VENTILATION CALCULATIONS - DINING (RTU-1)

PLASMASOFT Demonstration Software — Support: plasmasoft@plasma-air.com or call (203)327-0500 — Version PlasmaSoft 2.6 ASHRAE 62.1-2013 — PLASMA AIR INTERNATIONAL

CSC - Cleveland, TN - Dining (RTU-1)

ASHRAE 62.1
Space Contaminant(s) Calculation Using Appendix D Equations

USER INPUT FIELDS

Green colored fields need user input. Yellow colored fields are calculated inputs by Plasma Air.
Pink fields are auto-calculated based on user selection. Grey values are auto-calculated but also editable.

ASHRAE Equation	Equation 2 - Either returns air only, Combined Mixture Supply Air, Considers Mixture Outside Air
Space Type	Restaurant dining rooms
Ez	0.8 - Ceiling supply of warm air 15°F above space temp and ceiling return
Area (Sq.Ft.)	1,122
Number of People	80
Supply Air (CFM)	2400
Emission Rate / Person (cfm/min)	0.60

Calculation of Space Contaminants Using Ventilation Rate Procedure (VRP) OA			Calculation of Space Contaminants Using IAQ Procedure (IAQP) OA		
VRP Outside Air Rate per Person	5.00	cfm	IAQP Outside Air Rate per Person	7.50	cfm
Space Airflows	CFM	L/Min	Space Airflows	CFM	L/min
Supply Air	2,400	67,968	Supply Air	2,400	67,968
Outside Air	1,066.20	30,194.76	Outside Air	3,916.00	111,611.20
Return Air	1,333.80	37,773.22	Return Air	1,790.00	50,356.80

$$C_{SA} = \frac{N + E_Z V_{OZ} C_O}{E_Z (V_{OZ} + R V_R E_f)}$$

Variable	Description	Value	Units
N	Contaminant Generation Rate	21,350	µg/min
Ez	Zone Air Distribution Effectiveness	0.8	
Voz	Outdoor Air Flow Rate	30,194.76	L/min
Ef	Filter Efficiency	30	
Co	Contaminant Concentration, OA	1.2	µg/m³
R	Recirculation Flow Fraction =Vr/(Voz+Vr)	0.56	
Vr	Return Air Flow Rate	37,773.22	L/min
Csa	Contaminant Concentration, zone	1,271	ppm

Is the Csa for the IAQP equal or less than Csa for the VRP?

Variable	Description	Value	Units
N	Contaminant Generation Rate	21,350	µg/min
Ez	Zone Air Distribution Effectiveness	0.8	
Voz	Outdoor Air Flow Rate	111,611.20	L/min
Ef	Filter Efficiency	30.68	
Co	Contaminant Concentration, OA	1.2	µg/m³
R	Recirculation Flow Fraction =Vr/(Voz+Vr)	0.83	
Vr	Return Air Flow Rate	50,356.80	L/min
Csa	Contaminant Concentration, zone	1,004	ppm

No

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Notes:
1. Per International Mechanical Code, Section 403.2, Where The Registered Design Professional Demonstrates That An Engineered Ventilation System Design Will Prevent The Maximum Concentration Of Contaminants From Exceeding That Obtainable By The Rate Of Outdoor Air Ventilation Determined In Accordance With Section 403.3, The Minimum Required Rate Of Outdoor Air Shall Be Reduced In Accordance With Such An Engineered System.
2. The Table Above Indicates The Associated Indoor Air Contaminant Levels When Utilizing Plasma Air's Model 7203 Air Purification Device. All Associated Indoor Air Contaminant Levels Are Based On Manufacturer's Data For The Design Conditions Shown Above.

VENTILATION CALCULATIONS - CORRIDOR

Per Section 402.1 Of The International Mechanical Code, Natural Ventilation Means Are Permitted To Be Used To Satisfy The Code Mandated Ventilation Requirements. The Corridor Served By RTU-2 Will Have It's Ventilation Requirement Satisfied Through Natural Ventilation Means. Per Section 402.2, The Minimum Openable Area To The Outdoors Must Be At Least 4% Of The Area To Be Ventilated.

The Corridor Served By RTU-2 Is 98 Square Feet. For 98 Square Feet, 4% Equates To 3.92 Square Feet Of Openable Area. Door Rear Entry Door (3 Feet X 7 Feet), The Total Openable Area For Natural Ventilation Means Is 21 Square Feet. This Satisfies The Minimum Code Requirements. Additional / Supplemental Ventilation Air Will Be Provided Through RTU-1.

VENTILATION CALCULATIONS - KITCHEN

Outside Air Not Required For Kitchen Per International Mechanical Code Table 403.3. Exhaust Is Required At A Rate Of 0.7 CFM / SQ. FT. Exhaust Required Is 764 Square Feet * 0.7 CFM / SQ. FT. = 535 CFM. 555 CFM Is Exhausted. Air To Be Exhausted Will Be Made Up Through RTU-1 And RTU-2.

MECHANICAL SCHEDULES

ROOFTOP UNIT SCHEDULE

UNIT ID	MODEL NO.	AREA SERVED	SUPPLY FAN				GAS HEAT SECTION			COOLING COIL				ELECTRICAL				WEIGHT	NOTES	ACCESS.
			SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN WG)	MOTOR (HP)	INPUT (MBH)	OUTPUT (MBH)	# OF STAGES	TOTAL (MBH)	SENS (MBH)	EAT (DB / WB °F)	LAT (DB / WB °F)	VOLTAGE (V)	FLA (A)	MCA (A)	MOCP (A)	(LB)		
RTU-1	48TCEA07	Dining	2,400	410	0.5	1	115.0	93.0	1	74.0	55.8	79.4	66.4	208,3ϕ	-	40	50	652	ALL	-
RTU-2	48TCEA07	POS, Kitchen, BOH	2,400	345	0.5	1	115.0	93.0	1	74.0	55.8	79.4	66.4	208,3ϕ	-	40	50	652	ALL	-

NOTES:
1. RTU Is Existing To Remain; Rebalance Outside Air As Scheduled. Contractor Must Verify Electrical Requirements With Equipment Nameplate Prior To Installation And Notify Engineer If Any Discrepancies Occur.
2. Unit Shall Have A Duct Smoke Detector Installed In Main Return Duct And Shall Interface To Fire Alarm System And Be Wired For Unit Shutdown.

FAN SCHEDULE

UNIT ID	MODEL NO.	TYPE	LOCATION	SERVICE	AIRFLOW (CFM)	S.P. (IN WG)	SPEED (RPM)	MOTOR HORSEPOWER (HP)	VOLTAGE / PHASE (V)	FLA (A)	MCA (A)	MOCP (A)	DRIVE	INTERLOCK	WEIGHT (LB)	NOTES	ACCESSORIES
EF-1	DU33HFA	Upblast	Roof	Kitchen / Toilet Rm	555	0.75	-	0.333	115 / 1ϕ	5.6	20	20	Direct	Timeclock	100	1,3,4	ALL
EF-2	G-070-VG	Downblast	Roof	Toilet Rooms	150	0.25	1,257	0.1	115 / 1ϕ		20		Direct	Timeclock	50	2,3,4	ALL

NOTES:
1. Selection Based On Equipment Manufactured By CaptiveAire.
2. Selection Based On Equipment Manufactured By Greenheck.
3. Provide Factory Roof Curb. Roof Curbs Shall Be Suitable For Sloped Roof.
4. Motors Shall Be Of Premium Efficiency.

ACCESSORIES:
1. Disconnect Switch
2. 22" High Factory Roof Curb
3. Bird Screen
4. Backdraft Damper
5. Integral Speed Controller

DIFFUSER SCHEDULE

UNIT ID	MODEL NO.	SIZE	DESCRIPTION	NOTES
A	TMS	24X24	Steel, 3 Cone Full Face, Volume Control Damper And Opposed Blade Damper.	ALL
B	TMS-AA	24X24	Aluminum, 3 Cone Full Face, Volume Control Damper, And Opposed Blade Damper.	ALL
C	TMS-AA	12X12	Aluminum, 3 Cone Full Face, Volume Control Damper, And Opposed Blade Damper.	ALL
D	23RL	24X24	Steel Register, 3/4" Spacing, 35 Degree Blades, Fixed Deflection, Opposed Blade Damper And Front Bars Parallel To The Long Dimension.	1,3,4,6
	23RL	24X24	Aluminum Register, 3/4" Spacing, 35 Degree Blades, Fixed Deflection, Opposed Blade Damper And Front Bars Parallel To The Long Dimension.	1,3,4,6
	23RL	12X12	Steel Register, 3/4" Spacing, 35 Degree Blades, Fixed Deflection, Opposed Blade Damper And Front Bars Parallel To The Long Dimension.	1,3,4,6

NOTES:
1. Selection Based On Equipment Manufactured By Titus.
2. Flexible Ducts Connecting The Diffusers Shall Be Full Size Of Neck Diameter.
3. Maximum Noise Criterion Rating < 30 NC.
4. Baked Enamel Finish, Color To Be Selected By Architect.
5. Diffusers Shall Be 4-Way Blow Unless Otherwise Indicated On Plans.
6. Mounting Frame Type Shall Be Coordinated With Ceiling Construction Type.
7. Neck Diameter Shall Be As Scheduled In Table 1.

TABLE 1 - ROUND NECK SIZE SCHEDULE
UP TO 150 CFM - 6" DIAMETER
151 TO 275 CFM - 8" DIAMETER
276 TO 380 CFM - 10" DIAMETER
381 TO 500 CFM - 12" DIAMETER
501 TO 700 CFM - 14" DIAMETER
701 TO 900 CFM - 16" DIAMETER

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