Submittal Review

Project Name: Transit Track 25-36 – Mechancal Upgrade – HRV Pretender

Project / File No.: 19-332-01

Shop Drawing ID:

Description: Heat Recovery Ventilators – HRU-9 to HRU-11

Consultant's Stamp

☐ **Reviewed**
☐ **Not Reviewed**
☒ **Reviewed as Modified**
☐ **Revise and Resubmit**

This review by SMS Engineering Ltd. is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that SMS Engineering Ltd. approves the detail design inherent in the shop drawings, responsibility for which shall remain with the contractor submitting same, and such review shall not relieve the contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the contract documents. The contractor is responsible for dimensions to be confirmed and correlated at the job site for information that pertains solely to fabrication processes or to techniques for construction and installation and for co-ordination of the work of all subtrades.

Signed by: Jeff Horrocks (mech) and Valor Kane (elec) Date: February 3, 2020

Comments

Mechanical – Revise coil handing to opposite side for HRV -9 and 11.

Electrical – none

Structural – refer to attached comments from CKP.

Midwest engineering

Submittal Drawings

Project: Winnipeg Transit Storage Track 25-36
Job No: 24112

Date: Jan 20/20
Sold To: City of Winnipeg - Winnipeg Transit
Consulting Engineer: SMS Engineering
Midwest Engineering Contact: Dale Ziemanski

Equipment:

Tag	Section	Description
HRU-9	23 80 10	TempEff Heat Recovery Ventilators
HRU-10	23 80 10	TempEff Heat Recovery Ventilators
HRU-11	23 80 10	TempEff Heat Recovery Ventilators

Comments: _____

☐ Revision 1 ☐ Approved

☐ Revision 2 ☐ Approved with revisions noted

☐ Revision 3 ☐ Resubmit

JOB STATUS:

☑ HELD FOR APPROVAL

Equipment will not be scheduled until approved drawings are returned to Midwest Engineering.

If immediate release is required, notify Midwest Engineering in writing.

☐ RELEASED TO PRODUCTION

Scheduled for shipment from factory: _____

1369 Erin St. Winnipeg, Manitoba R3E 2S7 Phone: 204-989-3636 Fax: 204-633-0496

Submittal Drawings

Project: Transit Garage fort Rouge

Tag: HRU-9

PO#: 24121-03

Date: January 14, 2020

Agent: Midwest Engineering

Revision #	Revision Detail	Date Revised	Revised by
1	Added support and filter information	Jan 20, 2020	CR

JOB STATUS

■ HELD FOR APPROVAL

Equipment will not be scheduled until approved drawings are returned to Tempeff North America

Current lead times from release is 12-14 weeks

If immediate release is required, notify Tempeff in writing

☐ RELEASED TO PRODUCTION

Scheduled shipment from factory: _____

UNITS ARE SHIPPED SPLIT, WIRING RECONNECTION ON SITE REQUIRED – SEE PROPOSAL DRAWING FOR SPLIT LOCATIONS

675 Washington Ave. Winnipeg, MB R2K 1M4 Phone: (204) 783-1902

675 Washington Ave, WINNIPEG, MB CANADA R2K 1M4 PH: (204) 783-1902

Project	Transit Garage Fort Rouge
Tag(s)	HRU-9
Agent	Midwest Engineering
Job Number	

Line In		
Voltage	575-3-60	
FLA	58.6	AMPS
AMPACITY	66	AMPS
MAX.NON-TIME DELAY FUSE	110	AMP
MAX.TIME DELAY FUSE	110	AMP
MAX.CIRCUIT BREAKER	100	AMP
MIN.WIRE SIZE	#4	AWG

Model

RG 33000 Welded Damper

Approximate Weight	9130 KG	20177 LBS	**Outdoor**	Configuration	Type 1

Fans

Supply air fan: ANPA 36 X1

Exhaust air fan: ANPA 36 X1

Technical data

Input data	Sup. air	Exh. air
Total volume (SCFM)	27692	27692
HX Air volume (SCFM)	27692	27692
Filter	Merv 10 (2")	None
	-	-
External pressure drop (in. W.C)	1.50	1.00

Output data		
Filter air velocity (fpm)	498	0
Design pressure drop filter (in W.C)	0.73	0.00
HX air velocity (fpm)	495	495
Pressure drop heat exch. (in W.C)	0.76	0.76
Auxillary Pressure Drop drop (in W.C)	0.38	0.00
Backdraft dampers	0.00	0.00
Static pressure (in W.C)	3.37	1.76

Fan speed (rpm)	1163	1053
Max (rpm)	1600	1600
Fan efficiency (%)	73.95	66.73
Required BHP	23.89	16.57
Actual Required bhp	24.14	18.49

Motor efficiency (%)	93	93
Motor power rating (hp)	30.00	25.00
Motor RPM	1175	1175
Motor Operating Frequency (Hz)	59	54

Power and energy demand

Input data	Calculated Winter DB	Summer DB	Summer WB
Design outdoor temp. (°F)	-30.00	90.0	
Desired supply air temp. winter (°F)	70		
Exhaust air temperature (°F)	70.0	75.0	
Output data			
Efficiency (across unit) (%)	86.5	75.0	
Supply air temp. after unit (°F)	56.48	78.7	
Recovered energy across unit (BTUH)	2,586,445	-336,624.7	

Standard Features

2" Foam injected panels
Extruded aluminum post and corner construction
All sections come with hinged access doors and locking latches
Multi-Damper switchover section complete with actuators
SS Drain Pans under Heat Exchanger(s) w/ 1"NPTConnections
Galvanized Heat Exchanger Frames
Galvanized damper blades, damper rods and axles
18Ga Roof & Gutters
4" Ventex Louvers
SLEEPER/STAND MOUNT (BY OTHERS)

Additional Features

Exterior Casing: 24 Ga G90 Galv
Interior Casing: 24 Ga G90 Galv
30 HP WEG TEFC Premium Eff. 6 Pole 326T Frame
25 HP WEG TEFC Premium Eff. 6 Pole 324T Frame
SA Drive: ACH550-UH-032A-6
RA Drive: ACH550-UH-027A-6
1in. Seismic Spring Isolation
SA Pre-Filter: Dafco Merv 10 (2") 400 HC
Hot Water Coil
Single point power
Quick connect
Low Limit
Freight Insurance

CROSIER KILGOUR & PARTNERS LTD.

REVIEWED [X] NOT REVIEWED [ ]

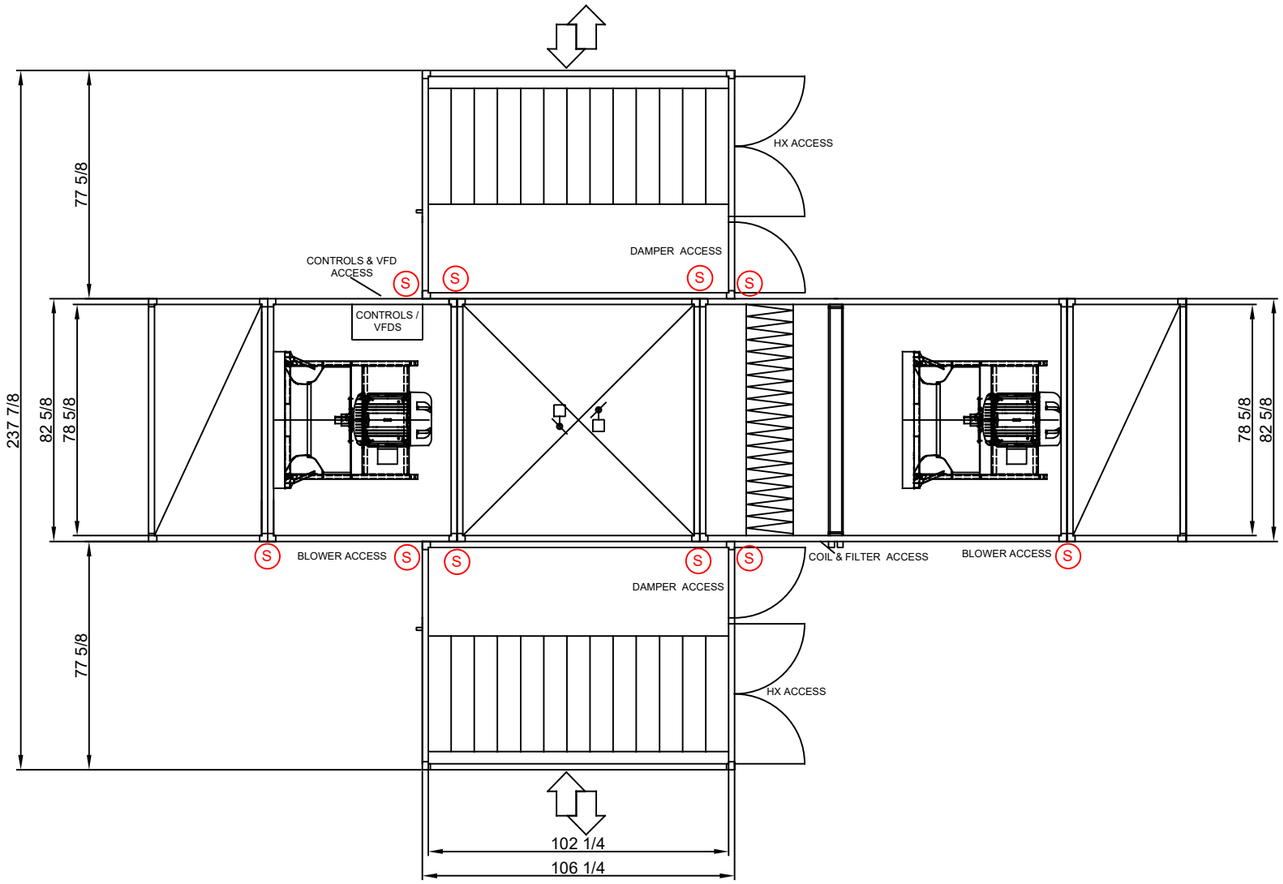
REVISE AND RE-SUBMIT [ ] REJECTED [ ]

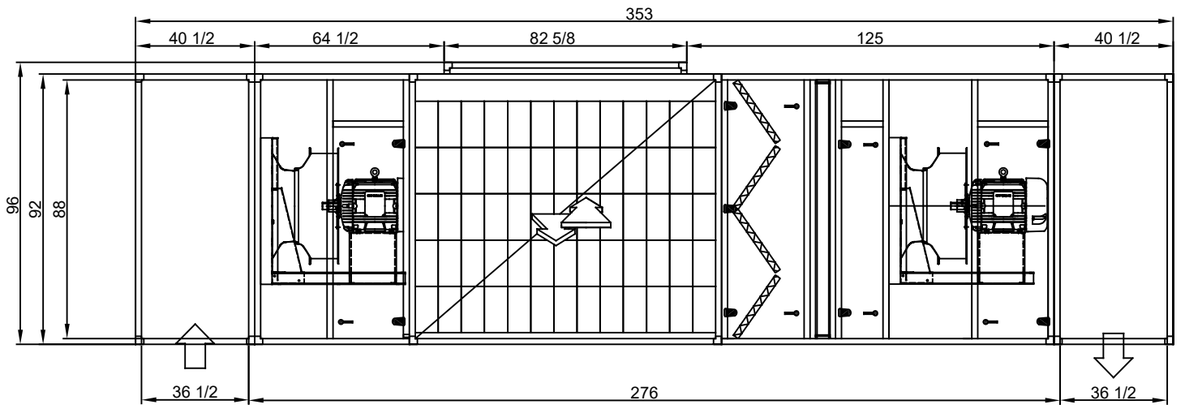
REVIEWED AS MODIFIED [ ] DATE: 2020/01/31

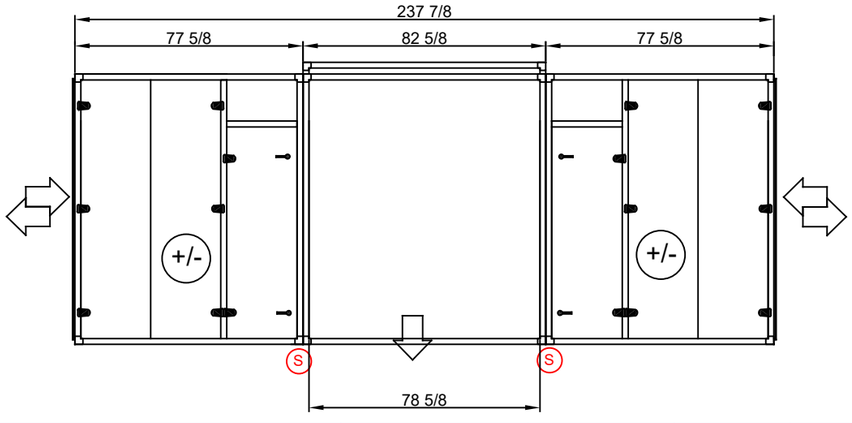
BY: jal

This review is for the sole purpose of ascertaining general conformance with the design concept of the project and general compliance with the information given in the contract documents. This review does not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to means, methods and/or techniques of construction and installation, for coordination of the work of all other trades, and for performing all work in a safe and satisfactory manner.

- Review applies to operating weight and structural support locations only. Please review structural support location drawing and confirm requirements.







Filters:
16- 20 x 25

Cells:
2- 65 x 200mm x 400mm

Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

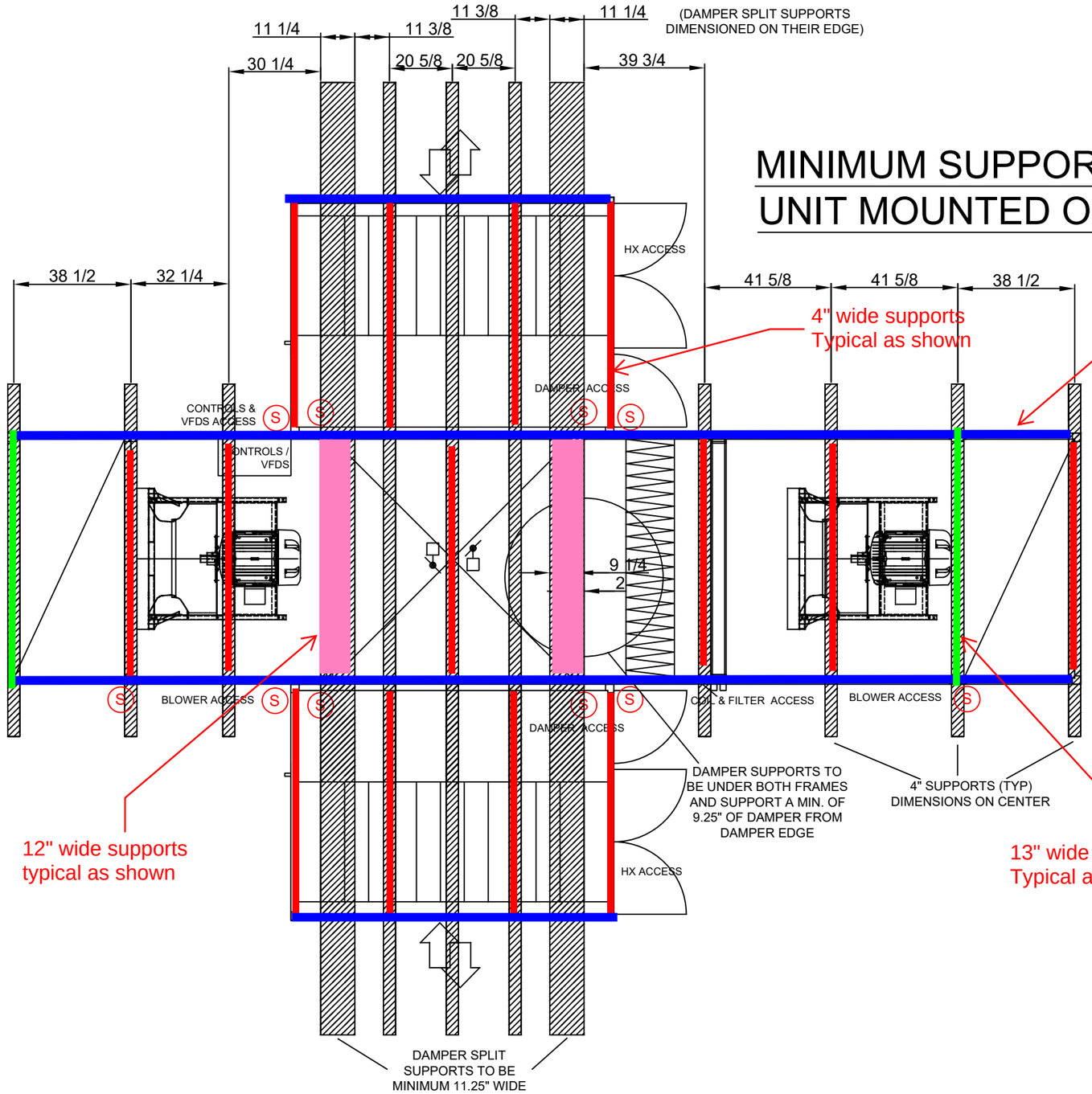
TEMPEFF
NORTH AMERICA
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

DRAWN BY	DATE	SCALE	MODEL	REV
JL	03-Feb-18	NTS	RG 33000	A

PROJECT NAME: Standard Drawing

Unit Tag

MINIMUM SUPPORT REQUIREMENTS FOR UNIT MOUNTED ON STRUCTURAL FRAME



CROSIER KILGOUR & PARTNERS LTD.

REVIEWED	☐	NOT REVIEWED	☐
REVIEWED AS MODIFIED	☒	REJECTED	☐
REVISE AND RE-SUBMIT	☐	DATE:	2020/01/31

BY: jal

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- Please confirm marked up bearing locations and widths will suit the equipment requirements.

Filters:
16- 20 x 25

Cells:
2- 65 x 200mm x 400mm

Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
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TEMPEFF NORTH AMERICA
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

DRAWN BY	DATE	SCALE	MODEL	REV
JL	03-Feb-18	NTS	RG 33000	A

PROJECT NAME: Standard Drawing

Unit Tag

HOT WATER COIL REPORT

5055 Taylor Kidd Blvd
Millhaven, Ontario
Canada,
K0H 1G0
T:(613) 544-2200
F:(613) 544-7779
E-Mail: info@directcoil.com
Website: directcoil.com

Company:
Contact:
Tel:
Fax or Email:

Date: December 10, 2019
Reference:
Prepared By:
Project Name:

Coil Tag:
Coil Model Number: 5W-02-81.0-07-72.0-13
Item: 001, Coil Hand: Right

Physical Data

Number Of Coils	One (1)	Tube Diameter	5/8 1.50 x 1.299
Fin Height (Per Coil)	81.000"	Tube Turbulators	No
Fin Length (Per Coil)	72.000"	Tube Material	Copper - 0.020 Plain
Number Of Rows Deep	Two (2)	Fin Material	Aluminum 0.010
Circuit Ratio	0.24	Fin Style	Corrugated
Fins Per Inch	Seven (7)	Connection Type	MPT Steel
Supply Connection Size	1 1/2"	Coil Weight (Per Coil)[operating]	308 [409] LBS
Return Connection Size	1 1/2"	Coil Internal Volume (Per Coil)	11.610 gal
Header Material	Copper (L)	Casing Style	Standard
		Casing Material	Galvanized Steel 16 gauge

Air Data

Total Airflow (All Coils)	27,692 SCFM
Airflow (Per Coil)	27,692 SCFM
Face Velocity	684 FPM
Altitude	0.00 FT
Entering Dry Bulb	56.48 °F
Leaving Dry Bulb	90.00 °F
Air Pressure Drop	0.38" WG
Fouling Factor	0.0000 ft² °F h/Btu

Fluid Data

Fluid Type	Ethylene Gly.
Glycol Ratio	55 %
Entering Fluid Temp	170.00 °F
Leaving Fluid Temp	130.00 °F
Fluid Flow Per Coil (Total)	58.62 GPM (58.62)
Tube Velocity	5.03 FPS
Fluid Pressure Drop	12.10' WG
Fouling Factor	0.0000 ft² °F h/Btu

Capacity

Capacity Per Coil (Total)	1,013.36 MBH (1,013.36)

Notes:

1. Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org

AHRI CERTIFIED®
www.ahridirectory.org
Air-Cooling and Air-Heating Coils
AHRI Standard 410

Software version: 0.99.8165

GENERAL DESCRIPTION OF FUNCTION

A Dual Core™ air handling unit comes with a regenerative cyclic dual core heat exchanger. It includes a supply and an exhaust fan (both optional) and two cores filled with specially corrugated 0.7 mm thick aluminium plates which act as heat accumulators. In between the cores is a patented damper section which changes over every 60 seconds to periodically direct warm air through one of the two cores while outside air gains heat from the other. Before each fan is a filter section (optional) to filter the air. Heat recovery is automatically activated when called upon.

The unit may also be used for cooling recovery. If the outside temperature is higher than the indoor the damper cycling starts, enabling cooling recovery. This function reduces the demand for mechanical cooling.

In the off position, the dampers all close against outdoor air thereby reducing infiltration losses through the unit.

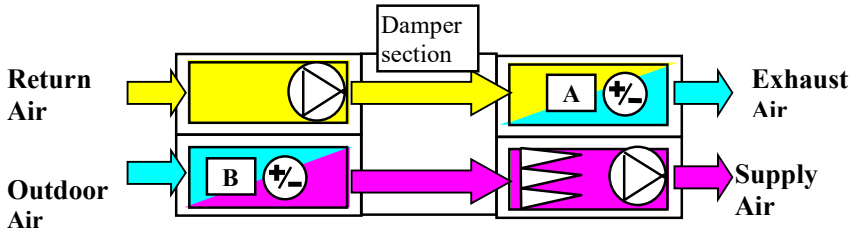
The extremely high temperature efficiency (90% +/- 5%) gives a supply air temperature just a few degrees below room temperature which in many cases allow systems to be designed without additional heating coils.

The inspection doors to fan and damper sections have lockable handles, which contributes to high security.

Principle of function

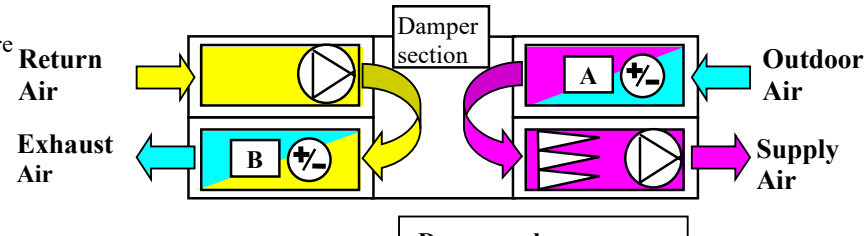
SEQUENCE 1
Exhaust air charges Core A with heat

Core B discharges heat to supply air



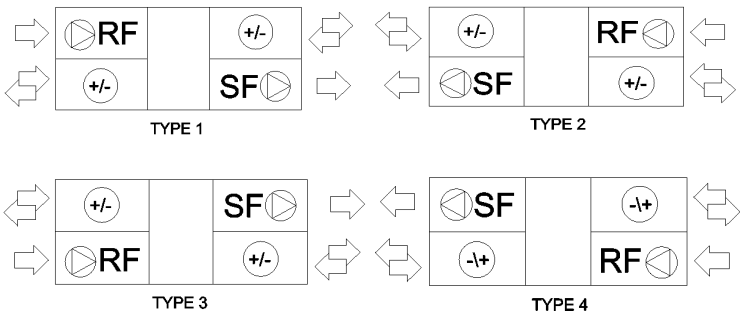
SEQUENCE 2
Exhaust air charges the Core B with heat

Core A discharges heat to supply air



Dampers change sequence every 60 sec.

Available configurations



Units are normally one of these configurations
Supply and exhaust air connection may also be on the backside

RG 33000-56000 Units

Sequence of Operation

A. Testing Damper Actuators:

1. The damper motors can be tested by using the changeover switch S1 and S2 in the damper control panel.
2. The normal position of the S1 and S2 switches are 0 where the actuators follow the signals from a central control system (BMS).
3. If S1 is in position 1 the damper actuator M1 runs continuously, and in position 2 actuator M2 runs continuously. If S2 is in position 1 the damper actuator M3 runs continuously, and in position 2 actuator M4 runs continuously.

B. Sequence with the unit controlled by central control system (BMS):

1. The damper is controlled by the central control system (BMS).
    a. Enable contact (see field wiring diagram) controls whether the damper and blower operate or not (contact closed = operating, open = not operating).
    b. Heat Recovery contact (see field wiring diagram) controls the damper operating mode (contact closed = heat recovery, open = free cooling).
2. When Enable contact is closed, the damper section starts and the PLC-Blower Interlocks are energized, enabling the enabling the VFDs to start the motors and run at a set constant speed.
3. Enable contact closed and Heat Recovery contact open = damper changes position every 3 hours (free cooling).
4. Enable contact closed and Heat Recovery contact closed = damper changes position every 60 seconds (field adjustable) (heat recovery).
5. Enable Contact open and Heat Recovery contact open = the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.

6. Should the system fall below an internal low limit set point for 5 min, the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
    a. 24Vdc low limit alarm to BMS signal will be enabled.
    b. The low limit requires the unit turned off and then back on (remove Enable signal and then re-enable or turn S2 switch to Manual Night and back).

C. Heating and cooling:
    1. Any type of supplemental heating or cooling of the supply air will be controlled by others (central control system).

D. Additional Notes:
    1. The unit has blade location micro switches to enable the PLC-Blower interlocks if the unit is operating normally.
    2. If fire alarm contacts are used, remove the factory installed jumper from terminals 101 & 150 and connect the Normally Closed fire alarm contact. If the contact opens during operation, the unit will shut down and dampers close.
    3. When the System Switch S3 is in the On position, the unit runs normally. When the System Switch S3 is in the Off position, the unit is disabled, but testing can still be performed.

Note: In all cases ensure that damper section is first on and last off, (after supply and exhaust blower section) to prevent damage to internal damper section.

ABB Variable Frequency Drive

ACH550-UH

Programming Single Speed

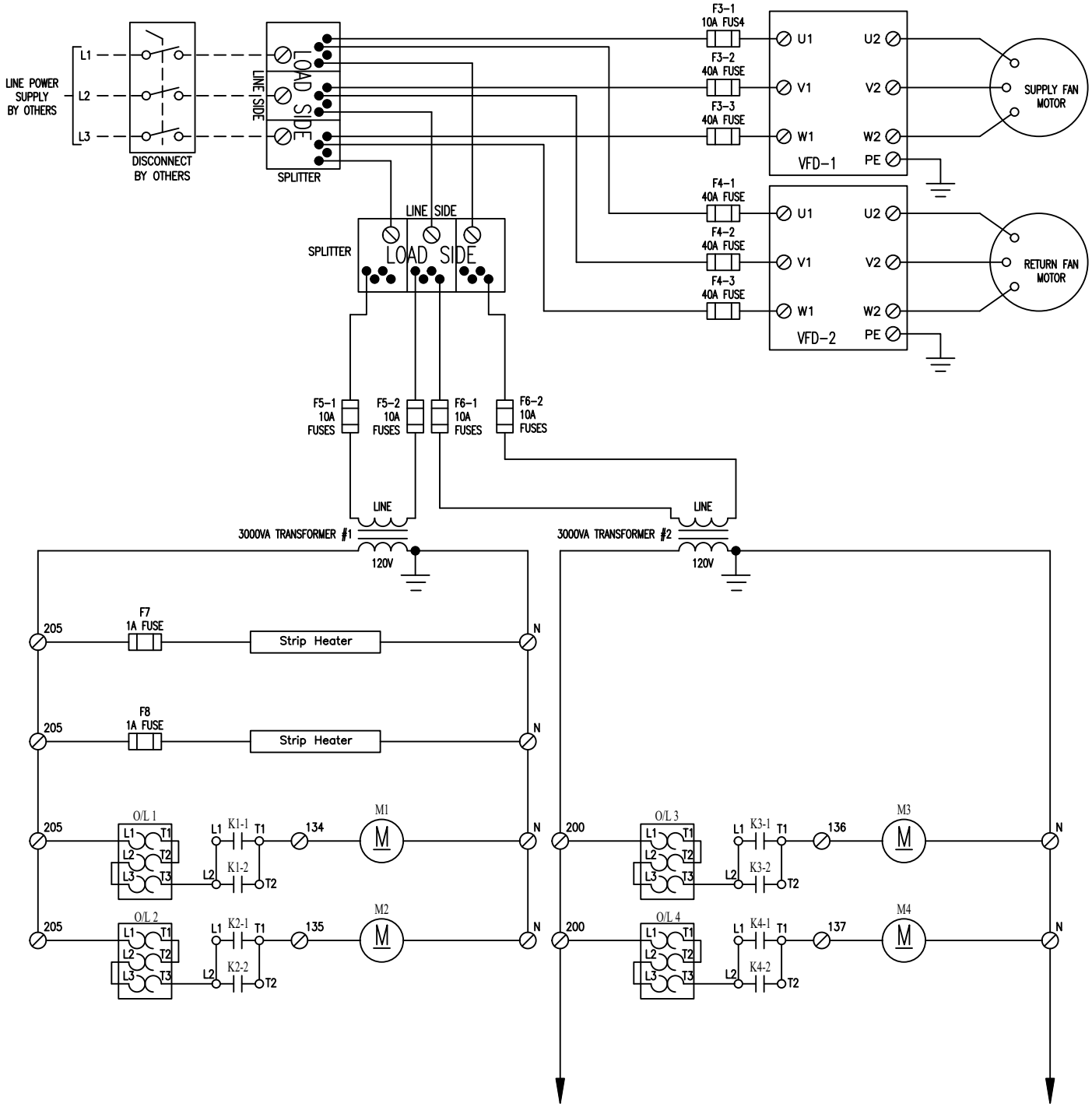
On initial start-up, or after resetting to factory parameters, follow the Start-Up Assistant to enter motor and supply information, use HVAC Default for Application Macro.

Enter Menu, then enter Parameters

P1001 –1	EXT1 Command (DI1 - Two-Wire Start/Stop) (default)
P1102 – 0	Ext 1/Ext 2 Sel (Ext1) (default)
P1201 – 3	Const Speed Sel (DI3) (default)
P1202 – 59.0	Const Speed 1 (DI3) (Hz) **–** Supply Air VFD
P1202 – 54.0	Const Speed 1 (DI3) (Hz) **–** Return Air VFD
P1608 – 0	Start Enable 1 (Not Sel)
P2007– 0.0	Minimum Frequency (Hz) (default)
P2008 – 70.0	Maximum Frequency (Hz)

P9902 – 1 Reset to factory parameters by selecting HVAC DEFAULT (after pressing SAVE press EXIT to return to the main screen, cut off main power and wait until LCD display turns off, re-apply main power).

!! Maximum Reference (Hz) = (maximum fan RPM / maximum motor RPM) * 60Hz **!!**



⊘	TERMINAL BLOCK
○	COMPONENT TERMINAL
◯	REMOTE PANEL TERMINAL
⊠	PLC CONTROLLER TERMINAL
———	UNIT WIRING
═══	REMOTE PANEL WIRING
– – –	FIELD WIRING

LEGEND

F1 – 8	– Fuse	R1 – 6	– Relay
MIB1 – 12	– Limit Switch	K1 – 4	– Motor Starter
S1 & 2	– 3 Pos Switch	M1 – 4	– Damper Actuator
S3	– 2 Pos Switch		

CONTINUED ON DRAWING
INTERNAL WIRING – 2

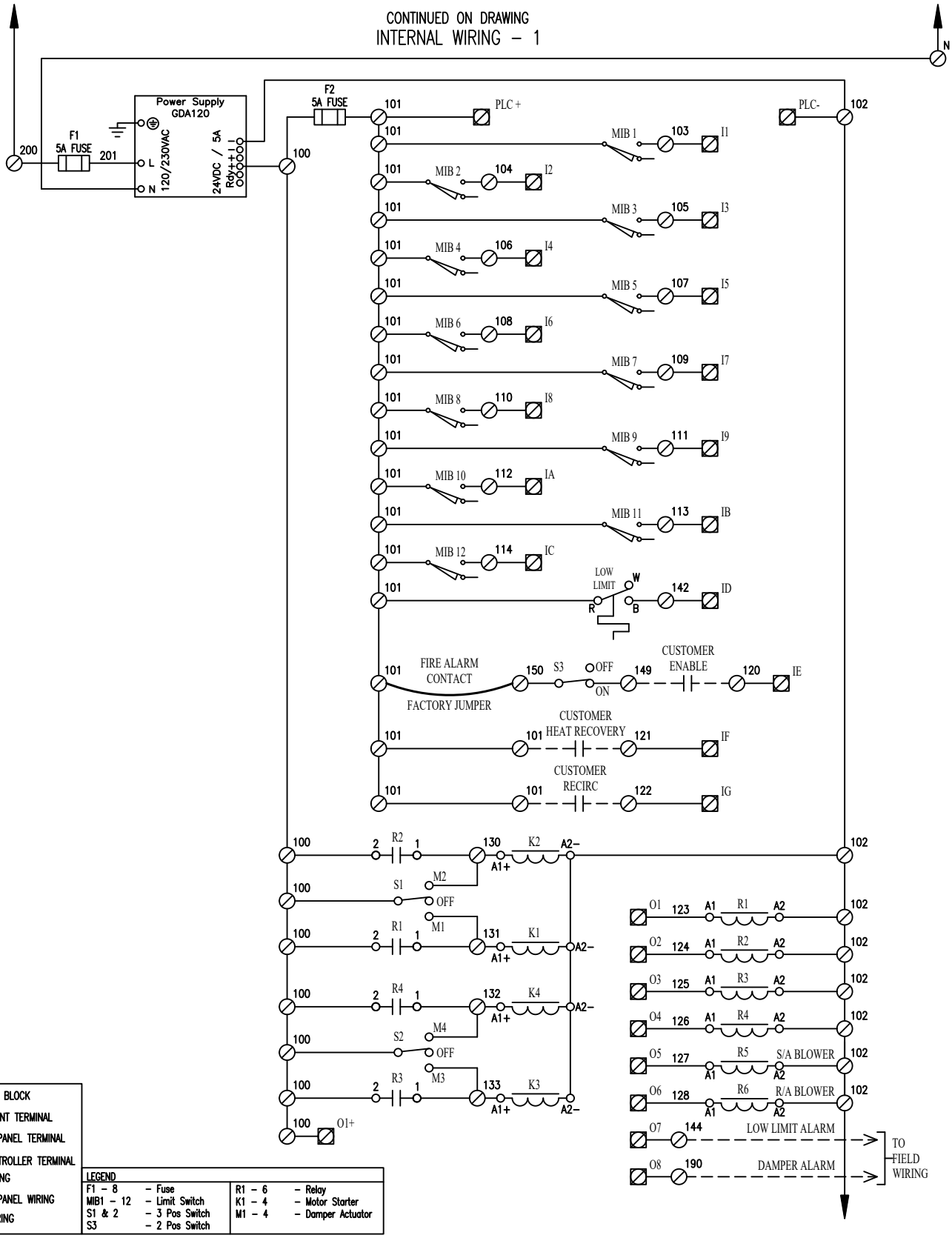
Drawing subject to change without notice

TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Control Wiring (VERTICAL)
SPP, VFD, Neri Motors & O/L.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	INT NERI WIRING 1
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–



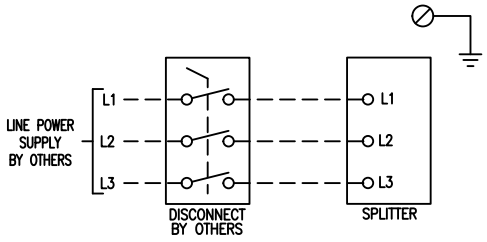
Drawing subject to change without notice

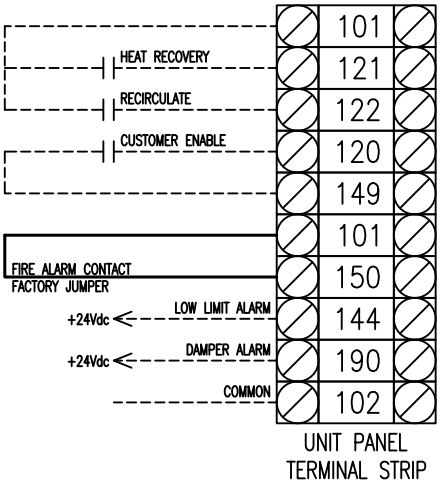
TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Control Wiring (VERTICAL)
SPP, VFD, Low Limit.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	INT NERI WIRING 2
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–





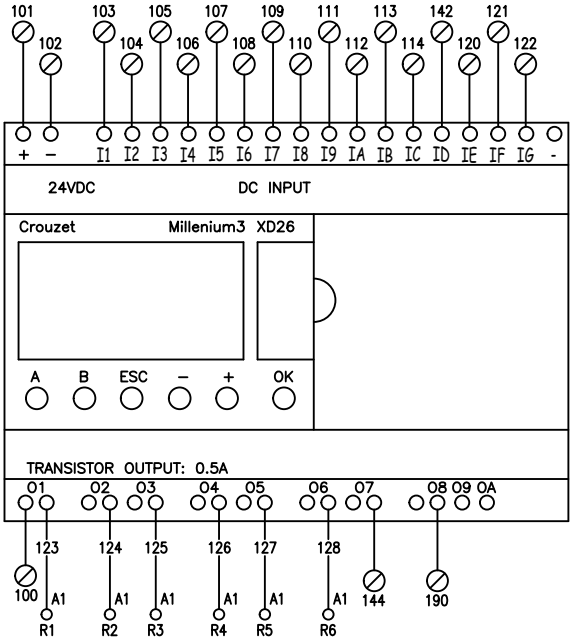
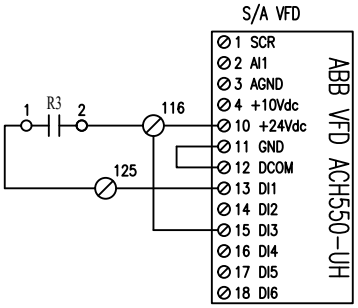
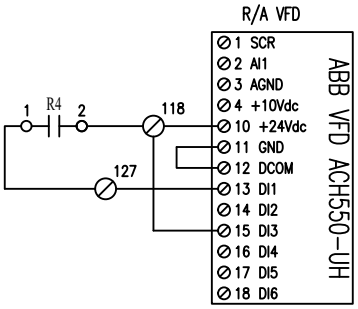


ABB SPEED CONTROL IS DONE IN THE VFD USING PARAMETER 1202 (LOW SPEED).





NOTE(S):

A – IF ANY OF THE ORIGINAL WIRE SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 90°C AND AN 600Vac INSULATION RATING.

B – FIELD WIRING MUST HAVE A TEMPERATURE RATING OF 90°C 600Vac WIRE INSULATION RATING. A MINIMUM WIRE SIZE OF 14AWG MUST BE USED. A MAXIMUM WIRE LENGTH OF 50ft.

C – FIELD WIRING VOLTAGE DROP NOT TO EXCEED 10%.

D – ALL FIELD WIRING SHOWN SHALL BE COMPLETED BY INSTALLER.

E – ALL WIRING TO COMPLY WITH THE NATIONAL ELECTRICAL CODE (NFPA 70-93)

F – IF FIRE ALARM CONTACTS ARE USED, REMOVE THE FACTORY INSTALLED JUMPER FROM TERMINALS 101 & 150. CONNECT THE N.C. FIRE ALARM CONTACTS. IF FIRE ALARM CONTACT OPENS, UNIT SHUTS DOWN. !! FOR OTHER OPERATION OPTIONS, CONTACT FACTORY !!

Drawing subject to change without notice

TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Wiring Field (VERTICAL)
SPP, VFD, Low Limit.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	NERI FIELD WIRING
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–

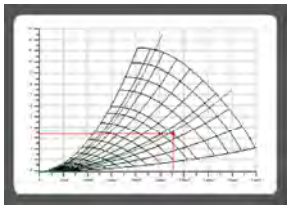
comefri
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	27692 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	3.37 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA36 -**	n Max 1/min	Pw Max BHP	J lb ft²
	1600		353.58



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	4.15	3.37	0.78	10792	1163	75.63	61.45	23.89			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

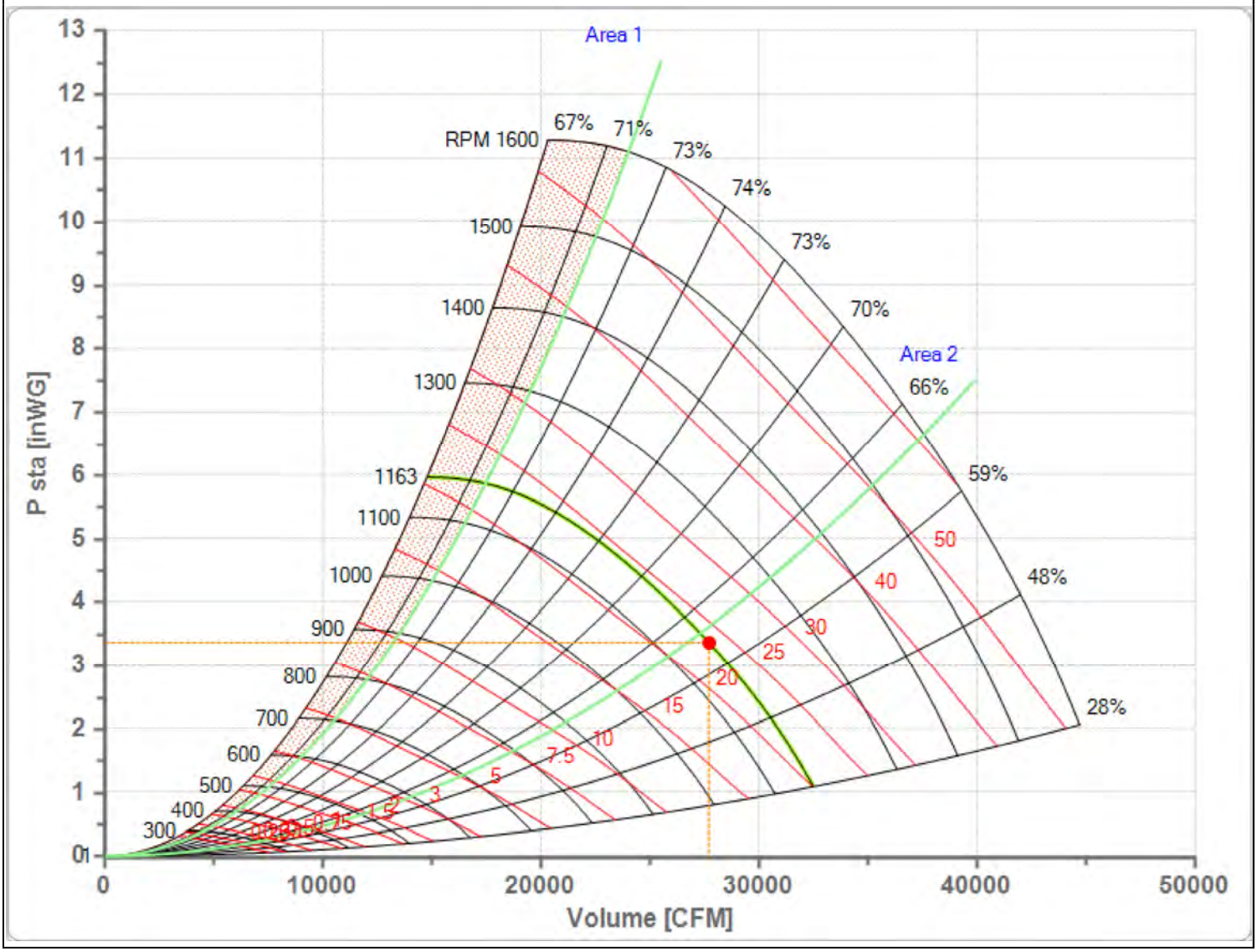
fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	92 / 65	93 / 77	91 / 82	84 / 80	84 / 84	79 / 80	73 / 74	68 / 67	**97 / 89**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	91 / 65	94 / 78	97 / 88	86 / 83	83 / 83	78 / 79	76 / 77	73 / 71	**100 / 91**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	95 / 69	92 / 76	97 / 88	96 / 93	90 / 90	84 / 85	80 / 81	77 / 76	**102 / 96**

Chart

comefri
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Selected Fan	ANPA36 -	Fan working conditions	Free Inlet - Free Outlet
n Max	1600 1/min	Volume	27692 CFM
Pw Max		Total Pressure	4.15 In.W.G.
P fan	23.89 BHP	Static Pressure	3.37 In.W.G.
J	353.58 lb ft²	eta Tot	75.63 %
Required working point	•	eta Sta	61.45 %
Effective working point	•	RPM	1163 1/min
		Temperature	68.0 °F
		Altitude	0 ft



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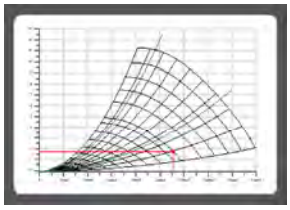
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	27692 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	1.76 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA36 -**	n Max 1/min	Pw Max BHP	J lb ft²
	1600		353.58



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	2.54	1.76	0.78	9771	1053	66.73	46.28	16.57			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

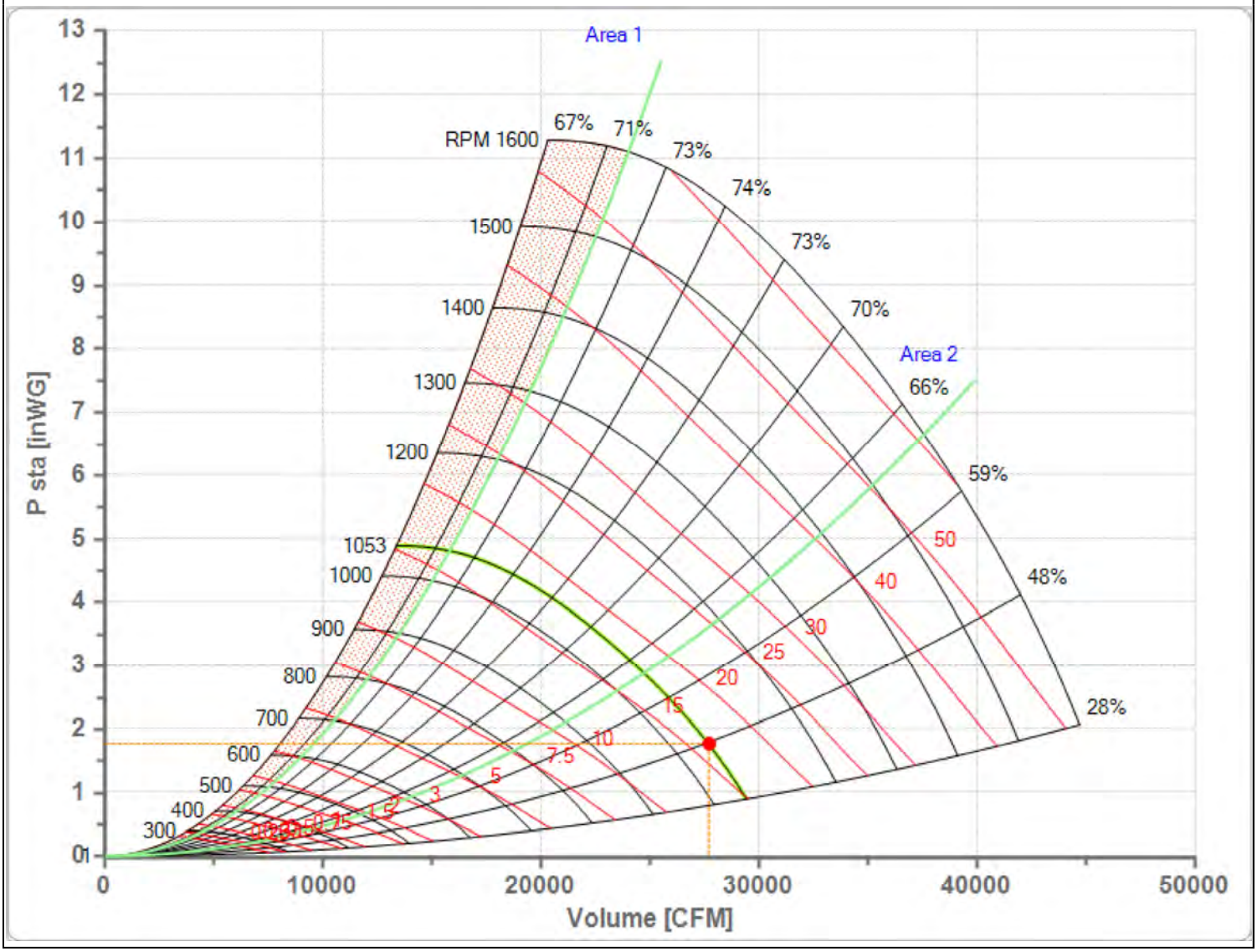
fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	92 / 66	96 / 80	89 / 81	84 / 81	84 / 84	78 / 79	73 / 74	67 / 66	**99 / 88**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	90 / 63	97 / 81	93 / 84	84 / 81	82 / 82	78 / 79	74 / 75	70 / 69	**99 / 89**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	96 / 70	98 / 82	95 / 86	95 / 92	89 / 89	83 / 84	82 / 83	76 / 75	**103 / 95**

Chart

comefri
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Selected Fan	ANPA36 -	Fan working conditions	Free Inlet - Free Outlet
n Max	1600 1/min	Volume	27692 CFM
Pw Max		Total Pressure	2.54 In.W.G.
P fan	16.57 BHP	Static Pressure	1.76 In.W.G.
J	353.58 lb ft²	eta Tot	66.73 %
Required working point	•	eta Sta	46.28 %
Effective working point	•	RPM	1053 1/min
		Temperature	68.0 °F
		Altitude	0 ft



Dafco Filtration Group®

PRODUCT OVERVIEW

- Standard Capacity (MERV 8) & High Capacity (MERV 10)
- Available in 1", 2" & 4"depths
- Ideal for use in
  - Prefilter for high efficiency filters
  - Office and Retail
  - Manufacturing and Distribution
  - Government and Education facilities
  - Doctor offices, assisted living facilities and Hospitals
  - Hotels and Airports
  - Single and Multi-Family Housing

100% Recycled Paperboard®
MINIMUM 35% POST CONSUMER CONTENT

CANADA GREEN BUILDING COUNCIL • CONSEIL DU BÂTIMENT DURABLE DU CANADA •

AEROSTAR® SERIES 400 PLEAT

WHY THE SERIES 400?

- 100% synthetic pleated media achieves exceptionally high levels of efficiency
  - Does not rely on electrostatic charge
  - Low resistance to air flow means minimal energy costs
  - Moisture resistant and will not promote microbial growth
  - Excellent pre-filter for higher efficiency air filters
  - Effectively removes airborne irritants
  - Protects cooling coils & ductwork of HVAC system
- Durable construction optimizes performance
  - Media laminated to metal grid
  - Minimized media fluttering
  - Design helps maintain pleat uniformity
  - Frame constructed of high wet strength beverage board
  - Will not warp, crack or distort under normal operating conditions

Phone: +1 888.628.3458 • www.dafcofiltrationgroup.com • inquirycanada@filtrationgroup.com

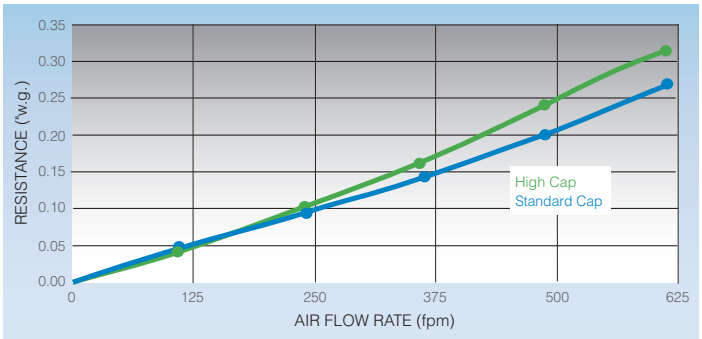
AEROSTAR® SERIES 400 PLEAT

PERFORMANCE DATA (24 x 24)

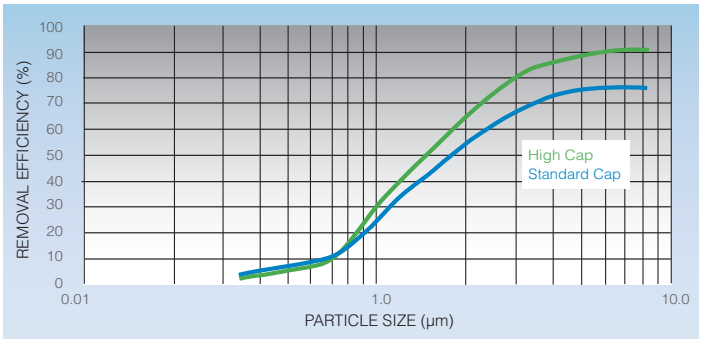
CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
Standard MERV 8	1"	0.14	0.21	–	–	1.0
	2"	–	0.14	0.20	0.27	1.0
	4"	–	0.09	0.14	0.21	1.0

CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
High MERV 10	1"	0.20	0.28	–	–	1.0
	2"	–	0.16	0.24	0.32	1.0
	4"	–	0.08	0.17	0.26	1.0

INITIAL RESISTANCE (24 x 24 x 2)



MINIMUM REMOVAL EFFICIENCY (24 x 24 x 2)



PRODUCT DATA

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 300 fpm	375 fpm
10403	10476	8 x 16 x 1	7 ¾ x 15 ¾ x ¾	250	325
10404	10477	10 x 10 x 1	9 ½ x 9 ½ x ¾	200	250
10364	10436	10 x 20 x 1	9 ½ x 19 ½ x ¾	400	525
10405	10478	10 x 24 x 1	9 ⅜ x 23 ⅜ x ¾	500	625
10406	10479	10 x 25 x 1	9 ¾ x 24 ¾ x ¾	525	650
10365	10437	12 x 12 x 1	11 ¾ x 11 ¾ x ¾	300	375
10407	10480	12 x 16 x 1	11 ½ x 15 ½ x ¾	400	500
10366	10438	12 x 20 x 1	11 ½ x 19 ½ x ¾	500	625
10367	10439	12 x 24 x 1	11 ½ x 23 ½ x ¾	600	750
10368	10440	12 x 25 x 1	11 ½ x 24 ½ x ¾	625	775
10369	10441	14 x 20 x 1	13 ½ x 19 ½ x ¾	575	725
10408	10481	14 x 24 x 1	13 ½ x 23 ½ x ¾	700	875
10370	10442	14 x 25 x 1	13 ½ x 24 ½ x ¾	725	900
10371	10443	15 x 20 x 1	14 ½ x 19 ½ x ¾	625	775
10409	10482	15 x 25 x 1	14 ½ x 24 ½ x ¾	800	975
10410	10483	16 x 16 x 1	15 ¾ x 15 ¾ x ¾	525	650
10372	10444	16 x 20 x 1	15 ½ x 19 ½ x ¾	650	825
10411	10484	16 x 24 x 1	15 ½ x 23 ½ x ¾	800	1000
10373	10445	16 x 25 x 1	15 ½ x 24 ½ x ¾	825	1050
10412	10485	18 x 18 x 1	17 ¾ x 17 ¾ x ¾	675	850
10413	10486	18 x 20 x 1	17 ½ x 19 ½ x ¾	750	925
10414	10487	18 x 22 x 1	17 ½ x 21 ½ x ¾	825	1025
10415	10488	18 x 24 x 1	17 ½ x 23 ½ x ¾	900	1125
10374	10446	18 x 25 x 1	17 ½ x 24 ½ x ¾	925	1175
10375	10447	20 x 20 x 1	19 ½ x 19 ½ x ¾	825	1050
10416	10489	20 x 24 x 1	19 ½ x 23 ½ x ¾	1000	1250
10376	10448	20 x 25 x 1	19 ½ x 24 ½ x ¾	1050	1300
10417	10490	22 x 22 x 1	21 ¾ x 21 ¾ x ¾	1000	1250
10377	10449	24 x 24 x 1	23 ½ x 23 ½ x ¾	1200	1500
10378	10450	25 x 25 x 1	24 ½ x 24 ½ x ¾	1300	1625

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 375 fpm	500 fpm
10418	10491	10 x 10 x 2	9 ¾ x 9 ¾ x 1 ¾	250	350
10379	10451	10 x 20 x 2	9 ½ x 19 ½ x 1 ¾	525	700
10419	10492	12 x 20 x 2	11 ½ x 19 ½ x 1 ¾	625	825
10380	10452	12 x 24 x 2	11 ⅜ x 23 ⅜ x 1 ¾	750	1000
10381	10453	14 x 20 x 2	13 ½ x 19 ½ x 1 ¾	725	975
10382	10454	14 x 25 x 2	13 ½ x 24 ½ x 1 ¾	900	1200
10383	10455	15 x 20 x 2	14 ½ x 19 ½ x 1 ¾	775	1025
10420	10493	16 x 16 x 2	15 ½ x 15 ½ x 1 ¾	650	875
10384	10456	16 x 20 x 2	15 ½ x 19 ½ x 1 ¾	825	1100
10385	10457	16 x 24 x 2	15 ⅜ x 23 ⅜ x 1 ¾	1000	1325
10386	10458	16 x 25 x 2	15 ½ x 24 ½ x 1 ¾	1050	1400
10421	10494	18 x 22 x 2	17 ½ x 21 ½ x 1 ¾	1025	1375
10387	10459	18 x 24 x 2	17 ⅜ x 23 ⅜ x 1 ¾	1125	1500
10422	10495	18 x 25 x 2	17 ½ x 24 ½ x 1 ¾	1175	1550
10388	10460	20 x 20 x 2	19 ½ x 19 ½ x 1 ¾	1050	1400
10389	10461	20 x 24 x 2	19 ⅜ x 23 ⅜ x 1 ¾	1250	1650
10390	10462	20 x 25 x 2	19 ½ x 24 ½ x 1 ¾	1300	1750
10391	10463	24 x 24 x 2	23 ⅜ x 23 ⅜ x 1 ¾	1500	2000
10392	10464	25 x 25 x 2	24 ½ x 24 ½ x 1 ¾	1625	2150
				500 fpm	625 fpm
10393	10465	12 x 24 x 4	11 ⅜ x 23 ⅜ x 3 ¾	1000	1250
10394	10466	16 x 20 x 4	15 ½ x 19 ½ x 3 ¾	1100	1400
10395	10467	16 x 25 x 4	15 ½ x 24 ½ x 3 ¾	1400	1750
10396	10468	18 x 24 x 4	17 ⅜ x 23 ⅜ x 3 ¾	1500	1875
10397	10469	20 x 20 x 4	19 ½ x 19 ½ x 3 ¾	1400	1750
10398	10470	20 x 24 x 4	19 ⅜ x 23 ⅜ x 3 ¾	1650	2100
10399	10471	20 x 25 x 4	19 ½ x 24 ½ x 3 ¾	1750	2200
10400	10472	24 x 24 x 4	23 ⅜ x 23 ⅜ x 3 ¾	2000	2500
10401	10473	25 x 29 x 4	24 ⅜ x 28 ⅜ x 3 ¾	2525	3150
10402	10474	28 x 30 x 4	27 ⅜ x 29 ⅜ x 3 ¾	2900	3650

* Contact Customer Care for additional sizes and information.

ENGINEERING SPECIFICATIONS

1.0 General

1.1 Filters shall be Aerostar® Series 400 extended surface pleated air filters as manufactured Dafco by Filtration Group.
1.2 Filters shall be available in standard and high capacity configurations and available in nominal depths of 1", 2", and 4".
1.3 Underwriters Laboratories classified to UL 900 and ULC-S111-07.

2.0 Filter Materials of Construction

2.1 Media shall be 100% synthetic, mechanical media that does not support microbial growth.
2.2 Filters shall have a high wet strength beverage board with a cross member design that increases filter rigidity and prevents breaching. Frame shall be recyclable.
2.3 Filters shall have an expanded metal support grid bonded to the air-exiting side of the filter to maintain pleat uniformity and prevent fluttering. Metal support grid shall be recyclable and contain a significant amount of post-consumer and pre-consumer content.

3.0 Filter Performance

3.1 Filters shall be MERV 10/10A in a high capacity configuration and MERV 8/8A in a standard capacity configuration when tested in accordance with ASHRAE 52.2 Test Standard.
3.2 For initial resistance of filters, see Performance Data chart above.
3.3 Filters shall be rated to withstand a continuous operating temperature up to 200˚F.
3.4 Filters shall have a recommended final resistance of 1.0" w.g.

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Dafco Filtration Group®

Submittal Drawings

Project: Transit Garage fort Rouge

Tag: HRU-10

PO#: 24121-03

Date: January 14, 2020

Agent: Midwest Engineering

Revision #	Revision Detail	Date Revised	Revised by
1	Added support and filter information	Jan 20, 2020	CR

JOB STATUS

■ HELD FOR APPROVAL

Equipment will not be scheduled until approved drawings are returned to Tempeff North America

Current lead times from release is 12-14 weeks

If immediate release is required, notify Tempeff in writing

☐ RELEASED TO PRODUCTION

Scheduled shipment from factory: _____

UNITS ARE SHIPPED SPLIT, WIRING RECONNECTION ON SITE REQUIRED – SEE PROPOSAL DRAWING FOR SPLIT LOCATIONS

675 Washington Ave. Winnipeg, MB R2K 1M4 Phone: (204) 783-1902

675 Washington Ave, WINNIPEG, MB CANADA R2K 1M4 PH: (204) 783-1902

Project	Transit Garage Fort Rouge
Tag(s)	HRU-10
Agent	Midwest Engineering
Job Number	

Line In		
Voltage	575-3-60	
FLA	9	AMPS
AMPACITY	11	AMPS
MAX.NON-TIME DELAY FUSE	20	AMP
MAX.TIME DELAY FUSE	15	AMP
MAX.CIRCUIT BREAKER	15	AMP
MIN.WIRE SIZE	#14	AWG

Model

RG 5500

Approximate Weight	3090 KG	6830 LBS	**Outdoor**	Configuration	Type 1

Fans

Supply air fan: ANPA 18 X1

Exhaust air fan: ANPA 18 X1

Technical data

Input data	Sup. air	Exh. air
Total volume (SCFM)	5152	5152
HX Air volume (SCFM)	5152	5152
Filter	Merv 10 (2")	None
	-	-
External pressure drop (in. W.C)	1.50	1.00

Output data		
Filter air velocity (fpm)	357	0
Design pressure drop filter (in W.C)	0.45	0.00
HX air velocity (fpm)	328	328
Pressure drop heat exch. (in W.C)	0.41	0.41
Auxillary Pressure Drop drop (in W.C)	0.11	0.00
Backdraft dampers	0.00	0.00
Static pressure (in W.C)	2.47	1.41

Fan speed (rpm)	1848	1622
Max (rpm)	3300	3300
Fan efficiency (%)	74.12	66.35
Required BHP	3.46	2.24
Actual Required bhp		2.43

Motor efficiency (%)	89.5	89.5
Motor power rating (hp)	5.00	3.00
Motor RPM	1755	1760
Motor Operating Frequency (Hz)	63	55

Power and energy demand

Input data	Calculated
	Winter DB
Design outdoor temp. (°F)	-30.00
Desired supply air temp. winter (°F)	70
Exhaust air temperature (°F)	70.0
Output data	
Efficiency (across unit) (%)	90.5
Supply air temp. after unit (°F)	60.51
Recovered energy across unit (BTUH)	503,589

Summer DB	WB
90.0	
75.0	
79.7	
78.0	
-66,547.5	

CROSIER KILGOUR & PARTNERS LTD.

REVIEWED ☒ NOT REVIEWED ☐

REVIEWED AS MODIFIED ☐ REJECTED ☐

REVISE AND RE–SUBMIT ☐ DATE: 2020/01/31

BY: jal

This review is for the sole purpose of ascertaining general conformance with the design concept of the project and general compliance with the information given in the contract documents. This review does not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to means, methods and/or techniques of construction and installation, for coordination of the work of all other trades, and for performing all work in a safe and satisfactory manner.

- Review applies to operating weight and structural support locations only.

Standard Features

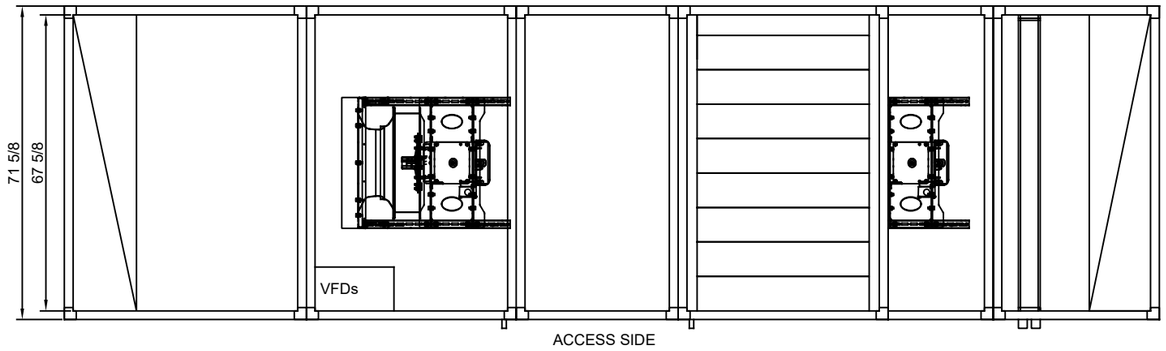
2" Foam injected panels
Extruded aluminum post and corner construction
All sections come with hinged access doors and locking latches
Multi-Damper switchover section complete with actuators
SS Drain Pans under Heat Exchanger(s) w/ 1"NPTConnections
Galvanized Heat Exchanger Frames
Galvanized damper blades, damper rods and axles
18Ga Roof & Gutters
4" Ventex Louvers
SLEEPER/STAND MOUNT (BY OTHERS)

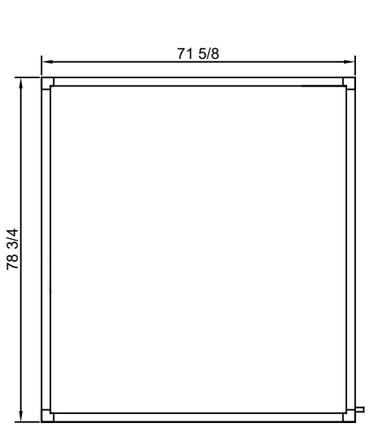
Additional Features

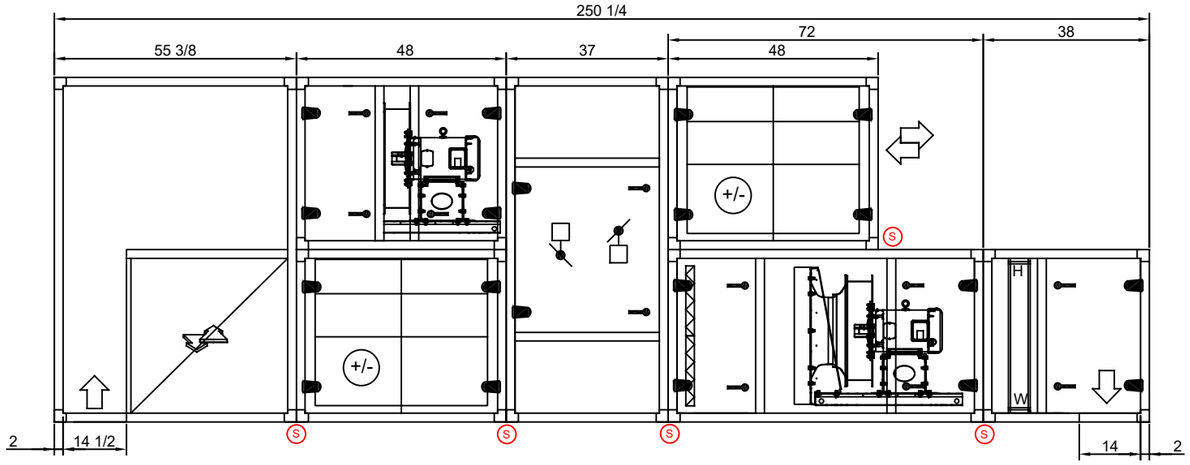
Exterior Casing: 24 Ga G90 Galv
Interior Casing: 24 Ga G90 Galv
5 HP WEG TEFC Premium Eff. 4 Pole 184T Frame
3 HP WEG TEFC Premium Eff. 4 Pole 182T Frame
SA Drive: ACS255-03U-06A5-6
RA Drive: ACS255-03U-04A1-6
1in. Seismic Spring Isolation
SA Pre-Filter: Dafco Merv 10 (2") 400 HC
Hot Water Coil
Single point power
Quick connect
Low Limit
Freight Insurance

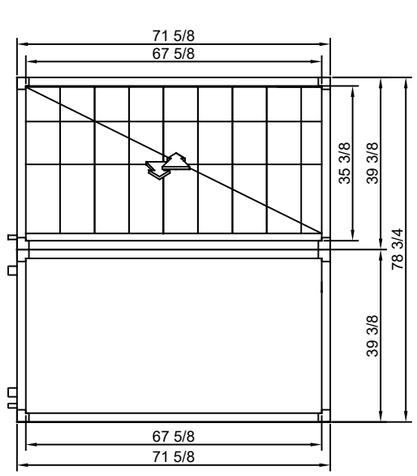
Filters:
4- 16 x 20
2- 16 x 25

Cells:
2- 8 x 200mm x 200mm
2- 8 x 200mm x 250mm
2- 8 x 200mm x 400mm
2- 1 x 115mm x 200mm
2- 1 x 115mm x 250mm
2- 1 x 115mm x 400mm









Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE
OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

TEMPEFF
NORTH AMERICA
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

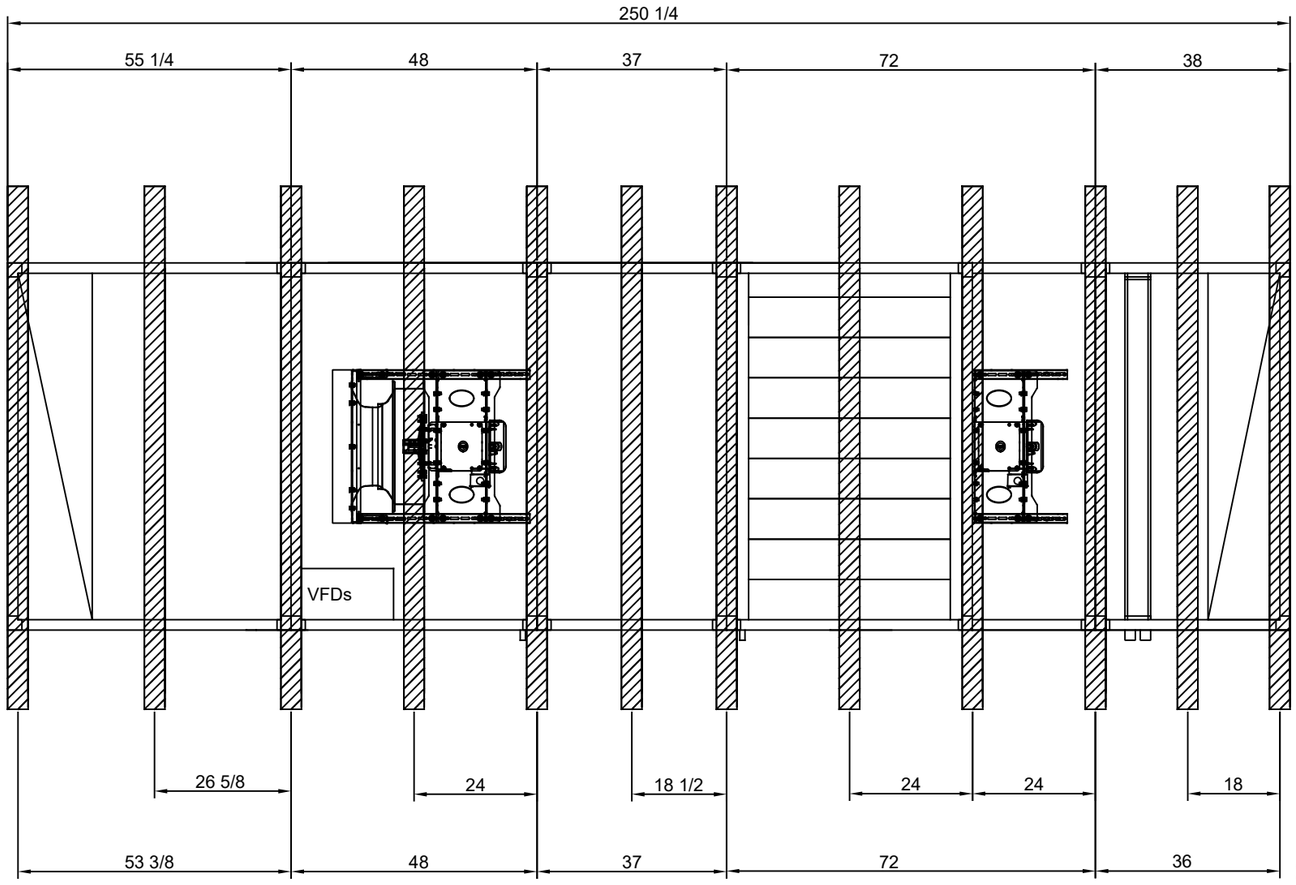
DRAWN BY	DATE	SCALE	MODEL	REV
JL	27-Aug-17	NTS	RG 5500 Type 1	A

PROJECT NAME
Standard Drawing

Unit Tag

MINIMUM SUPPORT REQUIREMENTS FOR UNIT MOUNTED ON STRUCTURAL FRAME

Structural layout is for guideline purposes only



4" SUPPORTS (TYP)
DIMENSIONS ON CENTER

NOTE: MAX WIDTH BETWEEN
SUPPORTS IS 32 INCHES

SECTION SPLIT
DIMENSIONS

STRUCTURAL
SUPPORT DIMENSIONS

CROSIER KILGOUR & PARTNERS LTD.

REVIEWED [X] NOT REVIEWED [ ]

REVIEWED AS MODIFIED [ ] REJECTED [ ]

REVISE AND RE-SUBMIT [ ] DATE: 2020/01/31

BY: jal

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Ⓢ SPLIT FOR SHIPMENT

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FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

TEMPEFF
NORTH AMERICA
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

DRAWN BY	DATE	SCALE	MODEL	REV
JL	27-Aug-17	NTS	RG 5500 Type 1	A

PROJECT NAME: Standard Drawing

Unit Tag

HOT WATER COIL REPORT

5055 Taylor Kidd Blvd
Millhaven, Ontario
Canada,
K0H 1G0
T:(613) 544-2200
F:(613) 544-7779
E-Mail: info@directcoil.com
Website: directcoil.com

Company:
Contact:
Tel:
Fax or Email:

Date: December 10, 2019
Reference:
Prepared By:
Project Name:

Coil Tag:
Coil Model Number: 5W-01-30.0-10-57.0-2
Item: 004, Coil Hand: Right

Physical Data

Number Of Coils	One (1)	Tube Diameter	5/8 1.50 x 1.299
Fin Height (Per Coil)	30.000"	Tube Turbulators	No
Fin Length (Per Coil)	57.000"	Tube Material	Copper - 0.020 Plain
Number Of Rows Deep	One (1)	Fin Material	Aluminum 0.010
Circuit Ratio	0.1	Fin Style	Corrugated
Fins Per Inch	Ten (10)	Connection Type	MPT Steel
Supply Connection Size	1"	Coil Weight (Per Coil)[operating]	71 [87] LBS
Return Connection Size	1"	Coil Internal Volume (Per Coil)	1.770 gal
Header Material	Copper (L)	Casing Style	Standard
		Casing Material	Galvanized Steel 16 gauge

Air Data

Total Airflow (All Coils)	5,152 SCFM
Airflow (Per Coil)	5,152 SCFM
Face Velocity	434 FPM
Altitude	0.00 FT
Entering Dry Bulb	60.51 °F
Leaving Dry Bulb	90.00 °F
Air Pressure Drop	0.11" WG
Fouling Factor	0.0000 ft² °F h/Btu

Fluid Data

Fluid Type	Ethylene Gly.
Glycol Ratio	55 %
Entering Fluid Temp	170.00 °F
Leaving Fluid Temp	130.00 °F
Fluid Flow Per Coil (Total)	9.61 GPM (9.61)
Tube Velocity	5.36 FPS
Fluid Pressure Drop	12.70' WG
Fouling Factor	0.0000 ft² °F h/Btu

Capacity

Capacity Per Coil (Total)	166.09 MBH (166.09)

Notes:

1. Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org

AHRI CERTIFIED®
www.ahridirectory.org
Air-Cooling and Air-Heating Coils
AHRI Standard 410

Software version: 0.99.8165

GENERAL DESCRIPTION OF FUNCTION

A Dual Core™ air handling unit comes with a regenerative cyclic dual core heat exchanger. It includes a supply and an exhaust fan (both optional) and two cores filled with specially corrugated 0.7 mm thick aluminium plates which act as heat accumulators. In between the cores is a patented damper section which changes over every 60 seconds to periodically direct warm air through one of the two cores while outside air gains heat from the other. Before each fan is a filter section (optional) to filter the air. Heat recovery is automatically activated when called upon.

The unit may also be used for cooling recovery. If the outside temperature is higher than the indoor the damper cycling starts, enabling cooling recovery. This function reduces the demand for mechanical cooling.

In the off position, the dampers all close against outdoor air thereby reducing infiltration losses through the unit.

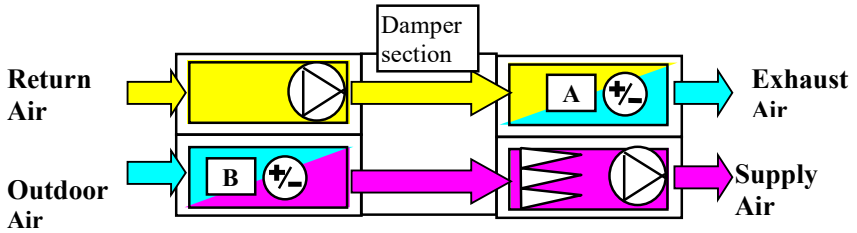
The extremely high temperature efficiency (90% +/- 5%) gives a supply air temperature just a few degrees below room temperature which in many cases allow systems to be designed without additional heating coils.

The inspection doors to fan and damper sections have lockable handles, which contributes to high security.

Principle of function

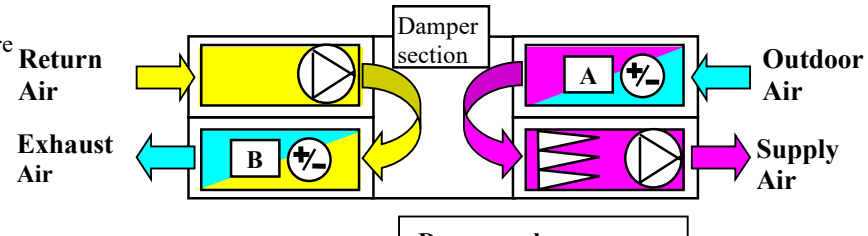
SEQUENCE 1
Exhaust air charges Core A with heat

Core B discharges heat to supply air



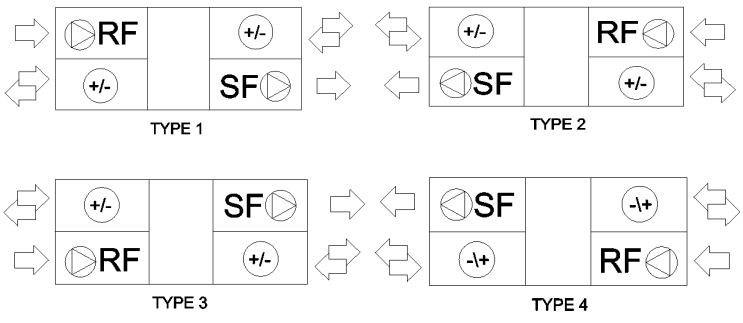
SEQUENCE 2
Exhaust air charges the Core B with heat

Core A discharges heat to supply air



Dampers change sequence every 60 sec.

Available configurations



Units are normally one of these configurations
Supply and exhaust air connection may also be on the backside

RG 1000-18000 Units

Sequence of Operation

A. Testing Damper Actuators:

1. The damper motors can be tested by using the changeover switch S1 in the damper control panel.
2. The normal position of the S1 switch is 0 where the actuators follow the signals from a central control system (BMS).
3. If S1 is in position 1 the damper actuator M7 runs continuously, and in position 2 actuator M6 runs continuously.

B. Sequence with the unit controlled by central control system (BMS):

1. When the S2 switch is in position A (auto) the damper is controlled by the central control system (BMS).
    a. Enable contact (see field wiring diagram) controls whether the damper and blower operate or not (contact closed = operating, open = not operating).
    b. Heat Recovery contact (see field wiring diagram) controls the damper operating mode (contact closed = heat recovery, open = free cooling).
2. When enable contact is closed, the damper section starts and the PLC-Blower Interlocks are energized, enabling the VFDs to start the motors and run at a set constant speed.
3. Enable contact closed and Heat Recovery contact open = damper changes position every 3 hours (free cooling).
4. Enable contact closed and Heat Recovery contact closed = damper changes position every 60 seconds (field adjustable) (heat recovery).
5. Enable contact open and Heat Recovery contact open = the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
6. Should the system fall below an internal low limit set point for 5 min, the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
    a. 24Vdc low limit alarm signal to BMS will be enabled.
    b. The low limit requires the unit turned off and then back on (remove Enable signal and then re-enable or turn S2 switch to Off and then back).

C. Operation of the changeover damper if central control system (BMS) is not used:

1. When the S2 switch is in position M (manual), the damper section starts and the PLC-Blower Interlocks are energized, enabling the VFDs to start the motors and run at a set constant speed.
2. The damper is now controlled by the 2 internal thermostats; GT1 in the supply air and GT2 in the exhaust air. GT1 is set to 59 °F (15 °C) and GT2 is set to 68 °F (20 °C).
3. The sequence will now be:
    a. If exhaust air < 68 °F (20 °C) = heat recovery (cycling every 60 seconds).
    b. If exhaust air > 68 °F (20 °C) and supply air > 59 °F (15 °C) = free cooling (cycling every 3 hours).
    c. If exhaust air > 68 °F (20 °C) and supply air < 59 °F (15 °C) = heat recovery until supply air > 59 °F (15 °C) then it will revert to free cooling mode.
4. When the S2 switch is in position 0 = shut off = the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
5. Should the system fall below an internal low limit set point for 5 min, the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
    a. 24Vdc low limit alarm signal to BMS will be enabled.
    b. The low limit requires the unit turned off and then back on (turn S2 switch to Off and then back).

D. Heating and cooling:

1. Any type of supplemental heating or cooling of the supply air will be controlled by others (central control system).

E. Internal Damper Alarm:

1. Should an error occur in the function of the internal damper (Energy Recovery Damper failure), the internal damper will be disabled.
2. The PLC–Blower Interlocks are de-energized, disabling the VFDs.
3. Damper alarm signal to BMS will be enabled (24Vdc signal).
4. To reset damper alarm, power must be cycled off-on.

F. Additional Notes:

1. If fire alarm contacts are used, remove the factory installed jumper from terminals 101 & 150 and connect the Normally Closed fire alarm contact. If the contact opens during operation, the unit will shut down and dampers close.

Note: In all cases ensure that damper section is first on and last off, (after supply and exhaust blower section) to prevent damage to internal damper section.

Troubleshooting – Damper Alarm

Damper has a built in alarm for testing the function of the internal components, if the damper goes into alarm the unit will shut down, disabling and re-enabling will reset the alarm and re-enable the unit for troubleshooting.

To rest the alarm do one of the below options

1. cycle power
2. Stop the Program and restart
    a. Hold “OK” press “ESC”
    b. Press “OK” on “STOP”
    c. Press “OK” again
    d. Press “OK” on “RUN”
    e. Select “RESET LATCHED VALUES & RUN”, press “OK”
    f. Press “ESC”

To reset the low limit, move S2 switch to the 0 (off) position and back on.

B. M6 Motor Alarm
    a. Use S1 switch (Position 2) to test movement on motor, when enabled, the motor will turn.
    b. If motor moves on motor test, check NC contacts on MIB1 and MIB2 for continuity.
    c. If motor does not move
        i. Check NC contacts on MIB1 and MIB2 for continuity.
        ii. Check motor starter (K2) for continuity.
        iii. Manually enable relay (R2) and check for continuity across relay contacts.
        iv. Check motor leads for voltage, Motor may defective contact Tempeff.

C. M7 Motor Alarm
    a. Use S1 switch (Position 1) to test movement on motor, when enabled, the motor will turn.
    b. If motor moves on motor test, check NC contacts on MIB3 and MIB4 for continuity.
    c. If motor does not move
        i. Check NC contacts on MIB3 and MIB4 for continuity.
        ii. Check motor starter (K1) for continuity.
        iii. Manually enable relay (R1) and check for continuity across relay contacts.
        iv. Check motor leads for voltage, Motor may defective contact Tempeff.

D. MIB1 Alarm – M6 Closed Position
    a. Damper motor will not stop at MIB1; motor (M6) will just spin
        i. Check that arm is making contact with the motor CAM (adjust position if necessary).
        ii. Temporarily remove relay (R2), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either sides not working replace limit switch.

E. MIB2 Alarm – M6 Open Position
    a. Damper motor will not stop at MIB2; motor (M6) will just spin

i. Check that arm is making contact with the motor CAM (adjust position if necessary).
ii. Temporarily remove relay (R2), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either sides not working replace limit switch.

F. MIB3 Alarm – M7 Closed Position
   a. Damper motor will not stop at MIB3; motor (M7) will just spin
      i. Check that arm is making contact with the motor CAM (adjust position if necessary).
      ii. Temporarily remove relay (R1), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either sides not working replace limit switch.

G. MIB4 Alarm – M7 Open Position
   a. Damper motor will not stop at MIB4; motor (M7) will just spin
      i. Check that arm is making contact with the motor CAM (adjust position if necessary).
      ii. Temporarily remove relay (R1), lift up limit switch arm with small screw driver, check continuity across both NC and NO contacts, if either sides not working replace limit switch.

H. MIB5 Alarm – M6 Proof of Open
   a. Blowers will enable for either 1 cycle or not at all, after a 10 second delay the unit will disable
      i. Check that the arm is making contact with the end collar when the M6 motor cam is on MIB2
         1. Adjust the collar if micro switch is on flat.
         2. Adjust the micro switch to make contact with collar.
      ii. Check to make sure the micro switch is releasing on the flat.
         1. When the unit is in the off position, the arm should be able to be pushed in and you should here the click.
         2. Adjust the flat on the collar to where the micro switch just releases on the flat.

I. MIB6 Alarm – M7 Proof of Open
   a. Blowers will enable for either 1 cycle or not at all, after a 10 second delay the unit will disable
      i. Check that the arm is making contact with the end collar when the M7 motor cam is on MIB4
         1. Adjust the collar if micro switch is on flat.
         2. Adjust the micro switch to make contact with collar.
      ii. Check to make sure the micro switch is releasing on the flat.
         1. When the unit is in the off position, the arm should be able to be pushed in and you should here the click.
         2. Adjust the flat on the collar to where the micro switch just releases on the flat.

ABB Variable Frequency Drive

ACS255 – 600V

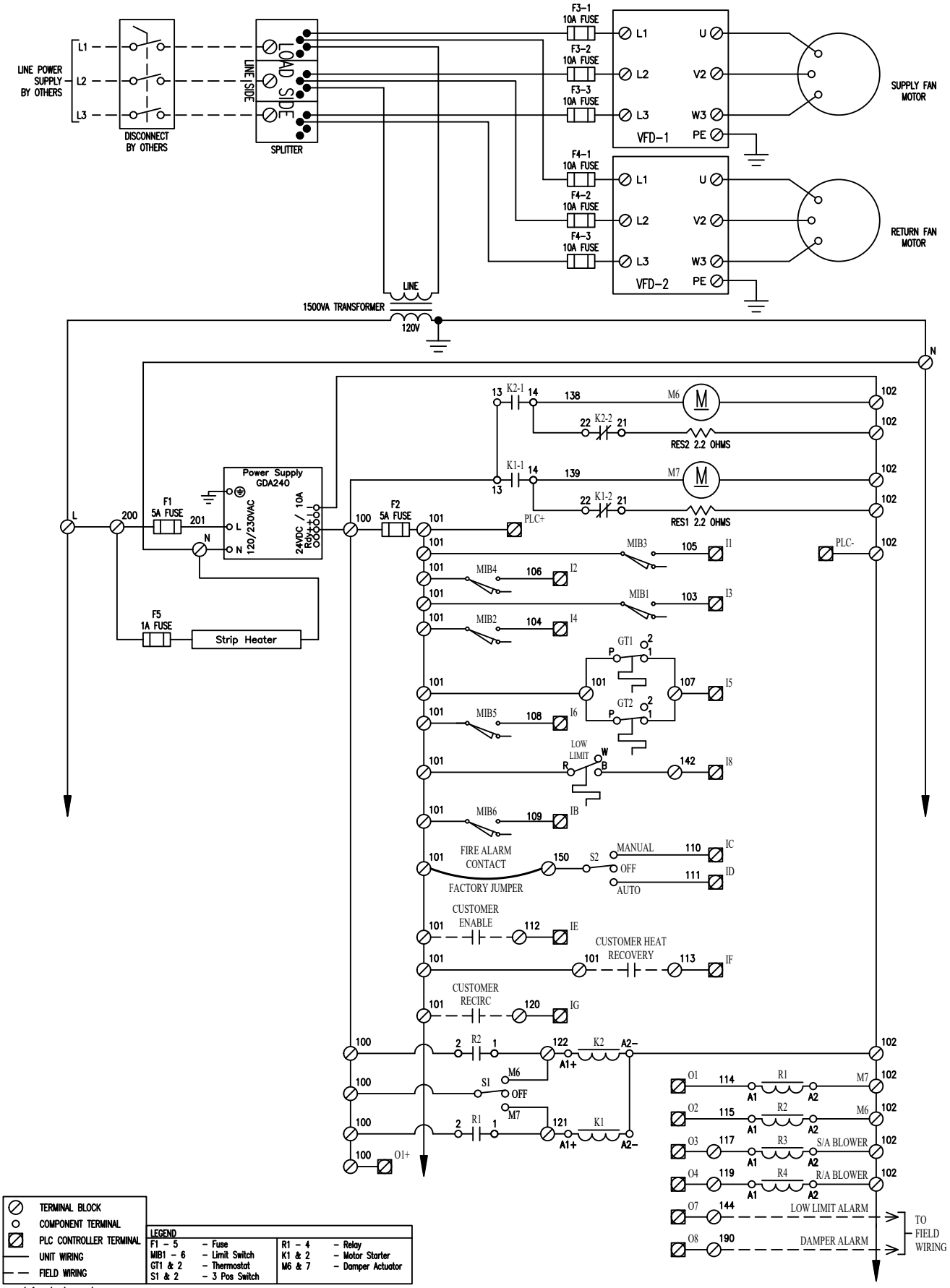
Programming Single Speed

On initial start-up, or after resetting to factory parameters (P9902), follow the Start-Up Assistant to enter motor and supply information, use HVAC Default for Application Macro.

Enter Menu, then enter Parameters in Long Parameter Mode; press and hold navigate button for >1 sec, select PAr L, press navigate button to exit and save view.

P9902 –1	Digital Inputs Function Select (DI1-Stop/Run, DI2-Forward/Reverse, DI3-Speed Ref/Preset Speed)
P9908 –0	Motor Rated Speed (rpm) – all speed parameters are displayed in Hz
P1103 – 0	Primary Command Source Mode (Terminals) (default)
P1202 – 63.0	Const Speed 1 (Hz) – Supply Air VFD
P1202 – 55.0	Const Speed 1 (Hz) – Return Air VFD
P2007– 0.0	Minimum Frequency (Hz) (default)
P2008 – 80.0	Maximum Frequency (Hz)
P2202 – 30.0	Acceleration Ramp (sec.)
P2203 – 30.0	Deceleration Ramp (sec.)

!! Maximum Reference (Hz) = (required fan RPM / maximum motor RPM) * 60Hz **!!**



TERMINAL BLOCK
COMPONENT TERMINAL
PLC CONTROLLER TERMINAL
UNIT WIRING
FIELD WIRING

LEGEND

F1 – 5	– Fuse	R1 – 4	– Relay
MIB1 – 6	– Limit Switch	K1 & 2	– Motor Starter
GT1 & 2	– Thermostat	M6 & 7	– Damper Actuator
S1 & 2	– 3 Pos Switch		

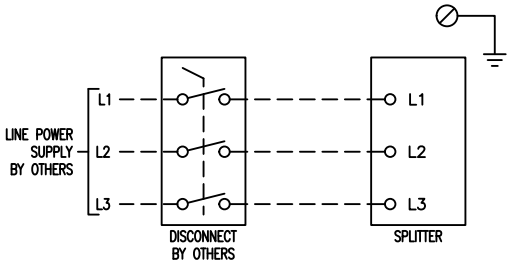
Drawing subject to change without notice

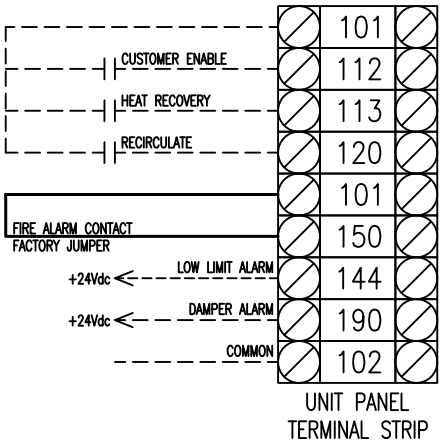
TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Control Wiring (DOGA)
SPP, VFD (ACS255–600V), Low Limit

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	INTERNAL DOGA WIRING
CHK. BY	DATE	JOB NO.	REV
	Jan. 14, 2020		–





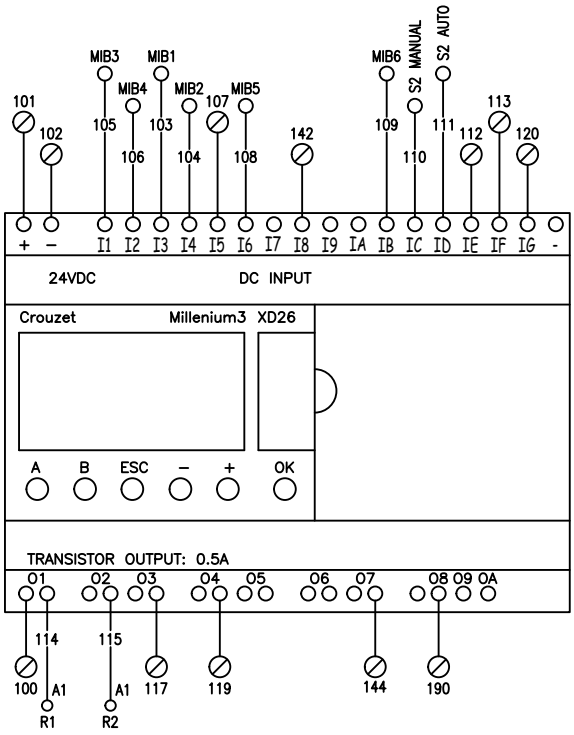
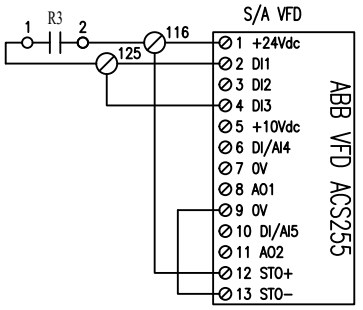
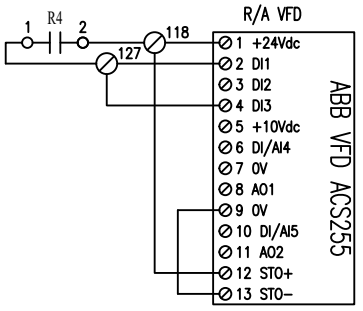


ABB SPEED CONTROL IS DONE IN THE VFD
USING PARAMETER 1202 (PREST SPEED 1).





NOTE(S):

A – IF ANY OF THE ORIGINAL WIRE SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 90°C AND AN 600Vac INSULATION RATING.

B – FIELD WIRING MUST HAVE A TEMPERATURE RATING OF 90°C 600Vac WIRE INSULATION RATING. A MINIMUM WIRE SIZE OF 14AWG MUST BE USED. A MAXIMUM WIRE LENGTH OF 50ft.

C – FIELD WIRING VOLTAGE DROP NOT TO EXCEED 10%.

D – ALL FIELD WIRING SHOWN SHALL BE COMPLETED BY INSTALLER.

E – ALL WIRING TO COMPLY WITH THE NATIONAL ELECTRICAL CODE (NFPA 70-93)

F – IF FIRE ALARM CONTACTS ARE USED, REMOVE THE FACTORY INSTALLED JUMPER FROM TERMINALS 101 & 150. CONNECT THE N.C. FIRE ALARM CONTACTS. IF FIRE ALARM CONTACT OPENS, UNIT SHUTS DOWN. !! FOR OTHER OPERATION OPTIONS, CONTACT FACTORY !!

Drawing subject to change
without notice

TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Field Wiring (DOGA)
SPP, VFD (ACS255-600V), Low Limit

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	DOGA FIELD WIRING
CHK. BY	DATE	JOB NO.	REV
	Jan. 14, 2020		–

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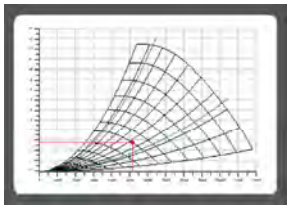
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	5152 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	2.74 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA18 -**	n Max 1/min	Pw Max BHP	J lb ft²
	3300		15.42



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	3.17	2.74	0.43	8573	1848	74.12	64.16	3.46			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	77 / 50	75 / 59	79 / 70	76 / 72	76 / 76	72 / 73	69 / 70	63 / 62	**84 / 80**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	77 / 50	78 / 61	89 / 81	85 / 81	78 / 78	77 / 78	71 / 72	66 / 65	**92 / 86**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	85 / 58	81 / 65	89 / 80	87 / 83	86 / 86	81 / 82	76 / 77	72 / 71	**93 / 90**

Chart

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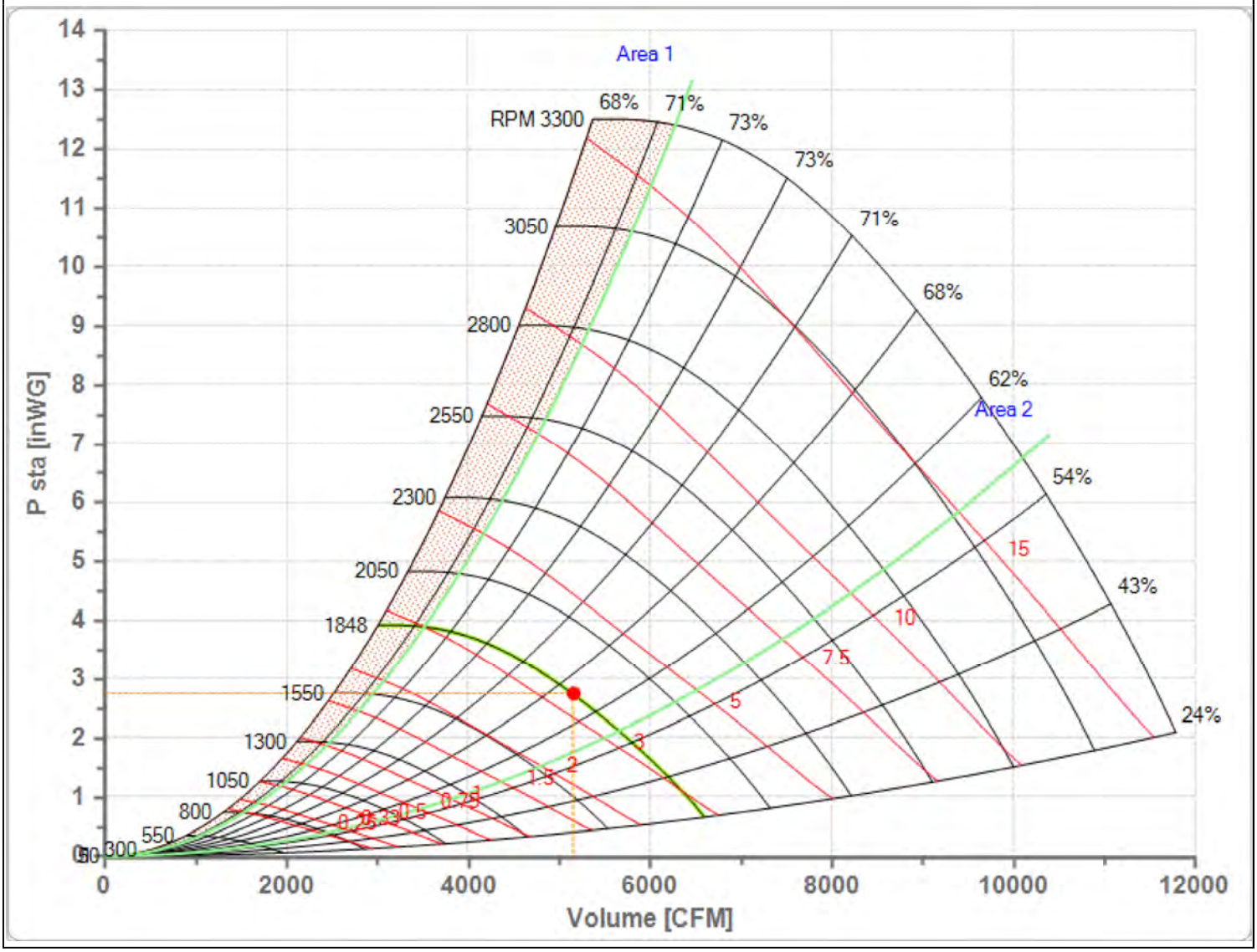
11/12/2019
Aeolus4 1.0.19079.1

Selected Fan	ANPA18 -	Fan working conditions	Free Inlet - Free Outlet
n Max	3300 1/min	Volume	5152 CFM
Pw Max		Total Pressure	3.17 In.W.G.
P fan	3.46 BHP	Static Pressure	2.74 In.W.G.
J	15.42 lb ft²	eta Tot	74.12 %
Required working point	•	eta Sta	64.16 %
Effective working point	•	RPM	1848 1/min
		Temperature	68.0 °F
		Altitude	0 ft



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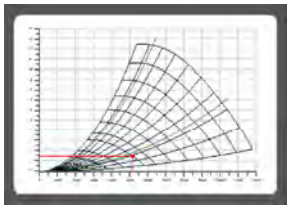
11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	5152 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	1.41 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA18 -**	n Max 1/min	Pw Max BHP	J lb ft²
	3300		15.42



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	1.84	1.41	0.43	7525	1622	66.35	50.98	2.24			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	77 / 50	76 / 59	79 / 70	74 / 70	74 / 74	71 / 72	69 / 70	63 / 61	**83 / 79**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	77 / 51	78 / 62	87 / 79	83 / 80	78 / 78	76 / 77	69 / 70	64 / 63	**90 / 85**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	83 / 56	80 / 63	88 / 79	84 / 80	85 / 85	82 / 83	76 / 77	69 / 67	**92 / 89**

Chart

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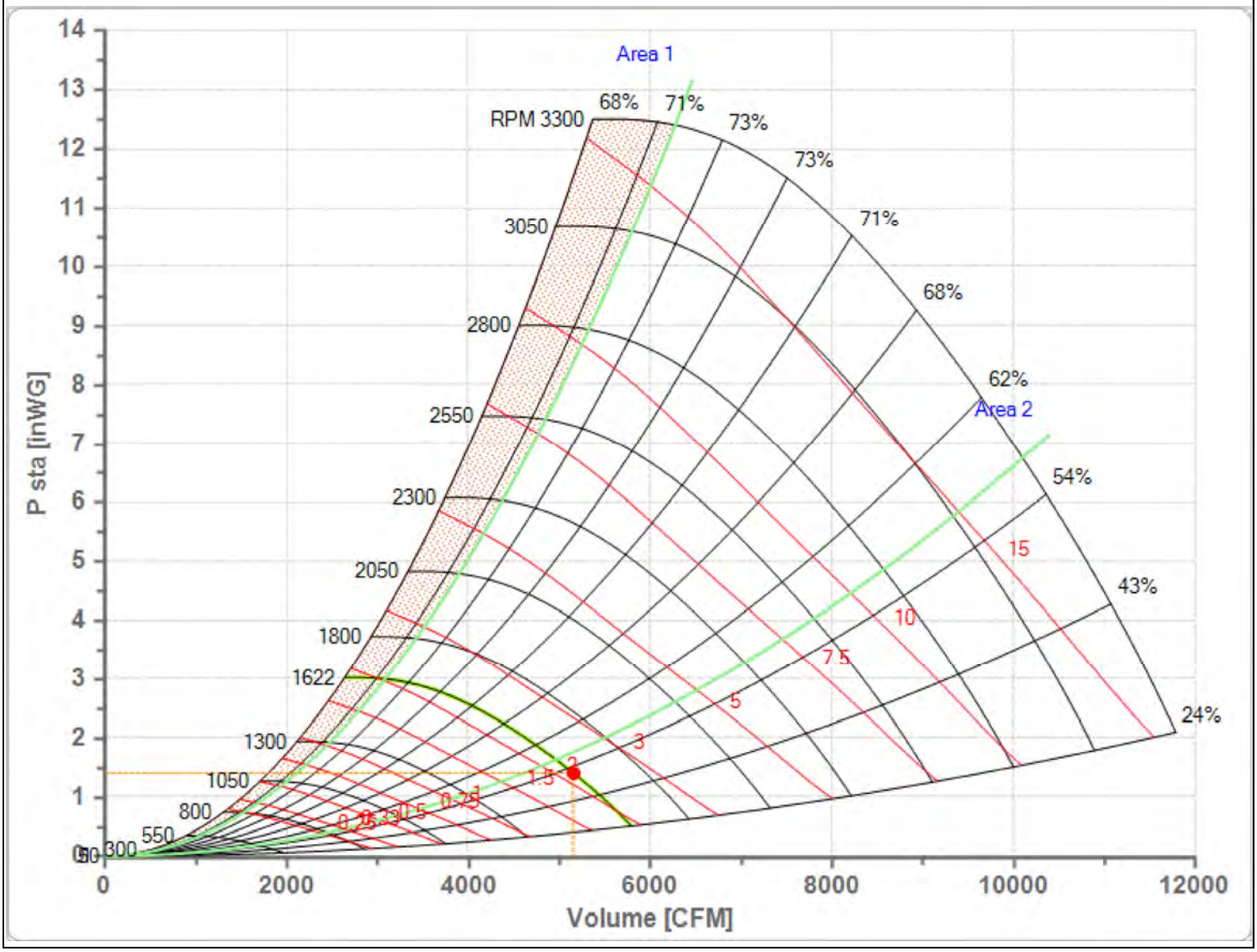
fans of energy saving

11/12/2019
Aeolus4 1.0.19079.1

Selected Fan	ANPA18 -	Fan working conditions	Free Inlet - Free Outlet
n Max	3300 1/min	Volume	5152 CFM
Pw Max		Total Pressure	1.84 In.W.G.
P fan	2.24 BHP	Static Pressure	1.41 In.W.G.
J	15.42 lb ft²	eta Tot	66.35 %
Required working point	•	eta Sta	50.98 %
Effective working point	•	RPM	1622 1/min
		Temperature	68.0 °F
		Altitude	0 ft



Dafco Filtration Group®

PRODUCT OVERVIEW

- Standard Capacity (MERV 8) & High Capacity (MERV 10)
- Available in 1", 2" & 4"depths
- Ideal for use in
  - Prefilter for high efficiency filters
  - Office and Retail
  - Manufacturing and Distribution
  - Government and Education facilities
  - Doctor offices, assisted living facilities and Hospitals
  - Hotels and Airports
  - Single and Multi-Family Housing

100% Recycled Paperboard®
MINIMUM 35% POST CONSUMER CONTENT

CANADA GREEN BUILDING COUNCIL • CONSEIL DU BÂTIMENT DURABLE DU CANADA •

AEROSTAR® SERIES 400 PLEAT

WHY THE SERIES 400?

- 100% synthetic pleated media achieves exceptionally high levels of efficiency
  - Does not rely on electrostatic charge
  - Low resistance to air flow means minimal energy costs
  - Moisture resistant and will not promote microbial growth
  - Excellent pre-filter for higher efficiency air filters
  - Effectively removes airborne irritants
  - Protects cooling coils & ductwork of HVAC system
- Durable construction optimizes performance
  - Media laminated to metal grid
  - Minimized media fluttering
  - Design helps maintain pleat uniformity
  - Frame constructed of high wet strength beverage board
  - Will not warp, crack or distort under normal operating conditions

Phone: +1 888.628.3458 • www.dafcofiltrationgroup.com • inquirycanada@filtrationgroup.com

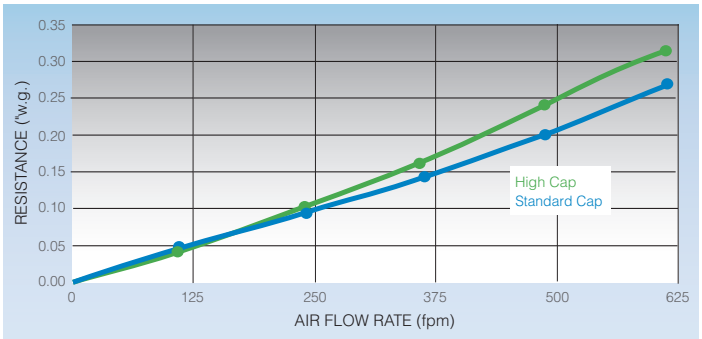
AEROSTAR® SERIES 400 PLEAT

PERFORMANCE DATA (24 x 24)

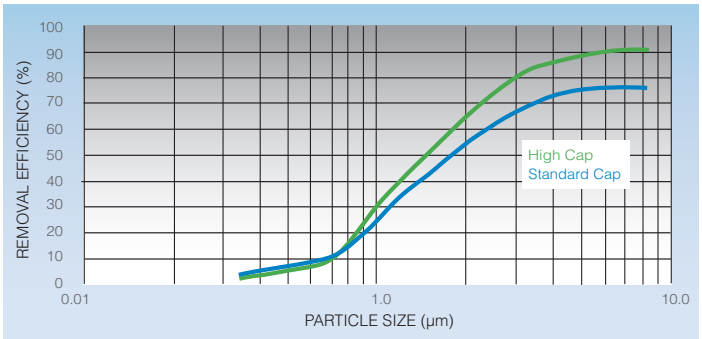
CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
Standard MERV 8	1"	0.14	0.21	–	–	1.0
	2"	–	0.14	0.20	0.27	1.0
	4"	–	0.09	0.14	0.21	1.0

CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
High MERV 10	1"	0.20	0.28	–	–	1.0
	2"	–	0.16	0.24	0.32	1.0
	4"	–	0.08	0.17	0.26	1.0

INITIAL RESISTANCE (24 x 24 x 2)



MINIMUM REMOVAL EFFICIENCY (24 x 24 x 2)



PRODUCT DATA

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 300 fpm	375 fpm
10403	10476	8 x 16 x 1	7 ¾ x 15 ¾ x ¾	250	325
10404	10477	10 x 10 x 1	9 ½ x 9 ½ x ¾	200	250
10364	10436	10 x 20 x 1	9 ½ x 19 ½ x ¾	400	525
10405	10478	10 x 24 x 1	9 ⅜ x 23 ⅜ x ¾	500	625
10406	10479	10 x 25 x 1	9 ¾ x 24 ¾ x ¾	525	650
10365	10437	12 x 12 x 1	11 ¾ x 11 ¾ x ¾	300	375
10407	10480	12 x 16 x 1	11 ½ x 15 ½ x ¾	400	500
10366	10438	12 x 20 x 1	11 ½ x 19 ½ x ¾	500	625
10367	10439	12 x 24 x 1	11 ½ x 23 ½ x ¾	600	750
10368	10440	12 x 25 x 1	11 ½ x 24 ½ x ¾	625	775
10369	10441	14 x 20 x 1	13 ½ x 19 ½ x ¾	575	725
10408	10481	14 x 24 x 1	13 ½ x 23 ½ x ¾	700	875
10370	10442	14 x 25 x 1	13 ½ x 24 ½ x ¾	725	900
10371	10443	15 x 20 x 1	14 ½ x 19 ½ x ¾	625	775
10409	10482	15 x 25 x 1	14 ½ x 24 ½ x ¾	800	975
10410	10483	16 x 16 x 1	15 ¾ x 15 ¾ x ¾	525	650
10372	10444	16 x 20 x 1	15 ½ x 19 ½ x ¾	650	825
10411	10484	16 x 24 x 1	15 ½ x 23 ½ x ¾	800	1000
10373	10445	16 x 25 x 1	15 ½ x 24 ½ x ¾	825	1050
10412	10485	18 x 18 x 1	17 ¾ x 17 ¾ x ¾	675	850
10413	10486	18 x 20 x 1	17 ½ x 19 ½ x ¾	750	925
10414	10487	18 x 22 x 1	17 ½ x 21 ½ x ¾	825	1025
10415	10488	18 x 24 x 1	17 ½ x 23 ½ x ¾	900	1125
10374	10446	18 x 25 x 1	17 ½ x 24 ½ x ¾	925	1175
10375	10447	20 x 20 x 1	19 ½ x 19 ½ x ¾	825	1050
10416	10489	20 x 24 x 1	19 ½ x 23 ½ x ¾	1000	1250
10376	10448	20 x 25 x 1	19 ½ x 24 ½ x ¾	1050	1300
10417	10490	22 x 22 x 1	21 ¾ x 21 ¾ x ¾	1000	1250
10377	10449	24 x 24 x 1	23 ½ x 23 ½ x ¾	1200	1500
10378	10450	25 x 25 x 1	24 ½ x 24 ½ x ¾	1300	1625

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 375 fpm	500 fpm
10418	10491	10 x 10 x 2	9 ¾ x 9 ¾ x 1 ¾	250	350
10379	10451	10 x 20 x 2	9 ½ x 19 ½ x 1 ¾	525	700
10419	10492	12 x 20 x 2	11 ½ x 19 ½ x 1 ¾	625	825
10380	10452	12 x 24 x 2	11 ⅜ x 23 ⅜ x 1 ¾	750	1000
10381	10453	14 x 20 x 2	13 ½ x 19 ½ x 1 ¾	725	975
10382	10454	14 x 25 x 2	13 ½ x 24 ½ x 1 ¾	900	1200
10383	10455	15 x 20 x 2	14 ½ x 19 ½ x 1 ¾	775	1025
10420	10493	16 x 16 x 2	15 ½ x 15 ½ x 1 ¾	650	875
10384	10456	16 x 20 x 2	15 ½ x 19 ½ x 1 ¾	825	1100
10385	10457	16 x 24 x 2	15 ⅜ x 23 ⅜ x 1 ¾	1000	1325
10386	10458	16 x 25 x 2	15 ½ x 24 ½ x 1 ¾	1050	1400
10421	10494	18 x 22 x 2	17 ½ x 21 ½ x 1 ¾	1025	1375
10387	10459	18 x 24 x 2	17 ⅜ x 23 ⅜ x 1 ¾	1125	1500
10422	10495	18 x 25 x 2	17 ½ x 24 ½ x 1 ¾	1175	1550
10388	10460	20 x 20 x 2	19 ½ x 19 ½ x 1 ¾	1050	1400
10389	10461	20 x 24 x 2	19 ⅜ x 23 ⅜ x 1 ¾	1250	1650
10390	10462	20 x 25 x 2	19 ½ x 24 ½ x 1 ¾	1300	1750
10391	10463	24 x 24 x 2	23 ⅜ x 23 ⅜ x 1 ¾	1500	2000
10392	10464	25 x 25 x 2	24 ½ x 24 ½ x 1 ¾	1625	2150
				500 fpm	625 fpm
10393	10465	12 x 24 x 4	11 ⅜ x 23 ⅜ x 3 ¾	1000	1250
10394	10466	16 x 20 x 4	15 ½ x 19 ½ x 3 ¾	1100	1400
10395	10467	16 x 25 x 4	15 ½ x 24 ½ x 3 ¾	1400	1750
10396	10468	18 x 24 x 4	17 ⅜ x 23 ⅜ x 3 ¾	1500	1875
10397	10469	20 x 20 x 4	19 ½ x 19 ½ x 3 ¾	1400	1750
10398	10470	20 x 24 x 4	19 ⅜ x 23 ⅜ x 3 ¾	1650	2100
10399	10471	20 x 25 x 4	19 ½ x 24 ½ x 3 ¾	1750	2200
10400	10472	24 x 24 x 4	23 ⅜ x 23 ⅜ x 3 ¾	2000	2500
10401	10473	25 x 29 x 4	24 ⅜ x 28 ⅜ x 3 ¾	2525	3150
10402	10474	28 x 30 x 4	27 ⅜ x 29 ⅜ x 3 ¾	2900	3650

* Contact Customer Care for additional sizes and information.

ENGINEERING SPECIFICATIONS

1.0 General

1.1 Filters shall be Aerostar® Series 400 extended surface pleated air filters as manufactured Dafco by Filtration Group.
1.2 Filters shall be available in standard and high capacity configurations and available in nominal depths of 1", 2", and 4".
1.3 Underwriters Laboratories classified to UL 900 and ULC-S111-07.

2.0 Filter Materials of Construction

2.1 Media shall be 100% synthetic, mechanical media that does not support microbial growth.
2.2 Filters shall have a high wet strength beverage board with a cross member design that increases filter rigidity and prevents breaching. Frame shall be recyclable.
2.3 Filters shall have an expanded metal support grid bonded to the air-exiting side of the filter to maintain pleat uniformity and prevent fluttering. Metal support grid shall be recyclable and contain a significant amount of post-consumer and pre-consumer content.

3.0 Filter Performance

3.1 Filters shall be MERV 10/10A in a high capacity configuration and MERV 8/8A in a standard capacity configuration when tested in accordance with ASHRAE 52.2 Test Standard.
3.2 For initial resistance of filters, see Performance Data chart above.
3.3 Filters shall be rated to withstand a continuous operating temperature up to 200˚F.
3.4 Filters shall have a recommended final resistance of 1.0" w.g.

Phone: +1 888.628.3458 • www.dafcofiltrationgroup.com • inquirycanada@filtrationgroup.com

Dafco Filtration Group®

Submittal Drawings

Project: Transit Garage fort Rouge

Tag: HRU-11

PO#: 24121-03

Date: January 14, 2020

Agent: Midwest Engineering

Revision #	Revision Detail	Date Revised	Revised by
1	Added support and filter information	Jan 20, 2020	CR

JOB STATUS

■ **HELD FOR APPROVAL**

Equipment will not be scheduled until approved drawings are returned to Tempeff North America

Current lead times from release is 12-14 weeks

If immediate release is required, notify Tempeff in writing

☐ **RELEASED TO PRODUCTION**

Scheduled shipment from factory: _____

UNITS ARE SHIPPED SPLIT, WIRING RECONNECTION ON SITE REQUIRED – SEE PROPOSAL DRAWING FOR SPLIT LOCATIONS

675 Washington Ave. Winnipeg, MB R2K 1M4 Phone: (204) 783-1902

675 Washington Ave, WINNIPEG, MB CANADA R2K 1M4 PH: (204) 783-1902

Project	Transit Garage Fort Rouge
Tag(s)	HRU-11
Agent	Midwest Engineering
Job Number	

Line In		
Voltage	575-3-60	
FLA	58.6	AMPS
AMPACITY	66	AMPS
MAX.NON-TIME DELAY FUSE	110	AMP
MAX.TIME DELAY FUSE	110	AMP
MAX.CIRCUIT BREAKER	100	AMP
MIN.WIRE SIZE	#4	AWG

Model

RG 33000 Welded Damper

Approximate Weight	9130 KG	20177 LBS	**Outdoor**	Configuration	Type 1

Fans

Supply air fan: ANPA 36 X1

Exhaust air fan: ANPA 36 X1

Technical data

Input data	Sup. air	Exh. air
Total volume (SCFM)	27692	27692
HX Air volume (SCFM)	27692	27692
Filter	Merv 10 (2")	None
	-	-
External pressure drop (in. W.C)	1.50	1.00

Output data		
Filter air velocity (fpm)	498	0
Design pressure drop filter (in W.C)	0.73	0.00
HX air velocity (fpm)	495	495
Pressure drop heat exch. (in W.C)	0.76	0.76
Auxillary Pressure Drop drop (in W.C)	0.38	0.00
Backdraft dampers	0.00	0.00
Static pressure (in W.C)	3.37	1.76

Fan speed (rpm)	1163	1053
Max (rpm)	1600	1600
Fan efficiency (%)	73.95	66.73
Required BHP	23.89	16.57
Actual Required bhp	24.14	18.49

Motor efficiency (%)	93	93
Motor power rating (hp)	30.00	25.00
Motor RPM	1175	1175
Motor Operating Frequency (Hz)	59	54

Power and energy demand

Input data	Calculated Winter DB	Summer DB	Summer WB
Design outdoor temp. (°F)	-30.00	90.0	
Desired supply air temp. winter (°F)	70		
Exhaust air temperature (°F)	70.0	75.0	
Output data			
Efficiency (across unit) (%)	86.5	75.0	
Supply air temp. after unit (°F)	56.48	78.7	
Recovered energy across unit (BTUH)	2,586,445	-336,624.7	

Standard Features

2" Foam injected panels
Extruded aluminum post and corner construction
All sections come with hinged access doors and locking latches
Multi-Damper switchover section complete with actuators
SS Drain Pans under Heat Exchanger(s) w/ 1"NPTConnections
Galvanized Heat Exchanger Frames
Galvanized damper blades, damper rods and axles
18Ga Roof & Gutters
4" Ventex Louvers
SLEEPER/STAND MOUNT (BY OTHERS)

Additional Features

Exterior Casing: 24 Ga G90 Galv
Interior Casing: 24 Ga G90 Galv
30 HP WEG TEFC Premium Eff. 6 Pole 326T Frame
25 HP WEG TEFC Premium Eff. 6 Pole 324T Frame
SA Drive: ACH550-UH-032A-6
RA Drive: ACH550-UH-027A-6
1in. Seismic Spring Isolation
SA Pre-Filter: Dafco Merv 10 (2") 400 HC
Hot Water Coil
Single point power
Quick connect
Low Limit
Freight Insurance

CROSIER KILGOUR & PARTNERS LTD.

REVIEWED ☒ NOT REVIEWED ☐

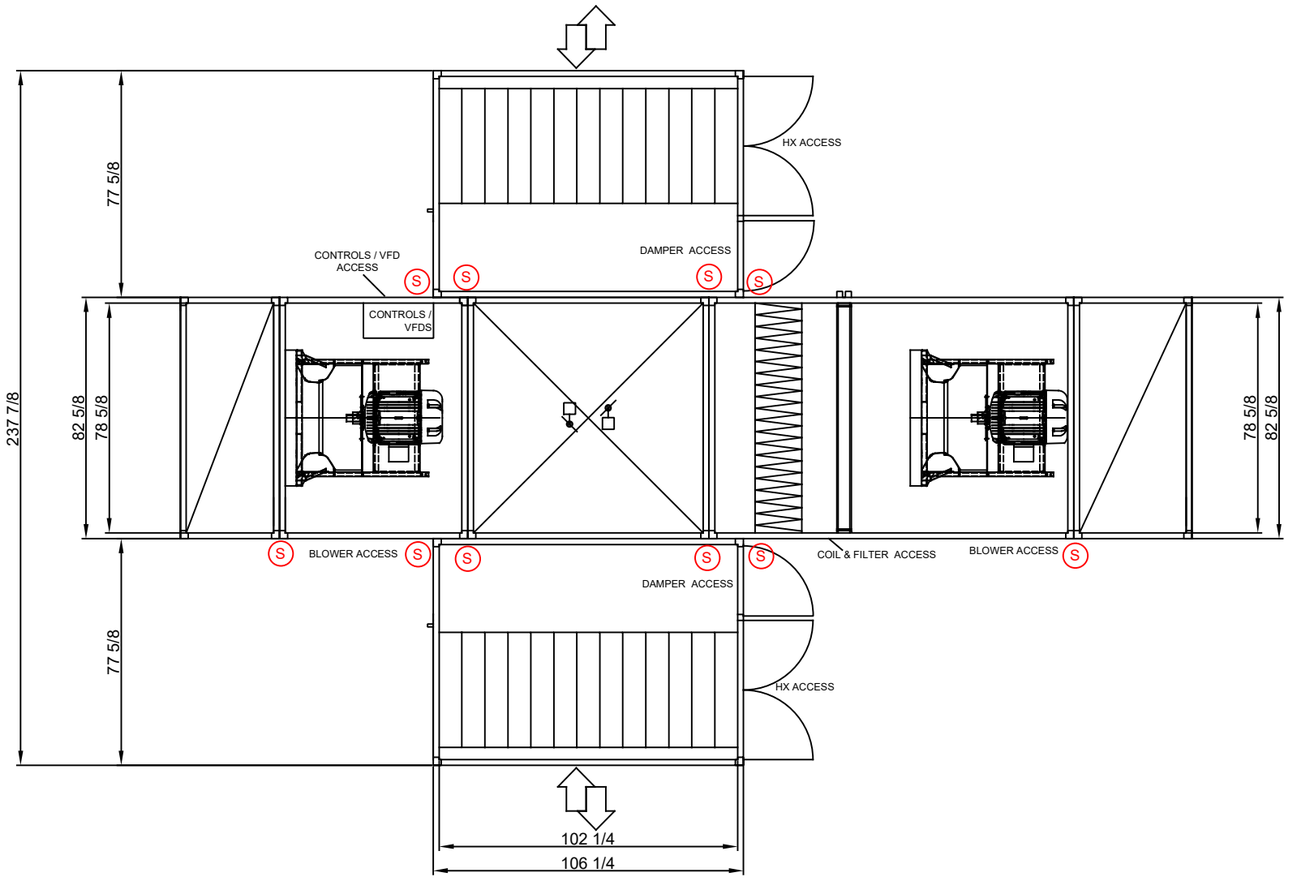
REVIEWED AS MODIFIED ☐ REJECTED ☐

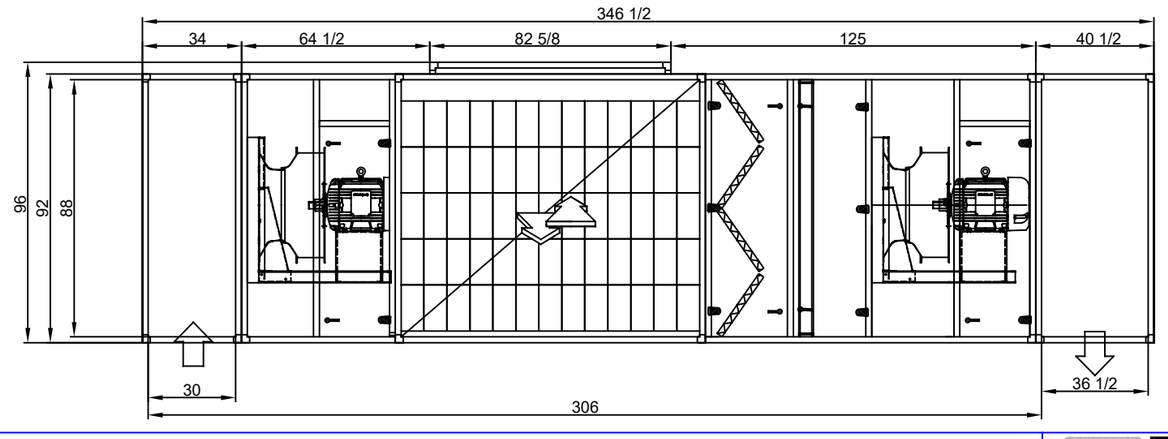
REVISE AND RE-SUBMIT ☐ DATE: 2020/01/31

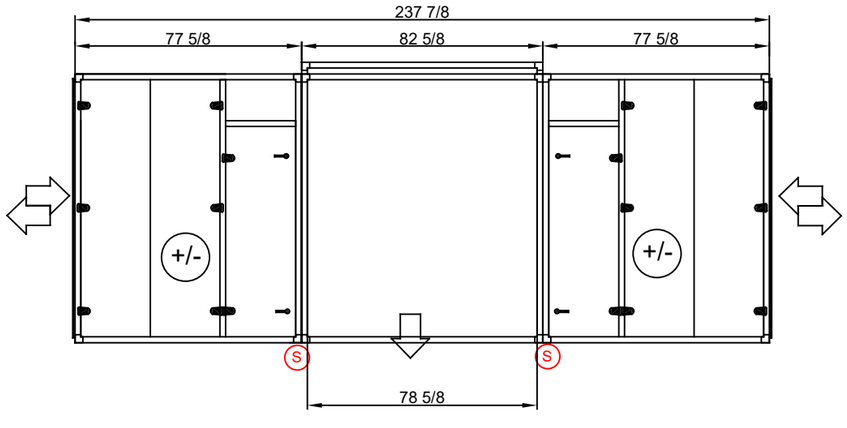
BY: jal

This review is for the sole purpose of ascertaining general conformance with the design concept of the project and general compliance with the information given in the contract documents. This review does not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to means, methods and/or techniques of construction and installation, for coordination of the work of all other trades, and for performing all work in a safe and satisfactory manner.

- Review applies to operating weight and structural support locations only. Please review structural support location drawing and confirm requirements.







Filters:
16- 20 x 25

Cells:
2- 60 x 200mm x 400mm
2- 5 x 195mm x 400mm

Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

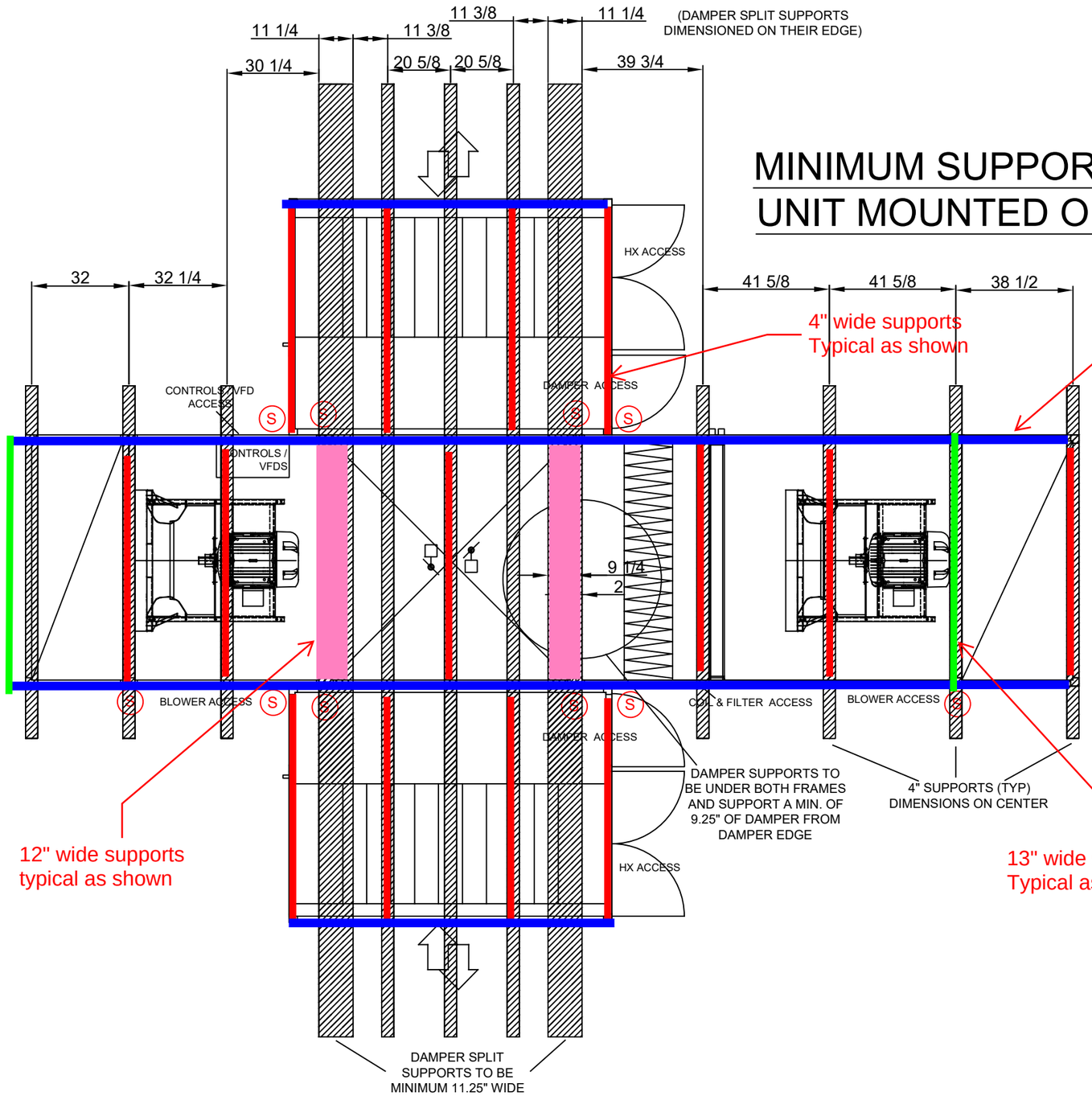
TEMPEFF
NORTH AMERICA
675 Washington Ave, Winnipeg, MB
Tel:(204) 783-1902

DRAWN BY	DATE	SCALE	MODEL	REV
JL	03-Feb-18	NTS	RG 33000	A

PROJECT NAME: Standard Drawing

Unit Tag

MINIMUM SUPPORT REQUIREMENTS FOR UNIT MOUNTED ON STRUCTURAL FRAME



CROSIER KILGOUR & PARTNERS LTD.

REVIEWED	☐	NOT REVIEWED	☐
REVIEWED AS MODIFIED	☒	REJECTED	☐
REVISE AND RE-SUBMIT	☐	DATE:	2020/01/31

BY: jal

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- Please confirm marked up bearing locations and widths will suit the equipment requirements.

Filters:
16- 20 x 25

Cells:
2- 60 x 200mm x 400mm
2- 5 x 195mm x 400mm

Ⓢ SPLIT FOR SHIPMENT

NOTES:
1. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE = SECTION SIZE.
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NORTH AMERICA
675 Washington Ave, Winnipeg, MB
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DRAWN BY	DATE	SCALE	MODEL	REV
JL	03-Feb-18	NTS	RG 33000	A

PROJECT NAME: Standard Drawing

Unit Tag

HOT WATER COIL REPORT

5055 Taylor Kidd Blvd
Millhaven, Ontario
Canada,
K0H 1G0
T:(613) 544-2200
F:(613) 544-7779
E-Mail: info@directcoil.com
Website: directcoil.com

Company:
Contact:
Tel:
Fax or Email:

Date: December 10, 2019
Reference:
Prepared By:
Project Name:

Coil Tag:
Coil Model Number: 5W-02-81.0-07-72.0-13
Item: 001, Coil Hand: Right

Physical Data

Number Of Coils	One (1)	Tube Diameter	5/8 1.50 x 1.299
Fin Height (Per Coil)	81.000"	Tube Turbulators	No
Fin Length (Per Coil)	72.000"	Tube Material	Copper - 0.020 Plain
Number Of Rows Deep	Two (2)	Fin Material	Aluminum 0.010
Circuit Ratio	0.24	Fin Style	Corrugated
Fins Per Inch	Seven (7)	Connection Type	MPT Steel
Supply Connection Size	1 1/2"	Coil Weight (Per Coil)[operating]	308 [409] LBS
Return Connection Size	1 1/2"	Coil Internal Volume (Per Coil)	11.610 gal
Header Material	Copper (L)	Casing Style	Standard
		Casing Material	Galvanized Steel 16 gauge

Air Data

Total Airflow (All Coils)	27,692 SCFM
Airflow (Per Coil)	27,692 SCFM
Face Velocity	684 FPM
Altitude	0.00 FT
Entering Dry Bulb	56.48 °F
Leaving Dry Bulb	90.00 °F
Air Pressure Drop	0.38" WG
Fouling Factor	0.0000 ft² °F h/Btu

Fluid Data

Fluid Type	Ethylene Gly.
Glycol Ratio	55 %
Entering Fluid Temp	170.00 °F
Leaving Fluid Temp	130.00 °F
Fluid Flow Per Coil (Total)	58.62 GPM (58.62)
Tube Velocity	5.03 FPS
Fluid Pressure Drop	12.10' WG
Fouling Factor	0.0000 ft² °F h/Btu

Capacity

Capacity Per Coil (Total)	1,013.36 MBH (1,013.36)

Notes:

1. Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org

AHRI CERTIFIED®
www.ahridirectory.org
Air-Cooling and Air-Heating Coils
AHRI Standard 410

Software version: 0.99.8165

GENERAL DESCRIPTION OF FUNCTION

A Dual Core™ air handling unit comes with a regenerative cyclic dual core heat exchanger. It includes a supply and an exhaust fan (both optional) and two cores filled with specially corrugated 0.7 mm thick aluminium plates which act as heat accumulators. In between the cores is a patented damper section which changes over every 60 seconds to periodically direct warm air through one of the two cores while outside air gains heat from the other. Before each fan is a filter section (optional) to filter the air. Heat recovery is automatically activated when called upon.

The unit may also be used for cooling recovery. If the outside temperature is higher than the indoor the damper cycling starts, enabling cooling recovery. This function reduces the demand for mechanical cooling.

In the off position, the dampers all close against outdoor air thereby reducing infiltration losses through the unit.

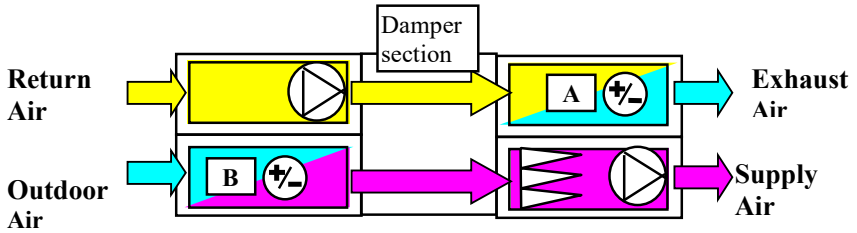
The extremely high temperature efficiency (90% +/- 5%) gives a supply air temperature just a few degrees below room temperature which in many cases allow systems to be designed without additional heating coils.

The inspection doors to fan and damper sections have lockable handles, which contributes to high security.

Principle of function

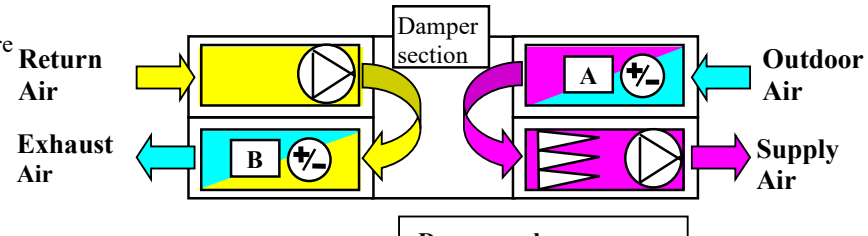
SEQUENCE 1
Exhaust air charges Core A with heat

Core B discharges heat to supply air



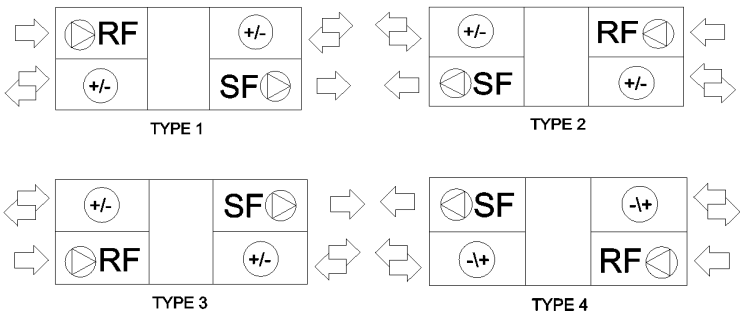
SEQUENCE 2
Exhaust air charges the Core B with heat

Core A discharges heat to supply air



Dampers change sequence every 60 sec.

Available configurations



Units are normally one of these configurations
Supply and exhaust air connection may also be on the backside

RG 33000-56000 Units

Sequence of Operation

A. Testing Damper Actuators:

1. The damper motors can be tested by using the changeover switch S1 and S2 in the damper control panel.
2. The normal position of the S1 and S2 switches are 0 where the actuators follow the signals from a central control system (BMS).
3. If S1 is in position 1 the damper actuator M1 runs continuously, and in position 2 actuator M2 runs continuously. If S2 is in position 1 the damper actuator M3 runs continuously, and in position 2 actuator M4 runs continuously.

B. Sequence with the unit controlled by central control system (BMS):

1. The damper is controlled by the central control system (BMS).
    a. Enable contact (see field wiring diagram) controls whether the damper and blower operate or not (contact closed = operating, open = not operating).
    b. Heat Recovery contact (see field wiring diagram) controls the damper operating mode (contact closed = heat recovery, open = free cooling).
2. When Enable contact is closed, the damper section starts and the PLC-Blower Interlocks are energized, enabling the enabling the VFDs to start the motors and run at a set constant speed.
3. Enable contact closed and Heat Recovery contact open = damper changes position every 3 hours (free cooling).
4. Enable contact closed and Heat Recovery contact closed = damper changes position every 60 seconds (field adjustable) (heat recovery).
5. Enable Contact open and Heat Recovery contact open = the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.

6. Should the system fall below an internal low limit set point for 5 min, the PLC-Blower Interlocks are de-energized, disabling the VFDs while enabling the damper to continue to cycle for 1 minute, to prevent damage to the damper unit.
    a. 24Vdc low limit alarm to BMS signal will be enabled.
    b. The low limit requires the unit turned off and then back on (remove Enable signal and then re-enable or turn S2 switch to Manual Night and back).

C. Heating and cooling:
    1. Any type of supplemental heating or cooling of the supply air will be controlled by others (central control system).

D. Additional Notes:
    1. The unit has blade location micro switches to enable the PLC-Blower interlocks if the unit is operating normally.
    2. If fire alarm contacts are used, remove the factory installed jumper from terminals 101 & 150 and connect the Normally Closed fire alarm contact. If the contact opens during operation, the unit will shut down and dampers close.
    3. When the System Switch S3 is in the On position, the unit runs normally. When the System Switch S3 is in the Off position, the unit is disabled, but testing can still be performed.

Note: In all cases ensure that damper section is first on and last off, (after supply and exhaust blower section) to prevent damage to internal damper section.

ABB Variable Frequency Drive

ACH550-UH

Programming Single Speed

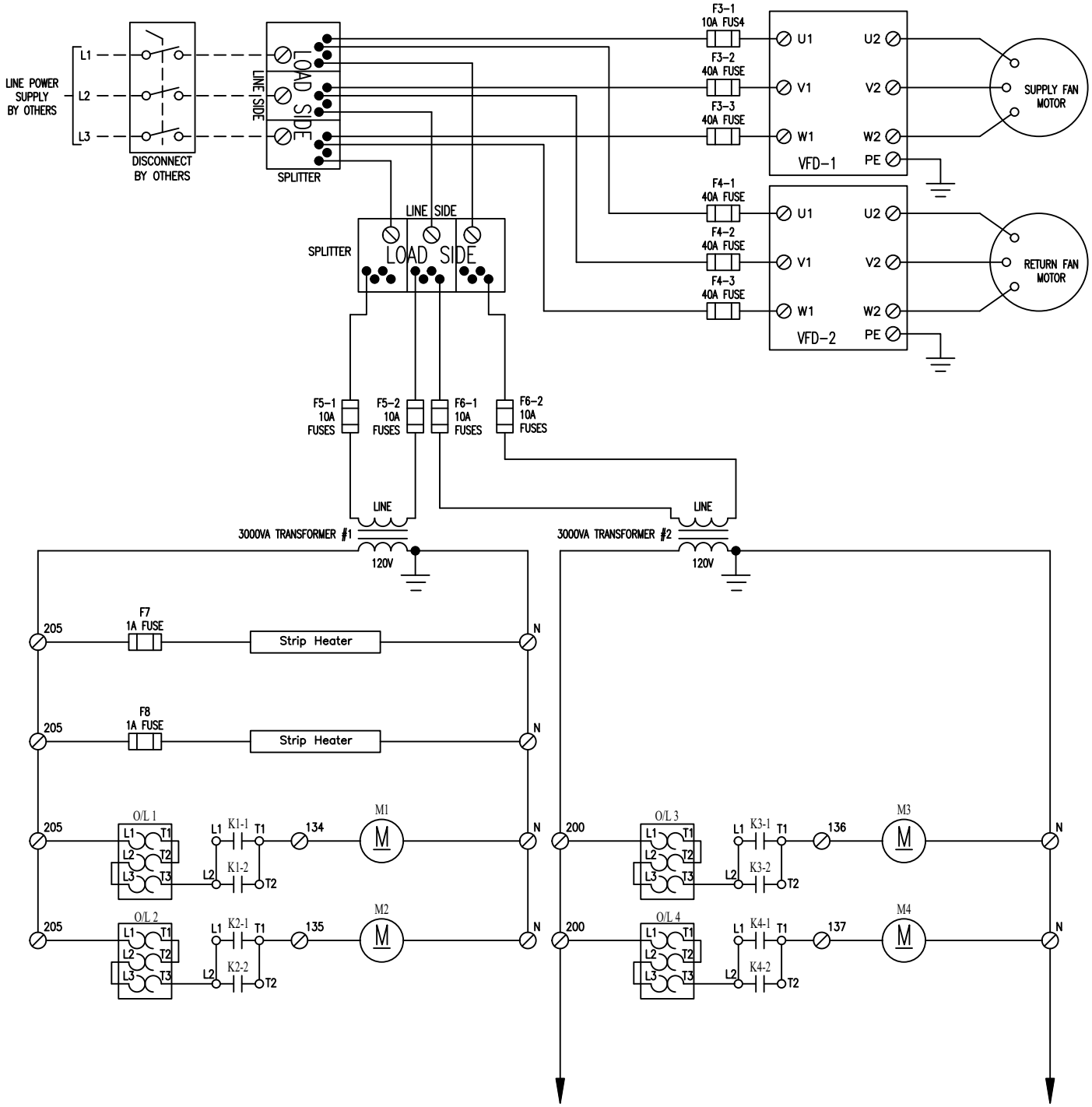
On initial start-up, or after resetting to factory parameters, follow the Start-Up Assistant to enter motor and supply information, use HVAC Default for Application Macro.

Enter Menu, then enter Parameters

P1001 –1	EXT1 Command (DI1 - Two-Wire Start/Stop) (default)
P1102 – 0	Ext 1/Ext 2 Sel (Ext1) (default)
P1201 – 3	Const Speed Sel (DI3) (default)
P1202 – 59.0	Const Speed 1 (DI3) (Hz) **–** Supply Air VFD
P1202 – 54.0	Const Speed 1 (DI3) (Hz) **–** Return Air VFD
P1608 – 0	Start Enable 1 (Not Sel)
P2007– 0.0	Minimum Frequency (Hz) (default)
P2008 – 70.0	Maximum Frequency (Hz)

P9902 – 1 Reset to factory parameters by selecting HVAC DEFAULT (after pressing SAVE press EXIT to return to the main screen, cut off main power and wait until LCD display turns off, re-apply main power).

!! Maximum Reference (Hz) = (maximum fan RPM / maximum motor RPM) * 60Hz **!!**



⊘	TERMINAL BLOCK
○	COMPONENT TERMINAL
◯	REMOTE PANEL TERMINAL
⊠	PLC CONTROLLER TERMINAL
———	UNIT WIRING
═══	REMOTE PANEL WIRING
– – –	FIELD WIRING

LEGEND

F1 – 8	– Fuse	R1 – 6	– Relay
MIB1 – 12	– Limit Switch	K1 – 4	– Motor Starter
S1 & 2	– 3 Pos Switch	M1 – 4	– Damper Actuator
S3	– 2 Pos Switch		

CONTINUED ON DRAWING
INTERNAL WIRING – 2

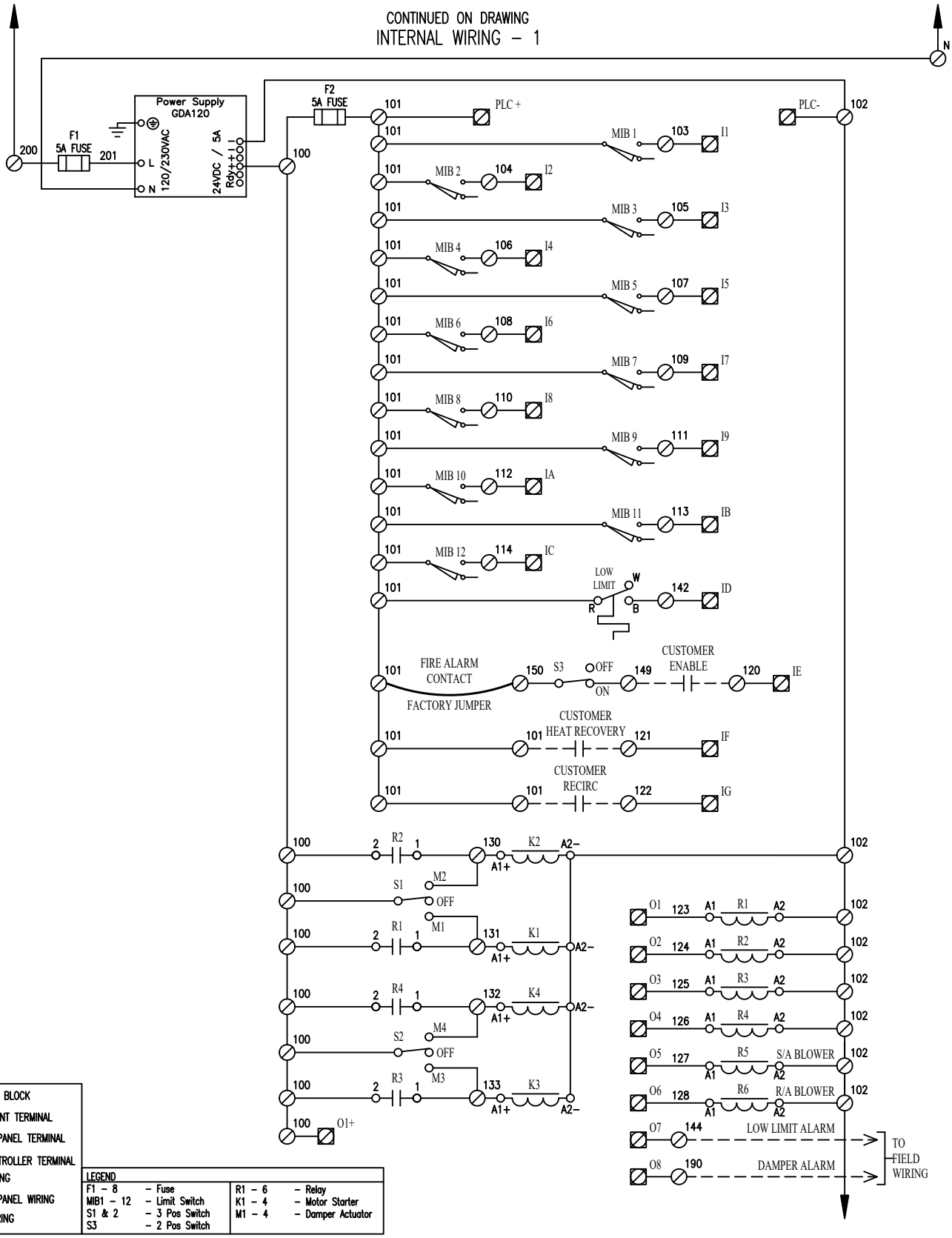
Drawing subject to change without notice

TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Control Wiring (VERTICAL)
SPP, VFD, Neri Motors & O/L.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	INT NERI WIRING 1
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–



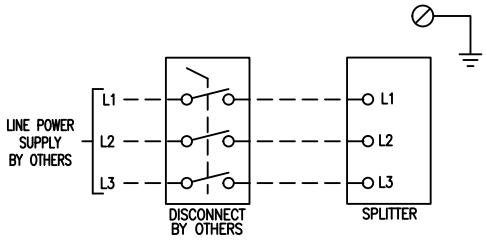
Drawing subject to change without notice

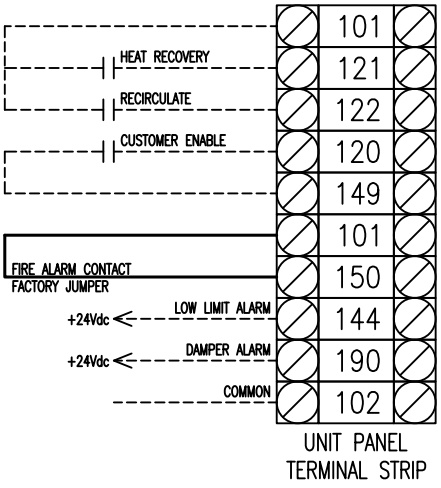
TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Control Wiring (VERTICAL)
SPP, VFD, Low Limit.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	INT NERI WIRING 2
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–





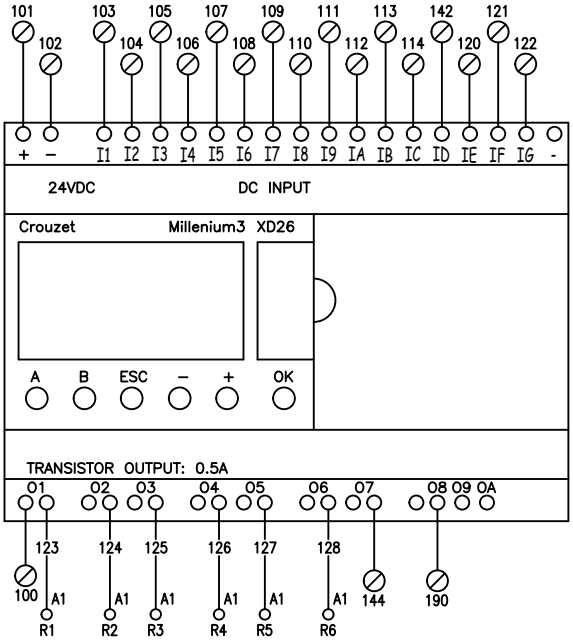
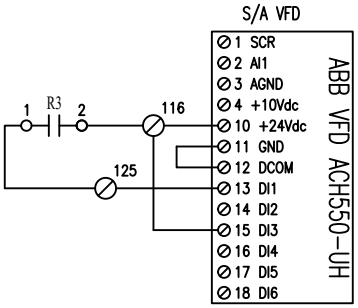
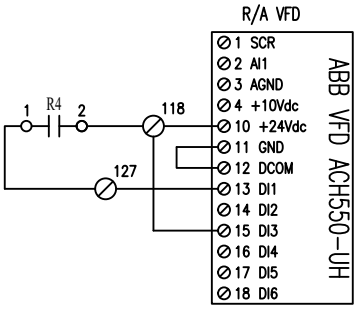


ABB SPEED CONTROL IS DONE IN THE VFD USING PARAMETER 1202 (LOW SPEED).





NOTE(S):

A – IF ANY OF THE ORIGINAL WIRE SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 90°C AND AN 600Vac INSULATION RATING.

B – FIELD WIRING MUST HAVE A TEMPERATURE RATING OF 90°C 600Vac WIRE INSULATION RATING. A MINIMUM WIRE SIZE OF 14AWG MUST BE USED. A MAXIMUM WIRE LENGTH OF 50ft.

C – FIELD WIRING VOLTAGE DROP NOT TO EXCEED 10%.

D – ALL FIELD WIRING SHOWN SHALL BE COMPLETED BY INSTALLER.

E – ALL WIRING TO COMPLY WITH THE NATIONAL ELECTRICAL CODE (NFPA 70-93)

F – IF FIRE ALARM CONTACTS ARE USED, REMOVE THE FACTORY INSTALLED JUMPER FROM TERMINALS 101 & 150. CONNECT THE N.C. FIRE ALARM CONTACTS. IF FIRE ALARM CONTACT OPENS, UNIT SHUTS DOWN. !! FOR OTHER OPERATION OPTIONS, CONTACT FACTORY !!

Drawing subject to change without notice

TEMPEFF NORTH AMERICA

WIRING DIAGRAM

TITLE
Wiring Field (VERTICAL)
SPP, VFD, Low Limit.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	NERI FIELD WIRING
CHK. BY	DATE	JOB NO.	REV
	Jan. 13, 2020		–

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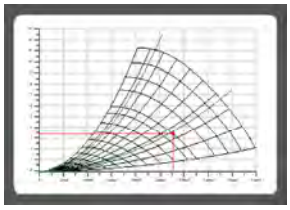
11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	27692 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	3.37 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA36 -**	n Max 1/min	Pw Max BHP	J lb ft²
	1600		353.58



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	4.15	3.37	0.78	10792	1163	75.63	61.45	23.89			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	92 / 65	93 / 77	91 / 82	84 / 80	84 / 84	79 / 80	73 / 74	68 / 67	**97 / 89**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	91 / 65	94 / 78	97 / 88	86 / 83	83 / 83	78 / 79	76 / 77	73 / 71	**100 / 91**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	95 / 69	92 / 76	97 / 88	96 / 93	90 / 90	84 / 85	80 / 81	77 / 76	**102 / 96**

Chart

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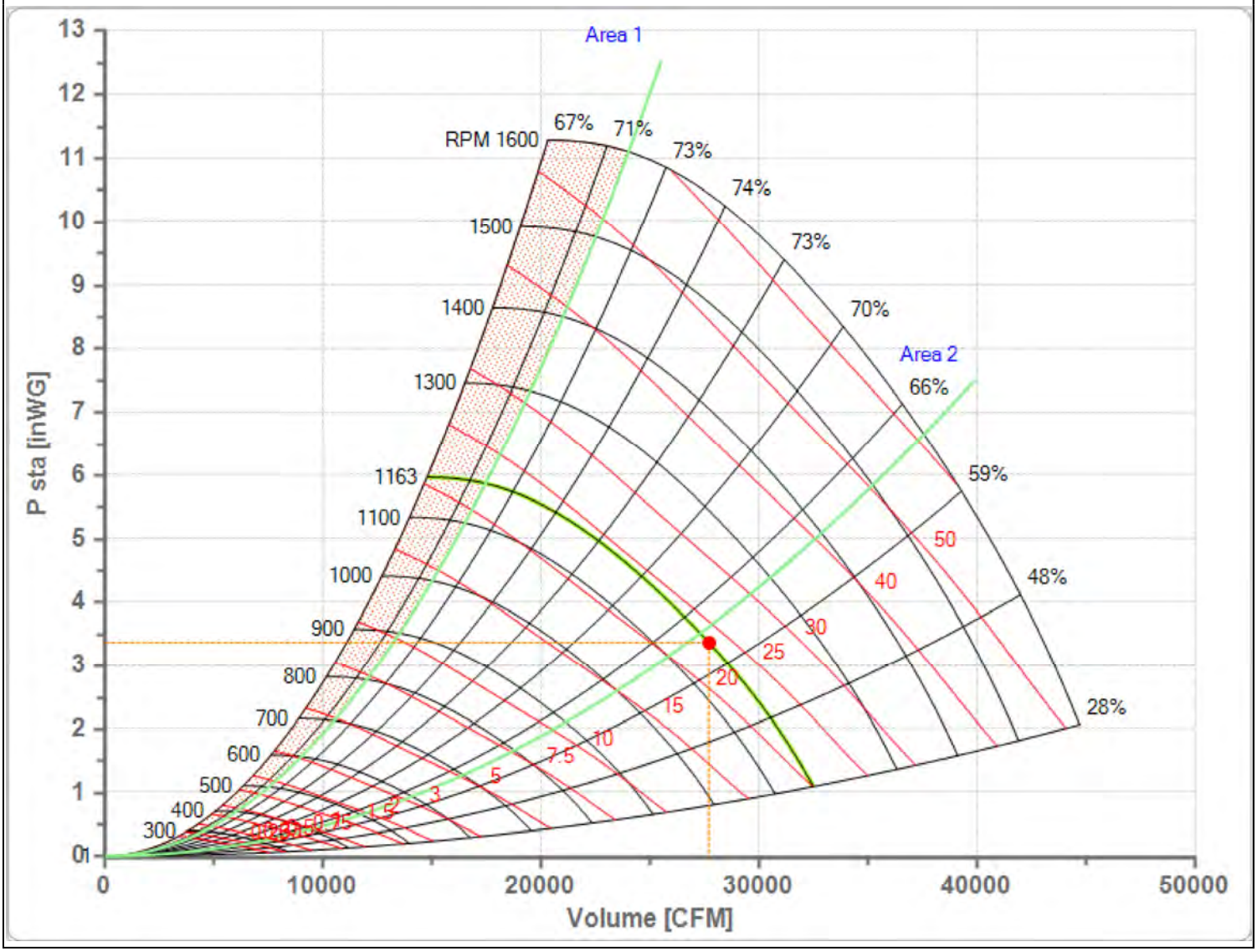
Selected Fan	ANPA36 -	Fan working conditions	Free Inlet - Free Outlet
n Max	1600 1/min	Volume	27692 CFM
Pw Max		Total Pressure	4.15 In.W.G.
P fan	23.89 BHP	Static Pressure	3.37 In.W.G.
J	353.58 lb ft²	eta Tot	75.63 %
Required working point	•	eta Sta	61.45 %
Effective working point	•	RPM	1163 1/min
		Temperature	68.0 °F
		Altitude	0 ft



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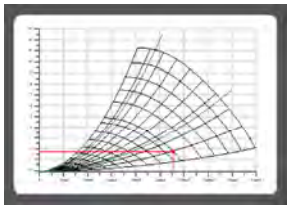
11/12/2019
Aeolus4 1.0.19079.1

Customer			
Project		**Description**	
Your Ref.		**Our Ref.**	Tempeff North America

Input data					
Volume	27692 CFM	**Temperature**	68.0 °F	**Density**	0.075 lb/cu.ft
Static Pressure	1.76 In.W.G.	**Altitude**	0 ft	**Free Inlet - Free Outlet**	

	Catalogue data		
Selected Fan **ANPA36 -**	n Max 1/min	Pw Max BHP	J lb ft²
	1600		353.58



Fan Information											
c ft/min	p tot * In.W.G.	p sta In.W.G.	p dyn ** In.W.G.	tip speed ft/min	RPM 1/min	eta Tot * %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter in
	2.54	1.76	0.78	9771	1053	66.73	46.28	16.57			0.00

(*)Theoric value calculated taking into account the dynamic pressure at the impeller outlet
(**)Theoric value, calculated at the impeller outlet

fm[Hz]	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Tot.**
Lw3 Total Sound Power Level in the inlet duct- Lwi Inlet Duct Sound Power Level includes the effect of duct end correction									
Level Lw3 dB/dB(A)	92 / 66	96 / 80	89 / 81	84 / 81	84 / 84	78 / 79	73 / 74	67 / 66	**99 / 88**
Lw5 Inlet Total Sound Power Level - Lwmi Inlet Sound Power Level (free inlet) do not includes the effect of duct end correction									
Level Lw5 dB/dB(A)	90 / 63	97 / 81	93 / 84	84 / 81	82 / 82	78 / 79	74 / 75	70 / 69	**99 / 89**
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction									
Level Lw6 dB/dB(A)	96 / 70	98 / 82	95 / 86	95 / 92	89 / 89	83 / 84	82 / 83	76 / 75	**103 / 95**

Chart

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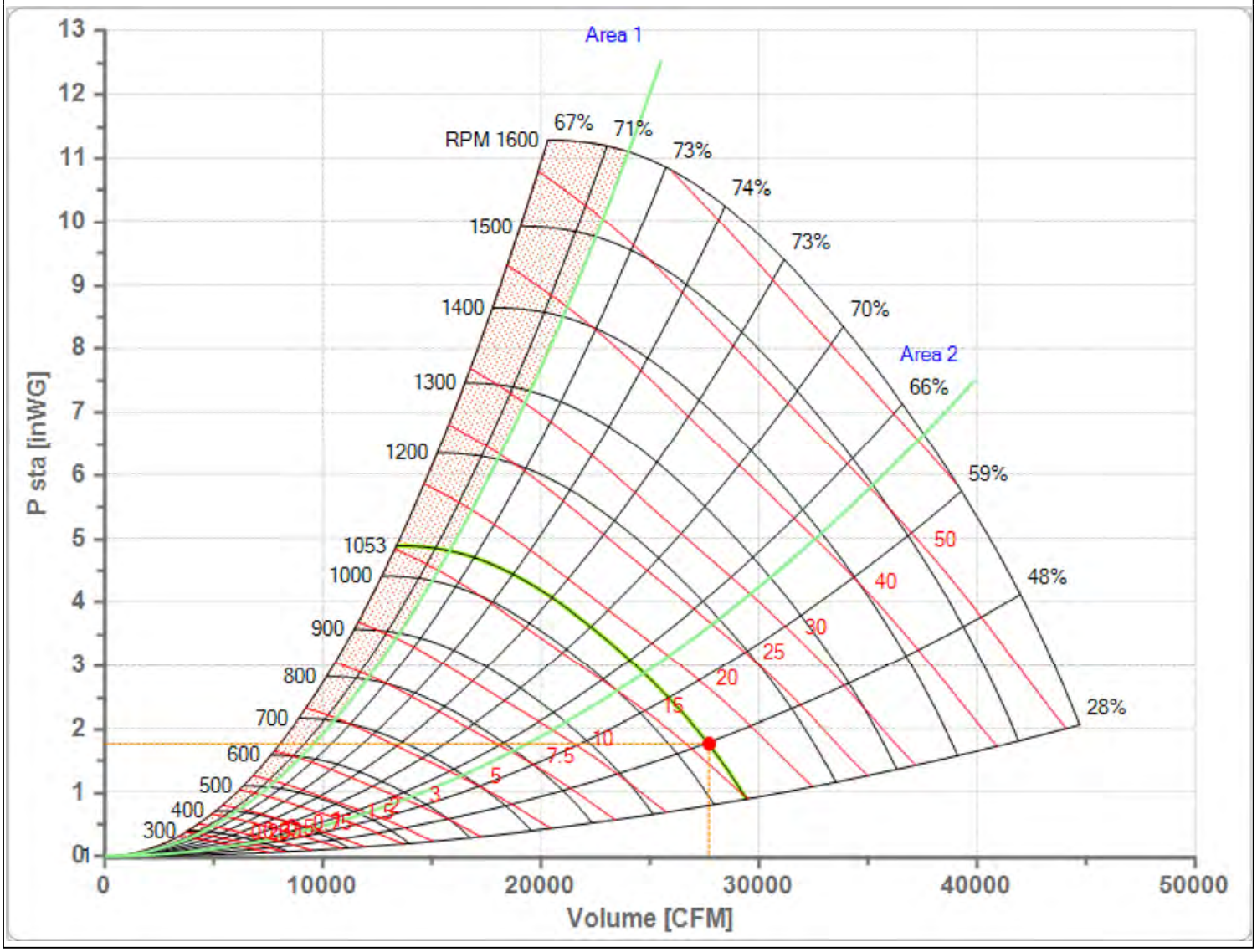
Selected Fan	ANPA36 -	Fan working conditions	Free Inlet - Free Outlet
n Max	1600 1/min	Volume	27692 CFM
Pw Max		Total Pressure	2.54 In.W.G.
P fan	16.57 BHP	Static Pressure	1.76 In.W.G.
J	353.58 lb ft²	eta Tot	66.73 %
Required working point	•	eta Sta	46.28 %
Effective working point	•	RPM	1053 1/min
		Temperature	68.0 °F
		Altitude	0 ft



Dafco Filtration Group®

PRODUCT OVERVIEW

- Standard Capacity (MERV 8) & High Capacity (MERV 10)
- Available in 1", 2" & 4"depths
- Ideal for use in
  - Prefilter for high efficiency filters
  - Office and Retail
  - Manufacturing and Distribution
  - Government and Education facilities
  - Doctor offices, assisted living facilities and Hospitals
  - Hotels and Airports
  - Single and Multi-Family Housing

100% Recycled Paperboard®
MINIMUM 35% POST CONSUMER CONTENT

CANADA GREEN BUILDING COUNCIL • CONSEIL DU BÂTIMENT DURABLE DU CANADA •

AEROSTAR® SERIES 400 PLEAT

WHY THE SERIES 400?

- 100% synthetic pleated media achieves exceptionally high levels of efficiency
  - Does not rely on electrostatic charge
  - Low resistance to air flow means minimal energy costs
  - Moisture resistant and will not promote microbial growth
  - Excellent pre-filter for higher efficiency air filters
  - Effectively removes airborne irritants
  - Protects cooling coils & ductwork of HVAC system
- Durable construction optimizes performance
  - Media laminated to metal grid
  - Minimized media fluttering
  - Design helps maintain pleat uniformity
  - Frame constructed of high wet strength beverage board
  - Will not warp, crack or distort under normal operating conditions

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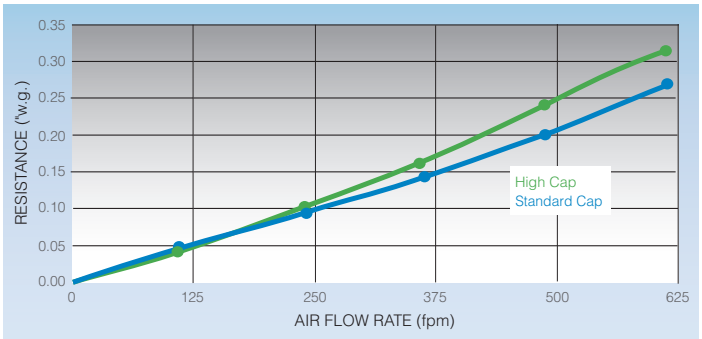
AEROSTAR® SERIES 400 PLEAT

PERFORMANCE DATA (24 x 24)

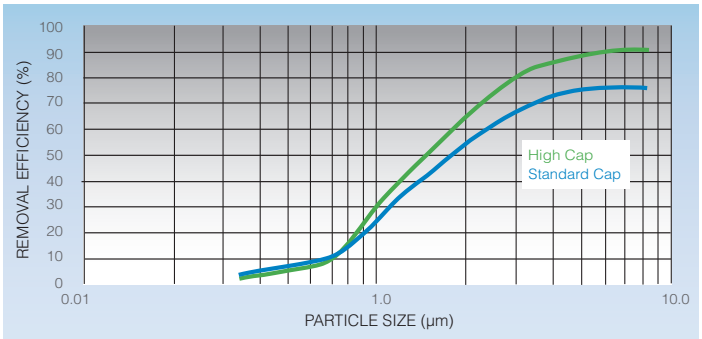
CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
Standard MERV 8	1"	0.14	0.21	–	–	1.0
	2"	–	0.14	0.20	0.27	1.0
	4"	–	0.09	0.14	0.21	1.0

CAPACITY	FILTER DEPTH	INITIAL RESISTANCE ("w.g.) 300 fpm	375 fpm	500 fpm	625 fpm	FINAL RESISTANCE ("w.g.)
High MERV 10	1"	0.20	0.28	–	–	1.0
	2"	–	0.16	0.24	0.32	1.0
	4"	–	0.08	0.17	0.26	1.0

INITIAL RESISTANCE (24 x 24 x 2)



MINIMUM REMOVAL EFFICIENCY (24 x 24 x 2)



PRODUCT DATA

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 300 fpm	375 fpm
10403	10476	8 x 16 x 1	7 ¾ x 15 ¾ x ¾	250	325
10404	10477	10 x 10 x 1	9 ½ x 9 ½ x ¾	200	250
10364	10436	10 x 20 x 1	9 ½ x 19 ½ x ¾	400	525
10405	10478	10 x 24 x 1	9 ⅜ x 23 ⅜ x ¾	500	625
10406	10479	10 x 25 x 1	9 ¾ x 24 ¾ x ¾	525	650
10365	10437	12 x 12 x 1	11 ¾ x 11 ¾ x ¾	300	375
10407	10480	12 x 16 x 1	11 ½ x 15 ½ x ¾	400	500
10366	10438	12 x 20 x 1	11 ½ x 19 ½ x ¾	500	625
10367	10439	12 x 24 x 1	11 ½ x 23 ½ x ¾	600	750
10368	10440	12 x 25 x 1	11 ½ x 24 ½ x ¾	625	775
10369	10441	14 x 20 x 1	13 ½ x 19 ½ x ¾	575	725
10408	10481	14 x 24 x 1	13 ½ x 23 ½ x ¾	700	875
10370	10442	14 x 25 x 1	13 ½ x 24 ½ x ¾	725	900
10371	10443	15 x 20 x 1	14 ½ x 19 ½ x ¾	625	775
10409	10482	15 x 25 x 1	14 ½ x 24 ½ x ¾	800	975
10410	10483	16 x 16 x 1	15 ¾ x 15 ¾ x ¾	525	650
10372	10444	16 x 20 x 1	15 ½ x 19 ½ x ¾	650	825
10411	10484	16 x 24 x 1	15 ½ x 23 ½ x ¾	800	1000
10373	10445	16 x 25 x 1	15 ½ x 24 ½ x ¾	825	1050
10412	10485	18 x 18 x 1	17 ¾ x 17 ¾ x ¾	675	850
10413	10486	18 x 20 x 1	17 ½ x 19 ½ x ¾	750	925
10414	10487	18 x 22 x 1	17 ½ x 21 ½ x ¾	825	1025
10415	10488	18 x 24 x 1	17 ½ x 23 ½ x ¾	900	1125
10374	10446	18 x 25 x 1	17 ½ x 24 ½ x ¾	925	1175
10375	10447	20 x 20 x 1	19 ½ x 19 ½ x ¾	825	1050
10416	10489	20 x 24 x 1	19 ½ x 23 ½ x ¾	1000	1250
10376	10448	20 x 25 x 1	19 ½ x 24 ½ x ¾	1050	1300
10417	10490	22 x 22 x 1	21 ¾ x 21 ¾ x ¾	1000	1250
10377	10449	24 x 24 x 1	23 ½ x 23 ½ x ¾	1200	1500
10378	10450	25 x 25 x 1	24 ½ x 24 ½ x ¾	1300	1625

PART NUMBER STD CAP	PART NUMBER HIGH CAP	NOMINAL SIZE* (H" x W" x D")	ACTUAL SIZE (H" x W" x D")	CFM CAPABILTIES 375 fpm	500 fpm
10418	10491	10 x 10 x 2	9 ¾ x 9 ¾ x 1 ¾	250	350
10379	10451	10 x 20 x 2	9 ½ x 19 ½ x 1 ¾	525	700
10419	10492	12 x 20 x 2	11 ½ x 19 ½ x 1 ¾	625	825
10380	10452	12 x 24 x 2	11 ⅜ x 23 ⅜ x 1 ¾	750	1000
10381	10453	14 x 20 x 2	13 ½ x 19 ½ x 1 ¾	725	975
10382	10454	14 x 25 x 2	13 ½ x 24 ½ x 1 ¾	900	1200
10383	10455	15 x 20 x 2	14 ½ x 19 ½ x 1 ¾	775	1025
10420	10493	16 x 16 x 2	15 ½ x 15 ½ x 1 ¾	650	875
10384	10456	16 x 20 x 2	15 ½ x 19 ½ x 1 ¾	825	1100
10385	10457	16 x 24 x 2	15 ⅜ x 23 ⅜ x 1 ¾	1000	1325
10386	10458	16 x 25 x 2	15 ½ x 24 ½ x 1 ¾	1050	1400
10421	10494	18 x 22 x 2	17 ½ x 21 ½ x 1 ¾	1025	1375
10387	10459	18 x 24 x 2	17 ⅜ x 23 ⅜ x 1 ¾	1125	1500
10422	10495	18 x 25 x 2	17 ½ x 24 ½ x 1 ¾	1175	1550
10388	10460	20 x 20 x 2	19 ½ x 19 ½ x 1 ¾	1050	1400
10389	10461	20 x 24 x 2	19 ⅜ x 23 ⅜ x 1 ¾	1250	1650
10390	10462	20 x 25 x 2	19 ½ x 24 ½ x 1 ¾	1300	1750
10391	10463	24 x 24 x 2	23 ⅜ x 23 ⅜ x 1 ¾	1500	2000
10392	10464	25 x 25 x 2	24 ½ x 24 ½ x 1 ¾	1625	2150
				500 fpm	625 fpm
10393	10465	12 x 24 x 4	11 ⅜ x 23 ⅜ x 3 ¾	1000	1250
10394	10466	16 x 20 x 4	15 ½ x 19 ½ x 3 ¾	1100	1400
10395	10467	16 x 25 x 4	15 ½ x 24 ½ x 3 ¾	1400	1750
10396	10468	18 x 24 x 4	17 ⅜ x 23 ⅜ x 3 ¾	1500	1875
10397	10469	20 x 20 x 4	19 ½ x 19 ½ x 3 ¾	1400	1750
10398	10470	20 x 24 x 4	19 ⅜ x 23 ⅜ x 3 ¾	1650	2100
10399	10471	20 x 25 x 4	19 ½ x 24 ½ x 3 ¾	1750	2200
10400	10472	24 x 24 x 4	23 ⅜ x 23 ⅜ x 3 ¾	2000	2500
10401	10473	25 x 29 x 4	24 ⅜ x 28 ⅜ x 3 ¾	2525	3150
10402	10474	28 x 30 x 4	27 ⅜ x 29 ⅜ x 3 ¾	2900	3650

* Contact Customer Care for additional sizes and information.

ENGINEERING SPECIFICATIONS

1.0 General

1.1 Filters shall be Aerostar® Series 400 extended surface pleated air filters as manufactured Dafco by Filtration Group.
1.2 Filters shall be available in standard and high capacity configurations and available in nominal depths of 1", 2", and 4".
1.3 Underwriters Laboratories classified to UL 900 and ULC-S111-07.

2.0 Filter Materials of Construction

2.1 Media shall be 100% synthetic, mechanical media that does not support microbial growth.
2.2 Filters shall have a high wet strength beverage board with a cross member design that increases filter rigidity and prevents breaching. Frame shall be recyclable.
2.3 Filters shall have an expanded metal support grid bonded to the air-exiting side of the filter to maintain pleat uniformity and prevent fluttering. Metal support grid shall be recyclable and contain a significant amount of post-consumer and pre-consumer content.

3.0 Filter Performance

3.1 Filters shall be MERV 10/10A in a high capacity configuration and MERV 8/8A in a standard capacity configuration when tested in accordance with ASHRAE 52.2 Test Standard.
3.2 For initial resistance of filters, see Performance Data chart above.
3.3 Filters shall be rated to withstand a continuous operating temperature up to 200˚F.
3.4 Filters shall have a recommended final resistance of 1.0" w.g.

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