

HVAC SUBMITTALS:

Project: Vanilla Bean

Architect: Slate Architecture

Engineer: Dawes Engineering and Design

Contractor: Sleeping Giant Mechanical

Manufacturers Rep: S. Conley Sales, Inc.

Engineers Comments:

1. Control systems for Kitchen HVAC equipment is above and beyond designed. Confirm with owner that this is acceptable.
2. Unless comment is made by engineer items to be considered as reviewed.

<input checked="" type="checkbox"/> REVIEWED	<input type="checkbox"/> REVISE & RESUBMIT
<input checked="" type="checkbox"/> REVIEWED AS NOTED	<input type="checkbox"/> REJECTED/RESUBMIT
<input type="checkbox"/> NOT REVIEWED	<input type="checkbox"/> FOR YOUR INFO

Submittals and Shop Drawings are reviewed for conformance with design intent and general compliance with the Contract Documents only. Notations do not authorize changes to the contract sum or contract time.

"Reviewed" indication and comments may be interpreted by the submitting Contractor as an approval, but does not relieve the Contractor from compliance with the Contract Documents. The Contractor is responsible for conforming and correlating all quantities, dimensions, tolerances, clearances, fabrication, processes, techniques, sequences of construction, compatibility of materials and methods, coordination of their associated work with other trades and subcontractors, performance of work in a safe and satisfactory manner and for full compliance with the Contract Documents.

Ray Dawes

REVIEWED BY:

October 10,2019

DATE:





SUBMITTAL REVIEW

architecture | interiors | planning

Arch. Project No.: 19035

Owner: Melissa Hiltunen

Project Name: Vanilla Bean

Contractor: Pentecost Builders

Date: October 14, 2019

Submitted To: Pentecost Builders

- Reviewed (REV)
- Reviewed – Exceptions Noted (EXN)
- Revise and Resubmit (RAR)
- Rejected (REJ)
- Submit Specific Item (SSI)
- Refer to Consultants

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings/submittal during this review do not relieve Contractor from compliance with the requirements of the plans and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite: information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction: coordination of the Work of all trades: and for performing all work in a safe and satisfactory manner.

COMMENTS/REMARKS:

Grilles and Diffusers to be standard finish

REVIEWED BY: Kelly Axtman

DATE RETURNED: October 14, 2019

Table of Contents:

Kitchen Equipment

- MAU
- Kitchen Hoods
- Kitchen Exhaust fans
- Grease Duct

Spiral Pipe

Volume Dampers

Flex Duct

High Efficiency Take-Offs

Grilles, Registers and Diffusers

ESTIMATED LEAD TIMES OF EQUIPMENT AS OF 10/7/19:

*****Lead Times are working days/weeks to ship from factory*****

****Does not include transit time****

Kitchen Equipment	12 Working Days
• MAU	
• Kitchen Hoods	
• Kitchen Exhaust fans	
• Grease Duct	
Spiral Pipe	3 Weeks
Volume Dampers	4-5 Weeks
Flex Duct	2-3 Weeks
High Efficiency Take-Offs	2-3 Weeks
Grilles, Registers and Diffusers	4-5 Weeks



384 Gallatin Park Dr. Suite 201, Bozeman, MT 59771
(O) 406.585.7333 (F) 406.585.7666

REVIEWED
AS NOTED

Vanilla Bean

Kitchen Equipment

Kitchen Equipment – Captive Aire

TAG: MAU-1 – Captive Aire Model A1-D.250-G10 Direct Drive Direct Fired Heater Unit with 10" Blower in Size #1 Housing with speed control, disconnect switch.

Supply Fan handles 1100 CFM @ 0.430" wc ESP, Fan runs at 1276 RPM.

Heater supplies 99164 BTUs. 100°F Temperature Rise. [Fuel: Natural Gas]

Supply Motor: 1.000 HP, 1 Phase, 115 V, 60Hz, 11.6 FLA, TEAO-ECM (Totally Enclosed Air Over Electronically Commutated Motor)

Down Discharge - Air Flow Right -> Left

- Sloped Filtered Intake for Size #1 Modular Heater.

21.813" Wide x 44.375" Long x 23.375" High.

Includes 2" MV EZ Kleen Metal Mesh Filters.

- RTC Solutions • 40-90°F Discharge Temp Control

- Gas Manifold for DF1 GM - BTU 0 - 550001 - 7 in. w.c. - 14 in. w.c., No Insurance

Requirement (ANSI), BV250-66

- Cooling Interlock Relay. 24VAC Coil. 120V Contacts. Locks out burner circuit when AC is energized.

- Motorized Back Draft Damper 16" X 18" for Size 1 Standard & Modular Heater Units w/Extended Shaft, Standard Galvanized Construction, 3/4" Rear Flange, Low Leakage, TFB120S Actuator Included

- Control panel enclosure heater, includes 200w, 120v heater and thermostat (10 degree setting).

Requires convenience outlet option (power by others). Recommended for winter design temperature less than 0°F.

- GFCI 15 amp Convenience Outlet For Heater Enclosure. Power supply by others - Includes receptacle and J box.

- Low Fire Start. Allows the burner circuit to energize when the modulation control is in a low fire position.

- Gas Pressure Gauge, 0-35", 2.5" Diameter, 1/4" Thread Size

- Gas Pressure Gauge, -5 to +15 Inches Wc., 2.5" Diameter, 1/4" Thread Size

- Freezestat With 10' Sensor. Factory set at 35°F and 10 minutes.

- ECM Wiring Package for supply motors with PWM signal from ECPMO3 prewire.

- MicroMetl Curved Curb

Engineers Comments:

1. Control systems for Kitchen HVAC equipment is above and beyond designed. Confirm with owner that this is ok.



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TAG: KH-1 – Captive Aire Model 6024ND-2-PSP-F - 6ft 0" Long Exhaust-Only Wall Canopy Hood with Front Perforated Supply Plenum with Built-in 3" Back Standoff

- 430 SS Where Exposed
- Fire Cabinet on the Left Side 12.00" Width x 60.00" Length x 24.00" Height (Additional charges may apply for cabinet if not sold with fire system)
- FILTER - 20" tall x 16" (19.625" by 15.625") wide Stainless Steel Captrate Solo filter with hook, ETL Listed. Particulate capture efficiency: 85% efficient at 9 microns, 76% efficient at 5 microns. Used on hoods shipped AFTER 7/27/17.
- Recessed Allanson Round LED fixture and LED Light, 3500 K warm output.
- EXHAUST RISER - Factory installed 10" Diameter X 4" Height
- SUPPLY RISER - 12"x 20" Supply Riser with Volume Dampers
- 1/2 Pint Grease Cup New Style, Flanged Slotted
- FIELD WRAPPER 16.00" High Front, Left, Right
- Electrical Package Installation in Utility Cabinet by Plant.
- BACKSPLASH 122.00" High X 120.00" Long 430 SS Vertical (Includes End Caps & Divider Bars)
- RIGHT QUARTER END PANEL 23" Top Width, 0" Bottom Width, 23" High 430 SS
- LEFT QUARTER END PANEL 23" Top Width, 0" Bottom Width, 23" High 430 SS
- Parts required to mount prewire sensor in capture volume of hood. Sensor installed directly in line with center of riser and in center of capture volume front to back. Sensor supplied from ECP tied to hood.

TAG: KH-2 – Captive Aire Model 5424VHB-G - 4ft 3" Long Condensate Hood, w/ Full Perimeter Gutter

- 430 SS - 100% Application
- EXHAUST RISER - Factory installed 10" Diameter X 4" Height

Fire System #1

ANSUL-3.0 Ansul 3 gallon Fire System in Utility Cabinet (includes pre-piped hood(s) with detection, tank(s), release mechanism, microswitches and pull station).

Includes piping for hood: 1.

MGVA2 GAS VALVE - 2" Mechanical Shutoff Valve (Ansul)(28-55610) - Includes Upstream Strainer assembly

Fire System Hookup

Electrical System #1 - ES-1

SC-111110FP 120V 1 Phase w/ control for 1 Exhaust Fan, 1 Supply Fan, Exhaust on in Fire, Lights out in Fire, Fan(s) On/Off Thermostatically Controlled. Room temperature sensor shipped loose for field installation. Includes 1 Duct Thermostat kit.

Electrical System #2 - ES-2

1st Switch

CASLink Monitoring



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TAG: EF-1 – Captive Aire Model DU85HFA High Speed Direct Drive Centrifugal Upblast Exhaust Fan with speed control (speed control included for single phase only), disconnect switch and 15-3/4" wheel.

Exhaust Fan handles 1200 CFM @ -.840" wc ESP, Fan runs at 1257 RPM.

Exhaust Motor: 0.750 HP, 1 Phs, 115 V, 60Hz, 8.9 FLA, TEAO-ECM (Totally Enclosed Air Over Electronically Commutated Motor)

- Grease Cup for kitchen-duty centrifugal exhaust fans,

Box Dimensions 17-1/8 L X 5-1/16 W X 3-3/4 H (18 GA.) (Includes Down Spout)

- Gasketing - Thermeez Woven Ceramic Tape - 1/4" x 1" with adhesive back - Max Temp 1500°F. To be applied between fan base and grease duct. Ships loose with fan. Gasket length supplied = perimeter of fan base.

- ECM Wiring Package for exhaust motors with PWM signal from ECPMO3 prewire.

- MicroMetl Curved Roof Curb – Knocked down - CW-1910-007 21 x 21 x 24

TAG: EF-2 – Captive Aire Model DU33HFA High Speed Direct Drive Centrifugal Upblast Exhaust Fan with speed control (speed control included for single phase only), disconnect switch and 11-3/4" wheel.

Exhaust Fan handles 650 CFM @ -0.384" wc ESP, Fan runs at 1360 RPM.

Exhaust Motor: 0.333 HP, 1 Phs, 115 V, 60Hz, 4.4 FLA, ODP-ECM (Open Drip Proof Electronically Commutated Motor)

- ECM Wiring Package and Manual or 0-10VDC Control for Exhaust EC motors. RTC Controller (No harness when ordered as a part).

- Bird Screen - 1/2" X 1/2" (5" X 56") Wire Screen for Upblast & Downblast Fans

DU/DR-25H/30H/33H, BDU/BDCR11, Galv after welded wire cloth.

- Gravity Back Draft Damper - with flange, damper is 15" sq., 2" deep, O.D. of flange is 17" sq.

MicroMetl Curved Roof Curb Knocked Down - CW-1910-007 21 x 21 x 24

Captive Aire 0 Clearance Grease Duct

See attached copy of equipment schedule and additional submittal data.

HOOD INFORMATION - Job#4002281

HOOD NO.	TAG	MODEL	LENGTH	MAX. COOKING TEMP.	APPLIANCE DUTY	DESIGN CFM/Ft	TOTAL EXH. CFM	EXHAUST PLENUM RISER(S)					TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG.		SWITCHES			
								WIDTH	LENG.	HEIGHT	DIA.	CFM			VEL.	S.P.	END TO END	ROW	QUANTITY	LOCATION
1	KH-1	6024 ND-2-PSP-F	6' 0"	600 Deg.	Heavy	200	1200			4'	10'	1200	2200	-0.740"	960	430 SS Where Exposed	ALONE	ALONE	1 FAN	
2	KH-2	5424 VHB-G	4' 3"	700 Deg.	N/A	153	650			4'	10'	650	1192	-0.106"	0	430 SS 100%	ALONE	ALONE		

HOOD INFORMATION

HOOD NO.	TAG	FILTER(S)				LIGHT(S)			UTILITY CABINET(S)					FIRE SYSTEM PIPING	HOOD HANGING WT		
		TYPE	QTY.	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	QTY.	TYPE	WIRE GUARD	LOCATION	SIZE	FIRE SYSTEM TYPE	SIZE			ELECTRICAL MODEL #	SWITCHES QUANTITY
1	KH-1	Captrate Solo Filter	4	20"	16"	85% See Filter Spec.	2	Recessed	NO	Left	12"x60"x24"	Ansul R102	3.0	SC-111110FP	1 Light 1 Fan	YES	549 LBS
2	KH-2						0									NO	170 LBS

HOOD OPTIONS

HOOD NO.	TAG	OPTION
1	KH-1	FIELD WRAPPER 16.00' High Front, Left, Right BACKSPLASH 122.00' High X 120.00' Long 430 SS Vertical RIGHT QUARTER END PANEL 23" Top Width, 0" Bottom Width, 23" High 430 SS LEFT QUARTER END PANEL 23" Top Width, 0" Bottom Width, 23" High 430 SS SENSOR-CV

PERFORATED SUPPLY PLENUM(S)

HOOD NO.	TAG	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S)			
							WIDTH	LENG.	DIA.	CFM
1	KH-1	Front	84"	14"	6"	MUA	12"	20"	480	0.128"
						MUA	12"	20"	480	0.128"

SPECIFICATION: CAPTRATE® GREASE-STOP® SOLID FILTER

THE CAPTRATE GREASE-STOP SOLID FILTER IS A SINGLE-STAGE FILTER FEATURING A UNIQUE S-BAFFLE DESIGN IN CONJUNCTION WITH A SLOTTED REAR BAFFLE DESIGN, TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

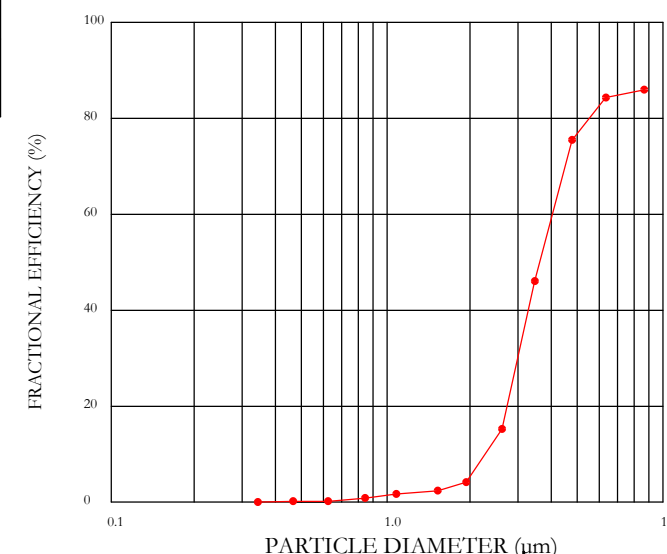
FILTER IS STAINLESS STEEL CONSTRUCTION, AND SIZED TO FIT INTO STANDARD 2-INCH DEEP HOOD CHANNEL(S).

UNITS SHALL INCLUDE STAINLESS STEEL HANDLES AND A FASTENING DEVICE TO SECURE THE TWO COMPONENTS WHEN ASSEMBLED.

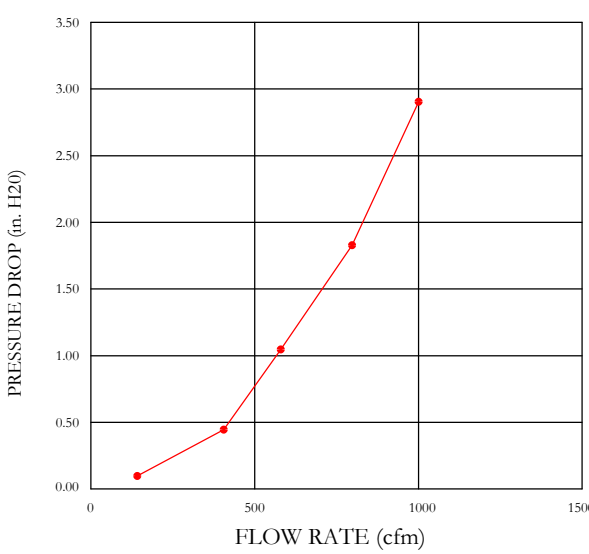
GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS IN SIZE, AND 85% GREASE PARTICLES SEVEN MICRONS IN SIZE AND LARGER, WITH A CORRESPONDING PRESSURE DROP NOT TO EXCEED 1.0 INCHES OF WATER GAUGE.

THE CAPTRATE GREASE-STOP SOLID WAS TESTED TO ASTM STANDARD ASTM F2519-05.

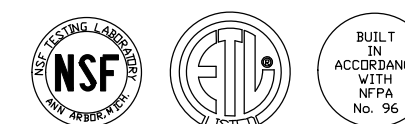
EFFICIENCY VS. PARTICLE DIAMETER



PRESSURE DROP VS. FLOW RATE



CAPTRATE FILTERS ARE BUILT IN COMPLIANCE WITH:
NFPA #96
NSF STANDARD #2
UL STANDARD #1046
INT. MECH. CODE (IMC)
ULC-S649



GREASE DUCT & CHIMNEY SPECIFICATIONS:
PROVIDE GREASE DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW" ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "DW" IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "DW" DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER THE MANUFACTURERS INSTALLATION GUIDE.
PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER. PER MANUFACTURERS LISTING MODEL "DW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12". DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE ACCUMULATION IN HORIZONTAL RUNS.
IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

CAPTIVEAIRE SYSTEMS RECOMMENDS THE USE OF LISTED, PRE-FABRICATED ROUND GREASE EXHAUST DUCT TO REDUCE STATIC PRESSURE IN THE SYSTEM, MINIMIZE INSTALLATION AND INSPECTION TIMES, AND ENSURE DUCT IS LIQUID TIGHT

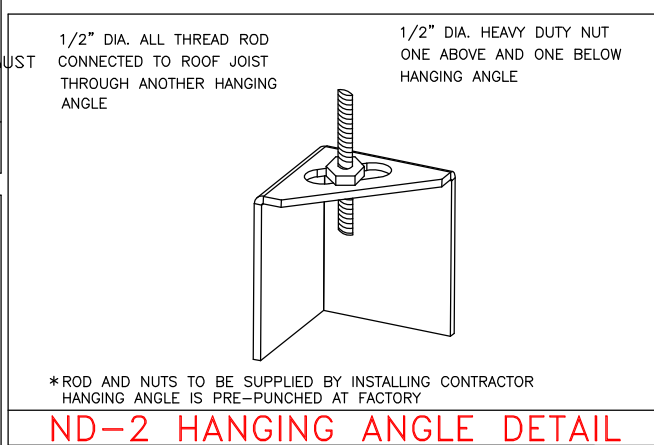
HVAC DISTRIBUTION NOTE
HIGH VELOCITY DIFFUSERS OR HVAC RETURNS SHOULD NOT BE PLACED WITHIN TEN (10) FEET OF THE EXHAUST HOOD. PERFORATED DIFFUSERS ARE RECOMMENDED.

EXHAUST CFM=LENGTH OF HOOD X CFM/LIN.FT. (LOAD)
SUPPLY CFM=EXHAUST CFM X PERCENTAGE REQUIRED
TOTAL DUCT AREA=144 X $\frac{CFM}{FPM(*)}$
DUCT LENGTH= $\frac{TOTAL DUCT AREA}{DUCT DEPTH}$

*CAPTIVE-AIRE VENTILATOR DUCT SIZES ARE CALCULATED USING AN EXHAUST VELOCITY OF 1600-1800 FPM AND A SUPPLY VELOCITY OF 1000 FPM. PLEASE CONSULT FACTORY FOR MAXIMUM ALLOWABLE DUCT SIZES

ETL LISTING DESCRIPTION
THE CAPTIVE AIRE MODEL ND-2 HAS BEEN E.T.L. TESTED, LISTED, AND APPROVED TO EXHAUST A MINIMUM OF 200 CFM PER LINEAR FOOT OVER 600 DEGREE COOKING EQUIPMENT

- ALL ELECTRICAL "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS BY ELECTRICAL CONTRACTORS.
- ALL PLUMBING "FIELD" CONNECTIONS AND RELATED INTERCONNECTIONS BY PLUMBING CONTRACTORS.
- ALL ASSOCIATED HANGER MATERIALS BY INSTALLING CONTRACTORS.
- 8" LONG FACTORY LOCATED AND WELDED HANGER BRACKETS AS SHOWN ON PLANS.
- ALL CONNECTIONS FROM CAPTIVE-AIRE DUCT PER THE PLANS BY MECHANICAL CONTRACTORS.
- ALL LIGHTS SHOWN INSTALLED BY CAPTIVE-AIRE, ARE FACTORY PREWIRED PER THE PLANS. INTERCONNECTIONS BETWEEN HOODS AND TO SWITCHES BY ELECTRICAL CONTRACTOR.
- LAMPS FOR LIGHT FIXTURES BY INSTALLING CONTRACTORS.
- SEISMIC RESTRAINTS ARE RESPONSIBILITY OF INSTALLING CONTRACTOR.
- INSTALLING CONTRACTORS ASSUME ALL RELATED RESPONSIBILITY FOR VERIFICATION OF DIMENSIONAL DATA CONTAINED ON THESE DOCUMENTS FOR ACCURACY, INTEGRATION, AND ADMINISTRATION OF CODE REQUIREMENTS IN EFFECT PRIOR TO ANY RELEASE FOR PRODUCTION OF EQUIPMENT SHOWN.
- SIGNED AND "APPROVED" COPIES OF THIS DOCUMENT MUST BE RECEIVED BY THE FACTORY PRIOR TO COMMENCEMENT OF FABRICATION.
- NOMINAL HOOD DIMENSIONS AS SHOWN ON DRAWINGS.



ND-2 HANGING ANGLE DETAIL

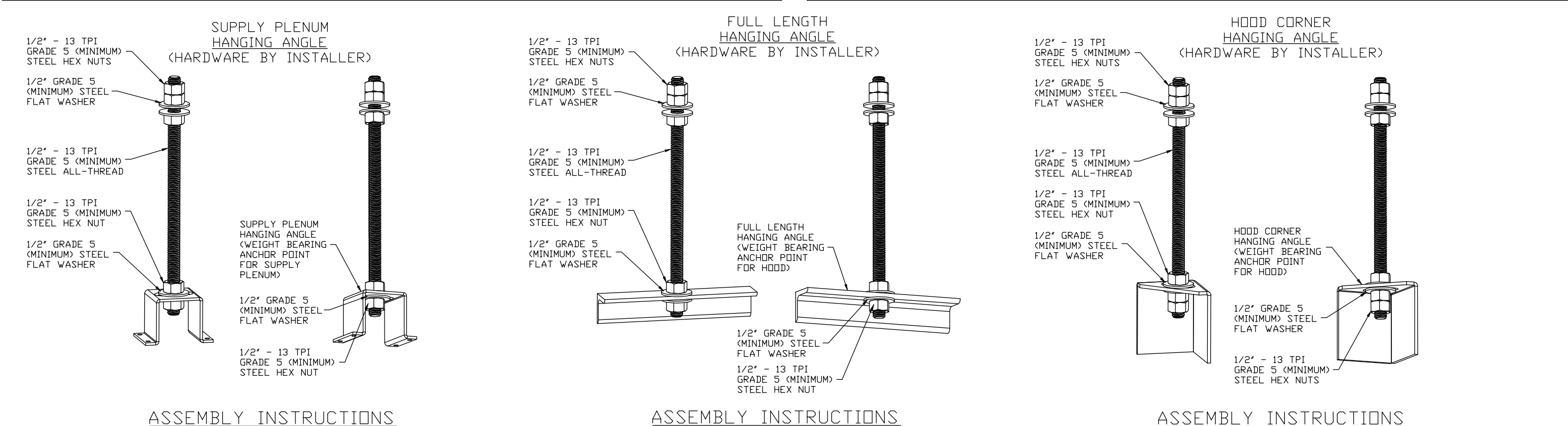
CAPTIVE-AIRE HOODS ARE BUILT IN COMPLIANCE WITH

NFPA #96, NSF
UL 710 & ULC710 STANDARDS
E.T.L. LISTED 3054804-001

* PLEASE NOTE: THE HOOD MAY BE INSTALLED WITH A 0 INCH CLEARANCE TO COMBUSTIBLE MATERIALS IF CONSTRUCTED IN ONE OF THE FOLLOWING METHODS:

- 1 INCH LAYER OF INSULATION (TYPE 475) OWENS CORNING, JOHNS MANVILLE, 3M FIRE WRAP
- 1 INCH INSULATED BACKSPLASH
- 3 INCH AIRSPACE WITH 1" MIN. INSULATION BACK-RETURN (BR) WITH 1" MIN. INSULATION

THESE RATINGS APPLY TO TOP, ENDS, BACK AND FRONT OF THE EXHAUST HOOD
REPORT NUMBER: 3054804-001
INTERTEK TESTING SERVICES NA INC.



ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" - 13 TPI GRADE 5 (MINIMUM) ALL-THREAD. SANDWICH HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 (MINIMUM) STEEL FLAT WASHERS AND 1/2" - 13 TPI GRADE 5 (MINIMUM) STEEL HEX NUTS AS SHOWN. MUST USE DOUBLED HEX NUT CONFIGURATION ABOVE CEILING ANCHORS. SINGLE HEX NUT BENEATH HANGING ANGLE IS ACCEPTABLE FOR PSP HANGING ANGLES. MAINTAIN 1/4" OF EXPOSED THREADS BENEATH BOTTOM HEX NUT. TORQUE ALL HEX NUTS TO 57 FT-LBS.

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REVISIONS

DESCRIPTION	DATE:

CAPTIVEAIRE

www.captiveaire.com

Montana

123 Birds Eye Trl, Kalispell, MT, 59901 PHONE: (919) 227-5973 EMAIL: reg88@captiveaire.com

Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019

DWG.#:
4002281

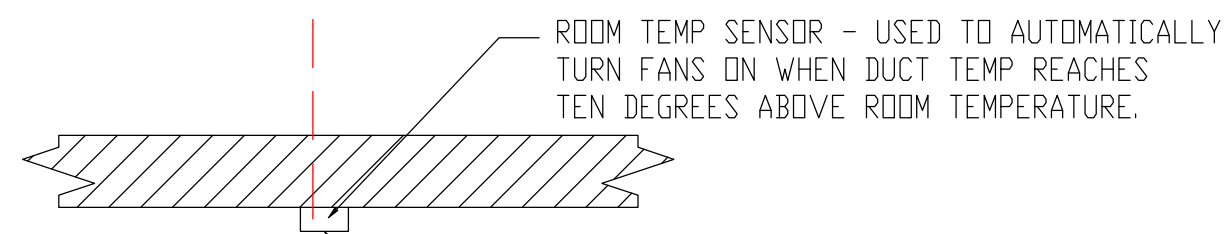
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SCALE:
3/4" = 1'-0"

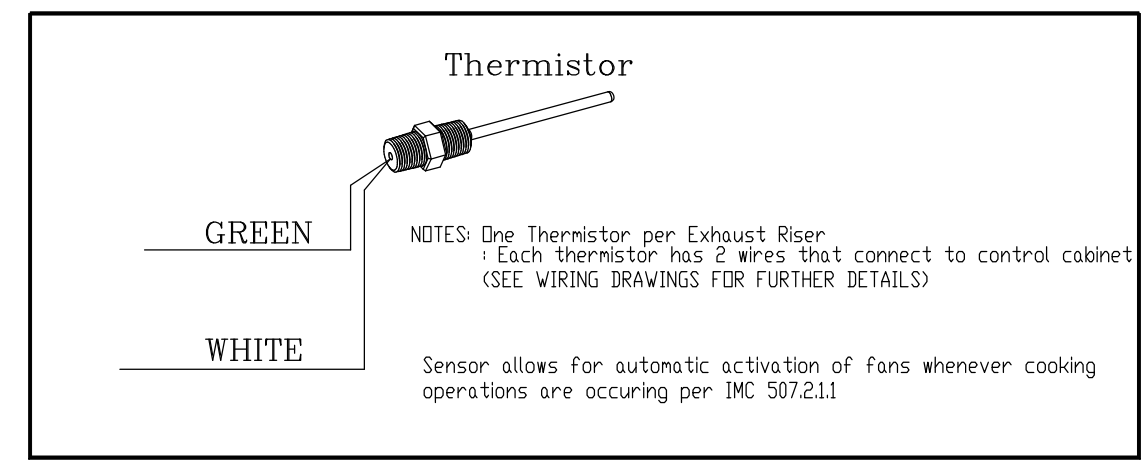
MASTER DRAWING

SHEET NO.
1

FIELD INSTALLED T-STAT WIRE TO CONTROL PANEL



Room Temperature Sensor
-Install on wall somewhere in the space but not directly under the hood or close to an appliance so that the reading is not affected by it. Ideal location is under an HVAC return or next to the HVAC thermostat.



ND-2 Series with PSP Accessory Specification

The model ND-2 with PSP Accessory is a compensating canopy hood rated for all types of cooking equipment. The hood shall have the size, shape and performance specified on drawings.

Construction shall be type 430 stainless steel, with a #3 or #4 polish where exposed. The manufacturer, ETL and NSF shall determine the individual component construction. Construction shall be dependent on the structural application to minimize distortion and other defects. All seams, joints and penetrations of the hood enclosure to the lower outermost perimeter that directs and captures grease-laden vapor and exhaust gases shall have a liquid-tight continuous external weld in accordance with NFPA 96. The hood shall be wall type with a minimum of four connections for hanger rods. Connectors shall have 3/16" holes pre-punched in 1 1/4" x 1 1/2" angle iron at the factory to allow for hanger rod connection by others.

The hood shall be furnished with UL classified filters, supplied in size and quantity as required by ventilator. The filters shall extend the full length of the hood and the filler panels shall not be more than 6' in width.

The hood manufacturer shall supply complete computer generated submittal drawings including hood sections view(s) and hood plan view(s). These drawings must be available to the engineer, architect and owner for their use in construction, operation and maintenance.

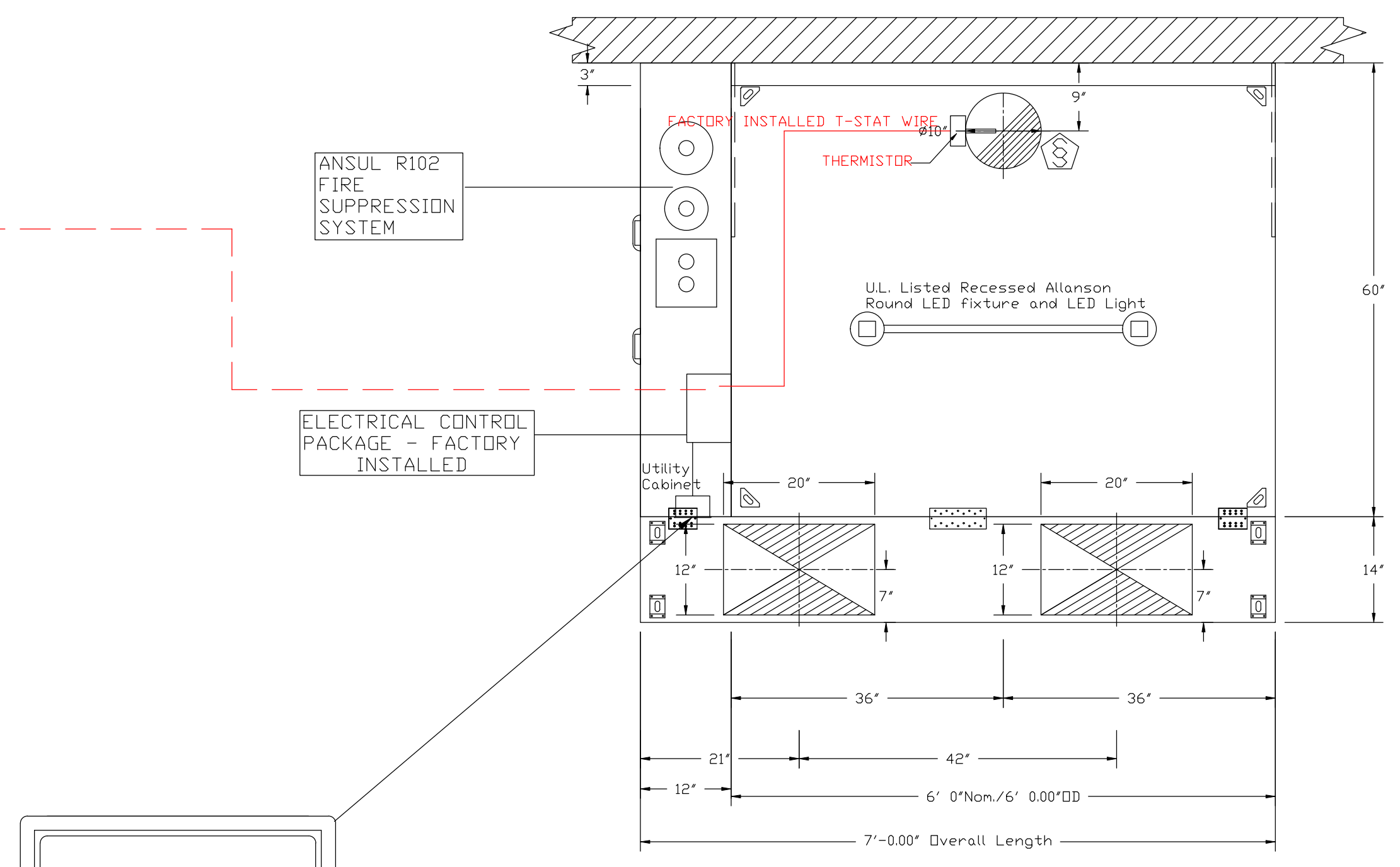
Exhaust duct collar to be 4' high with 1' flange. Duct sizes, CFM and static pressure requirements shall be as shown on drawings. Static pressure requirements shall be precise and accurate; air velocity and volume information shall be accurate within 1-ft increments along the length of the ventilator.

UL incandescent light fixtures and globes shall be installed and pre-wired to a junction box. The light fixtures shall be installed with a maximum of 4'0" spacing on center and allow up to a 100 watt standard light bulb.

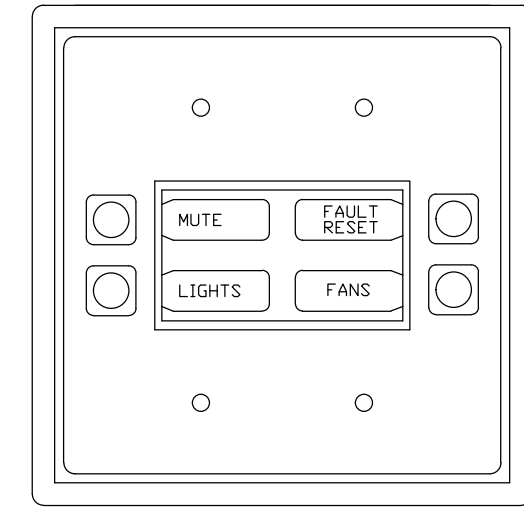
- The hood shall have:
- A double wall insulated front to eliminate condensation and increase rigidity. The insulation shall have a flexural modulus of 475 EI, meet UL 181 requirements and be in accordance with NFPA 90A and 90B.
 - An integral front baffle to direct grease laden vapors toward the exhaust filter bank.
 - A built-in wiring chase provided for outlets and electrical controls on the hood face and shall not penetrate the capture area or require an external chase way.
 - Removable grease cup for easy cleaning.

The hood shall be ETL Listed as "Exhaust Hood Without Exhaust Damper", NSF Listed and built in accordance with NFPA 96.

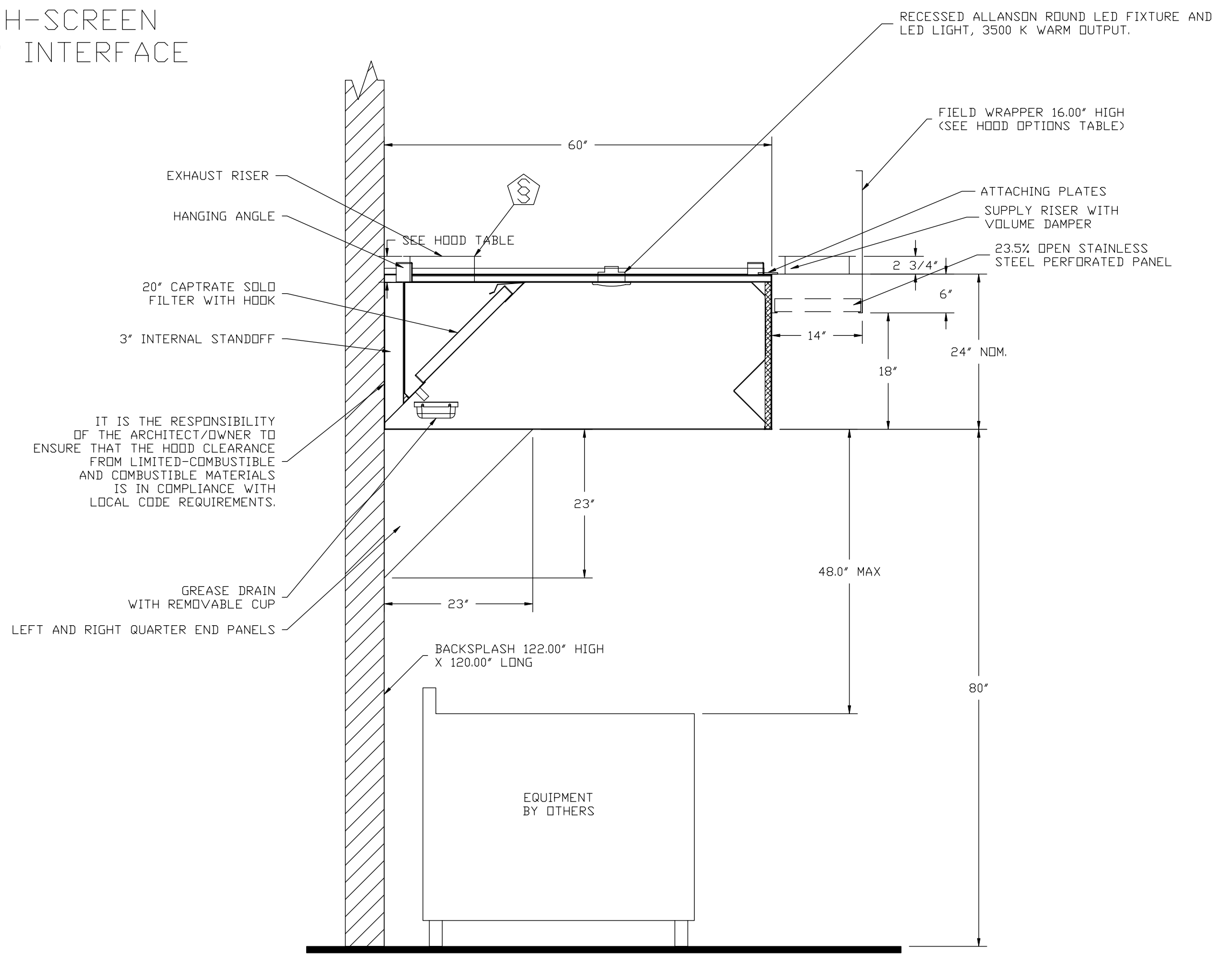
The hood shall be listed for 450°F cooking surfaces at 150 CFM/ft, 600°F cooking surfaces at 200 CFM/ft, and 700°F cooking surfaces at 250 CFM/ft. The hood shall be ETL Listed as "Exhaust Hood Without Exhaust Damper".



PLAN VIEW - Hood #1 (KH-1)
6' 0.00" LONG 6024ND-2-PSP-F



TOUCH-SCREEN USER INTERFACE



SECTION VIEW - MODEL 6024ND-2-PSP-F
HOOD - #1 (KH-1)

REVISIONS	
DESCRIPTION	DATE

www.captiveair.com

CAPTIVE AIR

Montana
123 Birds Eye Trl, Kalispell, MT, 59901 PHONE: (919) 227-5973 EMAIL: reg88@captiveair.com

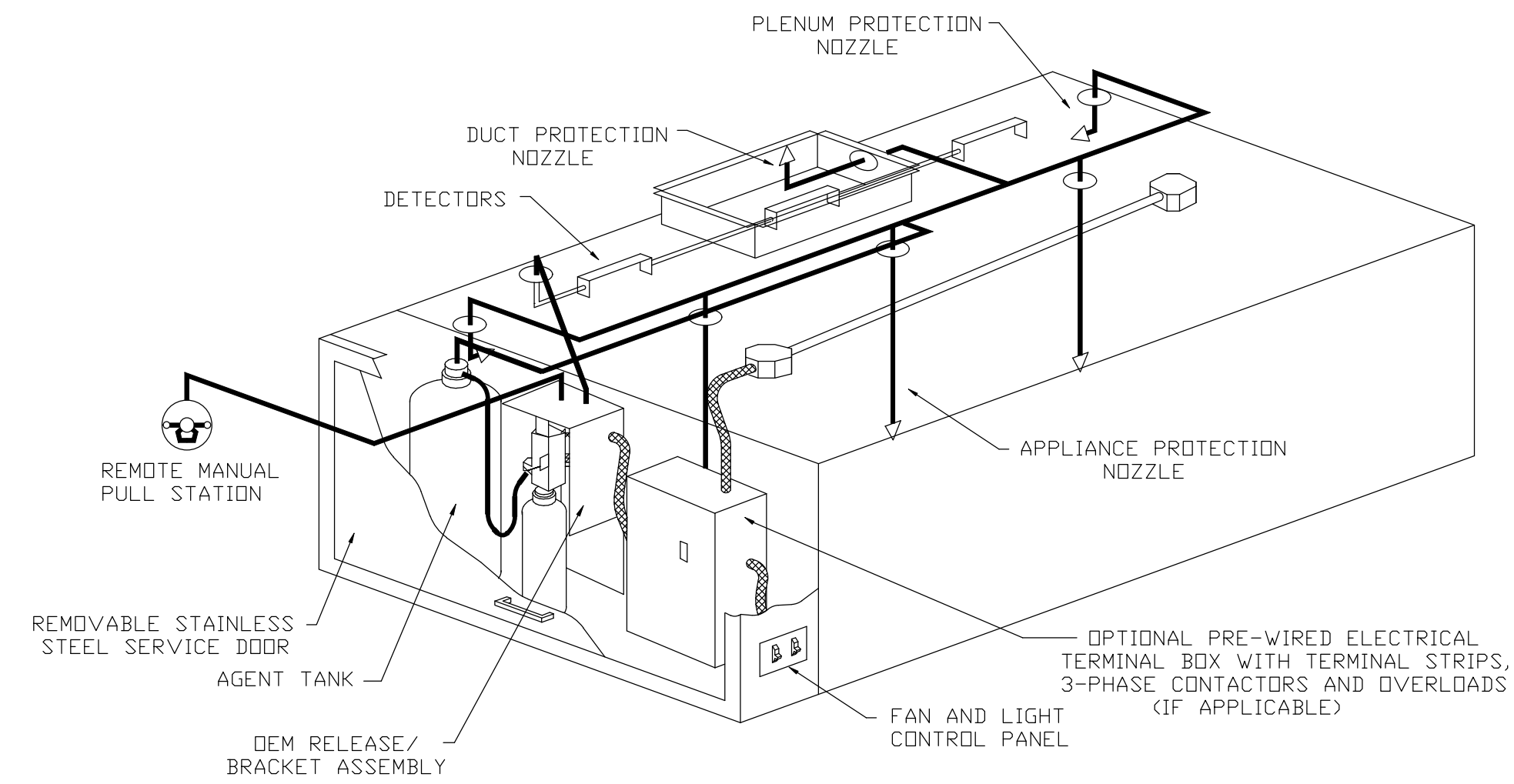
Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019
DWG.#: 4002281
DRAWN BY: ZM-88
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO.
2

Fire System Information - Job#4002281

FIRE SYSTEM NO.	Tag	TYPE	SIZE	FLOW POINTS	INSTALLATION	
					SYSTEM	LOCATION ON HOOD
1		Ansul R102	3.0	2	Fire Cabinet Left	Left



TYPICAL ANSUL R-102 SYSTEM LAYOUT

SPECIFICATIONS

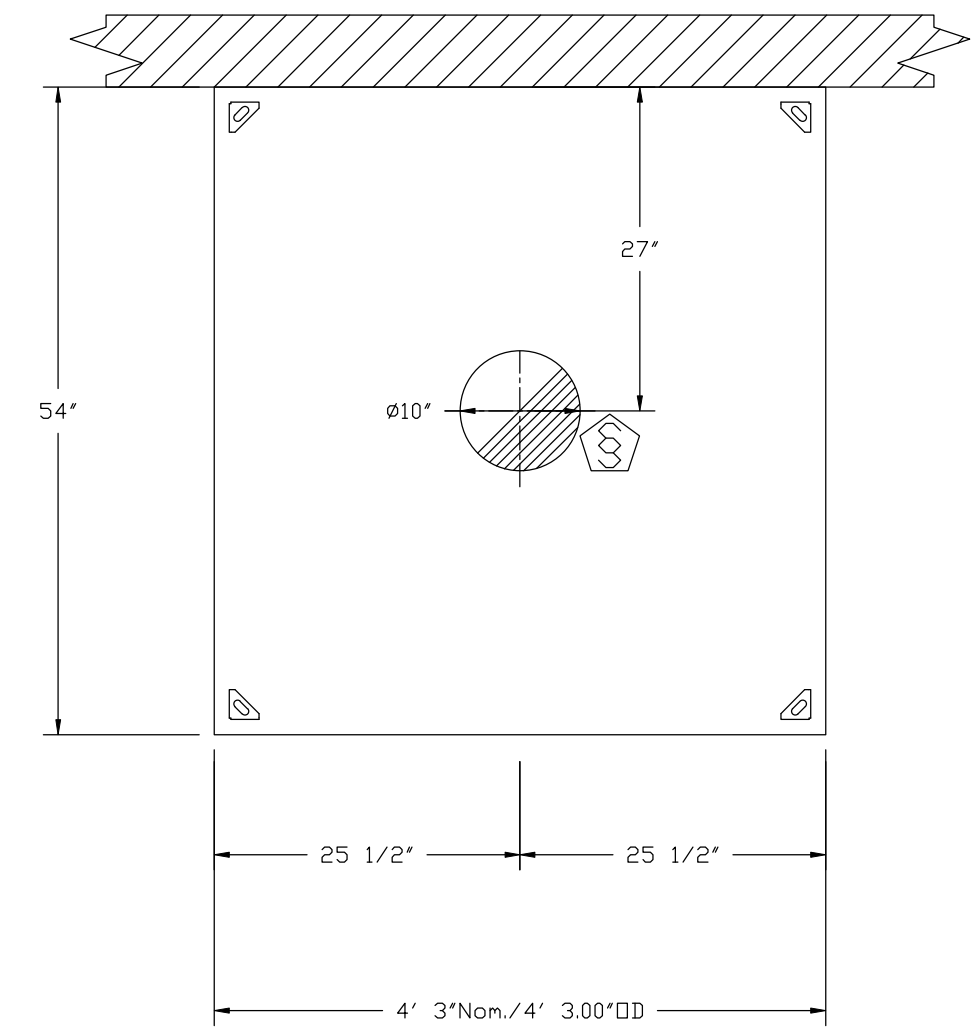
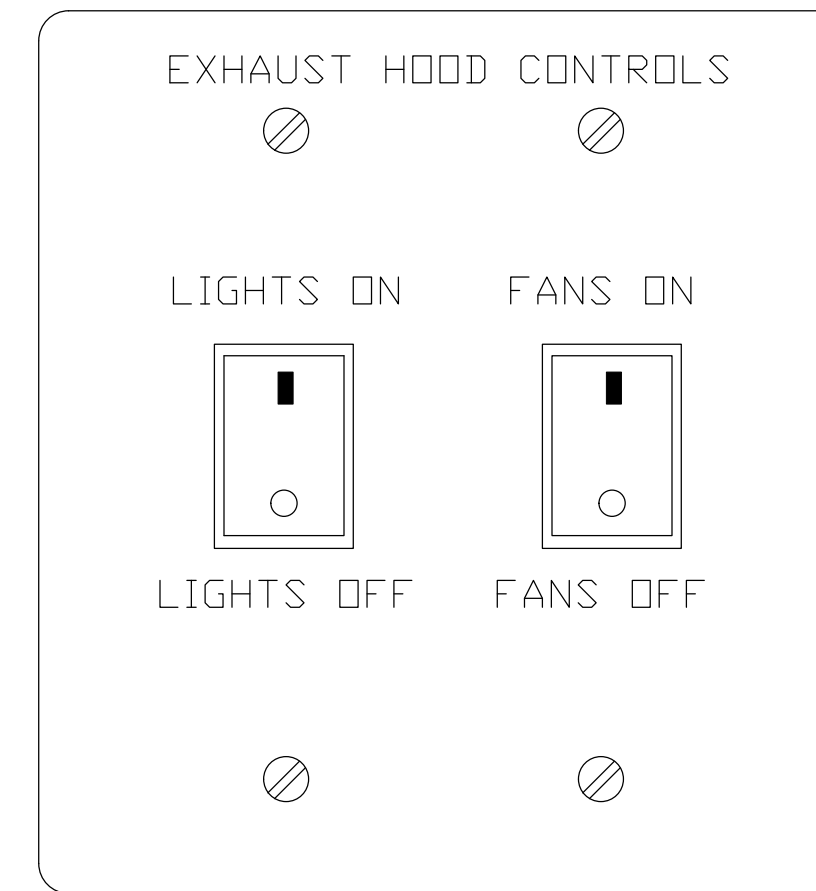
THE RESTAURANT FIRE SUPPRESSION SYSTEM SHALL BE THE PRE-ENGINEERED TYPE WITH A FIXED NOZZLE AGENT DISTRIBUTION NETWORK. IT SHALL BE LISTED WITH UNDERWRITERS LABORATORIES, INC. (UL)

THE SYSTEM SHALL BE CAPABLE OF AUTOMATIC DETECTION AND ACTUATION WITH LOCAL OR REMOTE MANUAL ACTUATION. ACCESSORIES SHALL BE AVAILABLE FOR MECHANICAL OR ELECTRICAL GAS LINE SHUT-OFF APPLICATIONS.

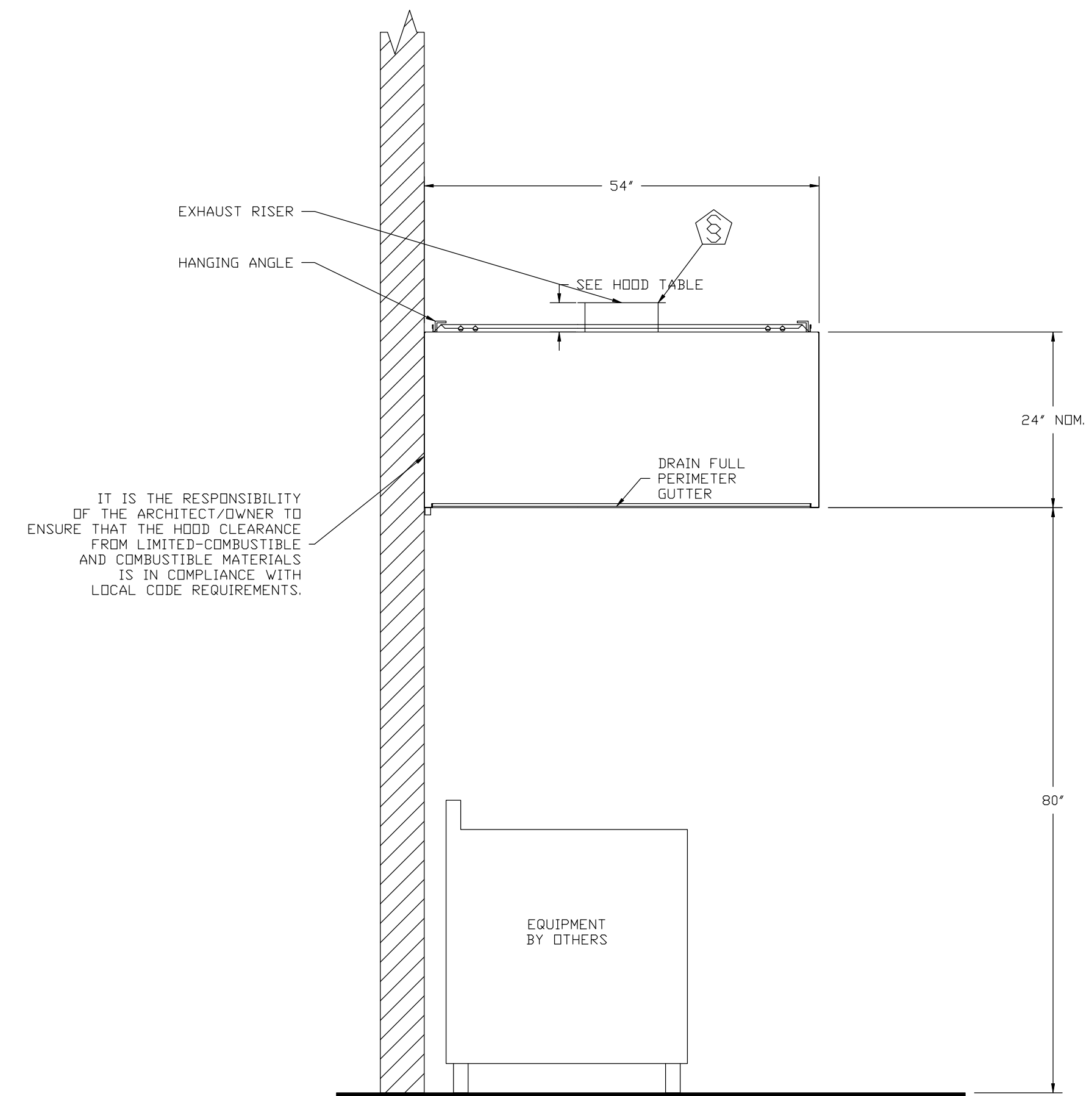
THE EXTINGUISHING AGENT SHALL BE A POTASSIUM CARBONATE, POTASSIUM ACETATE-BASED FORMULATION DESIGNED FOR FLAME KNOCKDOWN AND SECUREMENT OF GREASE RELATED FIRES. IT SHALL BE AVAILABLE IN PLASTIC CONTAINERS WITH INSTRUCTIONS FOR LIQUID AGENT HANDLING AND USAGE.

THE REGULATED RELEASE MECHANISM SHALL BE COMPATIBLE WITH A FUSIBLE LINK DETECTION SYSTEM. THE FUSIBLE LINK SHALL BE SELECTED AND INSTALLED ACCORDING TO THE OPERATING TEMPERATURE IN THE VENTILATING SYSTEM. THE FUSIBLE LINK SHALL BE SUPPORTED BY A DETECTOR BRACKET/ LINKAGE ASSEMBLY.

DETAIL OF FACE MOUNTED FAN AND LIGHT SWITCH



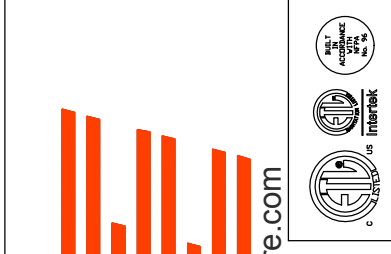
PLAN VIEW - Hood #2 (KH-2)
4' 3.00" LONG 5424VHB-G



SECTION VIEW - MODEL 5424VHB-G
HOOD - #2 (KH-2)

REVISIONS

DESCRIPTION	DATE:



Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019

DWG.#: 4002281

DRAWN BY: ZM-88

SCALE: 3/4" = 1'-0"

MASTER DRAWING

SHEET NO.
3

123 Birds Eye Trl, Kallispeil, MT, 59901 PHONE: (919) 227-5973 EMAIL: reg88@captive.com

EXHAUST FAN INFORMATION - Job#4002281

FAN UNIT NO.	TAG	FAN UNIT MODEL #	CFM	ESP.	RPM	H.P.	B.H.P.	Ø	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS.)	SDNES
1	EF-1	DU85HFA	1200	0.840	1176	0.750	0.2570	1	115	8.9	380 FPM	93	12
2	EF-2	DU33HFA	650	0.384	1360	0.333	0.1360	1	115	4.4	322 FPM	67	12.5

MUA FAN INFORMATION - Job#4002281

FAN UNIT NO.	TAG	FAN UNIT MODEL #	BLOWER	HOUSING	MIN CFM	DESIGN CFM	ESP.	RPM	H.P.	B.H.P.	Ø	VOLT	FLA	WEIGHT (LBS.)	SDNES	BURNER EFFICIENCY(%)
3	MAU-1	A1-D.250-G10	G10D	A1-D.250	1000	1100	0.430	1276	1.000	0.2590	1	115	11.6	454	25	92

GAS FIRED MAKE-UP AIR UNIT(S)

FAN UNIT NO.	TAG	INPUT BTUs	OUTPUT BTUs	TEMP. RISE	REQUIRED INPUT GAS PRESSURE	GAS TYPE
3	MAU-1	107787	99164	100 deg F	7 in. w.c. - 14 in. w.c.	Natural

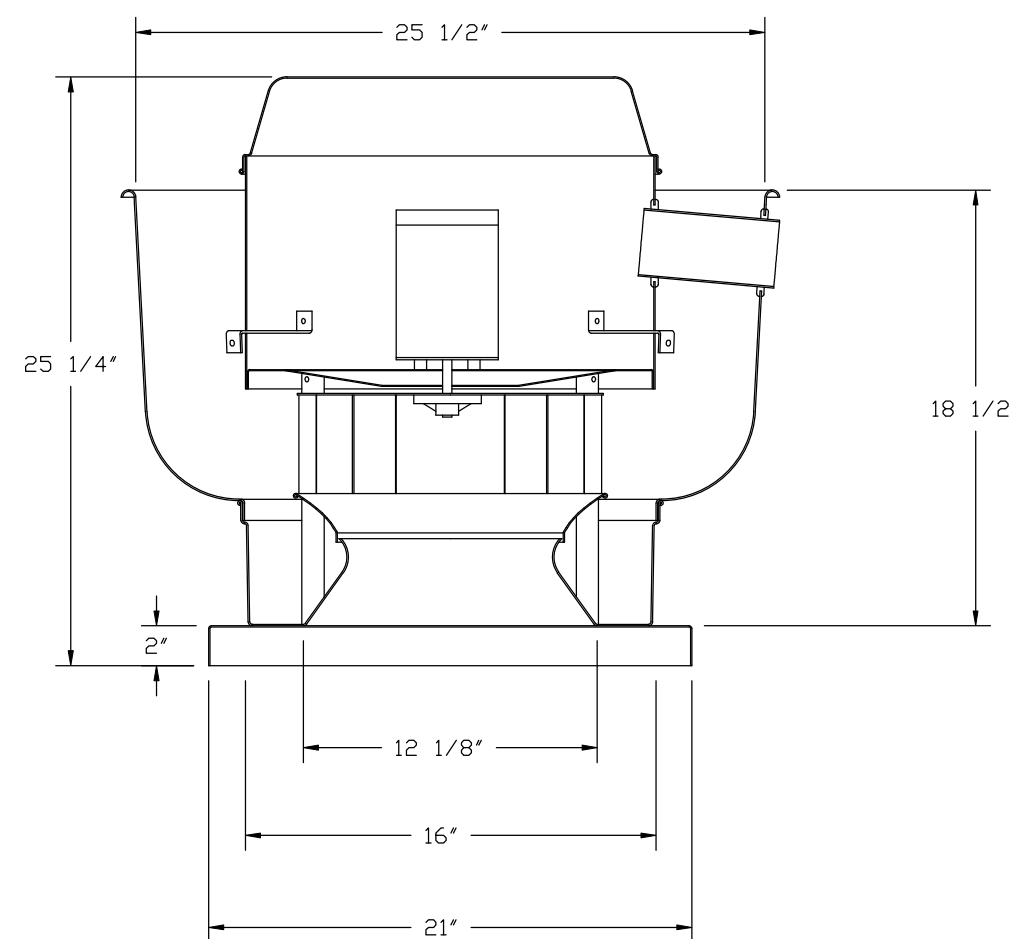
FAN OPTIONS

FAN UNIT NO.	TAG	OPTION (Qty. - Descr.)
1	EF-1	1 - Grease Box
		1 - Fan Base Ceramic Seal - Ship Loose - For Grease Ducts
2	EF-2	1 - ECM Wiring Package - PWM Signal from ECPM03 Prewire (TELCO Motor), CCW Rotation
		1 - ECM Wiring Package-Exhaust - Manual or 0-10VDC Reference Speed Control (NIDEC Motor)
3	MAU-1	1 - SCR-11 Bird Screen
		1 - I 15-BDD Damper
		1 - AC Interlock Relay - 24VAC Coil
		1 - Motorized Backdraft Damper For A1-D Housing
		1 - Control panel enclosure heater. Recommended for winter design temperature less than 0°F.
		1 - Convenience Outlet (GFCI), 15 amp - Requires Separate 120V Connection. Includes receptacle and J box.
		1 - Low Fire Start
		1 - Inlet Pressure Gauge, 0-35"
		1 - Manifold Pressure Gauge, -5 to 15" wc
		1 - Freezestat (10)
1 - ECM Wiring Package-Supply - PWM Signal from ECPM03 Prewire (TELCO Motor), CW Rotation		

FAN ACCESSORIES

FAN UNIT NO.	TAG	EXHAUST			SUPPLY			
		GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1	EF-1	YES						
2	EF-2		YES					
3	MAU-1					YES		

FAN #2 DU33HFA - EXHAUST FAN (EF-2)



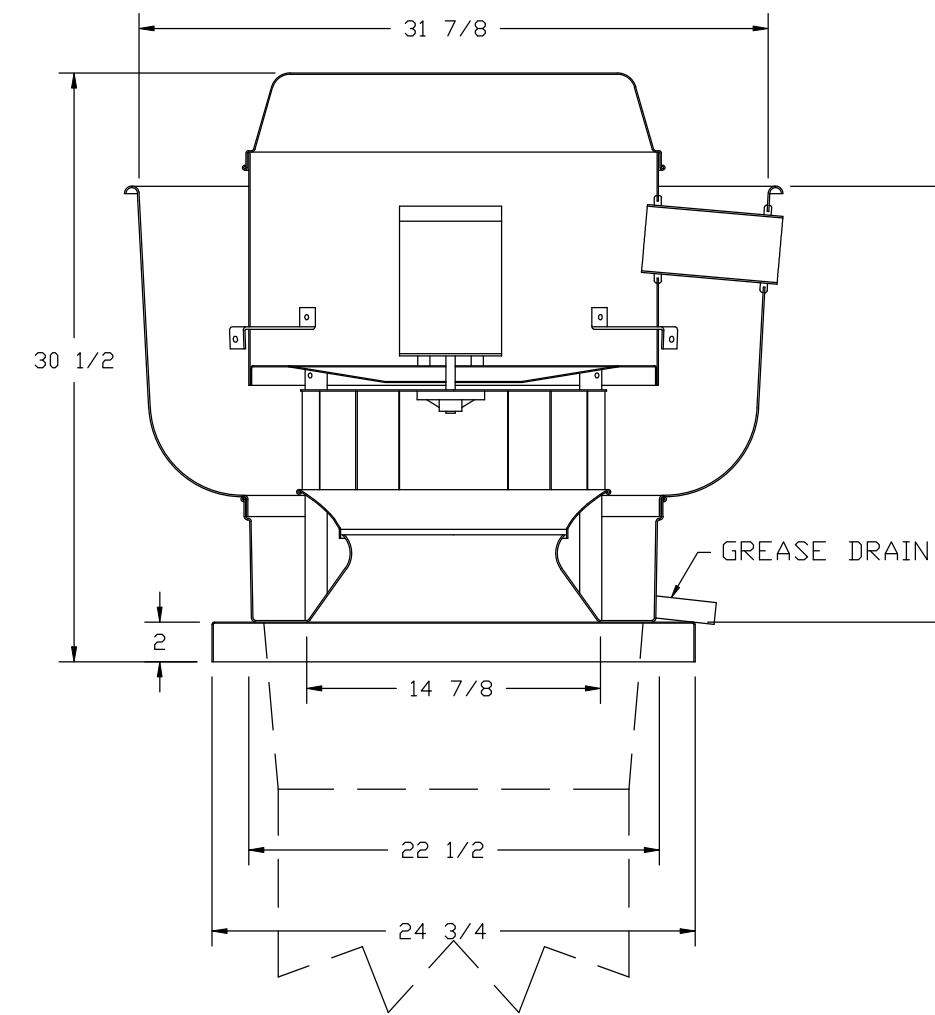
FEATURES:

- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- ROOF MOUNTED FANS
- UL705
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)

OPTIONS

ECM WIRING PACKAGE-EXHAUST - MANUAL OR 0-10VDC REFERENCE SPEED CONTROL (NIDEC MOTOR).
SCR-11 BIRD SCREEN.
I 15-BDD DAMPER.

FAN #1 DU85HFA - EXHAUST FAN (EF-1)



FEATURES:

- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- ROOF MOUNTED FANS
- RESTAURANT MODEL
- UL705 AND UL762 AND ULC-S645
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST

EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST

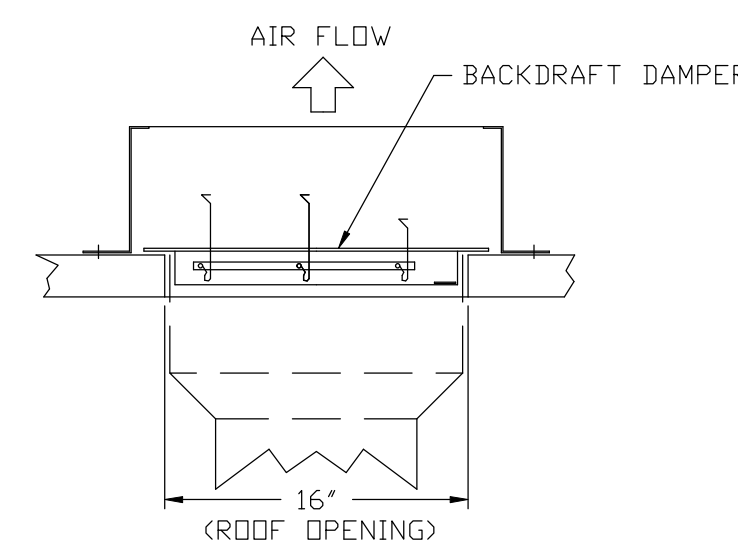
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS

GREASE BOX.
FAN BASE CERAMIC SEAL - SHIP LOOSE - FOR GREASE DUCTS.
ECM WIRING PACKAGE - PWM SIGNAL FROM ECPM03 PREWIRE (TELCO MOTOR), CCW ROTATION.

NOTE ON EF-1 - .84" ESP IS MINIMUM IF DUCT IS STRAIGHT WITH NO BENDS

BACKDRAFT DAMPER INSTALLATION



REVISIONS	
DESCRIPTION	DATE

Montana

123 Birds Eye Trl, Kallispeil, MT, 59901 PHONE: (919) 227-5973 EMAIL: reg88@captiveair.com

Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019
DWG.#: 4002281
DRAWN BY: ZM-88
SCALE: 3/4" = 1'-0"
MASTER DRAWING

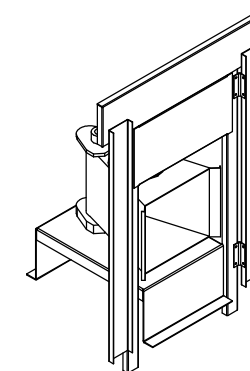
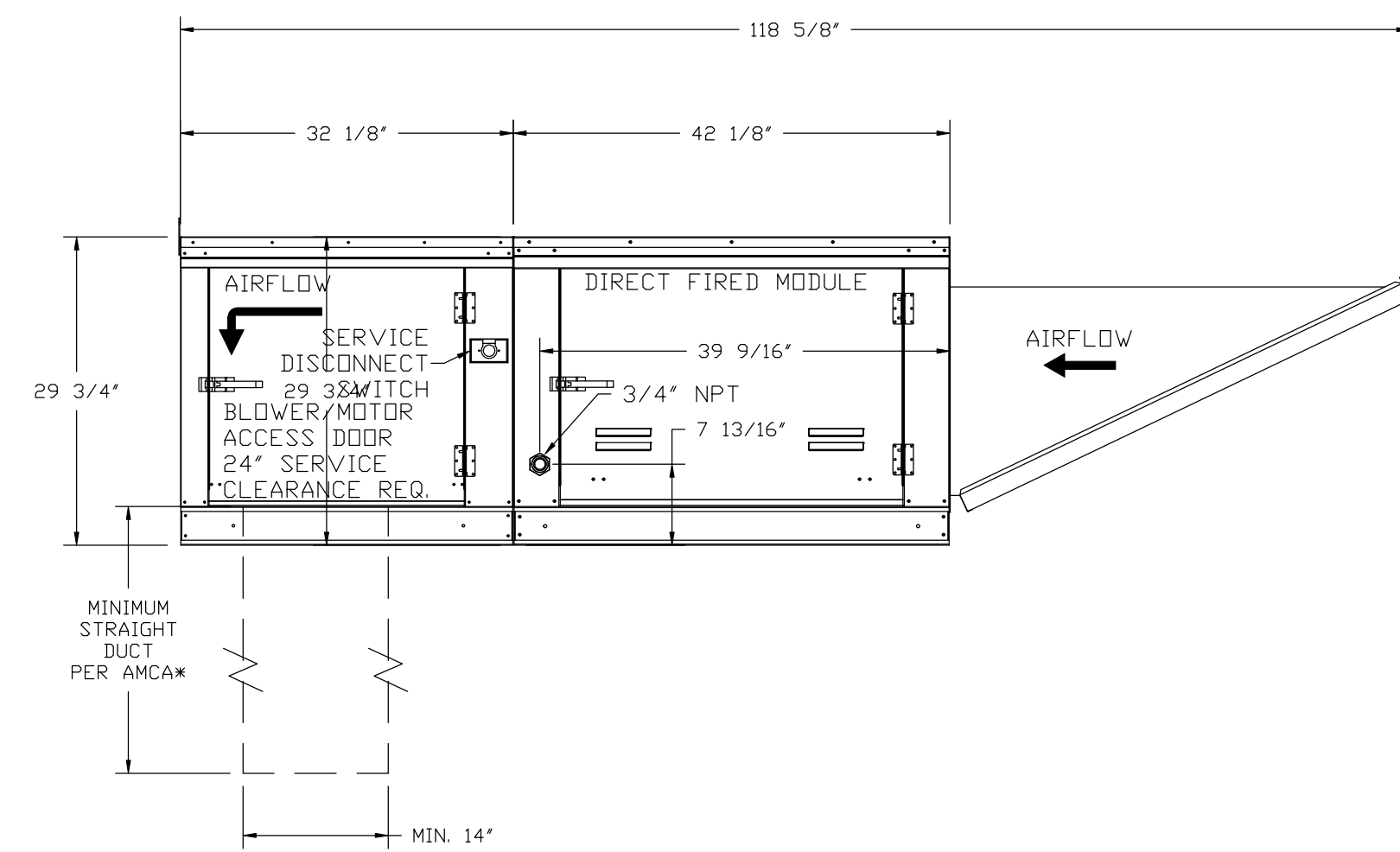
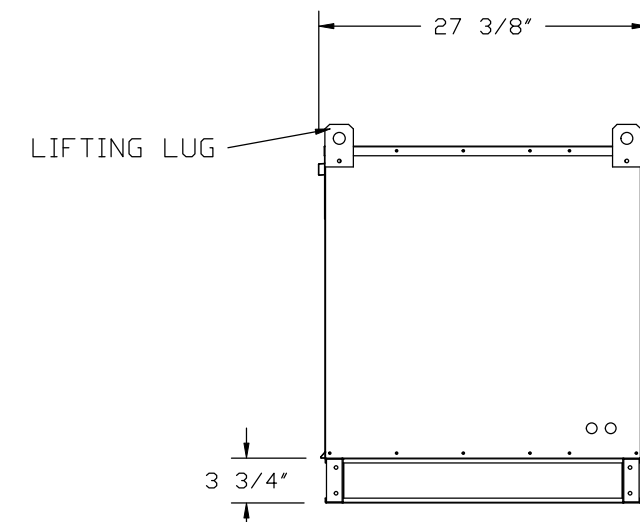
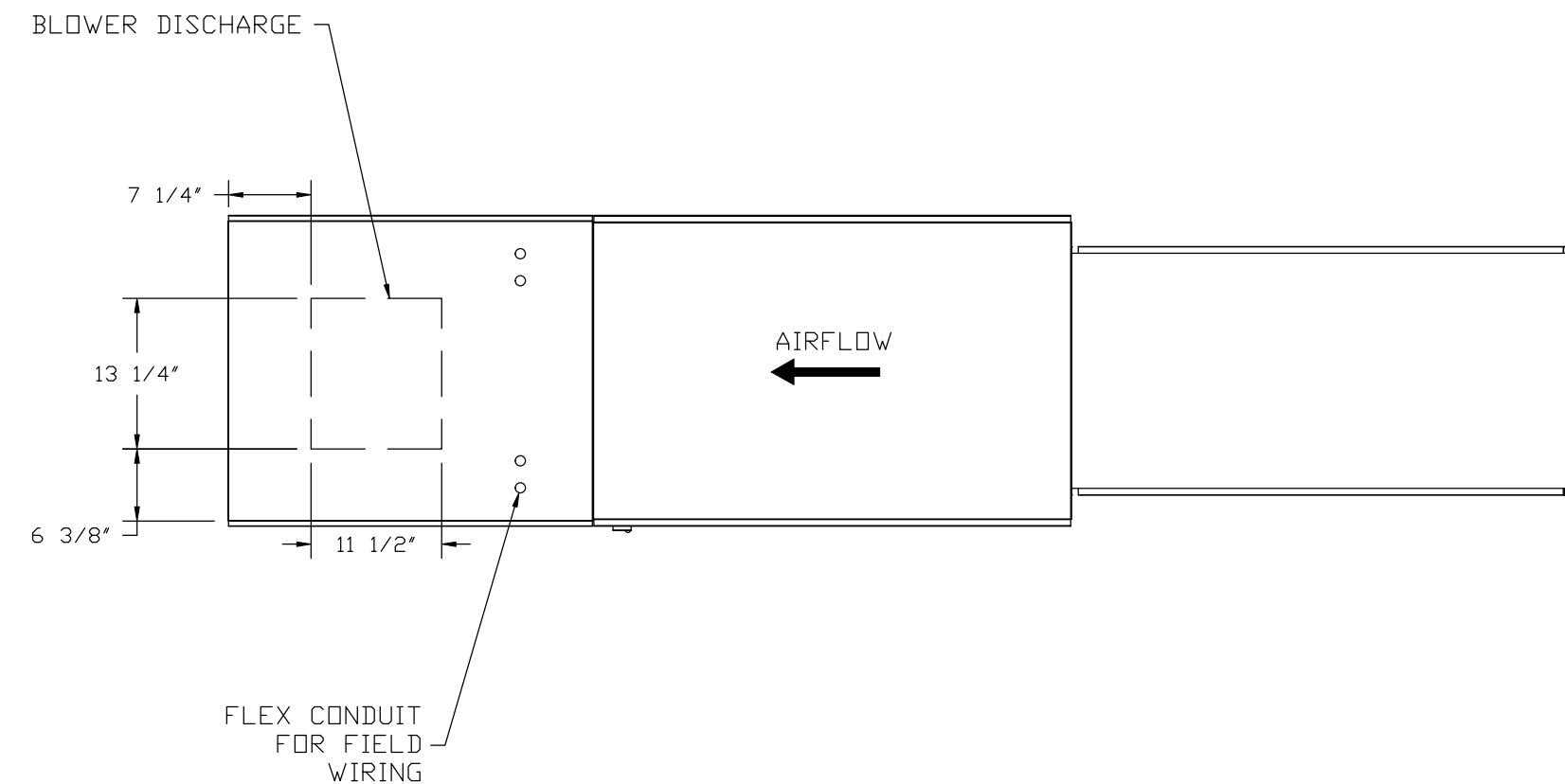
SHEET NO.
4

- FAN #3 A1-D250-G10D - HEATER (MAU-1)
1. DIRECT DRIVE DIRECT FIRED HEATER UNIT WITH 10" BLOWER IN SIZE #1 HOUSING WITH SPEED CONTROL, DISCONNECT SWITCH.
 2. INTAKE HOOD WITH E2 FILTERS
 3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT
 4. COOLING INTERLOCK RELAY, 24VAC COIL, 120V CONTACTS. LOCKS OUT BURNER CIRCUIT WHEN AC IS ENERGIZED.
 5. MOTORIZED BACK DRAFT DAMPER 16" X 18" FOR SIZE 1 STANDARD & MODULAR HEATER UNITS W/EXTENDED SHAFT, STANDARD GALVANIZED CONSTRUCTION, 3/4" REAR FLANGE, LOW LEAKAGE, TF B120S ACTUATOR INCLUDED.
 6. CONTROL PANEL ENCLOSURE HEATER, INCLUDES 200W, 120V HEATER AND THERMOSTAT (10 DEGREE SETTING). REQUIRES CONVENIENCE OUTLET OPTION (POWER BY OTHERS). RECOMMENDED FOR WINTER DESIGN TEMPERATURE LESS THAN 0°F.
 7. GFI 15 AMP CONVENIENCE OUTLET FOR HEATER ENCLOSURE. POWER SUPPLY BY OTHERS - INCLUDES RECEPTACLE AND J BOX.
 8. LOW FIRE START. ALLOWS THE BURNER CIRCUIT TO ENERGIZE WHEN THE MODULATION CONTROL IS IN A LOW FIRE POSITION.
 9. GAS PRESSURE GAUGE, 0-35", 2.5" DIAMETER, 1/4" THREAD SIZE.
 10. GAS PRESSURE GAUGE, -5 TO +15 INCHES WC, 2.5" DIAMETER, 1/4" THREAD SIZE.
 11. FREEZESTAT WITH 10' SENSOR. FACTORY SET AT 35°F AND 10 MINUTES.
 12. ECM WIRING PACKAGE FOR SUPPLY MOTORS WITH PWM SIGNAL FROM ECPM03 PREWIRE.

*NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE AS OUTLINED IN AMCA PUBLICATION 201. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY. FAILURE TO PROPERLY SIZE DUCTWORK MAY CAUSE SYSTEM EFFECTS AND REDUCE PERFORMANCE OF THE EQUIPMENT. SUGGESTED STRAIGHT DUCT SIZE IS 14" X 14"

SUPPLY SIDE HEATER INFORMATION:

WINTER TEMPERATURE = -8°F. TEMP. RISE = 100°F.
 BTUs CALCULATED OFF ACTUAL AIR DENSITY
 OUTPUT BTUs AT ALTITUDE OF 0.0 Ft. = 113896
 INPUT BTUs AT ALTITUDE OF 0.0 Ft. = 123800
 OUTPUT BTUs AT ALTITUDE OF 3783 Ft. = 99164
 INPUT BTUs AT ALTITUDE OF 3783 Ft. = 107787

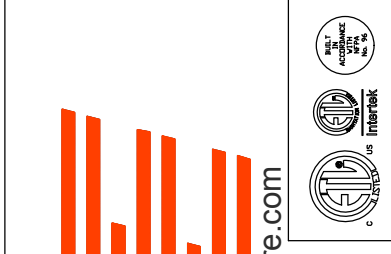


Direct Fired (DF) Profile Plate Assembly

Direct Fired Profile Plate Specifications:
Description:
 Direct Fired burners shall have patented (US Patent No. US6629238B2), self-adjusting profile plates designed to ensure proper air velocity and pressure drop across the burner. Profile plates shall allow burners to achieve clean combustion by limiting by-product levels to a maximum of 5ppm of carbon monoxide (CO), and 10ppm of nitrogen dioxide (NO2). Direct Fired units shall be configured with the blower mounted downstream of the burner. This arrangement will ensure a consistent airflow, regardless of inlet air temperature.
Application:
 Spring-loaded burner profile plates are engineered to automatically react to the momentum of a fresh air stream, without the need for any motors or actuators to mechanically adjust them. With this feature, all DF units are designed for demand control ventilation (DCV) requirements.
Certifications:
 All profile plate assemblies shall be included in the DF unit's ETL listing and comply with combined safety standards ANSI Z83.4 and CSA 3.7 (non-recirculating DF heaters) and ANSI Z83.8 (recirculating DF heaters).
General Construction:
 -Profile plates shall be formed from G90 galvanized steel.
 -Profile plates shall vary in size per unit.
 -Profile plates shall be mounted along the same plane as the discharge of the burner.
 -Design shall incorporate properly torqued, permanently mounted spring hinges.
 -Spring hinges shall be made from plated steel.

REVISIONS

DESCRIPTION	DATE



Vanilla Bean R2
 HELENA, MT, 59601

DATE: 10/1/2019

DWG.#: 4002281


DRAWN BY: ZM-88

SCALE: 3/4" = 1'-0"

MASTER DRAWING

SHEET NO. 5

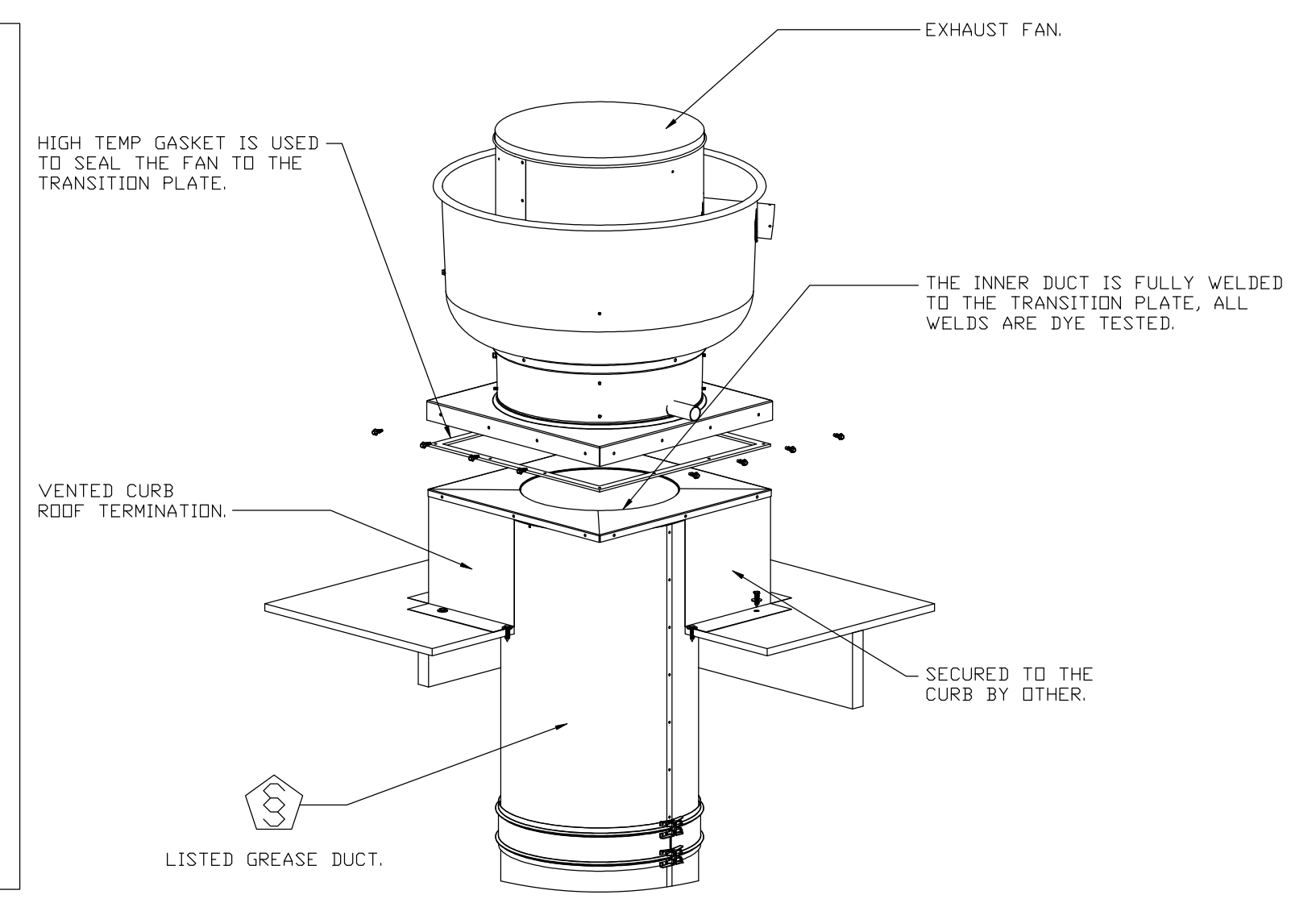
123 Birds Eye Trl, Kallispeil, MT, 59901 PHONE: (919) 227-5973 EMAIL: reg88@captiveaire.com


GREASE DUCT & CHIMNEY SPECIFICATIONS:
 PROVIDE GREASE DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW"
 ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "DW"
 IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING
 CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "DW"
 DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER
 THE MANUFACTURES INSTALLATION GUIDE.
 PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER.
 PER MANUFACTURES LISTING MODEL "DW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE
 SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12".
 DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE
 ACCUMULATION IN HORIZONTAL RUNS.

 IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE
 UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY
 EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE
 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

CUSTOMER APPROVAL TO MANUFACTURE:

Approved as Noted	<input type="checkbox"/>
Approved with NO Exception Taken	<input type="checkbox"/>
Revise and Resubmit	<input type="checkbox"/>
SIGNATURE _____	
Your Title _____ Date _____	



REVISIONS	
DESCRIPTION	DATE:



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Vanilla Bean R2
 HELENA, MT, 59601

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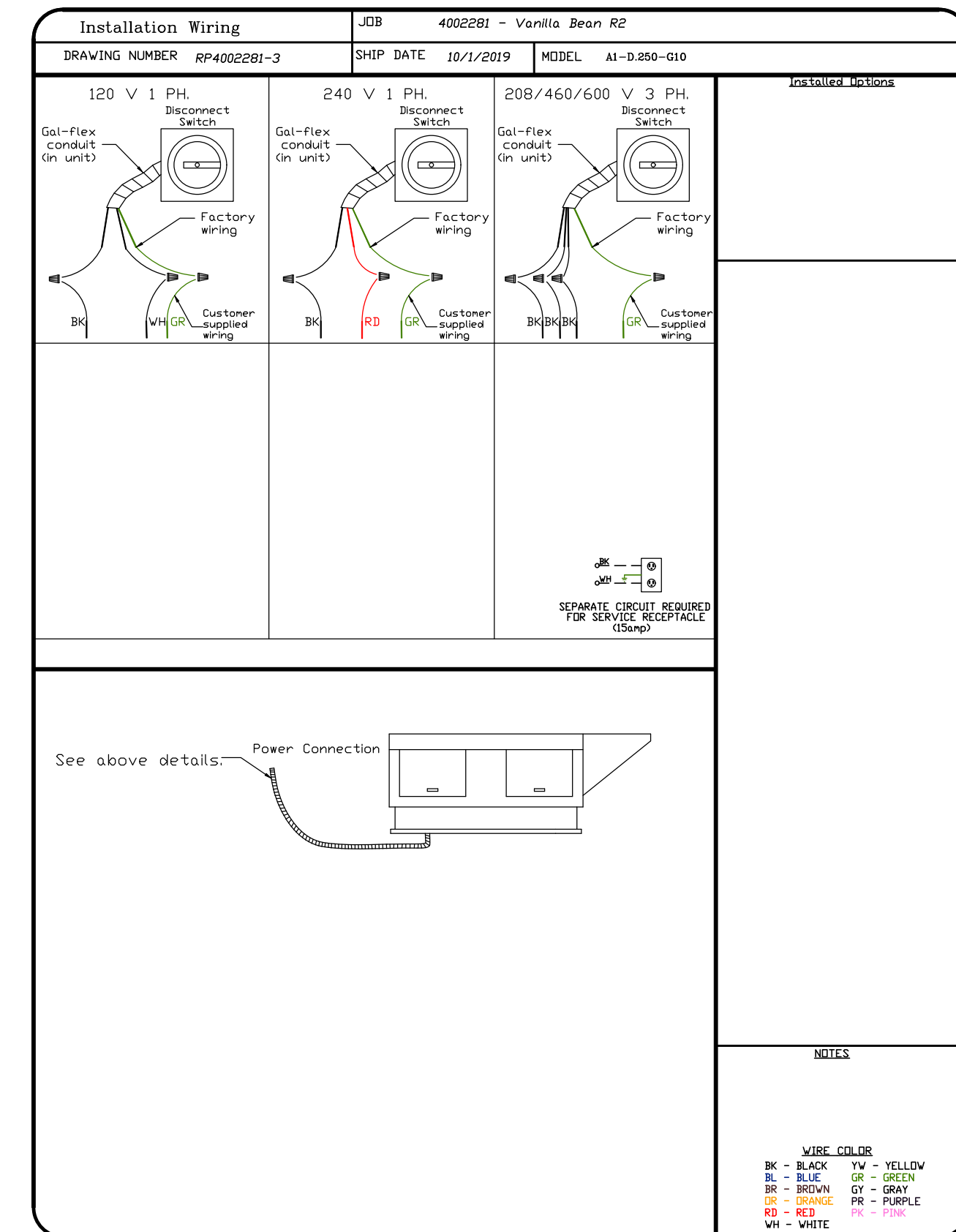
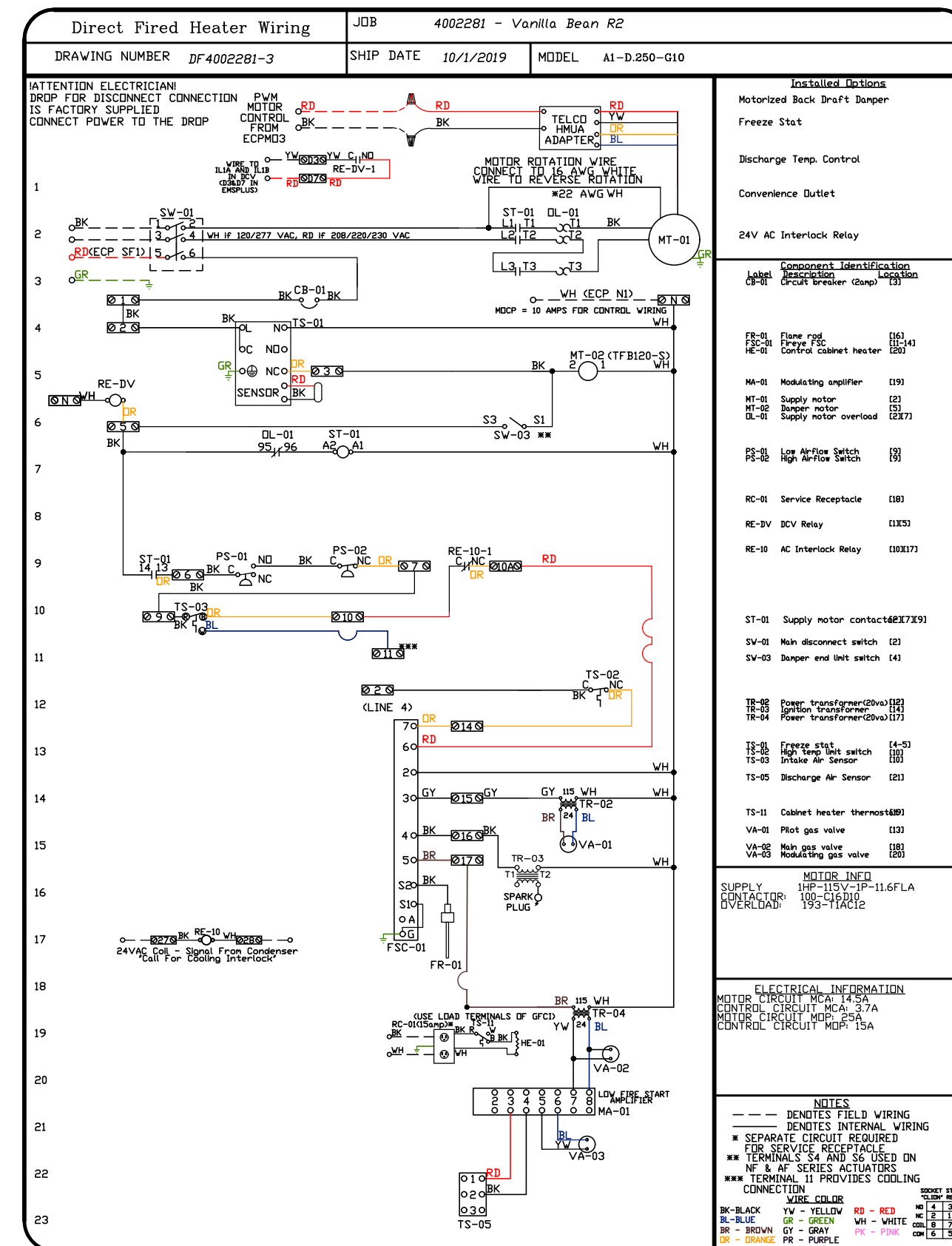
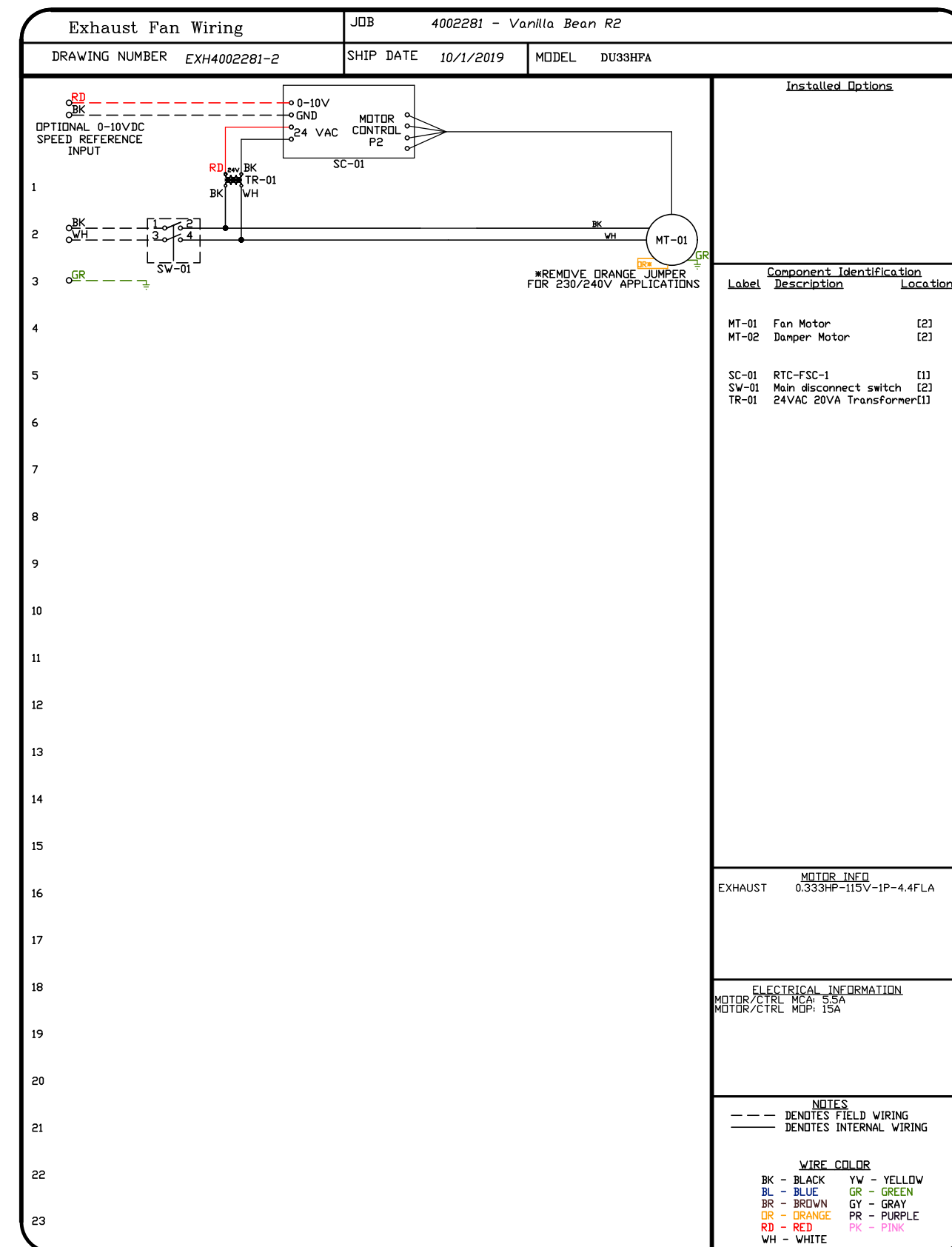
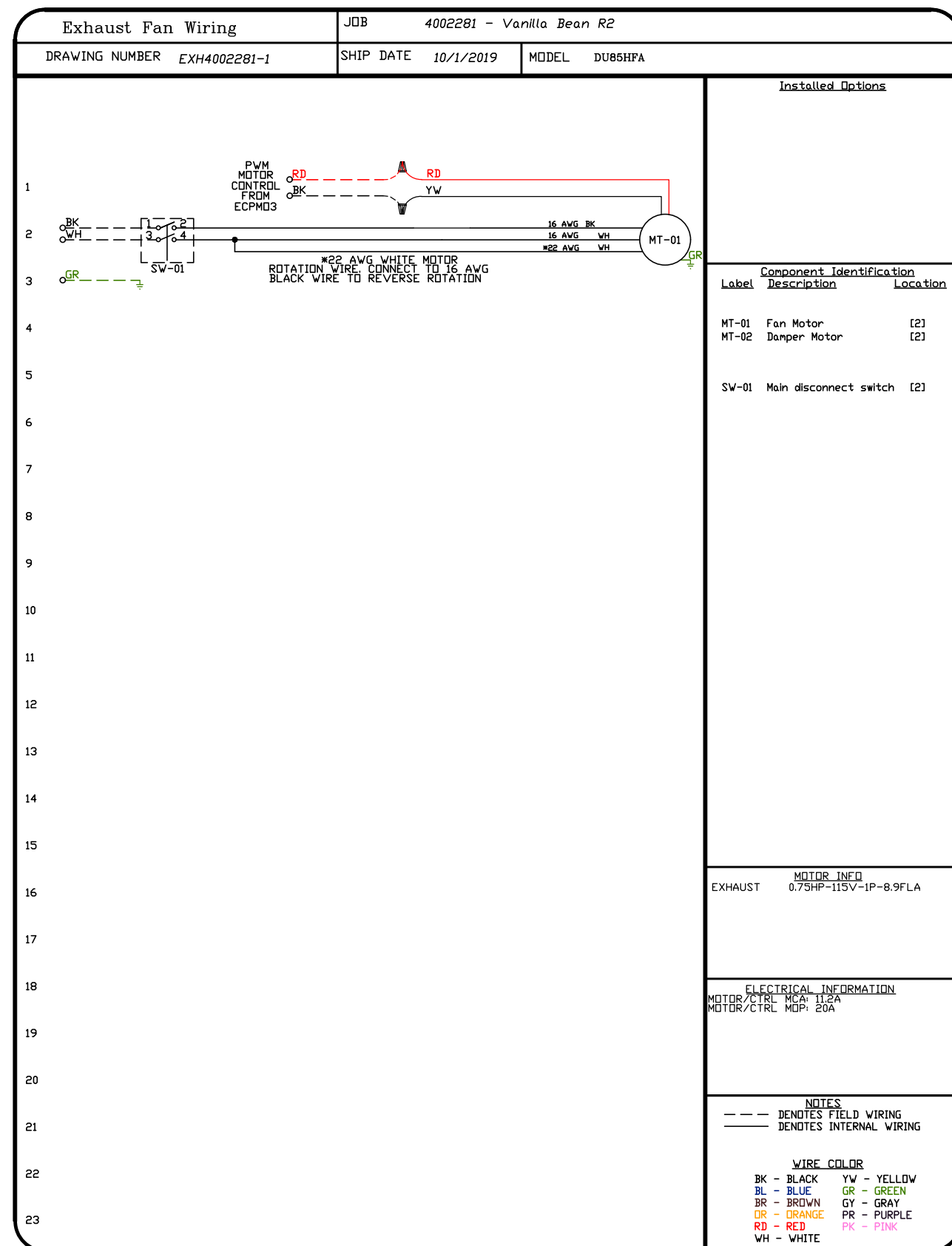
DWG.#:
4002281

DRAWN BY: ZM-88

SCALE:
3/4" = 1'-0"

MASTER DRAWING

SHEET NO.
6



REVISIONS	
DESCRIPTION	DATE



Vanilla Bean R2
HELENA, MT, 59601

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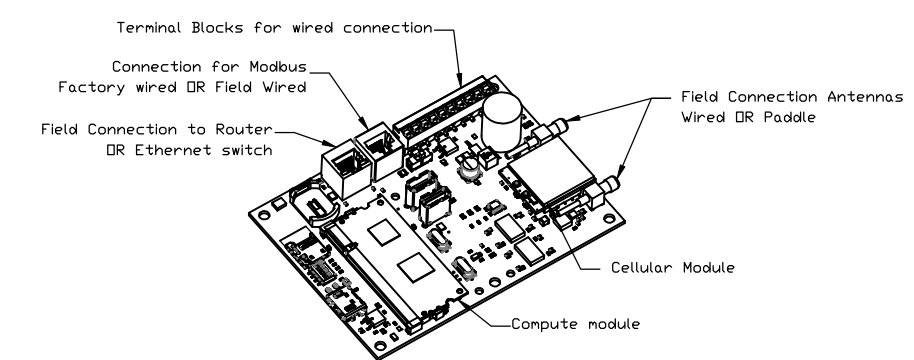
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REVISIONS

DESCRIPTION	DATE:

ELECTRICAL PACKAGE - Job#4002281

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED					
				LOCATION	QUANTITY		FAN TAG	TYPE	HP	VOLT	FLA	
1	ES-1	SC-11110FP	Utility Cabinet Left	03 - Utility Cabinet Left	1 Light	Smart Controls Thermostatic Control	EF-1	Exhaust	1	0.750	115	8.9
				Hood # 1	1 Fan		MAU-1	Supply	1	1.000	115	11.6
2	ES-2	Switches	11 - Ship Loose w/ Hood	1 Fan								

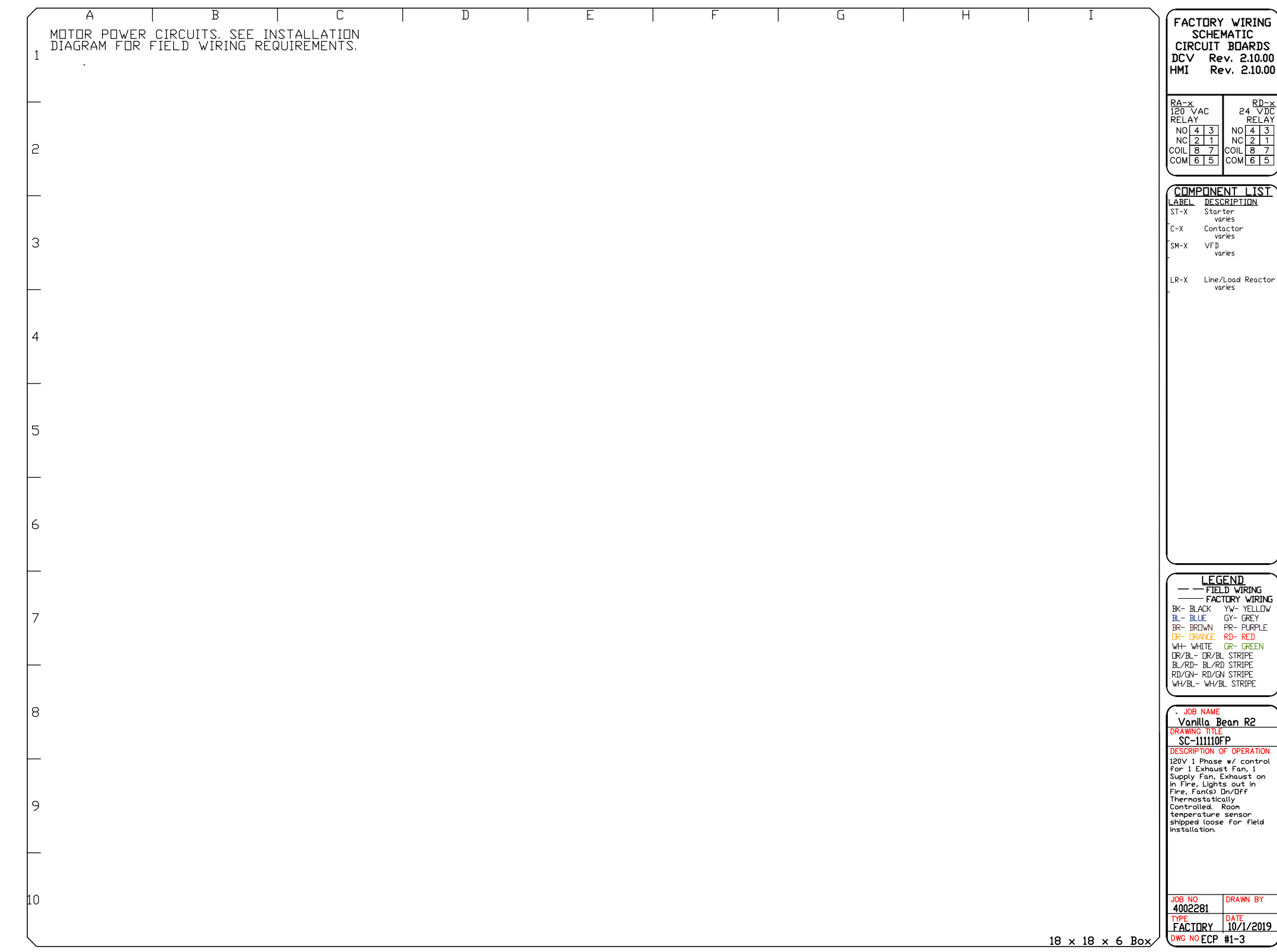
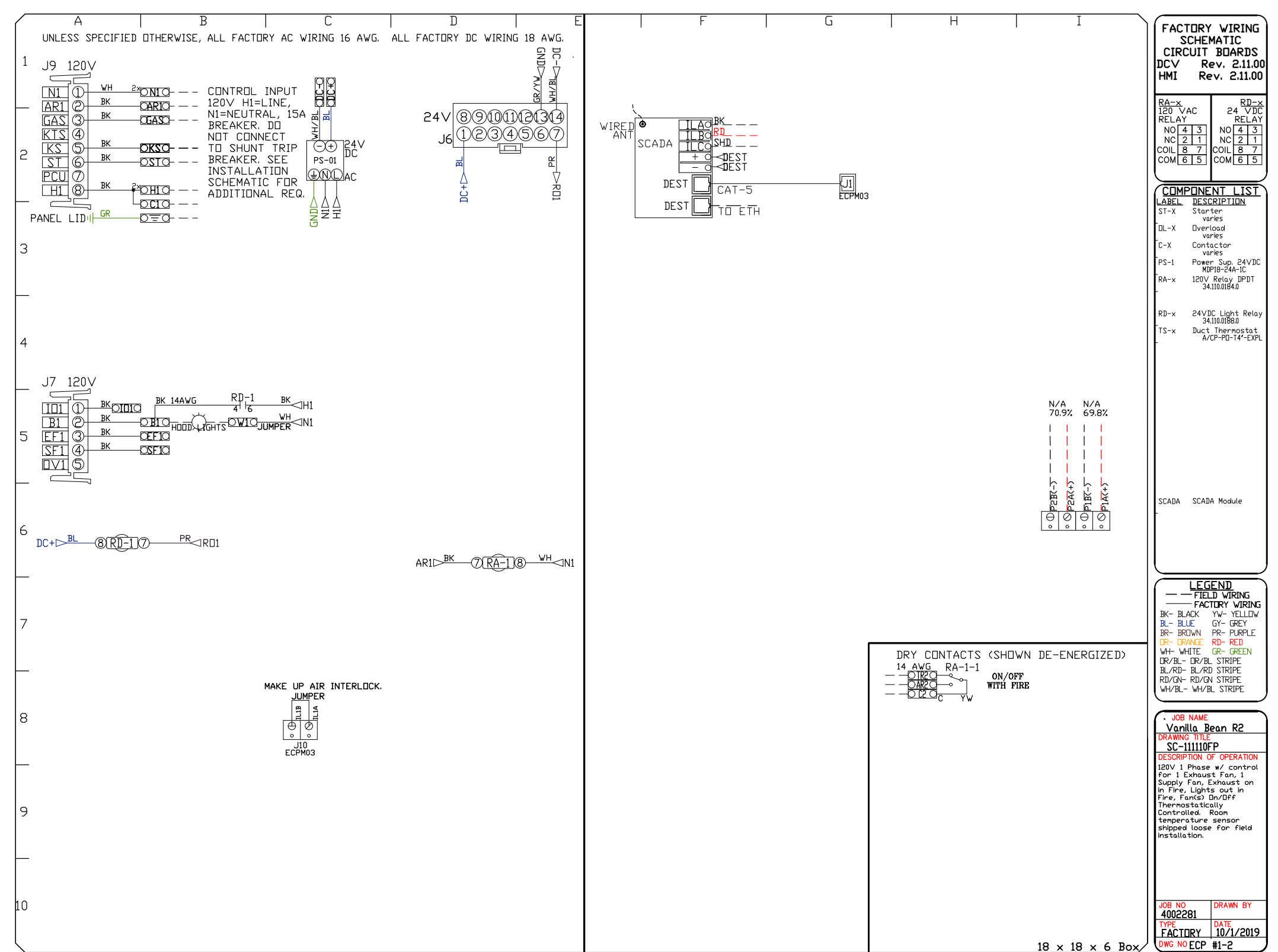
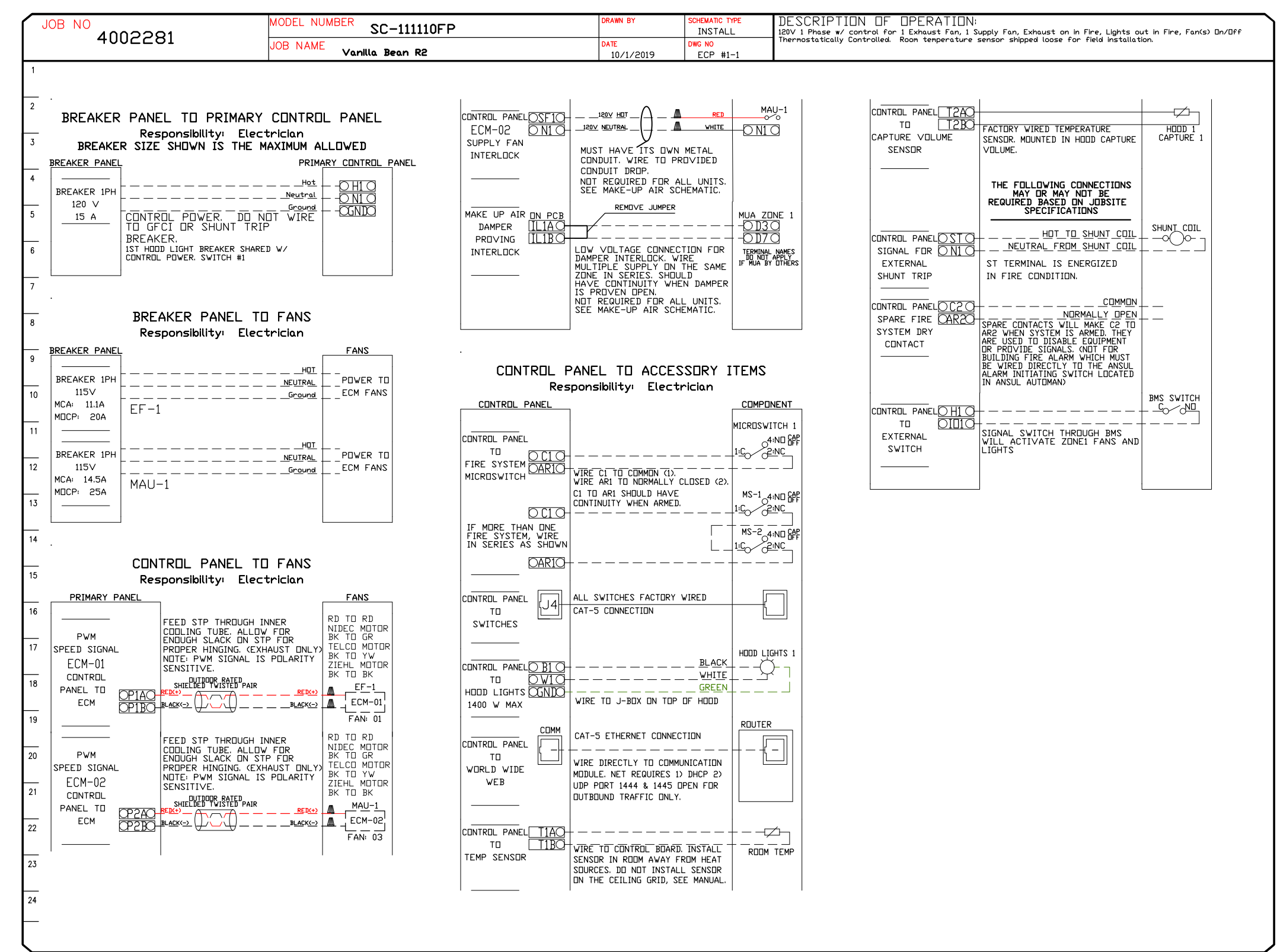


Caslink Monitor and Control

- Hood control panel to support communications to cloud-based Building Management System.
- Hood Control Panel to allow cloud-based Building Management System to monitor real time parameters outlined as **MONITOR** in the points list.
- Hood Control Panel to allow cloud-based Building Management System to control parameters outlined as **CONTROL** in the points list.
- Hood Control Panel to allow cloud-based Building Management System to implement **SYSTEM ECONOMIZERS** control strategies for fully integrated Building Management.

MONITORING AND CONTROL POINTS LIST

DCV Packages	Function	SC Packages	Function
Room Temperature	MONITOR	Room Temperature(s)	MONITOR
Duct Temperature(s)	MONITOR	Duct Temperature(s)	MONITOR
MUA Discharge Temperature	MONITOR	MUA Discharge Temperature	MONITOR
Kitchen RTU Discharge Temperature	MONITOR	Kitchen RTU Discharge Temperature	MONITOR
Fan Speed	MONITOR	Controlter Faults	MONITOR
Fan Amperage	MONITOR	Fan Faults	MONITOR
Fan Power	MONITOR	Fan Status	MONITOR
VPD Faults	MONITOR	PCU Faults	MONITOR
Controlter Faults	MONITOR	PCU Filter Clog Percentages	MONITOR
Fan Faults	MONITOR	Fire Condition	MONITOR
Fan Status	MONITOR	CORE Fire System	MONITOR
PCU Faults	MONITOR	Building Pressures	MONITOR
PCU Filter Clog Percentages	MONITOR	Fans Button(s)	MONITOR & CONTROL
Fire Condition	MONITOR	Lights Button(s)	MONITOR & CONTROL
CORE Fire System	MONITOR	Wash Button	MONITOR & CONTROL
Building Pressures	MONITOR		
Prep Time Button	MONITOR & CONTROL		
Fans Button	MONITOR & CONTROL		
Lights Button	MONITOR & CONTROL		
Wash Button	MONITOR & CONTROL		



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Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019

DWG.#:
4002281

DRAWN BY:
ZM-88

SCALE:
3/4" = 1'-0"

MASTER DRAWING

SHEET NO.
8

DuctWork #1 Parts -- Job#4002281

Tag	Part #	CFM	S.P.	Weight	Velocity	QTY	Description
P1	DW1047DWLT-3Z-S	1200	-0.0474	58.82	2200.16	1	Double Wall Duct - 10" Inner Duct, 47' long - 3 Layers Zero Clearance - 16" Stainless Steel Outer Shell.
P2	DW1035DWLT-3Z-S	1200	-0.0353	43.75	2200.16	1	Double Wall Duct - 10" Inner Duct, 35' long - 3 Layers Zero Clearance - 16" Stainless Steel Outer Shell.
P3	DW1027DWAJTP-3Z-S	1200	-0.0233	46.35	2200.16	1	Double Wall Adjustable Duct Transition Plate - 10" Inner Duct - 3 Layers Zero Clearance - 16" Stainless Steel Outer Shell. Min Length = 11' / Max Length = 25.5' / Adjustment = 7.5' / Adjustable Section May Need To Be Cut.
P4	DW2310TP	1200	0	8.49	2200.16	1	Includes single and double wall "V" Clamps. Duct to Curb Transition, 23" Curb to 10" Duct, 16 GA Aluminized. Misc. non-standard transition plate.
Assembled w/P4 System at P4		1200	-0.8455				
	DW16DWRISER-3Z-S			8.17		1	Double Wall Riser Cover - Used On 10" Inner Riser, 4' long - 3 Layers Zero Clearance - 16" Stainless Steel Outer Riser Shell Assembly. Includes Insulation & Single V Clamps For Inner & Outer Connections.
	3M-2000PLUS			0.80		1	Duct - 3M Fire Barrier 2000 Plus Silicone - Used as sealant to Seal Duct Joints.
	DW10DWCLASY-3Z-S			7.12		1	Duct - 10" Duct - 16" Double "V" Clamp - 3Z Insulation & Single "V" Clamp Included - Zero Clearance.
Total Weight				173.50			

SINGLE WALL FACTORY BUILT DUCTWORK

- ALL DUCTWORK IS REQUIRED TO BE INSTALLED WITH THE MAXIMUM SUPPORT SPACING LISTED BELOW.
- FOR A COMPLETE LIST OF APPROVED SUPPORT METHODS, SEE THE INSTALLATION AND OPERATION MANUAL.
- DUCTWORK SHALL SLOPE NOT LESS THAN 1/16" PER LINEAR FOOT TOWARDS THE HOOD OR AN APPROVED GREASE COLLECTION RESERVOIR.
- WHERE HORIZONTAL DUCTS EXCEED 75 FEET IN LENGTH, THE SLOPE SHALL NOT BE LESS THAN 3/16" PER LINEAR FOOT.

DUCT DIAMETER	HORIZONTAL SUPPORT (ft)	VERTICAL WALL SUPPORT (ft)	VERTICAL CURB SUPPORT (ft)
8"	10'	10'	24'
10"	10'	10'	24'
12"	10'	10'	24'
14"	10'	10'	24'
16"	10'	10'	24'
18"	10'	10'	24'
20"	10'	10'	24'
22"	10'	10'	24'
24"	10'	10'	24'

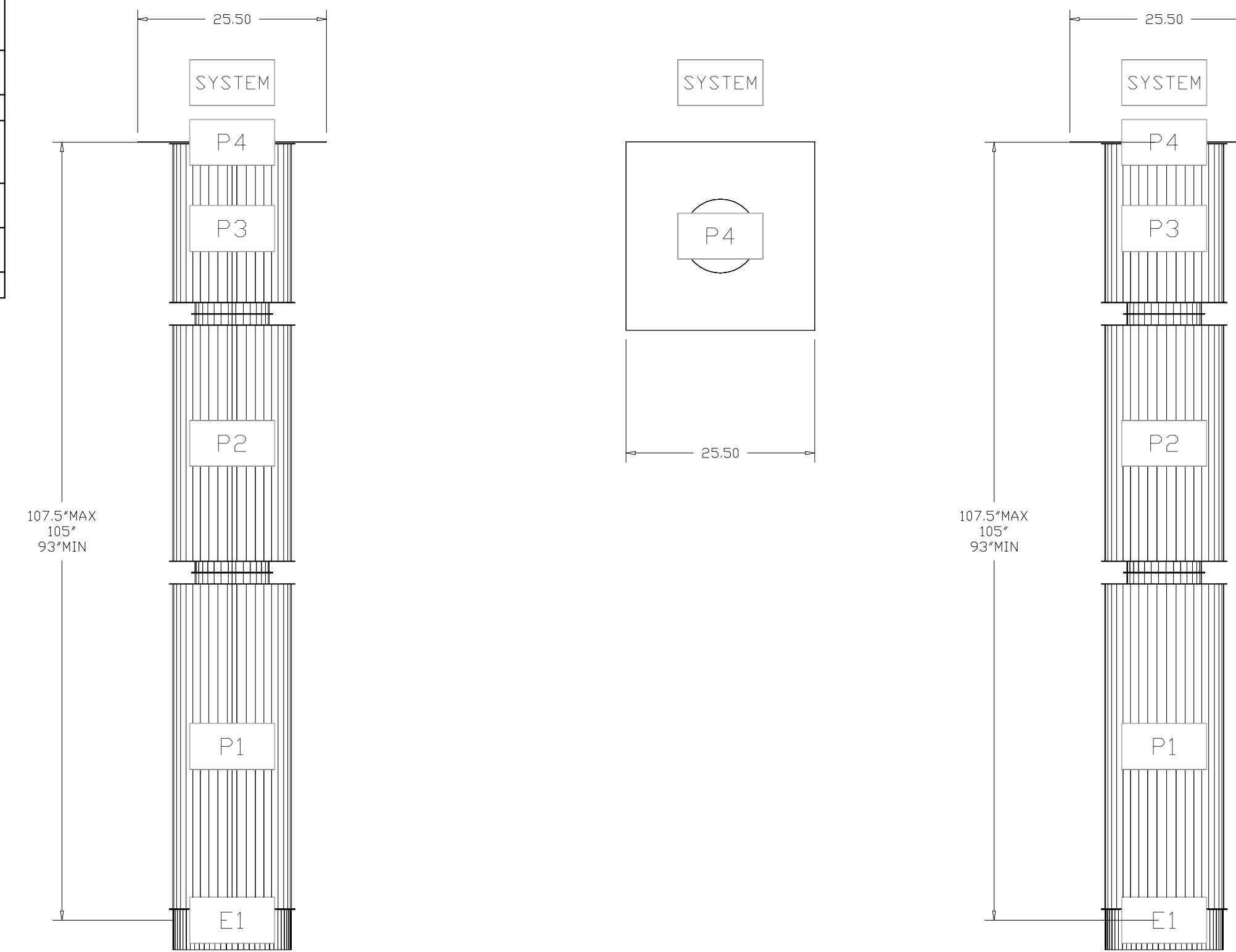
DOUBLE WALL FACTORY BUILT DUCTWORK

- ALL DUCTWORK IS REQUIRED TO BE INSTALLED WITH THE MAXIMUM SUPPORT SPACING LISTED BELOW.
- FOR A COMPLETE LIST OF APPROVED SUPPORT METHODS, SEE THE ENTIRE INSTALLATION AND OPERATION MANUAL.
- DUCTWORK SHALL SLOPE NOT LESS THAN 1/16" PER LINEAR FOOT TOWARDS THE HOOD OR AN APPROVED GREASE COLLECTION RESERVOIR.
- WHERE HORIZONTAL DUCTS EXCEED 75 FEET IN LENGTH, THE SLOPE SHALL NOT BE LESS THAN 3/16" PER LINEAR FOOT.

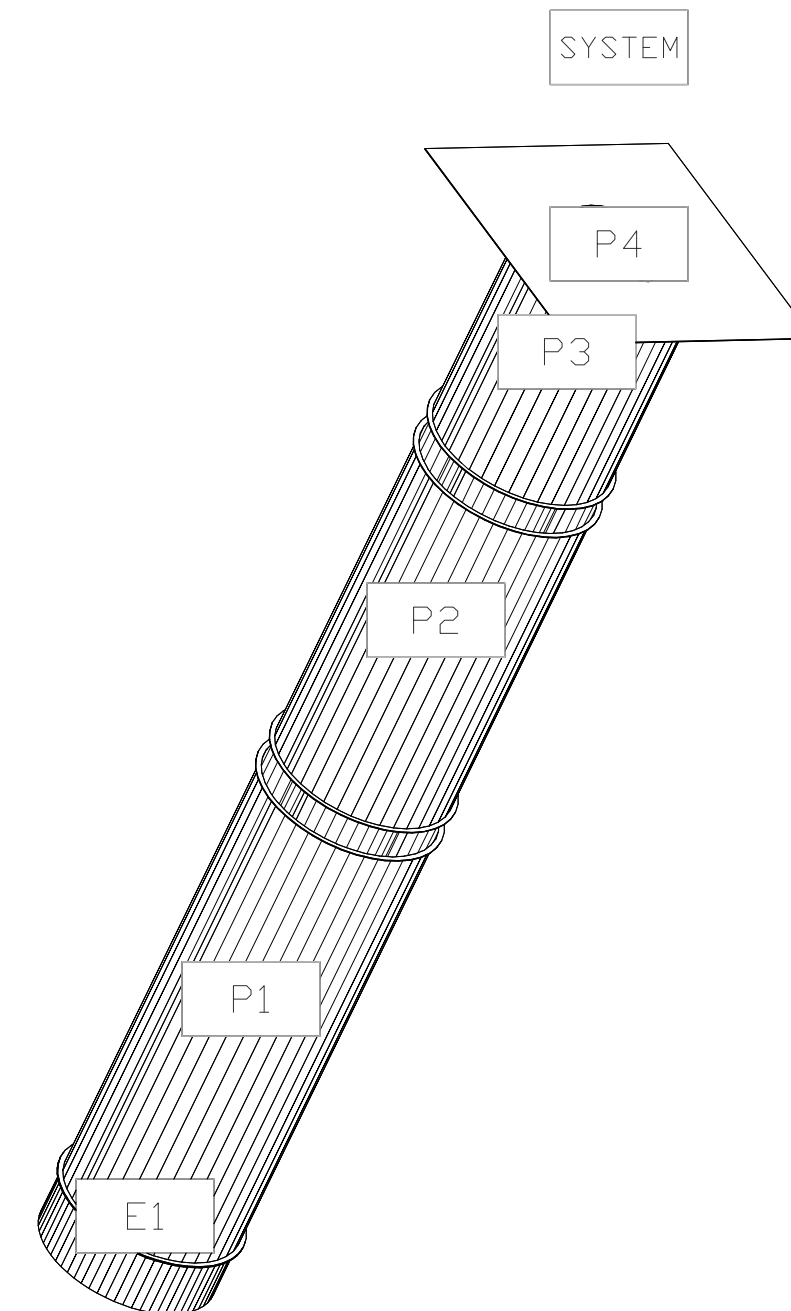
HORIZONTAL	
DUCT DIAMETER	SUPPORT SPACING (ft)
8"	7'
10"	7'
12"	7'
14"	7'
16"	7'
18"	5'
20"	5'
22"	5'
24"	5'

VERTICAL			
TYPE	WALL SUPPORT (ft)	CURB SUPPORT (ft)	FLOOR SUPPORT (ft)
2R & 2R HT	20'	24'	24'
3R	10'	24'	24'
3Z	10'	24'	24'

DuctWork #1 Front View DuctWork #1 Top View DuctWork #1 Side View

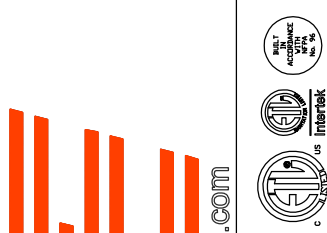


DuctWork #1 SE View



REVISIONS

DESCRIPTION	DATE



Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019
DWG.#: 4002281
DRAWN BY: ZM-88
SCALE: 3/4" = 1'-0"
MASTER DRAWING

SHEET NO. 9

System Design Verification (SDV)

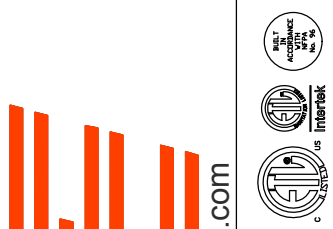
If ordered, CAS Service will perform a System Design Verification (SDV) once all equipment has had a complete start up per the Operation and Installation Manual. Typically, the SDV will be performed after all inspections are complete.

Any field related discrepancies that are discovered during the SDV will be brought to the attention of the general contractor and corresponding trades on site. These issues will be documented and forwarded to the appropriate sales office. If CAS Service has to resolve a discrepancy that is a field issue, the general contractor will be notified and billed for the work. Should a return trip be required due to any field related discrepancy that cannot be resolved during the SDV, there will be additional trip charges.

During the SDV, CAS Service will address any discrepancy that is the fault of the manufacturer. Should a return trip be required, the general contractor and appropriate sales office will be notified. There will be no additional charges for manufacturer discrepancies.

REVISIONS

DESCRIPTION	DATE:
Δ	
Δ	
Δ	
Δ	



Vanilla Bean R2
HELENA, MT, 59601

DATE: 10/1/2019

DWG.#:
4002281

DRAWN BY: ZM-88

SCALE:
3/4" = 1'-0"

MASTER DRAWING

SHEET NO.
10

123 Birds Eye Tri, Kallispeil, MT, 59901 PHONE: FAX: (919) 227-5973 EMAIL: reg88@captiveaire.com



384 Gallatin Park Dr. Suite 201, Bozeman, MT 59771
(O) 406.585.7333 (F) 406.585.7666



Vanilla Bean

Spiral Pipe

Spiral Pipe and Fittings – L&L Fab

Lot low pressure single wall Exposed Galvanized and Aluminum Spiral pipe and fittings with couplers every 10'

APPROXIMATELY 2030#

ALUMINUM

10" ALUM	30
----------	----

LP FITTING - 90

10" Aluminum	2
--------------	---

LP DUCT EXP

10"	60
12"	20
14"	40
18"	15
20"	40
6"	50
7"	95

LP FITTING - 90

10" Aluminum	2
12"	1
20"	1
8"	24

LP FITTING - CAP

10" PIPE CAP	3
12" PIPE CAP	1
14" PIPE CAP	2
18" PIPE CAP	1



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LP FITTING- Reducer

8/6	6
8/7	16

LP FITTING- Tee

10/10/6	6
10/10/7	3
12/12/7	4
14/14/10	2
14/14/7	6
18/18/10	1
18/18/14	1
20/20/7	3

See attached copy of equipment schedule and additional submittal data.

SUBMITTAL SINGLE WALL ROUND



QUOTE #: 1909-169

DATE: 10/2/2019

PROJECT: The Vanilla Bean

LOCATION: Helena, Montana

ENGINEER: N/A

CUSTOMER: S. Conley Sales

SYSTEM

Low Pressure Exposed

PRODUCT

Single Wall Round Spiral
Duct and Matching Fittings.

CONSTRUCTION

All spiral pipe and fittings
are manufactured in
accordance with the latest
edition of SMACNA 2005
Duct Construction Standards

MATERIAL

G-60 Paint Grip G-90 Galvanized

Steel is of lock-forming quality, conforming to A-653 standards manufactured as Spiral Lock-seam in accordance with the following table:

<u>Spiral Duct</u>	<u>Gauge</u>	<u>Fittings</u>	<u>Gauge</u>
4" - 26"	26	4" - 26"	24
28 - 42	24	28 - 42	22
44" - 66"	22	44" - 66"	20

Branch Taps

Conical Taps Lateral Taps
 High Efficiency Taps Straight Taps

FITTING / ASSEMBLY SEAMS

Tack Wire Welded and Sealed
 Full Wire Welded

*SPIRAL DUCT/PIPE * FITTINGS * SEALANT * ACOUSTICAL/THERMAL PANELS * ANGLE RINGS*

P. O. Box 14439 5936 EDEN DRIVE FORT WORTH, TX 76117
800-299-8340 email spiral@lewisandlambert.com * 817-834-2971 fax
WEB PAGE www.lewisandlambert.com/spiral.html

SUBMITTAL SINGLE WALL ROUND



CONNECTIONS

- Coupling Slip-Fit
- Dura Flange

FITTING INFORMATION

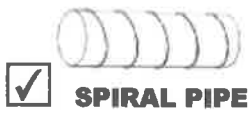
- PROVIDED AS PIPE AND LOOSE TAPS
- PROVIDED AS PIPE WITH MANIFOLDED TAPS AND REDUCERS
- PROVIDED AS PIPE AND SEPARATE BARREL FITTINGS

ELBOW RADIUS PROVIDED AS: 1 1/2 x Diameter

COMMENTS:

SPIRAL DUCT/PIPE * FITTINGS * SEALANT * ACOUSTICAL/THERMAL PANELS * ANGLE RINGS

P. O. Box 14439 5936 EDEN DRIVE FORT WORTH, TX 76117
800-299-8340 email spiral@lewisandlambert.com * 817-834-2971 fax
WEB PAGE www.lewisandlambert.com/spiral.html



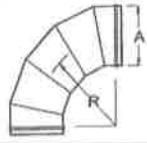
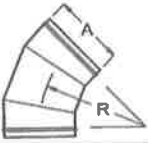
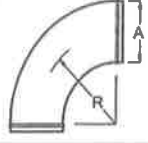

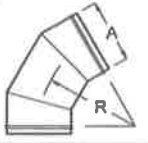
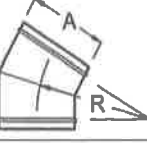
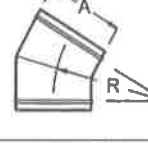
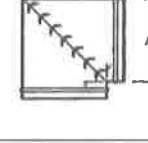
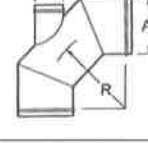

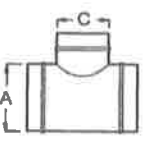
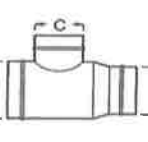
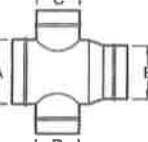
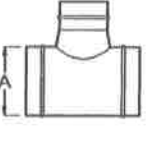
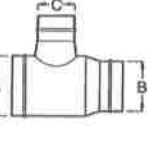
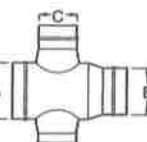
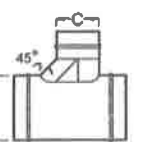
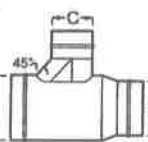
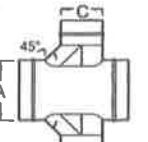
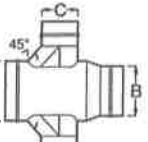
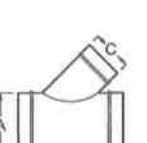
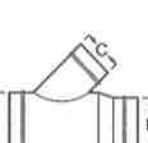
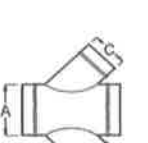
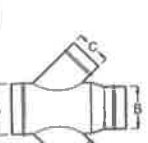

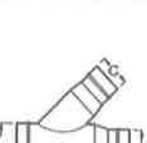


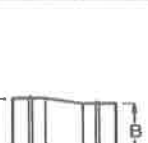

SPIRAL PIPE



LONG SEAM PIPE

Project: The Vanilla Bean

Quote #: 1909-169

SINGLE WALL ROUND PIPE & FITTINGS				
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E5-90	E3-45	SE-90	SE-45	E3-60
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
E2-30	E2-22 1/2	EV2-90	HTE3-90	HTE2-45
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
T1	T1R	T2R	CT1	CT1R
<input type="checkbox"/> 	<input checked="" type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
CT2R	HT1	HT1R	HT2	HT2R
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 
L1	L1R	L2	L2R	CL1
<input type="checkbox"/> 	<input type="checkbox"/> 	<input type="checkbox"/> 	<input checked="" type="checkbox"/> 	<input type="checkbox"/> 
CL1R	CL2	CL2R	R1	ER1

Dimensions: A = Inlet Size B = Outlet Size C, D = Branch Sizes R = Radius

***Items checked or highlighted are included in this project.**



SPIRAL PIPE



LONG SEAM PIPE

Project: The Vanilla Bean

Quote #: 1909-169

SINGLE WALL ROUND PIPE AND FITTINGS

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OS	BM	Y2	Y2	BT
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BTR	DEP	FEC	SQR	DC
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FC	TP	TSP	TCP	TCSP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LP	LSP	HTP	HTSP	LCP
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LCSP	PRTI	PRTO	PTRBI	PTRBO
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Dura-Flange	SpiralMate	Angle Ring		

Dimensions: A = Inlet Size B = Outlet Size C, D = Branch Sizes R = Radius

*Items checked or highlighted are included in this project.

SUBMITTAL

SINGLE WALL ALUMINUM



QUOTE #: 1909-169

DATE: 10/2/2019

PROJECT: The Vanilla Bean

LOCATION: Helena, Montana

ENGINEER: N/A

CUSTOMER: S. Conley Sales

SYSTEM

Low Pressure

PRODUCT

Aluminum Single Wall Round
Spiral Duct and Matching Fittings.

CONSTRUCTION

All spiral pipe and fittings
are manufactured in
accordance with the latest
edition of SMACNA 1995
H.P.D.C.S.

MATERIAL

Aluminum 3003 H-14

Steel is of lock-forming quality, conforming to A-527 standards manufactured as Spiral Lock-seam in accordance with the following table:

<u>Spiral Duct</u>	<u>Gauge</u>	<u>Fittings</u>
3" - 14"	22	20
16" - 26"	20	18
28" - 36"	18	16
38" - 50"	16	14
52" - 60"	14	12

BRANCH TAPS

Conical Taps

Straight Taps

FITTING / ASSEMBLY SEAMS

Tack Welded and Sealed

*SPIRAL DUCT/PIPE * FITTINGS * SEALANT * ACOUSTICAL/THERMAL PANELS * ANGLE RINGS*

P. O. Box 14439 5936 EDEN DRIVE FORT WORTH, TX 76117

800-299-8340 email spiral@lewisandlambert.com * 817-834-2971 fax

WEB PAGE www.lewisandlambert.com/spiral.html

SUBMITTAL SINGLE WALL ALUMINUM



CONNECTIONS

- Coupling Slip-Fit
- Aluminum Duraflange Connections

FITTING INFORMATION

- Provided As Pipe and Separate Fittings
- Provided As Pipe, Elbows and Reducers

ELBOW RADIUS PROVIDED AS: 1 1/2 x Diameter

COMMENTS:

SPIRAL DUCT/PIPE * FITTINGS * SEALANT * ACOUSTICAL/THERMAL PANELS * ANGLE RINGS

P. O. Box 14439 5936 EDEN DRIVE FORT WORTH, TX 76117
800-299-8340 email spiral@lewisandlambert.com * 817-834-2971 fax
WEB PAGE www.lewisandlambert.com/spiral.html



SPIRAL PIPE



LONG SEAM PIPE

Project: The Vanilla Bean

Quote #: 1909-169

SINGLE WALL ROUND PIPE & FITTINGS				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E5-90	E3-45	SE-90	SE-45	E3-60
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E2-30	E2-22 1/2	EV2-90	HTE3-90	HTE2-45
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T1	T1R	T2R	CT1	CT1R
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CT2R	HT1	HT1R	HT2	HT2R
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L1	L1R	L2	L2R	CL1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CL1R	CL2	CL2R	R1	ER1

Dimensions: A = Inlet Size B = Outlet Size C, D = Branch Sizes R = Radius

***Items checked or highlighted are included in this project.**



SPIRAL PIPE



LONG SEAM PIPE

Project: The Vanilla Bean

Quote #: 1909-169

SINGLE WALL ROUND PIPE AND FITTINGS				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OS	BM	Y2	Y2	BT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
BTR	DEP	FEC	SQR	DC
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FC	TP	TSP	TCP	TCSP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LP	LSP	HTP	HTSP	LCP
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LCSP	PRTI	PRTO	PTRBI	PTRBO
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Duraflange	SpiralMate	Angle Ring		

Dimensions: A = Inlet Size B = Outlet Size C, D = Branch Sizes R = Radius

***Items checked or highlighted are included in this project.**



384 Gallatin Park Dr. Suite 201, Bozeman, MT 59771
(O) 406.585.7333 (F) 406.585.7666

Vanilla Bean

Volume Dampers

Volume Dampers – Nailor Industries

22 – Nailor Model 1890 Round Manual Volume Dampers with Locking Quadrant and 2” Standoff

- 6 – 6”
- 16 – 7”

See attached copy of equipment schedule and additional submittal data.



**ROUND MANUAL BALANCING DAMPER
STEEL
MODEL: 1890**

The Nailor Model 1890 is a manual balancing, butterfly damper which has been designed for all types of round ductwork applications and is suitable for use in the majority of low pressure and velocity commercial HVAC systems. The 1890 installs easily in round spiral ductwork.

The 1890 is supplied as standard with a hand locking quadrant. They are not intended to be used in applications as a positive shut-off or automatic control damper.

STANDARD CONSTRUCTION:

FRAME: 22 ga. (0.86) corrosion-resistant steel with stiffening beads up to 12" (305) dia. 20 ga. (0.91) over 12" (305) dia.

BLADE: 22 ga. (0.86) corrosion-resistant steel up to 12" (305) dia., 20 ga. (1.0) over 12" (305) dia.

**DRIVE SHAFT/
AXLE:**

1/4" (6) square plated steel.

AVAILABLE SIZES: 4" (102) through 20" (508) diameter in nominal 1" (25) increments.

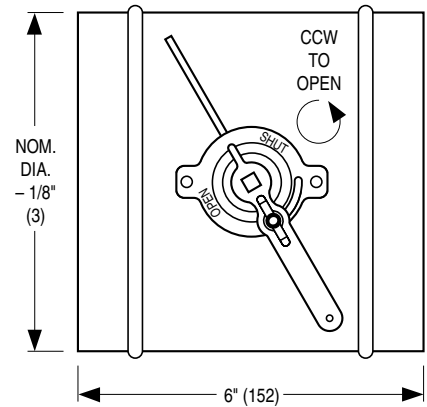
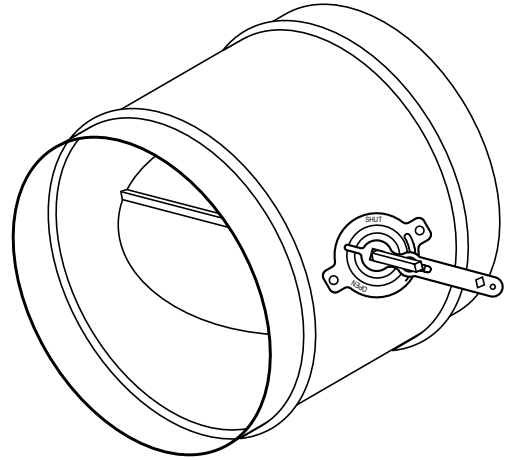
TEMPERATURE RANGE: -50°F to 250°F (-45°C to +121°C)

OPTIONS:

- SB** 2" (51) stand-off bracket for hand locking quadrant.
- BO** Oilite bearings.
- A38** 3/8" (9.5) square axle. No hand locking quadrant (control supplied by others).
- A38Q** 3/8" (9.5) square axle with matching hand locking quadrant.
- Special features _____ .

PERFORMANCE:

Dampers are designed to operate in a clean, dry environment.
Maximum System Pressure: 2" w.g. (500 Pa).
Maximum Face Velocity: 2000 fpm (10 m/s).



REVIEWED

SCHEDULE TYPE:		Dimensions are in inches (mm).			
PROJECT:	The Vanilla Bean				
ENGINEER:	Dawes Engineering & Design	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	Sleeping Giant Mechanical	9 - 29 - 10	1800	17 - 5 - 99RR	1800-3



384 Gallatin Park Dr. Suite 201, Bozeman, MT 59771
(O) 406.585.7333 (F) 406.585.7666

Vanilla Bean

Flex Duct

Flex Duct - Flexmaster

Flexmaster Type 5B Low Pressure Insulated R6.0 Flex Duct – Box Quantities, 25’/Box

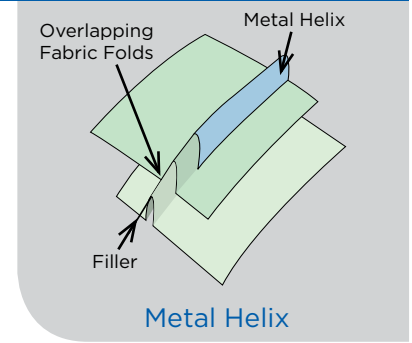
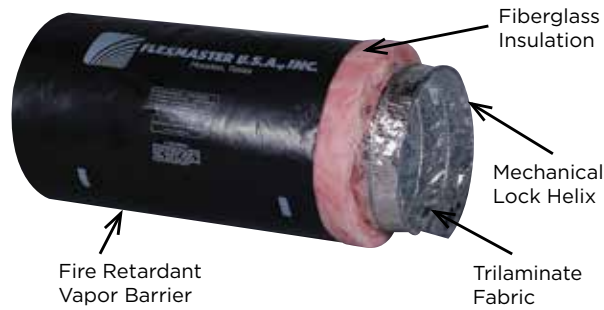
- 1 – 6”
- 1 – 8”

See attached copy of equipment schedule and additional submittal data.

SUBMITTAL DATA

Flexmaster U.S.A.® 5B

Low Pressure Flexible Duct Insulated



Technical Data	
Standard Lengths (ft)	25 ft, Special lengths on request
Inside Diameter (in)	3", 4", 5", 6", 7", 8", 9", 10", 12", 14", 15", 16", 18", 20"
Air Friction Loss	See Friction Loss Chart for details
Vapor Barrier Permeance	(.10) perm A.S.T.M. E96, Procedure A
Test Standard	UL181
Tested By	Intertek/ETL
Certifications Met	Class 1 Air Connector, NFPA 90A and 90B, BOCA, SBBC, HUD/FHA, MIN Property Std.
Internal Working Pressure (w.g.)	15" w.g. positive 10" w.g. negative thru 12" dia. 5" w.g. negative 14" & 16" dia. 1" w.g. negative, 18" & 20" dia.
Rated Velocity	5500 F.P.M.
Min Burst Pressure	2 1/2 times working pressure
Operating Temperature Range	-20° to +250°F
Flame/Smoke	25/50
Insulation Thermal Conductance	R4.2, R6, R8
Like the UL Mark, the ETL Listed Mark shows that our product has been independently tested by a Nationally Recognized Testing Laboratory (NRTL). It shows that it has met the requirements of widely accepted product safety standards and that we have agreed to periodic follow-up inspections to verify continued compliance.	

Construction Features

The Flexmaster U.S.A.® Type 5B is manufactured to meet the highest quality standards in strength, permeability and fire resistance required in a flexible duct. Tested to UL standard 181, this Class 1 Air Connector is fabricated for application in a low to medium pressure HVAC air distribution system.

Duct Fabric

A Trilaminare of Aluminum Foil, Fiberglass and Aluminized Polyester, mechanically locked to the duct helix without the use of adhesives.

Duct Helix

Made from corrosive resistant galvanized steel, the duct helix is mechanically formed to attach the duct fabric without the use of adhesives.

Vapor Barrier

Black, fire retardant, Polyethylene material. Excellent strength at low temperatures. Will not age harden.

Insulation

Fiberglass insulation jacket, factory wrapped.

REVIEWED



384 Gallatin Park Dr. Suite 201, Bozeman, MT 59771
(O) 406.585.7333 (F) 406.585.7666

Vanilla Bean

High Efficiency Take-Offs

HET's - Flexmaster

2 – Flexmaster Model STO High Efficiency Take-off Without Damper

- 1 – 14”
- 1 – 18”

2 – Flexmaster Model STOD High Efficiency Take-Offs with Damper, Locking quadrant and 2” Stand-off

- 1 – 12”
- 1 – 20”

See attached copy of equipment schedule and additional submittal data.

SUBMITTAL DATA

Flexmaster U.S.A.® Side Takeoff 90°

SHEET METAL FITTINGS



The Flexmaster U.S.A.® Side Takeoff (STO) is manufactured from 26 gauge, or heavier, galvanized steel to meet SMACNA and UMC Standards for commercial construction.

The Side Takeoff is manufactured with a 1" formed on flange and Stick on Gasket to provide air-tight installation.

The Side Takeoff should be installed using SMACNA installation standards.

Standard Features

- 26 gauge G90 Galvanized Steel
- 4" w.g. construction
- 1" Flange with Unique Corner Clips for Extra Strength
- Prepunched Mounting Holes
- Double Sided Adhesive Gasket for Minimal Leakage

Optional Features

Gauge Options: standard 26 ga

- 24 ga
- 22 ga
- 20 ga

Material Options:

- Aluminum
- Stainless steel

Construction Options:

- All seams sealed

Damper Options:

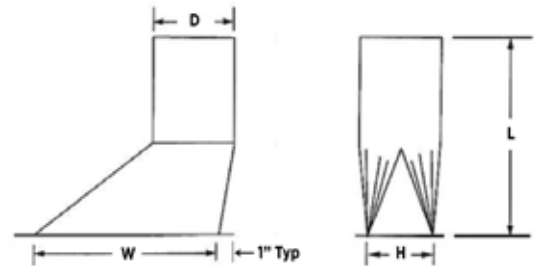
- BO3, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, locking quadrant, handle
- BO4, Build-Out (2"), 3/8" square shaft, U-bolt, nylon bushings, Rossi Everlock locking quadrant, handle



- BO3**
- 2" Build out
 - Locking Quadrant
 - 3/8" Aluminum Square Shaft
 - Nylon Bushing



- BO4**
- 2" Rossi (Everlock) Build out
 - Locking Quadrant
 - 3/8" Aluminum Square Shaft
 - Nylon Bushing



Order Size	Diameter (D)	Length (L) w/ and w/o Damper	Height (H)	Width (W)
5"	4 7/8"	13"	5"	9"
6"	5 7/8"	14"	5"	9"
7"	6 7/8"	13"	5"	11"
8"	7 7/8"	14"	6"	12"
9"	8 7/8"	13"	7"	13"
10"	9 7/8"	14"	8"	14"
12"	11 7/8"	14"	10"	16"
14"	13 7/8"	14"	12"	18"
15"	14 7/8"	13"	13"	19"
16"	15 7/8"	13"	14"	20"
18"	17 7/8"	13"	16"	22"
20"	19 7/8"	13"	18"	24"

(+/-) 1/8" Tolerance on all Sizes.



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Vanilla Bean

Grilles, Registers and Diffusers

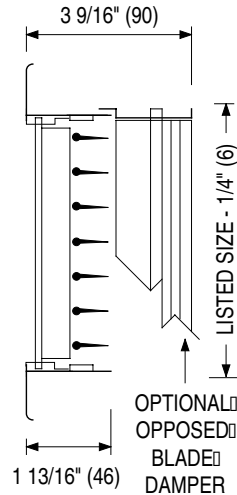
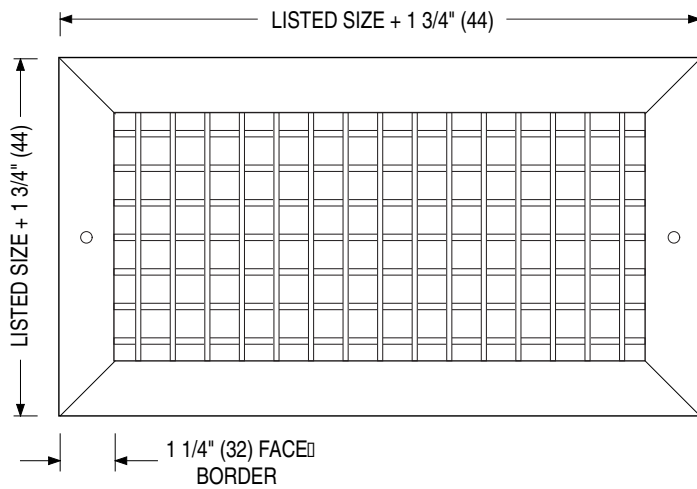
Nailor Industries Grilles, Registers and Diffusers

<u>QTY</u>	<u>TAG</u>	<u>MODEL</u>	<u>FRAME STYLE</u>	<u>NECK</u>	<u>DAMPER</u>	<u>COLOR</u>	<u>MATERIAL</u>	<u>THROW</u>
1	SG1	61DH	SURFACE	8/8/6"	NO	WHITE	STEEL	DBL DEF
1	SG1	61DH	SURFACE	8/8/8"	NO	WHITE	STEEL	DBL DEF
22	SD1	RDB	SURFACE w/SAFETY CHAIN	8"	NO	WHITE	STEEL	N/A

Note: Verify Surface/Lay-In Mounting Type and Neck Sizes Before Releasing.



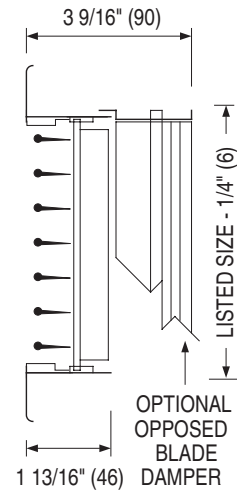
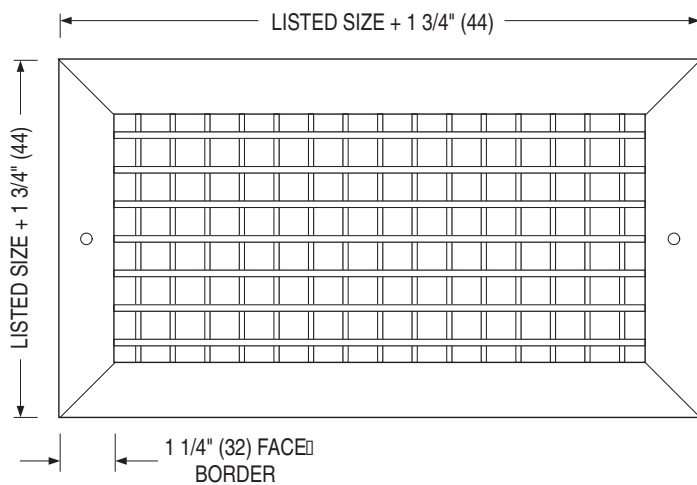
STEEL SUPPLY GRILLES & REGISTERS
DOUBLE DEFLECTION • ADJUSTABLE
MODELS: 61DV(-O) AND 61DH(-O)



Frame/Border Type S:
Surface Mount

Model 61DV
Double Deflection Grille
Vertical Front Blades

Model 61DV-O
Double Deflection Register
Vertical Front Blades
(Includes O. B. Damper)



Frame/Border Type S:
Surface Mount

Model 61DH
Double Deflection Grille
Horizontal Front Blades

Model 61DH-O
Double Deflection Register
Horizontal Front Blades
(Includes O. B. Damper)

DESCRIPTION:

1. Construction: Corrosion-resistant steel. Roll-formed frame mechanically interlocked with mitered corners for strength. Two sets of perpendicular roll-formed 'teardrop' blades on 3/4" (19) centers provide air pattern control in two planes. Blades are individually pivoted to ensure positive positioning when adjusted to desired deflection setting.
2. Optional roll-formed steel opposed blade damper has a screw driver slot operator accessible through face of register.
3. Minimum size is 4" x 4" (102 x 102).
Maximum size is 48" x 36" (1219 x 914).
4. Type S Surface mount frame has a 1 1/4" (32) face border and a 1" (25) overlap margin.
5. Standard fastening is Type A countersunk screw holes.
6. Standard finish is AW Appliance White.

OPTIONS:

1. Finish:
 - SP Special _____ .
2. Fastening (Type S):
 - Type C Concealed mounting straps
 - Type D Concealed screw holes in neck
 - Type N None.
3. PF Plaster sub-frame
4. IS Insect screen
5. Other _____ .



Dimensions are in inches (mm).

SCHEDULE TYPE:	sg1
PROJECT:	The Vanilla Bean
ENGINEER:	Dawes Engineering & Design
CONTRACTOR:	Sleeping Giant Mechanical

DATE	B SERIES	SUPERSEDES	DRAWING NO.
9-24-19	6100	2-1-11	6100-2



SQUARE TO ROUND TRANSITION COLLARS

STEEL • DIFFUSER ACCESSORY

MODELS: SR, SR-O

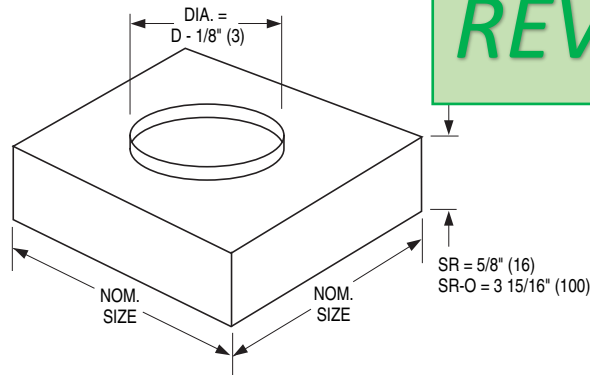
DESCRIPTION:

Transition collars are for use with any Nailor square neck diffuser where a round duct connection is desired. Round necks are sized for flexible or hard duct connection. SR's ship loose for field installation and are supplied with barbed S-clips.

- Model SR
For direct attachment to diffuser neck. Round dampers may be added to neck.
- Model SR-O
For use over a square neck opposed blade damper.

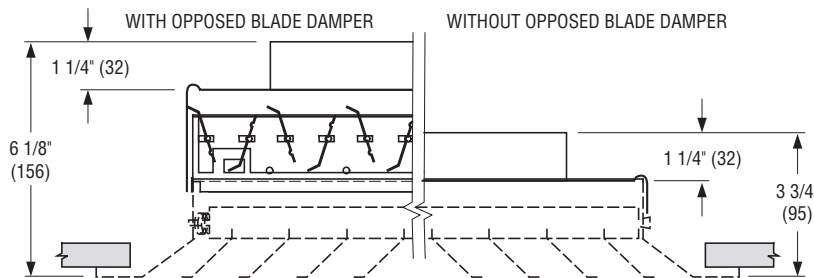
CONSTRUCTION:

22 ga. corrosion-resistant steel.



REVIEWED

Square Neck Size (inches)	Round Neck Size D (inches)
6 x 6	4, 5, 6
8 x 8	4, 5, 6, 7, 8
9 x 9	6, 7, 8, 9
10 x 10	6, 7, 8, 9, 10
12 x 12	6, 8, 9, 10, 12
14 x 14	6, 8, 9, 10, 12, 14
15 x 15	6, 8, 10, 12, 14, 15
16 x 16	6, 8, 10, 12, 14, 15, 16
18 x 18	6, 8, 10, 12, 14, 15, 16, 18
20 x 20	6, 8, 10, 12, 14, 15, 16, 18, 20
21 x 21	6, 8, 10, 12, 14, 15, 16, 18, 20
22 x 22	6, 8, 10, 12, 14, 16, 18, 20
24 x 24	6, 8, 10, 12, 14, 15, 16, 18, 20, 22, 24



Example illustrated is Model 6500 Pattern Diffuser.

SCHEDULE TYPE: sg1		Dimensions are in inches (mm).			
PROJECT: The Vanilla Bean					
ENGINEER: Dawes Engineering & Design	DATE: 3 - 4 - 16	B SERIES: ACC	SUPERSEDES: 10 - 27 - 05	DRAWING NO.: ACC-SR	
CONTRACTOR: Sleeping Giant Mechanical					

Panel Mounted/Ceiling Modules

Border Type PLS: Steel Lay-in Panel

The grille or register is mounted in an extended panel to suit standard T-Bar Lay-in type ceilings.

Border Type FPS: Steel Finline® Panel

The grille or register is mounted in an extended panel that will fit a 9/16" (14) narrow regressed (bolt slot) T-Bar ceiling grid or 9/16" (14) Flat T-Bar with tegular ceiling tile.

Border Type SPS: Steel Spline Panel

The grille or register is mounted in an extended panel to suit spline type ceiling modules. CM 24" x 24" (600 x 600) only.

Border Type MPS: Steel Metal Pan Panel

The grille or register is mounted in an extended panel to suit metal pan ceilings that have snap-in type ceiling modules. CM 24" x 24" (600 x 600) only.

Border Type TPS: Steel Tegular Panel

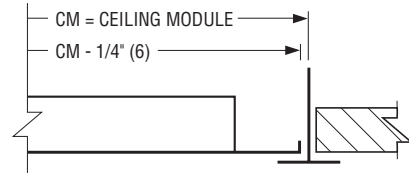
The grille or register is mounted in a panel that will extend below a 15/16" (24) Flat T-Bar ceiling grid.

Available Border Type PLS, FPS and TPS Ceiling Module Sizes

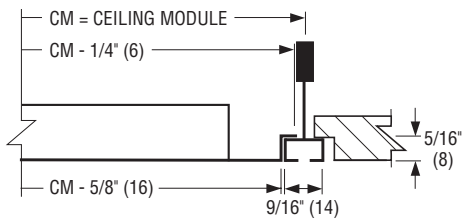
Ceiling Module	
Imperial Units (in.)	Metric Units (mm)
12 x 12	300 x 300
24 x 12	600 x 300
36 x 12	900 x 300
48 x 12	1200 x 300
20 x 20	500 x 500
24 x 24	600 x 600
36 x 24	900 x 600
48 x 24	1200 x 600

Maximum grille neck size is CM Ceiling Module – 3" (76).

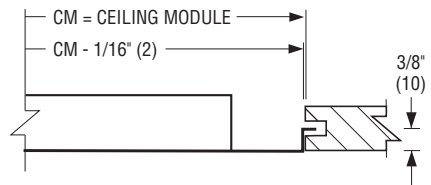
Type PLS Lay-in Panel



Type FPS Finline® Panel

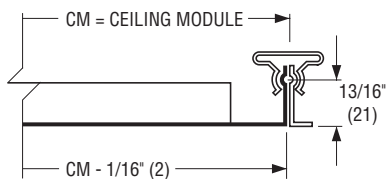


Type SPS Spline Panel

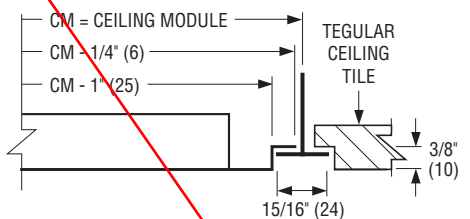


Note: Splines on two opposite sides.

Type MPS Metal Pan Panel



Type TPS Tegular Panel



SCHEDULE TYPE:	sg1
PROJECT:	The Vanilla Bean
ENGINEER:	Dawes Engineering & Design
CONTRACTOR:	Sleeping Giant Mechanical

Page 2 of 2
 Dimensions are in inches (mm).

DATE	B SERIES	SUPERSEDES	DRAWING NO.
9-24-19	6100	2-1-11	6100-2

PERFORMANCE NOTES FOR SUPPLY GRILLES AND REGISTERS:

MODEL SERIES: 5100, 6100 AND 6700

Throw, Spread and Drop

The isovel diagrams shown below, illustrate in plan view, the relationship of horizontal spread to throw for three standard vertical blade deflections and represent a typical high side wall supply outlet. The isovels (throw values) are for the cataloged terminal velocities of 150, 100 and 50 fpm.

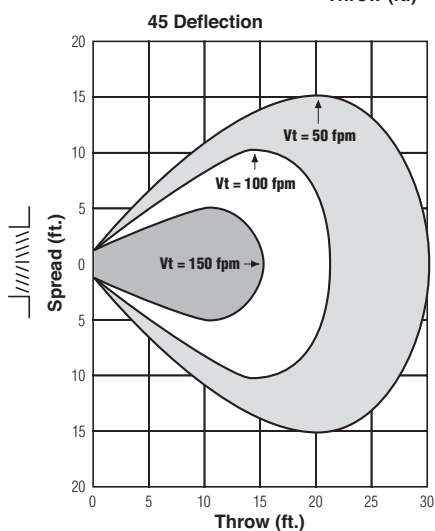
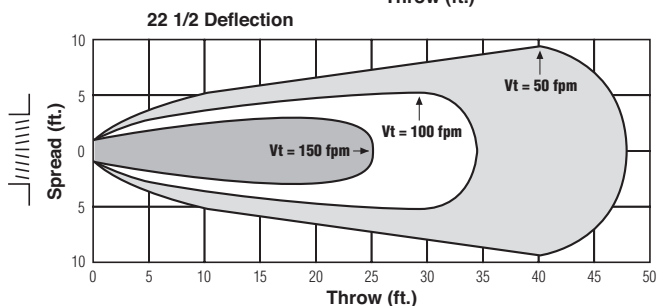
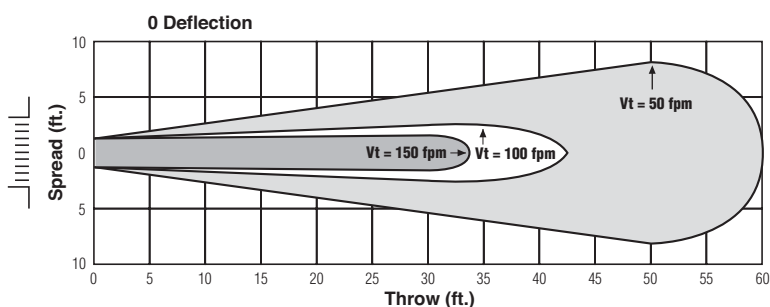
Cataloged data, in accordance with the test code, is with the grille mounted 9" (229) below the ceiling and benefiting from the ceiling coanda effect under isothermal conditions. Throw values without ceiling effect (greater than 24" (610) from a surface parallel to the airflow) may be approximated by multiplying the cataloged throw by x 0.7.

In order to offset potential draft problems caused by premature drop, it is recommended to set the blades with an upward deflection setting of 15 – 20° in free space conditions. The angle of spread and temperature differential between the supply air and room air (ΔT) also effects the drop of the airstream.

Under constant conditions of temperature, volume and core velocity, the wider the spread, the smaller the drop. Typical cold supply air (20°F ΔT) reduces horizontal throw by approximately 30%. Warm air will increase throw by approximately 30% and reduce drop.

For a full explanation of the effects of spread, throw, temperature and drop, refer to the engineering guide at the back of the catalog.

SPREAD CHARACTERISTICS WITH THREE DEFLECTION SETTINGS



NC Corrections for Blade Deflection (add)

Model Type	Damper	Blade Deflection		
		0°	22 1/2°	45°
Double Deflection	With	0	+ 2	+ 7
	Without	- 4	- 2	+ 3
Single Deflection	With	- 4	- 1	+ 4
	Without	- 8	- 6	+ 1

Note: Damper corrections are for wide open damper.

TP Correction Factors for Grilles Without Damper (multiply)

Blade Deflection	0°	22 1/2°	45°
Double Deflection Factor	x .80	x .83	x .89
Single Deflection Factor	x .73	x .76	x .85

NC Corrections for Throttling Damper (add)

Additional Pressure Drop (in. w.g.)	.05"	.15"	.25"
Approx. Damper Opening	75%	67%	50%
NC add	+ 6	+ 11	+ 18

PERFORMANCE DATA: SUPPLY GRILLES AND REGISTERS • 5100, 6100 AND 6700 SERIES

MODELS: 51DV, 51DH, 51SV, 51SH, 61DV, 61DH, 61SV, 61SH, 67DV, 67DH, 67SV, 67SH

Listed Duct Size (inches)	Alternate Sizes (inches)	Core Area (sq. ft.)	Ak Factor	Core Velocity Pressure		300	400	500	600	700	800	1000	1200	1400		
						.006	.010	.016	.022	.031	.040	.062	.090	.122		
				CFM Noise Criteria	0°	.015	.026	.041	.059	.081	.106	.165	.238	.324		
					22 1/2°	.017	.030	.047	.068	.093	.122	.190	.274	.373		
					45°	.026	.046	.072	.103	.142	.186	.289	.417	.567		
6 x 6	8 x 4 10 x 4	0.20		CFM Noise Criteria	0°	60	80	100	120	140	160	200	240	280		
					22 1/2°	—	—	—	—	19	23	29	35	40		
					45°	—	—	—	—	—	—	—	—	—	—	
8 x 6	10 x 5 12 x 4	0.27		CFM Noise Criteria	0°	81	108	135	162	189	216	270	324	378		
					22 1/2°	—	—	—	—	15	20	24	30	36	41	
					45°	—	—	—	—	—	—	—	—	—	—	—
10 x 6	12 x 5 16 x 4	0.35		CFM Noise Criteria	0°	105	140	175	210	245	280	350	420	490		
					22 1/2°	—	—	—	—	16	21	25	31	37	42	
					45°	—	—	—	—	—	—	—	—	—	—	—
8 x 8	14 x 5	0.38		CFM Noise Criteria	0°	114	152	190	228	266	304	380	456	532		
					22 1/2°	—	—	—	—	17	22	26	32	38	43	
					45°	—	—	—	—	—	—	—	—	—	—	—
12 x 6	18 x 4	0.42		CFM Noise Criteria	0°	126	168	210	252	294	336	420	504	588		
					22 1/2°	—	—	—	—	17	22	26	32	38	43	
					45°	—	—	—	—	—	—	—	—	—	—	—
14 x 6	10 x 8	0.50		CFM Noise Criteria	0°	150	200	250	300	350	400	500	600	700		
					22 1/2°	—	—	—	—	18	23	27	33	39	44	
					45°	—	—	—	—	—	—	—	—	—	—	—
12 x 8	16 x 6 24 x 4	0.58		CFM Noise Criteria	0°	174	232	290	348	406	464	580	696	812		
					22 1/2°	—	—	—	—	19	24	28	34	40	45	
					45°	—	—	—	—	—	—	—	—	—	—	—
10 x 10	14 x 7 26 x 4	0.61		CFM Noise Criteria	0°	183	244	305	366	427	488	610	732	854		
					22 1/2°	—	—	—	—	19	24	28	34	40	45	
					45°	—	—	—	—	—	—	—	—	—	—	—
18 x 6	14 x 8 28 x 4 30 x 4	0.65		CFM Noise Criteria	0°	195	260	325	390	455	520	650	780	910		
					22 1/2°	—	—	—	—	20	25	29	35	41	46	
					45°	—	—	—	—	—	—	—	—	—	—	—
12 x 10	20 x 6 24 x 5	0.74		CFM Noise Criteria	0°	222	296	370	444	518	592	740	888	1036		
					22 1/2°	—	—	—	—	15	20	25	29	35	41	46
					45°	—	—	—	—	—	—	—	—	—	—	—
22 x 6	16 x 8 28 x 5 36 x 4	0.80		CFM Noise Criteria	0°	240	320	400	480	560	640	800	960	1120		
					22 1/2°	—	—	—	—	16	21	26	30	36	42	47
					45°	—	—	—	—	—	—	—	—	—	—	—
12 x 12	14 x 10 18 x 8 24 x 6 38 x 4	0.90		CFM Noise Criteria	0°	270	360	450	540	630	720	900	1080	1260		
					22 1/2°	—	—	—	—	16	21	26	30	36	42	47
					45°	—	—	—	—	—	—	—	—	—	—	—
18 x 10	30 x 6	1.13		CFM Noise Criteria	0°	339	452	565	678	791	904	1130	1356	1582		
					22 1/2°	—	—	—	—	17	22	27	31	37	43	48
					45°	—	—	—	—	—	—	—	—	—	—	—

GRILLES AND REGISTERS

F

For performance data notes, see F24.

PERFORMANCE DATA: SUPPLY GRILLES AND REGISTERS • 5100, 6100 AND 6700 SERIES MODELS: 51DV, 51DH, 51SV, 51SH, 61DV, 61DH, 61SV, 61SH, 67DV, 67DH, 67SV, 67SH

Listed Duct Size (inches)	Alternate Sizes (inches)	Core Area (sq. ft.)	Ak Factor	Core Velocity Pressure		300	400	500	600	700	800	1000	1200	1400
				0°	22 1/2°	.006	.010	.016	.022	.031	.040	.062	.090	.122
24 x 24	26 x 22 28 x 20 32 x 18 36 x 16	3.79		CFM		1137	1516	1895	2274	2653	3032	3790	4548	5306
				Noise Criteria		—	—	21	26	31	35	41	47	52
				Throw	0°	18-29-55	29-36-62	33-48-70	39-55-77	45-59-83	51-62-89	57-70-99	62-77-108	68-83-117
					22 1/2°	14-23-44	21-31-50	26-38-56	31-44-62	36-47-66	41-50-71	46-56-79	50-62-86	54-66-94
36 x 18	32 x 20 40 x 16 46 x 14	4.29		CFM		1287	1716	2145	2574	3003	3432	4290	5148	6006
				Noise Criteria		—	15	22	27	32	36	42	48	53
				Throw	0°	19-31-58	28-42-68	35-52-75	2-58-83	48-63-89	55-68-95	61-75-106	68-83-117	73-89-125
					22 1/2°	15-25-46	22-34-54	28-42-60	34-46-66	38-50-71	44-54-76	49-60-85	54-66-94	58-71-100
26 x 26	28 x 24 48 x 14	4.47		CFM		1341	1788	2235	2682	3129	3576	4470	5364	6258
				Noise Criteria		—	15	22	27	32	36	42	48	53
				Throw	0°	19-32-59	28-43-69	35-53-77	43-59-85	49-65-91	56-69-98	63-77-109	69-85-120	75-91-129
					22 1/2°	15-26-47	22-34-55	28-42-62	34-47-68	39-52-73	45-55-78	50-62-87	55-68-96	60-73-103
30 x 24	32 x 22 36 x 20 40 x 18	4.77		CFM		1431	1908	2385	2862	3339	3816	4770	5724	6678
				Noise Criteria		—	15	22	27	32	36	42	48	53
				Throw	0°	20-33-61	29-44-71	36-54-79	44-61-87	51-67-94	58-71-101	65-79-112	71-87-123	77-94-133
					22 1/2°	16-26-49	23-35-57	29-43-63	35-49-70	41-54-75	46-57-81	52-63-90	57-70-98	62-75-106
42 x 18	28 x 26	4.99		CFM		1497	1997	2495	2994	3493	3992	4990	5988	6986
				Noise Criteria		—	16	23	28	33	37	43	49	54
				Throw	0°	20-33-62	30-44-72	37-55-80	44-62-88	52-67-95	59-72-102	66-80-114	72-88-125	77-95-135
					22 1/2°	16-26-50	24-35-58	30-44-64	35-50-70	42-54-76	47-58-82	53-64-91	58-70-100	62-76-108
28 x 28	30 x 26 36 x 22 40 x 20	5.20		CFM		1560	2080	2600	3120	3640	4160	5200	6240	7280
				Noise Criteria		—	16	23	28	33	37	43	49	54
				Throw	0°	21-34-63	30-45-74	38-56-82	45-63-90	53-69-97	60-74-104	67-82-116	74-90-128	79-97-137
					22 1/2°	17-27-50	24-36-59	30-45-66	36-50-72	42-55-78	48-59-83	54-66-93	59-72-102	63-78-110
42 x 20	30 x 28	5.57		CFM		1671	2228	2785	3342	3899	4456	5570	6684	7798
				Noise Criteria		—	16	23	28	33	37	43	49	54
				Throw	0°	22-35-66	31-47-76	39-58-84	47-66-93	55-71-101	62-76-107	70-84-120	76-93-131	82-100-142
					22 1/2°	18-28-53	25-38-61	31-46-67	38-53-74	44-57-80	50-61-86	56-67-96	61-74-105	66-80-114
36 x 24	40 x 22 44 x 20	5.74		CFM		1722	2296	2870	3444	4018	4592	5740	6888	8036
				Noise Criteria		—	16	23	28	33	37	43	49	54
				Throw	0°	23-36-68	32-49-78	41-60-88	49-68-96	57-74-104	64-78-112	72-88-124	78-96-137	85-104-148
					22 1/2°	18-29-54	26-39-62	33-48-70	39-54-77	46-59-83	51-62-90	58-70-99	62-77-110	68-83-118
30 x 30	34 x 26 38 x 24 48 x 20	5.99		CFM		1797	2396	2995	3594	4193	4792	5990	7188	8386
				Noise Criteria		—	16	23	28	33	37	43	49	54
				Throw	0°	23-36-69	33-49-80	41-61-89	49-69-98	57-75-106	65-80-113	73-89-126	80-98-138	86-106-150
					22 1/2°	18-29-55	26-39-64	33-49-71	39-55-78	46-60-85	52-64-90	58-71-101	64-78-110	69-85-120
42 x 24	36 x 28 42 x 24 46 x 22	6.72		CFM		2016	2688	3360	4032	4704	5376	6720	8064	9408
				Noise Criteria		—	17	24	29	34	38	44	50	55
				Throw	0°	24-39-72	34-51-84	43-64-93	51-72-102	60-78-111	68-84-118	77-93-132	84-102-144	90-111-157
					22 1/2°	19-31-58	27-41-67	34-51-74	41-58-82	48-62-89	54-67-94	62-74-106	67-82-115	72-89-126
32 x 32	40 x 26	6.84		CFM		2052	2736	3420	4104	4788	5472	6840	8208	9576
				Noise Criteria		—	17	24	29	34	38	44	50	55
				Throw	0°	24-39-73	34-52-84	43-65-94	52-73-103	61-79-112	69-84-119	77-94-133	84-103-146	91-112-158
					22 1/2°	19-31-58	27-42-67	34-52-75	42-58-82	49-63-90	55-67-95	62-75-106	67-82-117	73-90-126
36 x 30	38 x 28	7.22		CFM		2166	2888	3610	4332	5054	5776	7220	8664	10108
				Noise Criteria		—	17	24	29	34	38	44	50	55
				Throw	0°	25-40-76	36-54-87	45-68-98	54-76-108	63-82-116	71-87-124	80-98-139	87-108-151	94-116-164
					22 1/2°	20-32-61	29-43-70	36-54-78	43-61-86	50-66-93	57-70-99	64-78-111	70-86-121	75-93-131
48 x 24	34 x 34 36 x 32 38 x 30 42 x 28	7.69		CFM		2307	3076	3845	4614	5383	6152	7690	9228	10766
				Noise Criteria		—	18	25	30	35	39	45	51	56
				Throw	0°	26-41-77	37-55-90	46-69-100	55-77-109	64-84-118	73-90-127	82-100-142	90-109-155	97-118-167
					22 1/2°	21-33-62	30-44-72	37-55-80	44-62-87	51-67-94	58-72-102	66-80-114	72-87-124	78-94-134
Throw	45°	13-22-39	19-28-45	23-45-50	28-39-55	32-42-59	37-45-64	41-50-71	45-55-78	49-59-84				

GRILLES AND REGISTERS

F

For performance data notes, see F24.

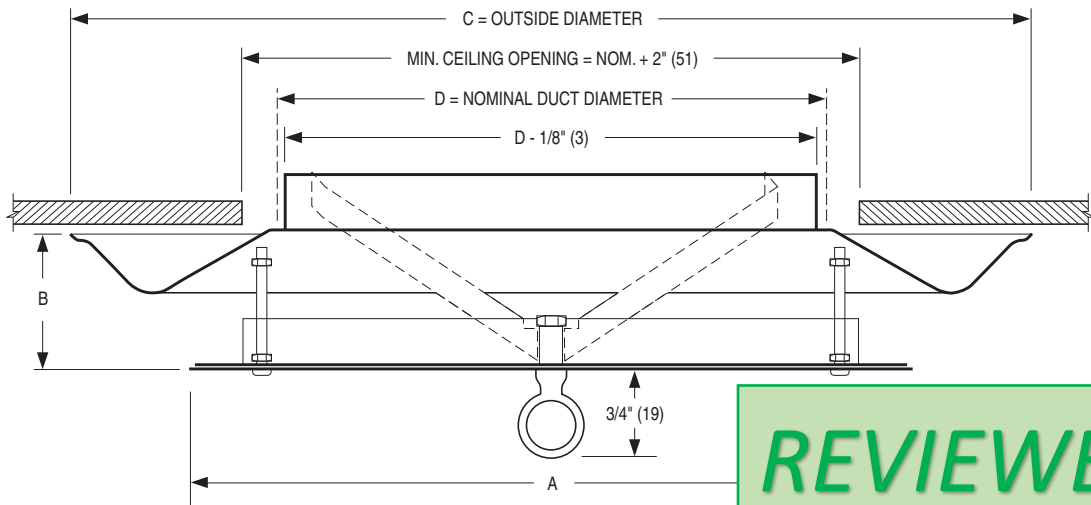
PERFORMANCE DATA: SUPPLY GRILLES AND REGISTERS • 5100, 6100 AND 6700 SERIES MODELS: 51DV, 51DH, 51SV, 51SH, 61DV, 61DH, 61SV, 61SH, 67DV, 67DH, 67SV, 67SH

Listed Duct Size (inches)	Alternate Sizes (inches)	Core Area (sq. ft.)	Ak Factor	Core Velocity Pressure	300	400	500	600	700	800	1000	1200	1400
				0°	.006	.010	.016	.022	.031	.040	.062	.090	.122
				Total Pressure	0°	22 1/2°	45°	0°	22 1/2°	45°	0°	22 1/2°	45°
36 x 34	38 x 32 40 x 30 48 x 26	8.20		CFM	2460	3280	4100	4920	5740	6560	8200	9840	11480
				Noise Criteria	–	18	25	30	35	39	45	51	56
				Throw	0°	22 1/2°	45°	26-42-79	37-57-91	47-70-102	57-79-111	65-85-121	75-91-129
36 x 36	38 x 34 42 x 30 46 x 28	8.69		CFM	2607	3476	4345	5214	6083	6952	8690	10428	12166
				Noise Criteria	–	18	25	30	35	39	45	51	56
				Throw	0°	22 1/2°	45°	28-45-84	36-60-96	49-74-108	60-84-117	69-90-127	78-96-136
38 x 38	42 x 34	9.70		CFM	2910	3880	4850	5820	6790	7760	9700	11640	13580
				Noise Criteria	–	19	26	31	36	40	46	52	57
				Throw	0°	22 1/2°	45°	28-47-88	42-62-101	53-78-114	62-88-125	73-95-134	83-101-143
42 x 36	44 x 34 48 x 30	10.16		CFM	3048	4064	5080	6096	7112	8128	10160	12192	14224
				Noise Criteria	–	19	26	31	36	40	46	52	57
				Throw	0°	22 1/2°	45°	29-48-90	43-64-104	53-80-117	64-90-127	75-97-138	85-104-147
40 x 40	42 x 38 46 x 34 48 x 32	10.77		CFM	3231	4308	5385	6462	7539	8616	10770	12924	15078
				Noise Criteria	–	19	26	31	36	40	46	52	57
				Throw	0°	22 1/2°	45°	31-50-94	44-67-108	56-84-121	67-94-132	77-102-143	88-108-153
42 x 42	44 x 40 46 x 38 48 x 36	11.89		CFM	3567	4756	5945	7134	8323	9512	11890	14268	16646
				Noise Criteria	–	20	27	32	37	41	47	53	58
				Throw	0°	22 1/2°	45°	32-52-97	46-69-112	58-86-125	69-97-138	81-105-149	92-112-159
44 x 44	46 x 42	13.07		CFM	3921	5228	6535	7842	9149	10456	13070	15684	18298
				Noise Criteria	–	20	27	32	37	41	47	53	58
				Throw	0°	22 1/2°	45°	34-55-104	49-74-120	61-92-133	74-104-146	86-112-158	97-120-168
46 x 46		14.30		CFM	4290	5720	7150	8580	10010	11440	14300	17160	20020
				Noise Criteria	–	20	27	32	37	41	47	53	58
				Throw	0°	22 1/2°	45°	35-57-107	51-76-124	63-95-138	76-107-151	89-116-163	101-124-174
48 x 48		15.59		CFM	4677	6236	7795	9354	10913	12472	15590	18708	21826
				Noise Criteria	–	21	28	33	38	42	48	54	59
				Throw	0°	22 1/2°	45°	37-60-113	53-80-131	67-100-146	80-113-159	94-122-173	106-131-185

Performance Notes:

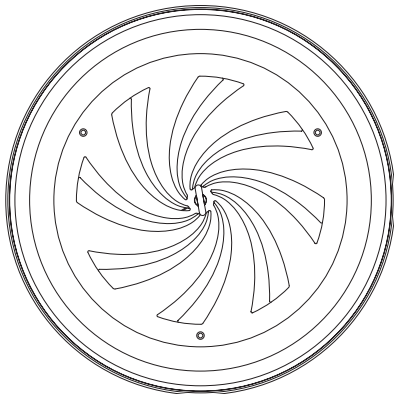
- All pressures are in inches w.g..
- Core Velocity is in feet per minute.
- Performance data is based on double deflection grille with opposed blade damper (register).
- 0°, 22 1/2° and 45° represent vertical blade deflection angles and horizontal spread.
- Throw values are given for terminal velocities of 150, 100 and 50 fpm under isothermal conditions.
- Additional performance notes and correction factors for various models and settings may be found on page F20.
- Noise Criteria (NC) values are based upon 10dB room absorption, re 10⁻¹² watts @ 0° deflection. Dash (–) in space indicates a Noise Criteria of less than 15.
- Data derived from tests conducted in accordance with ANSI/ASHRAE Standard 70 – 2006.

ROUND DOWNBLAST DIFFUSER
STEEL • HEAVY DUTY • ADJUSTABLE
VERTICAL TO HORIZONTAL DISCHARGE PATTERN
MODEL: RDB



REVIEWED

Face View



Dimensional Data

Listed Size D	Imperial Units (inches)			Metric Units (mm)		
	A	B	C	A	B	C
8	11 11/16	2 1/4	14 3/8	297	57	365
10	14	2 9/16	17 15/16	356	65	456
12	16 1/4	3	21 5/8	413	76	549
14	18 5/8	3 3/8	25 1/4	473	86	641
16	20 7/8	4	29	530	102	737
18	23 1/4	4 1/2	33 1/2	591	114	851
20	25 1/2	5 7/16	37 1/4	648	138	946
24	30 3/16	6 1/2	43 7/8	767	165	1114

DESCRIPTION:

1. Material: Heavy gauge corrosion resistant steel.
2. The Nailor RDB heavy duty round downblast ceiling diffusers have been designed for industrial and commercial applications. Unique contemporary design features a "Fibonacci spiral" adjustable aperture.
3. Especially suitable for theaters, auditoriums, factories, warehouses, convention halls, coliseums, shopping malls and other applications where ceilings are high and conditions variable.
4. The discharge pattern can be adjusted from full horizontal to full vertical. At the full vertical setting, the diffuser forces approximately 75% of the air in a long downward projection. This results in effective spot cooling or heating from high mounting locations.
5. Uniform 360° discharge pattern in the horizontal mode with excellent performance in VAV applications.
6. Ring operator can be adjustable with a pole.
7. An optional round opposed blade damper is screwdriver operated and adjusted through the aperture or by removing the inner core of the diffuser.
8. Standard finish is AW Appliance White.

OPTIONS:

- GK Foam gasket
 - EQ Earthquake Tabs
- Finish:
- SP Special. Specify _____.

SCHEDULE TYPE:	sd1
PROJECT:	The Vanilla Bean
ENGINEER:	Dawes Engineering & Design
CONTRACTOR:	Sleeping Giant Mechanical

Dimensions are in inches (mm).

DATE	B SERIES	SUPERSEDES	DRAWING NO.
1 - 9 - 04	RBD	12 - 8 - 03	RDB-1

PERFORMANCE DATA:

MODEL RDB • IMPERIAL UNITS

Nominal Neck Size	Neck Velocity, FPM	400	500	600	700	800	900	1000	1200	1400	1600
	Velocity Pressure	.010	.016	.022	.031	.040	.050	.062	.090	.122	.160
8" Dia.	Total Pressure, Horizontal	.027	.042	.062	.073	.115	.140	.175	.258	.335	.421
	Total Pressure, Vertical	.014	.024	.035	.049	.053	.071	.088	.122	.176	.235
	Airflow, CFM	140	175	209	244	279	314	349	419	489	559
	Noise Criteria, Horizontal	—	—	—	21	23	25	31	33	37	39
	Noise Criteria, Vertical	—	—	—	—	—	—	20	22	28	31
	Throw, Horizontal	0-1-2	1-2-4	1-2-5	1-2-7	1-3-9	2-4-10	2-4-11	3-5-12	4-6-13	6-7-15
	Throw, Vertical	8	10	16	19	24	31	34	37	43	48
10" Dia.	Total Pressure, Horizontal	.036	.056	.082	.111	.145	.185	.230	.335	.462	.570
	Total Pressure, Vertical	.016	.026	.037	.051	.066	.083	.103	.149	.204	.265
	Airflow, CFM	218	273	327	382	436	491	545	654	764	873
	Noise Criteria, Horizontal	—	—	—	—	21	23	27	33	39	41
	Noise Criteria, Vertical	—	—	—	—	—	—	20	25	32	35
	Throw, Horizontal	0-1-3	1-2-5	1-2-7	1-3-8	2-4-10	2-4-11	3-5-12	4-7-13	6-8-15	7-10-16
	Throw, Vertical	12	13	22	26	29	34	37	40	48	50
12" Dia.	Total Pressure, Horizontal	.047	.073	.107	.149	.195	.245	.307	.445	.612	.800
	Total Pressure, Vertical	.018	.029	.042	.058	.076	.095	.118	.170	.232	.305
	Airflow, CFM	314	393	471	550	628	707	785	942	1100	1257
	Noise Criteria, Horizontal	—	—	—	33	27	31	35	39	43	46
	Noise Criteria, Vertical	—	—	—	—	—	—	22	25	28	37
	Throw, Horizontal	3-6-20-11	4-7-13	5-8-15	6-10-17	7-11-18	8-12-19	9-13-20	12-16-22	15-18-23	18-20-25
	Throw, Vertical	15	17	28	36	46	50	55	60	67	75
14" Dia.	Total Pressure, Horizontal	.039	.062	.090	.127	.165	.209	.262	.380	.542	.700
	Total Pressure, Vertical	.016	.027	.038	.054	.070	.088	.111	.162	.224	.295
	Airflow, CFM	428	535	641	748	855	962	1069	1283	1497	1710
	Noise Criteria, Horizontal	—	—	—	—	22	25	29	37	46	52
	Noise Criteria, Vertical	—	—	—	—	—	—	22	29	35	38
	Throw, Horizontal	1-6-12	2-7-14	3-8-16	4-10-17	5-11-18	7-12-19	8-13-20	11-16-22	15-18-23	19-21-25
	Throw, Vertical	21	25	31	39	48	53	57	63	70	89
16" Dia.	Total Pressure, Horizontal	.053	.069	.110	.181	.232	.292	.367	.535	.737	.965
	Total Pressure, Vertical	.020	.032	.045	.061	.083	.104	.132	.189	.261	.342
	Airflow, CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
	Noise Criteria, Horizontal	—	—	—	22	25	31	37	42	46	52
	Noise Criteria, Vertical	—	—	—	—	—	—	22	27	35	41
	Throw, Horizontal	6-10-18	7-11-20	7-13-21	8-16-22	9-17-24	11-19-25	13-20-26	14-21-27	15-22-28	16-23-29
	Throw, Vertical	25	27	34	41	50	55	59	67	85	94
18" Dia.	Total Pressure, Horizontal	.071	.114	.162	.226	.300	.375	.472	.690	.942	1.230
	Total Pressure, Vertical	.023	.037	.053	.073	.096	.120	.150	.217	.298	.390
	Airflow, CFM	707	884	1060	1237	1414	1590	1767	2121	2474	2827
	Noise Criteria, Horizontal	—	—	22	34	37	41	44	52	57	62
	Noise Criteria, Vertical	—	—	—	—	—	24	27	33	37	41
	Throw, Horizontal	8-13-21	10-14-22	11-16-23	12-17-24	14-18-25	15-19-26	16-20-27	18-22-28	21-23-29	23-25-30
	Throw, Vertical	29	34	39	44	55	57	63	74	85	100
20" Dia.	Total Pressure, Horizontal	.074	.116	.162	.221	.289	.365	.442	.630	.862	1.12
	Total Pressure, Vertical	.022	.035	.05	.069	.09	.115	.142	.206	.284	.373
	Airflow, CFM	873	1091	1309	1527	1745	1963	2182	2618	3054	3491
	Noise Criteria, Horizontal	—	25	31	34	38	42	45	53	58	62
	Noise Criteria, Vertical	—	—	—	—	23	27	31	36	42	46
	Throw, Horizontal	10-14-20	12-16-23	14-19-26	16-21-29	18-23-31	20-25-32	22-27-34	25-30-37	29-34-39	32-37-41
	Throw, Vertical	36	42	48	53	58	63	69	81	90	105
24" Dia.	Total Pressure, Horizontal	.047	.073	.104	.141	.182	.229	.281	.400	.540	.700
	Total Pressure, Vertical	.010	.016	.022	.030	.040	.050	.062	.090	.122	.159
	Airflow, CFM	1257	1571	1885	2199	2513	2827	3142	3770	4398	5027
	Noise Criteria, Horizontal	25	30	34	36	42	47	53	62	70	73
	Noise Criteria, Vertical	—	—	—	24	27	33	38	44	47	51
	Throw, Horizontal	12-16-22	14-19-26	17-21-30	18-23-32	20-25-33	23-27-36	25-31-37	29-35-40	33-38-42	34-40-47
	Throw, Vertical	43	47	50	58	64	69	87	95	99	113

D
CEILING DIFFUSERS

Performance Notes:

- All pressures are in inches w.g.. To obtain static pressure, subtract the velocity pressure from the total pressure.
- Horizontal throws are given at 150, 100 and 50 fpm terminal velocities under isothermal conditions with the face fully closed.
- Vertical throw (projection) is given at 50 fpm terminal velocity under isothermal conditions with the face fully open. For non-isothermal conditions, use the following correction factors:

ΔT Temperature Differential	Correction Factor
20°F Cooling	x 1.40
Isothermal	x 1.00
10°F Heating	x 0.83
20°F Heating	x 0.58
30°F Heating	x 0.53
40°F Heating	x 0.43

4. Noise Criteria (NC) values are based upon 10 dB room absorption, re 10⁻¹² watts. Dash (—) in space indicates an Noise

Criteria of less than 20. Values shown are for the horizontal discharge pattern (center closed) and vertical discharge pattern (center fully open).
5. Data derived from tests conducted in accordance with ANSI/ASHRAE Standard 70 – 2006.

Nominal Neck Size Dia. in Inches	Ak Factor
6	0.13
8	0.25
10	0.51
12	0.56
14	1.08
18	1.36
20	1.60