Etihad North Stand Expansion –
NSE-SEE-NS-XX-TEC-M-000004



Technical Submittal 04

ASHPs

MCFC-SES-TS-M-04

Status S3 - Suitable for review & comment
Rev - P01

Status B; Approved with Comments

DOCUMENT STATUS

Document Status				
Revision	A			
Date	20/08/24			
Author	J Lavelle			
Checked	A Whitworth			
Verified	D Hudson			

Status B; Approved with Comments
Status A: Approved

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Status B; Approved with Comments
Status A: Approved

Executive Summary

The purpose of this technical submittal is to provide the reader with an overview of the ASHP Units to be provided within the MCFC North Stand Development.

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Status A: Approved

Appendix A - Basis of Design

- Document No: NSE-MEE-NS-XX-TS-Z-008002 RIBA Stage 4a - P01
- Document No: NSE-MEE-NS-XX-LS-M-008013 – P03
- Document No: NSE-MEE-NS-03-DR-M-553415 - P01
- Document No: NSE-MEE-NS-ZZ-DR-M-500515 - P01

Status B; Approved with Comments
Status A: Approved

Appendix B - Manufacturers Details

Email: paul.thurkettle@aermec.co.uk
Tel : +44 (0) 1702 789 570
Address: Aermec UK Limited, Unit 11 The Quad, Airport Business Park Southend, Cherry Orchard Way, Rochford, SS4 1YH

Status B; Approved with Comments
Status A: Approved

Appendix C – Technical Literature

As per technical data attached – see appendix H.

Status B; Approved with Comments
Status A: Approved

Appendix D – Compliance

In line with the mechanical specification and equipment schedule:

NSE-SEE-NS-XX-LS-M-008317

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Appendix E – Non -Compliance

N/A

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Status A: Approved

Appendix F - Programme

Lead time of 19-20 weeks

The Purpose of this technical submission is to inform the Etihad client team and professional team of SES intent regards to procurement of systems and equipment to enable input into the MEP design and therefore complete the systems MEP design.

The Technical submission is by no means intended to show full systems design by the way of MEP design drawings and schematics.

Drawings and Schematics will follow once technical submissions have reached A or B status and the technical information from within the approved submission has been inputted into the MEP design.

Status B; Approved with Comments
Status A: Approved

Appendix G – Drawing Reference

NSE-SEE-NS-M3-DR-M-553415/553425 – P01.

Status B; Approved with Comments
Status A: Approved

Appendix H – Attachments

ASHP – Aermec Technical Details

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UNIT SPECIFICATIONS

Model: NRK0700°H°A°J°P2



Code	NRK
Size	0700
Working fields	° - Mechanical thermostatic valve (outlet water temperature from +4 °C)
Model	H - Heat pump
Heat recovery	° - Without heat recovery
Version	A - High efficiency
Coils	° - Copper pipes and aluminium fins
Fans	J - Inverter
Power supply	° - 400V/3N/50Hz with circuit breakers
Hydronic kit	P2 - Without storage tank, with low head pump and standby pump

Images are for reference purposes only and may nof *represent exactly the configured model in this document.*

Certifications

Aermec participates in the Eurovent Certification Programme. The certified data of certified models are listed in the Eurovent Directory.

Notes

Data in accordance fo *EN 14511.2018*

Data shown is calcula fed *without soft-starter and/or power factor correction devices.*

The unit is suitable for the following energy applications:

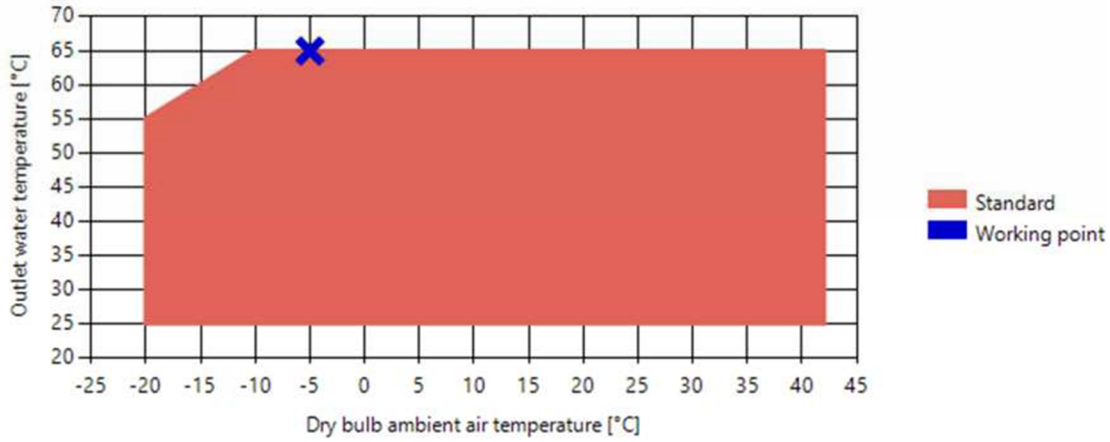
- Low temperature comfort (12 / 7 °C)
- High temperature comfort (23 / 18 °C)
- High temperature process (12 / 7 °C)
- Low temperature heating (35 °C)
- Medium temperature heating (55 °C)

Heating at -5°C ambient

Capacity	kW	143.3
Input power	kW	72.3
Input current	A	153
COP	WM	1.98
Dry bulb ambient air temperature	°C	-5.0
Wet bulb ambient air temperature	°C	-6.0
Inlet water temperature	°C	60.0
Outlet water temperature	°C	65.0
Temperature difference	°C	5.0
Ethylene glycol	%	0
Water flow rate	l/s	6.9931
Available pressure	kPa	114
Fouling factor	(m° K)M	0

Heating at 35°C ambient

Capacity	kW	256.3
Input power	kW	75.5
Input current	A	159
COP	WM	3.39
Dry bulb ambient air temperature	°C	35.0
Wet bulb ambient air temperature	°C	26.6
Inlet water temperature	°C	56.1
Outlet water temperature	°C	65.0
Temperature difference	°C	8.9
Ethylene glycol	%	0
Water flow rate	l/s	6.9897
Available pressure	kPa	114
Fouling factor	(m° K)/W	0



Seasonal energy performance - Average climatic conditions

Pdesignh	55 °C	kW	176.00
F]S	55 °C	%	110.00
SCOP	55 °C	WM	2.83

Pdesignh	35 °C	kW	166.00
F]S	35 °C	%	125.00
SCOP	35 °C	W/W	3.20

General data

Refrigerant circuit data

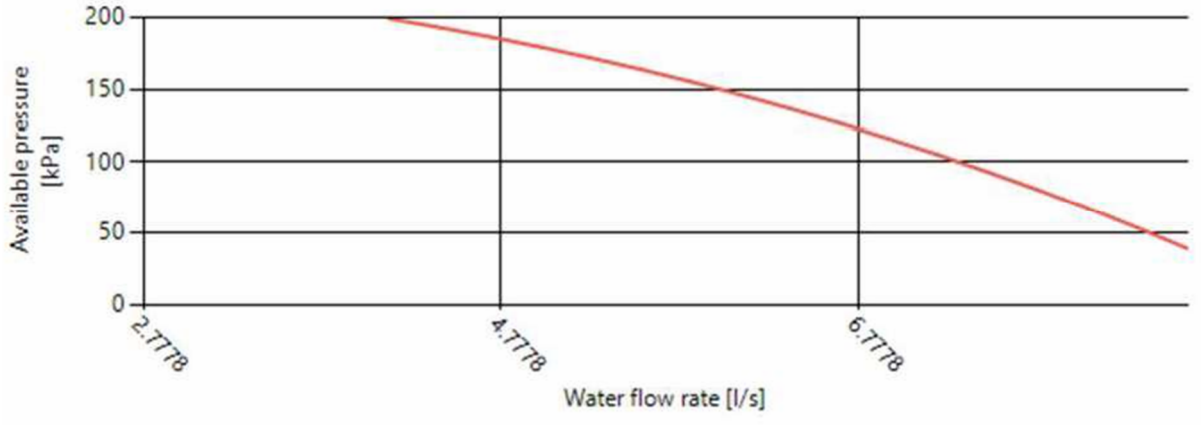
Refrigerant			R410A
Driver			On-Off
Compressor type			Scroll
Number of compressors		n.	4
Number of cooling circuits		n.	2
Refrigerant gas charge	C1	kg	20
	C2	kg	20
Oil charge	C1		6.5
	C2		6.5

Fan group data

Driver		Inverter modulation
Fan type		Axial
Number of fans	n.	3
Air flow rate	m°/s	16.1111

Water circuit data

Exchanger type		Plate
Number of exchangers	n.	1
Water content	l	18
Expansion tank number	n.	1
Expansion tank capacity	l	24
Connections type		Grooved joints
Water connections of exchanger	inlet	2"1/2
	outlet	2"1/2



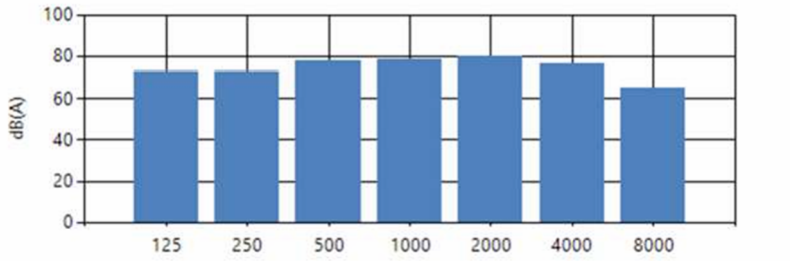
Electric data

Full Load Amps (FLA)	A	151.53
Locked Rotor Amps (LRA)	A	292.53
Power supply		400V/3N/50Hz with circuit breakers

Sound data (nominal cooling data)

Sound power - Lw	dB(A)	85.0
Sound pressure at 10 m	dB(A)	53.0

Hz	dB	dB(A)
125	89	72.9
250	81.8	73.2
500	81.2	78
1000	78.3	78.3
2000	78.8	80
4000	75.6	76.6
8000	66.3	65.2



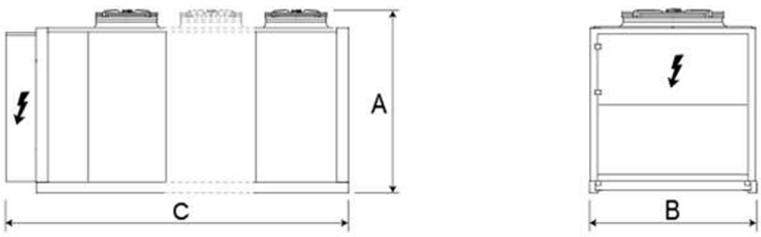
The sound levels are given at full load, without pumps (if available) and at nominal conditions (air temperature.' 35.0 °C, water temperature (in/out): 12.0/7.0 "C).

Dimensions and weights

A[m]	B[m]	C[m]
1.88	1.1	4.33

** -- Free field*

The dimensions and *weight refer to the unit without packaging. For these data, consult the installation manual.*



Technical description

Series
Outdoor unit with high-efficiency compressors.

The base, the structure and the panels are made of steel treated with rustproof polyester paint.

Model
Heat pump

Version
High-efficiency version obtained by appropriately sizing the condensing surface through the use of an adequate number of cooling modules.

Refrigerant
HFC R410A, this is characterised by zero ODP (ozone depletion potential) and is classified A1 within the safety group in accordance with the ASHRAE 34-1997 standard.

Cooling circuit
- Made with a copper pipe with welded silver alloy joints.
- Thermostatic valve that modulates gas flow depending on chiller load.
- Filter-drier: it can collect debris and any traces of humidity in the refrigerant circuit.
- Sight glass: used to check the refrigerating gas load and any humidity in the refrigerant circuit.
- Solenoid valve: it closes when the compressor turns off, preventing the flow of refrigerant gas towards the evaporator. It is envisaged only if no mechanical thermostatic valve is fitted.
- Separator for compressor suction liquid to prevent ingress of any liquid into the compressor.
- 4-way reverse cycle valve for winter/summer operation changeover.
- Accumulation of liquid on the high-pressure line; it contains any excess refrigerant in the event of refrigerant circuit reversal.

Circuit number: 2
Compressor number: 4

Bearing structure
Supporting structure made of hot-dipped galvanised steel sheets, painted with polyester powders, built to guarantee easy accessibility for service and maintenance.

Compressor
The scroll-type hermetic compressor is characterised by high performance and low electrical power consumption. Supplied as standard with an antifreeze electric heating element (oil heater) coiled around the casing that is automatically powered when the unit pauses, as long as the unit is kept powered up.

Mounted on rubber vibration dampers on the base.
The use of multiple compressors, put into operation depending on the load requirements of the system, allows effective "step" regulation of the power supplied from the unit, obtaining very efficient operation at partial loads. All this translates into significant seasonal energy efficiency ratios.

Thermostatic valve
Mechanical thermostatic valve with external equaliser located at the evaporator outlet and bulb sensitive to the intake temperature. Depending on the heat load, it modulates the gas flow, always maintaining the correct heating level of the gas suctioned to the compressor.

Water side exchanger
High-efficiency, dry expansion refrigerant/water heat plate heat exchanger made out of brazed AISI 316 stainless steel, externally insulated with closed-cell material to prevent condensation and reduce heat loss.
There is also an anti-freeze electric heating element controlled by a dedicated probe positioned in the heat exchanger; activation is controlled by the PCB and is triggered when the water temperature is +3 °C (default, adjustable).

Air side exchanger
Louvered fin coils with copper pipes and hydrophilic aluminium louvered fins.

Fan unit
Continuous modulation of revolution speed according to the condensation pressure, highly efficient brushless motor for low energy consumption.
Statically and dynamically balanced helical fan, activated by electric motor equipped with inner thermal protection with automatic reset.
There are metal anti-intrusion grids (according to IEC EN 60335-2-40 standards).
With 800mm impellers.
Fan number: 3

Power supply
400V/3N/50Hz with circuit breakers

Electrical panel
It contains the power section, the management of the controls and safety devices and the on-board control panel.

It is equipped with a door-lock disconnecting switch to disconnect the power supply by using the opening lever itself. This lever can be blocked with padlocks during maintenance to prevent the machine from being accidentally powered.

All the cables are numbered so they can be immediately recognised.

Safety devices and protections
- High-pressure switch (one for each circuit): factory-calibrated, installed downstream of the compressor with the function of stopping machine operation in the event of abnormal pressure.
- Refrigerant circuit safety valve on the low pressure side: it kicks in by releasing overpressure in the event of abnormal working pressure levels.
- Electric control board access door interlock system.
- Compressor protection fuses or circuit breakers.
- Fan protection circuit breakers.
- Auxiliary circuit protection circuit breakers.
- Pump consent relay

Transducers
The unit is supplied equipped with water temperature probes at the exchanger inlet and outlet.
- Low-pressure transducer (one per circuit): it makes it possible to show the value of the compressor intake pressure on the microprocessor electronic card display; it is installed on the low pressure side of the refrigerant circuit and shuts down compressor operation in the case of abnormal operating pressure.
- High-pressure transducer (one per circuit): it makes it possible to show the value of the compressor delivery pressure on the microprocessor electronic card display; it is installed on the high pressure side of the refrigerant circuit and shuts down compressor operation in the case of abnormal operating pressure.

Electronic regulation
- Control board with microprocessor.
- Control panel.
- Remote ON/OFF with external contact without voltage.
- Multi-language menu.
- Independent control of the individual compressors.
- Cumulative faults block signal.
- Historical alarms function.
- Temperature display of the input and output water.
- Alarms display.
- Integral proportional adjustment of the output water temperature (precision up to +0.1K).
- Function with double set-point linked to an external contact.
- Fan adjustment.
- Pump unit check.
- Compensation of the set-point on the basis of the external temperature or from external analogue signal (4-20 mA).
- Compressor rotation management.

Heat recovery unit
Without heat recovery units.

Hydraulic components
- Water filter equipped with steel filtering mesh, it prevents the heat-exchanger from clogging system side due to any impurity inside the circuit.
- Flow switch, it controls that there is water circulation inside the heat exchangers; if this is not the case, they block the unit.
- Water temperature sensor (inlet).
- Water temperature sensor (outlet).
- Expansion vessel with nitrogen pre-load membrane.
- One-way valves
- Drain cock to discharge of the circuit water.
- Air vent valve, manual type, discharges any air pockets in the hydraulic circuit.

Description: Without storage tank, with low head pump and standby pump
Pump number: 2
Expansion vessel number: 1
Expansion vessel capacity: 24 l

Conformity

Inside every unit there is the declaration of CE conformity with reference to the serial number of the appliance.
The unit complies with the following harmonised standards:

- IEC EN 61000-6-2 and IEC EN 61000-6-4 (Immunity and electromagnetic emissions for industrial environments)
- EN378 (Refrigerating systems and heat pumps - Safety and environmental requirements)
- EN12735 (Copper and copper alloys - Seamless, round copper tubes for air conditioning and refrigeration)
- UNI1285-68 Calculation of resistance of metal pipes subject to internal pressure
- EN60204-1 (Safety of machinery - Electrical equipment on machines)

The unit is in compliance with the following directives:

- LVD Directive: 2014/95/EC
- Electromagnetic Compatibility Directive 2014/30/EC
- Machinery Directive 2006/42/EC
- PED Directive regarding pressurised devices 2014/68/EC

The product satisfies the Total Quality Assurance procedure (form H) with certificate no.06/270-QT3664 Rev.10 issued by notified body no.1131 CEC via Pisacane 46, Legnano (MI) - Italy.

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