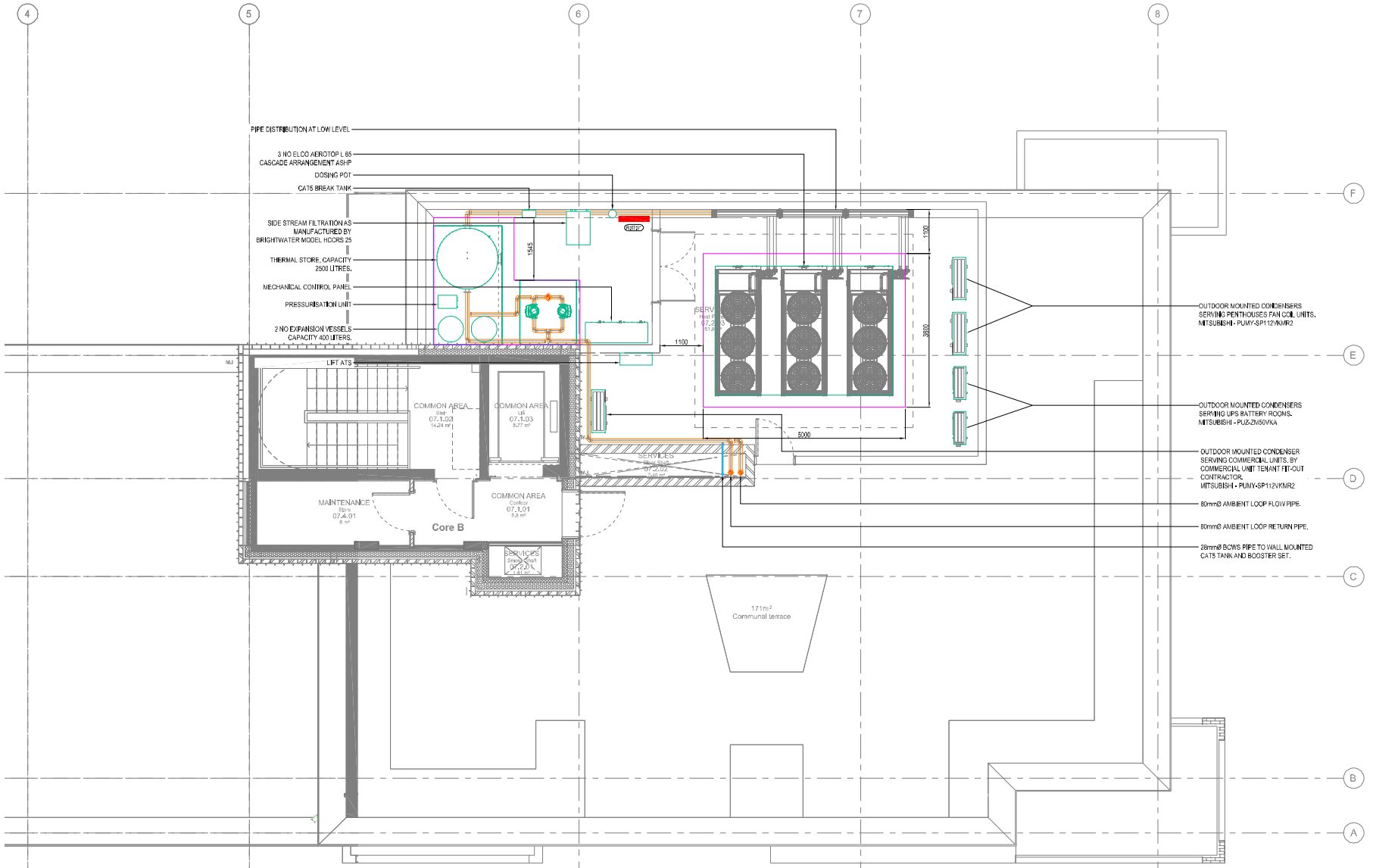
Appendix B - ASHP Location Drawing & Ambient Loop Schematics

THIS DRAWING IS INDICATIVE AND REPRESENTS ONLY THE DESIGN INTENT. THE CONTRACTOR MUST PRODUCE FULLY CO-ORDINATED WORKING / INSTALLATION DRAWINGS AS REFERRED TO IN THE CONTRACT DOCUMENTATION

MECHANICAL NOTES

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS INDICATED ARE IN MILLIMETRES
2. DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION, DOCUMENTATION, DRAWINGS & ALL RELEVANT BRITISH STANDARD DOCUMENTS
3. ALL INSTALLATIONS TO COMPLY FULLY WITH CURRENT WATER BYELAWS, REQUIREMENTS OF BS 6700, BS-EN-806 AND LOCAL WATER AUTHORITIES
4. ALL FITTINGS, PLANT AND EQUIPMENT TO BE INSTALLED, REGULATED AND TESTED IN ACCORDANCE WITH THE MANUFACTURERS PRINTED INSTRUCTIONS
5. ALL PIPEWORK, FITTINGS AND EQUIPMENT TO BE INSTALLED TO PROVIDE SYSTEMS FREE OF AIR LOCKS, WATER HAMMER OR LEAKS
6. ALL VALVES TO BE FULLY ACCESSIBLE AND BE PROVIDED WITH IDENTIFICATION LABELS
7. DRAIN VALVES TO BE PROVIDED AT ALL LOW POINTS IN ALL SYSTEMS
8. ALL PIPEWORK TO BE ADEQUATELY SUPPORTED THROUGHOUT ITS LENGTH
9. ALL PIPES PASSING THROUGH FIRE STOP BARRIERS TO BE SLEEVED BEYOND THE BARRIER TO A MINIMUM LENGTH OF 300mm WITH BARRIER FIRE STOP MATERIAL
10. ALL PIPEWORK IN CEILING VOID DUCTS AND ENCLOSURES TO BE FULLY INSULATED. PIPEWORK WITHIN FLOOR VOIDS TO HAVE ARMOURFLEX INSULATION DUE TO SPACE RESTRICTION

ALL EXTERNAL AMBIENT LOOP & BCWS PIPEWORK TO BE TRACE HEATED AT ROOF LEVEL & WITHIN BASEMENT.



REV	DESCRIPTION	BY	CHK	APP	DATE
C01	CONTRACT ISSUE	TS	TG	AP	17.04.24
P02	UPDATED ISSUE	TS	AP	AP	14.02.24
P01	ISSUED TO DESIGN TEAM FOR APPROVAL	TS	TG	AP	06.02.24

Project Status:
CONTRACT

HARLEY HADDOW
ENGINEERING POWERED BY THE PAST
BUILDING THE FUTURE
Unit A2, Fletchers Yard
9 Tanner Street
London SE1 3LE
T 44 (0) 203 794 5000
www.harleyhaddow.com

Project: 312164

19-37 HIGHGATE ROAD
KENTISH TOWN

Drawing Title:

ROOF MECHANICAL SERVICES PLANTROOM LAYOUT

Scale @ A1	Date	Engineer
1:50	NOV 2023	AP

Drawing No.	Revision
312164-HAH-B1-07-D-M-05970	C01

THIS DRAWING IS INDICATIVE AND REPRESENTS ONLY THE DESIGN INTENT, THE CONTRACTOR MUST PRODUCE FULLY CO-ORDINATED WORKING / INSTALLATION DRAWINGS AS REFERRED TO IN THE CONTRACT DOCUMENTATION

HEATING NOTES

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS INDICATED ARE IN MILLIMETRES
2. DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION, DOCUMENTATION, DRAWINGS & ALL RELEVANT BRITISH STANDARD DOCUMENTS
3. THE HEATING INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF BS EN 12828:2012, BS EN 12831:2017 AND THE BUILDING REGULATIONS 2010.
4. ALL FITTINGS, PIPEWORK, PLANT & EQUIPMENT TO BE INSTALLED, REGULATED & TESTED IN ACCORDANCE WITH THE MANUFACTURERS PRINTED INSTRUCTIONS.
5. ALL HIGH POINTS IN SYSTEM TO INCLUDE AUTOMATIC AIR VALVE & ALL LOW POINTS INCLUDE A DRAIN OFF COCK.
6. ALL PIPEWORK TO BE ADEQUATELY SUPPORTED THROUGHOUT ITS LENGTH.
7. ALL PIPES PASSING THROUGH FIRE STOP BARRIERS TO BE SLEEVED BEYOND THE BARRIER TO A MINIMUM LENGTH OF 300mm WITH BARRIER FIRE STOP MATERIAL.
8. ALL FINAL CONNECTIONS TO TOWEL RAILS / RADIATORS TO BE 15mmØ STAINLESS STEEL OR CHROMED COPPER UNLESS OTHERWISE STATED.
9. ALL PIPEWORK WITHIN NON ACCESSIBLE CEILINGS & WITHIN FLOOR TRENCHES TO BE FULLY WELDED/BRAZED.
10. UNDERFLOOR HEATING SPECIALIST TO CONFIRM WITH ARCHITECT / INTERIOR DESIGNER TOG RATINGS OF ALL FLOOR FINISHES PRIOR TO INSTALLATION TO ACHIEVE HEATING OUTPUTS.

LEGEND

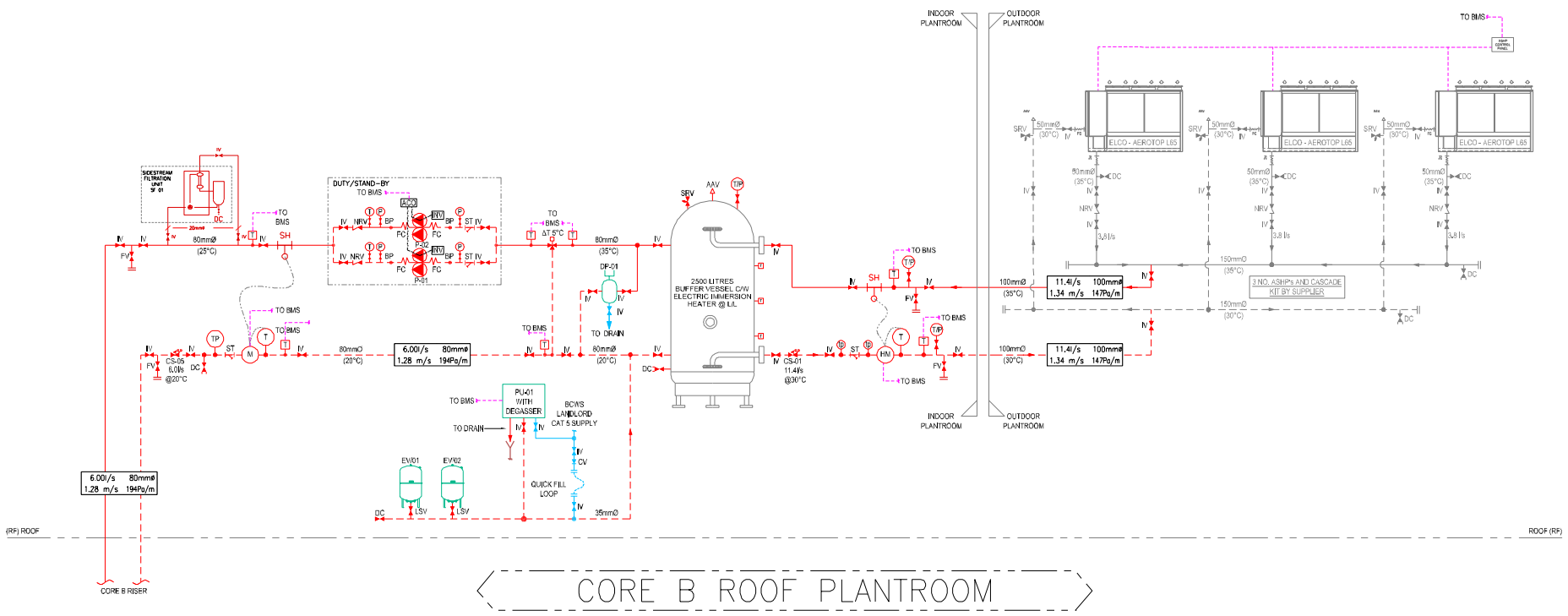
- RADIATOR
- ELECTRICAL RADIATOR/TOWEL RAIL
- LTHW UNDERFLOOR HEATING
- ELECTRIC UNDERFLOOR HEATING MAT
- UNDERFLOOR HEATING MANIFOLD
- Zxx UNDERFLOOR HEATING ZONE
- xxx kW SPACE HEATING OUTPUT REQUIREMENT
- xx°C SPACE HEATING TEMPERATURE
- TRAD TOWEL RAIL / RADIATOR REFERENCE
- PIPEWORK AT LOW LEVEL
- PIPEWORK WITHIN FLOOR VOID
- PIPEWORK WITHIN CEILING VOID
- S SPACE TEMPERATURE SENSOR
- T SPACE THERMOSTAT

ABBREVIATIONS

L/L	LOW LEVEL
M/L	MID LEVEL
H/L	HIGH LEVEL
DFA	DROP FROM ABOVE
DTB	DROP TO BELOW
RFB	RISE FROM BELOW
RTA	RISE TO ABOVE
CS	COMMISSIONING SET
CV	CHECK VALVE
DCV	DOUBLE CHECK VALVE
CWST	COLD WATER STORAGE TANK
DOC	DRAIN COCK
FC	FLEXIBLE CONNECTION
HWC	HOT WATER CYLINDER
IV	ISOLATION VALVE
LSV	LOCK SHIELD VALVE
M	METER
MV	MOTORISED VALVE
NC	NORMALLY CLOSED VALVE
NRV	NON RETURN VALVE
PRV	PRESSURE REDUCING VALVE
ST	STRAINER

ALL EXTERNAL AMBIENT LOOP & BCWS PIPEWORK TO BE TRACE HEATED AT ROOF LEVEL & WITHIN BASEMENT

CORE B ROOF PLANTROOM



EQUIPMENT SCHEDULE

QUANTITY	NAME	MANUFACTURER	MODEL No.	OUTPUT/ CAPACITY
3	ASHP	ELCO	AEROTOP L 6S-8S	61.5kW
1	THERMAL STORES	VISTRON	G.SCH-N 2500	2500 LITRES
1	DOSING POT	DUTYPOINT	DP3.5	3.5 LITRES
1	SIDE STREAM FILTER	BRIGHTWATER	HCORS 25	N/A
1	PRESSURISATION UNIT	SPIROTECH	MultiControl Kompact Maxi Twin EMCK-M75-4J-TWIN	N/A
2	EXPANSION VESSELS 01 & 02	REFLEX	REFLEX N400	400 LITRES

PUMP SCHEDULE

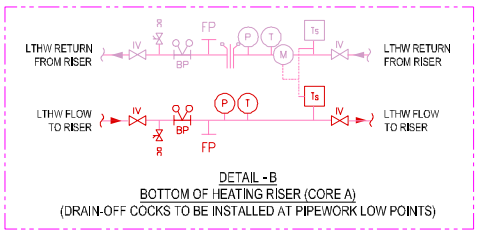
REF No.	NAME	PERFORMANCE	MANUFACTURER	MODEL
P01	AMBIENT LOOP CIRCULATION PUMP	6.5 L/S @170 kPa	GRUNDFOS	TPE 50-290/2 A-F-A-BQQE-NVB
P02	AMBIENT LOOP CIRCULATION PUMP	6.5 L/S @170 kPa	GRUNDFOS	TPE 50-290/2 A-F-A-BQQE-NVB

* PUMP C/W INVERTER AND AUTO CHANGE OVER.
* FACILITY TO RESPOND TO REMOTE DIFFERENTION PRESSURE SWITCH.
* FACILITY TO BE LINKED TO BMS.
* COMPLETE WITH ANTI-VIBRATION MOUNTS.

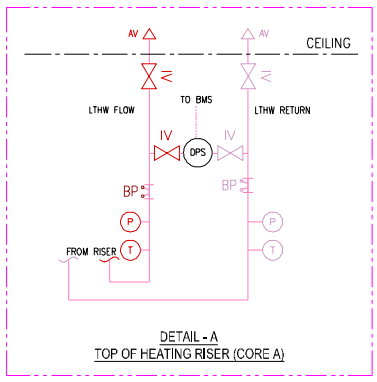
PIPE ISULATION THICKNESS TABLE

PVC-U PN10 (BS/EN 1452-2)	MEDIUM GRADE STEEL (BS/EN 10255)	COPPER PIPE SIZE NB (mm) (BS/EN 1057)	MIN. INSULATION THICKNESS FOR INSULATION PHENOLIC 0.025 w/m/K
		15	20
	15		20
	20	22	20
	25	28	25
32	32	35	25
40	40	42	30
50	50	54	30
63	65	67	30
75	80	76	35
110	100	108	35
140	125	133	35
160	150	159	35

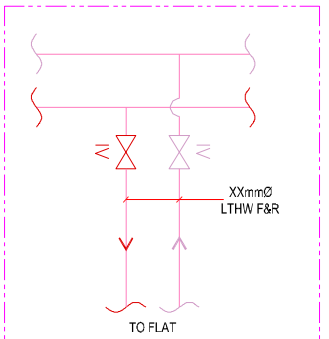
NOTE:
ALL PIPE SIZES SHOWN ARE FOR TENDER PURPOSES, SUB-CONTRACTOR TO PROVIDE DETAILED CALCULATIONS & WORKING PLANT ROOM DRAWINGS.
INSULATION THICKNESS AS PER BS 5422:2023



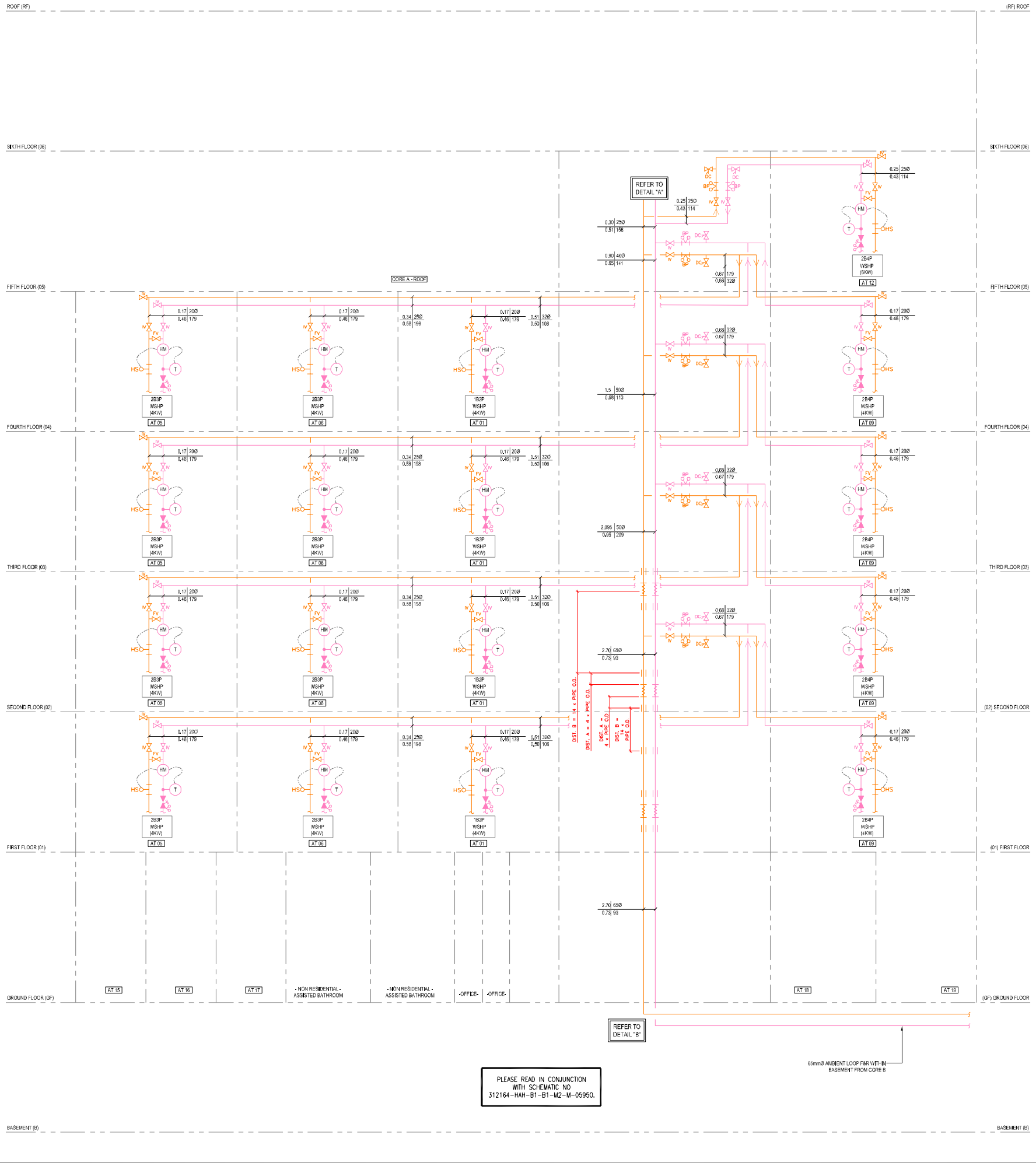
DETAIL - B
BOTTOM OF HEATING RISER (CORE A)
(DRAIN-OFF COCKS TO BE INSTALLED AT PIPEWORK LOW POINTS)



DETAIL - A
TOP OF HEATING RISER (CORE A)



DETAIL OF ISOLATION VALVE EXTERNAL TO THE PROPERTY WITHIN THE CEILING VOID AND ACCESSIBLE FROM THE CORRIDOR



PLEASE READ IN CONJUNCTION WITH SCHEMATIC NO 312164-HAH-B1-B1-M2-M-05950.

C01	CONTRACT ISSUE	TD	AP	17.04.24
P02	UPDATED ISSUE	TD	AP	14.02.24
P01	ISSUED FOR COMMENT/APPROVAL	TD	AP	02.02.24
REV	DESCRIPTION	BY	CHK	APP DATE

Project Status:
CONTRACT

HARLEY HADDOW
ENGINEERING POWERED BY THE PAST BUILDING THE FUTURE
Unit A2, Hatchers Yard
9 Tanner Street
London, SE1 3LE
T 44 (0) 208 735 5050
www.harleyhaddow.com

Project: 312164
19-37 HIGHGATE ROAD
KENTISH TOWN

Drawing Title:
CORE A
HEATING SERVICES
PLANTROOM SCHEMATIC

Scale @ A0	Date	Engineer
N.T.S.	JAN 2024	AP

Drawing No.	Revision
312164-HAH-B1-XX-D-M-05690	C01

FILENAME: Z:\PROJECTS\312164 - 19-37 HIGHGATE ROAD\07 HAH DRAWINGS\02 CAD\03 MECH-MNCAL\312164-HAH-B1-XX-D-M-05690.DWG | PLOTTED DATE: 17 April 2024 16:29:22

THIS DRAWING IS INDICATIVE AND REPRESENTS ONLY THE DESIGN INTENT, THE CONTRACTOR MUST PRODUCE FULLY CO-ORDINATED WORKING / INSTALLATION DRAWINGS AS REFERRED TO IN THE CONTRACT DOCUMENTATION

HEATING NOTES

1. DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS INDICATED ARE IN MILLIMETRES
2. DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION, DOCUMENTATION, DRAWINGS & ALL RELEVANT BRITISH STANDARD DOCUMENTS
3. THE HEATING INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF BS EN 12828:2012, BS EN 12831:2017 AND THE BUILDING REGULATIONS 2010.
4. ALL FITTINGS, PIPEWORK, PLANT & EQUIPMENT TO BE INSTALLED, REGULATED & TESTED IN ACCORDANCE WITH THE MANUFACTURERS PRINTED INSTRUCTIONS.
5. ALL HIGH POINTS IN SYSTEM TO INCLUDE AUTOMATIC AIR VALVE & ALL LOW POINTS INCLUDE A DRAIN OFF COCK.
6. ALL PIPEWORK TO BE ADEQUATELY SUPPORTED THROUGHOUT ITS LENGTH.
7. ALL PIPES PASSING THROUGH FIRE STOP BARRIERS TO BE SLEEVED BEYOND THE BARRIER TO A MINIMUM LENGTH OF 300mm WITH BARRIER FIRE STOP MATERIAL.
8. ALL FINAL CONNECTIONS TO TOWEL RAILS / RADIATORS TO BE 15mmØ STAINLESS STEEL OR CHROMED COPPER UNLESS OTHERWISE STATED.
9. ALL PIPEWORK WITHIN NON ACCESSIBLE CEILINGS & WITHIN FLOOR TRENCHES TO BE FULLY WELDED/BRAZED.
10. UNDERFLOOR HEATING SPECIALIST TO CONFIRM WITH ARCHITECT / INTERIOR DESIGNER TOG RATINGS OF ALL FLOOR FINISHES PRIOR TO INSTALLATION TO ACHIEVE HEATING OUTPUTS.

LEGEND

- RADIATOR
- ELECTRICAL RADIATOR/TOWEL RAIL
- LTHW UNDERFLOOR HEATING
- ELECTRIC UNDERFLOOR HEATING MAT
- UNDERFLOOR HEATING MANIFOLD
- Zxx — UNDERFLOOR HEATING ZONE
- xxx kW — SPACE HEATING OUTPUT REQUIREMENT
- xx°C — SPACE HEATING TEMPERATURE
- TRxx — TOWEL RAIL / RADIATOR REFERENCE
- PIPEWORK AT LOW LEVEL
- PIPEWORK WITHIN FLOOR VOID
- PIPEWORK WITHIN CEILING VOID
- S — SPACE TEMPERATURE SENSOR
- T — SPACE THERMOSTAT

ABBREVIATIONS

L/L	LOW LEVEL
M/L	MID LEVEL
H/L	HIGH LEVEL
DFA	DROP FROM ABOVE
DTB	DROP TO BELOW
RFB	RISE FROM BELOW
RTA	RISE TO ABOVE
CS	COMMISSIONING SET
CV	CHECK VALVE
DCV	DOUBLE CHECK VALVE
CWST	COLD WATER STORAGE TANK
DOC	DRAIN COCK
FC	FLEXIBLE CONNECTION
HWC	HOT WATER CYLINDER
IV	ISOLATION VALVE
LSV	LOCK SHIELD VALVE
M	METER
MV	MOTORISED VALVE
NC	NORMALLY CLOSED VALVE
NRV	NON RETURN VALVE
PRV	PRESSURE REDUCING VALVE
ST	STRAINER

ALL EXTERNAL AMBIENT LOOP & BCWS PIPEWORK TO BE TRACE HEATED AT ROOF LEVEL & WITHIN BASEMENT

CORE B ROOF PLANTROOM

EQUIPMENT SCHEDULE				
QUANTITY	NAME	MANUFACTURER	MODEL No.	OUTPUT/ CAPACITY
3	ASHP	ELCO	AEROTOP L 65-88	61.5kW
1	THERMAL STORES	VISTRON	G,SCH-N 2500	2500 LITRES
1	DOSING POT	DUTYPOINT	DP3.5	3.5 LITRES
1	SIDE STREAM FILTER	BRIGHTWATER	HCCRS 25	N/A
1	PRESSURISATION UNIT	SPIROTECH	MultiControl Kompact Maxi Twin EMCK-M75-4J-TWIN	N/A
2	EXPANSION VESSELS 01 & 02	REFLEX	REFLEX N400	400 LITRES

PUMP SCHEDULE				
REF No.	NAME	PERFORMANCE	MANUFACTURER	MODEL
P01	AMBIENT LOOP CIRCULATION PUMP	6.5 L/S @170 kPa	GRUNDFOS	TPE 50-290/2 A-F-A-BQQE-NVB
P02	AMBIENT LOOP CIRCULATION PUMP	6.5 L/S @170 kPa	GRUNDFOS	TPE 50-290/2 A-F-A-BQQE-NVB

* PUMP C/W INVERTER AND AUTO CHANGE OVER.
* FACILITY TO RESPOND TO REMOTE DIFFERENTION PRESSURE SWITCH.
* FACILITY TO BE LINKED TO BMS.
* COMPLETE WITH ANTI-VIBRATION MOUNTS.

PIPE ISULATION THICKNESS TABLE			
PVC-U PN10 (BS/EN 1452-2)	MEDIUM GRADE STEEL (BS/EN 10255)	COPPER PIPE SIZE NB (mm) (BS/EN 1057)	MIN. INSULATION THICKNESS FOR INSULATION PHENOLIC 0.025 w/m/K
		15	20
	15		20
	20	22	20
	25	28	25
32	32	35	25
40	40	42	30
50	50	54	30
63	65	67	30
75	80	76	35
110	100	108	35
140	125	133	35
160	150	159	35

NOTE:
ALL PIPE SIZES SHOWN ARE FOR TENDER PURPOSES, SUB-CONTRACTOR TO PROVIDE DETAILED CALCULATIONS & WORKING PLANT ROOM DRAWINGS.
INSULATION THICKNESS AS PER BS 5422:2023

REFER TO DETAIL "B"

PLEASE SEE HEATING SCHEMATIC DL0020-HAH-ZZ-SH-M-05990

DETAIL - A
TOP OF HEATING RISER (CORE A)

DETAIL OF ISOLATION VALVE EXTERNAL TO THE PROPERTY WITHIN THE CEILING VOID AND ACCESSIBLE FROM THE CORRIDOR

DETAIL - B
BOTTOM OF HEATING RISER (CORE A)
(DRAIN-OFF COCKS TO BE INSTALLED AT PIPEWORK LOW POINTS)

PLEASE READ IN CONJUNCTION WITH SCHEMATIC NO 312164-HAH-B1-B1-M2-M-05950.

C01	CONTRACT ISSUE	TD	AP	17.04.24
P02	UPDATED ISSUE	TD	AP	14.02.24
P01	ISSUED FOR COMMENT/APPROVAL	TD	AP	02.02.24
REV	DESCRIPTION	BY	CHK	APP DATE

Project Status: CONTRACT

HARLEY HADDOW
ENGINEERING POWERED BY THE PAST BUILDING THE FUTURE
Unit A2, Hatchers Yard, 9 Tanner Street, London, SE1 3LE
T 44 (0) 208 735 5050
www.harleyhaddow.com

Project: 312164
19-37 HIGHGATE ROAD
KENTISH TOWN

Drawing Title:
CORE B
HEATING SERVICES & PLANTROOM SCHEMATIC

Scale @ A0	Date	Engineer
N.T.S.	JAN 2024	AP

Drawing No.: 312164-HAH-B1-XX-D-M-05691
Revision: C01

FILENAME: Z:\PROJECTS\312164 - 19-37 HIGHGATE ROAD\07 HAH DRAWINGS\02 CAD\03 MECH-M\NCAL\312164-HAH-B1-XX-DM-05691.DWG | PLOTTED DATE: 17 April 2024 16:26:17

Appendix C – ASHP Maintenance Schedule

To be undertaken at least twice per year by the designated maintenance contractor

- Check on-board electronics, electric sub-meters, and control equipment
- Check electrical power supplies to the equipment and continuity of electrical bonding
- Check BMS interfaces for monitoring plant fault
- Check BMS temperature sensors and sensor pockets
- Check integral ASHP shunt pumps
- Check compressors including refrigerant levels and pressure
- Check condensate drainage lines from ASHP's
- Clean strainers as required
- Check for system leaks
- Service the coils and fans as required
- Check for signs of adverse vibrations
- Check three-port mixing valve
- Check ambient loop distribution pumps
- Check ambient loop by-pass circuit
- Check ambient loop water treatment
- Ensure plantroom louvers are not obstructed
- Check pipework trace heating

Harley Haddow's Drawing 312164-HAH-B1-07-D-M-05970 Revision C01 in Appendix A shows to scale the clear access provision around the ASHP's, electrical panel, buffer vessels, and ambient loop distribution pumps for safe maintenance.