	ABBI	REVIA	TIONS		HVAC LEGEND
A/C		HWP	HEATING WATER PUMP	 SYMBOL	DESCRIPTION
ABV	ACCEPTANCE	HWR	HEATING WATER RETURN HEATING WATER SUPPLY	$\overline{}$	LIMIT OF DEMOLITION
	AIR CONDITIONING UNIT	HX	HEAT EXCHANGER	•	POINT OF CONNECTION
ADA	AMERICANS WITH DISABILITIES ACT	IE	INVERT ELEVATION	$\langle I\!\!I \rangle$	KEYNOTE
ADD	ADDITION	IN	INCH	M	FURNISHED & INSTALLED
AHJ	AUTHORITY HAVING JURISDICTION	L	LENGTH		FURNISHED BY MECHANICAL
	AIR HANDLING UNIT	LBS	POUNDS		
APPROX	APPROXIMATE	LPC	LOW PRESSURE CONDENSATE	EM	INSTALLED BY MECHANICAL
ARCH		LPS	LOW PRESSURE STEAM	 E	FURNISHED & INSTALLED BY ELECTRICAL
AN	AIR SEPARATOR	MA	MIXED AIR		SUPPLY, RETURN, & EXHAUST REGISTER
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	MAU		 (RAR/EAR)	– NECK SIZE – AIR QUANTITY (C.F.M.)
AUX	AUXILIARY	MC	MECHANICAL CONTRACTOR		RELIEF AIR GRILLE
AV	AIR VENT	MCC	MOTOR CONTROL CENTER	 (REAG)	- AIR QUANTITY (CFM)
BAS	BUILDING AUTOMATION SYSTEM	MIN	MINIMUM		LINEAR SUPPLY & RETURN - # OF SLOTS – SLOT WIDTH
BDD	BACKDRAFT DAMPER	MPC MPS	MEDIUM PRESSURE CONDENSATE		- TOTAL LENGTH (FT)
BLDG	BUILDING	MV	MANUAL AIR VENT	 777	
BOD	BOTTOM OF DUCT	(N)	NEW	 <u> </u>	EXIST. DIFFUSER, RETURN AIR GRILLE OR EXHAUST GRILLE TO
BSMT	BASEMENT	NC	NORMALLY CLOSED		BE REMOVED
BV BYV	BALL VALVE		NORMALLY OPENED		ELUCATED EXIST. DIFFUSER, RETURN AIR GRILLE OR EXHAUST GRILLE TO
C	COMMON, CONDENSATE OR CONDUIT	NIC	NOT IN CONTRACT	 גא רא רא גא גא גא	EXIST. DIFFUSER, RETURN AIR GRILLE OR EXHAUST GRILLE TO REMAIN OR BE RELOCATED
CA	CONTROL AIR, or COMBUSTION AIR	NTS	NOT TO SCALE	 	EXIST. MECHANICAL EQUIPMENT & DUCT
CAP	CAPACITY	OBD	OPPOSED BLADE DAMPER		LINEAR DIFFUSER
CAV	CONSTANT AIR VOLUME		ON CENTER	 \square	SUPPLY AIR
CBC	CALIFORNIA BUILDING CODE	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED		RETURN AIR
	COOLING COIL OR CONTROLS CONTRACTOR	OFOI	OWNER FURNISHED OWNER INSTALLED		
CEC	CALIFORNIA ELECTRICAL CODE	PC	PUMPED CONDENSATE		EXHAUST AIR
CFC	CALIFORNIA FIRE CODE	PCR	PRESSURIZED CONDENSATE RETURN	 14x12	RECTANGULAR DUCT SIZE
СРМ	CHILLER	PD PE	PREUMATIC ELECTRIC	14x12	(WIDTH × DEPTH IN INCHES)
CHV	CHECK VALVE	PF	PRE FILTER	 14 " ø	ROUND DUCT SIZE
CHWP	CHILLED WATER RETURN	PG PH	PHASE	۲ <u>۲</u>	(WIDTH x DEPTH IN INCHES)
CHWS	CHILLED WATER SUPPLY	PLBG	PLUMBING		DUCT RISE / DUCT DROP
CLG	CEILING	POC POD	POINT OF DISCONNECTION		
CMC	CALIFORNIA MECHANICAL CODE	PS	PRESSURE SENSOR	 77	DUCT WITH SOUND INSULATION
CONN	CONTROL PANEL	PSI PSIG	POUNDS PER SQUARE INCH – GAUGE		STAINLESS STEEL DUCTWORK
CPC	CALIFORNIA PLUMBING CODE	QTY	QUANTITY		FLEXIBLE DUCT
CV CWP	CONSTANT VOLUME OR CONTROL VALVE	R R	REMOVE RISERS, RELOCATE OR RISE		RECTANGULAR DUCT UP
CWR	CONDENSER WATER RETURN	RA	RETURN AIR		RECTANGULAR DUCT DOWN
CWS D	DROP OR DRAIN	REB REF	REBALANCE RELIEF FAN		
DDC	DIRECT DIGITAL CONTROL	REFRIG	REFRIGERANT		DOOR LOUVER OF UNDERCUT
DEMO DEPT	DEMOLISH / DEMOLITION DEPARTMENT	REL REQ'D	RELOCATE		AUTOMATIC DAMPER (WITH ACTUATOR)
DET	DETAIL	REV	REVISE, REVISION OR REVOLUTIONS		BACKDRAFT DAMPER MANUAL VOLUME DAMPER
DIA	DIFFERENCE	RF RHC	REHEAT COIL	 (FSD)	COMBINATION FIRE & SMOKE DAMPER
DISCH	DISCHARGE	RL	REFRIGERANT LIQUID		
DN DTR	DOWN DOWN THRU ROOF	RM RS	ROOM REFRIGERANT SUCTION		
DV	DIAPHRAGM VALVE	RTU	ROOFTOP UNIT		CONTROLS (PLAN)
DWG DX	DRAWING DIRECT EXPANSION	SA SAN	SUPPLY AIR SANITARY	 603	CO2 SENSOR
(E)	EXISTING TO REMAIN	SD	SMOKE DAMPER		NITROGEN DIOXIDE SENSOR
EA EC	EXHAUST AIR OR EACH	SEN SF	SENSIBLE SUPPLY FAN OR SQUARE FEET	 - ₩	HUMIDITY SENSOR
ECON	ECONOMIZER	SP	STATIC PRESSURE		OXYGEN SENSOR
EL	EXTRAUST FAN ELEVATION	SPEC SQ FT	SPECIFICATION SQUARE FEET	 <u> </u>	ROUM THERMUSTAT & ZUNE NUMBER SWITCH (MANUAL WALL MOUNT OR DOOR INTERLOCK)
ELEC	ELECTRICAL	SQ IN	SQUARE INCH	 ୍ଷ ଜ	SMOKE DETECTOR
EQUIP	EQUIPMENT EXTERNAL STATIC PRESSURE	ST STD	STRAINER OR SOUND TRAP OR STEAM TRAP STANDARD	 <u> </u>	PRESSURE SENSOR (DUCT MOUNTED)
ET	EXPANSION TANK	STRUC	STRUCTURAL	(P) (V)	PRESSURE SENSOR (ROOM PRESSURE) PURGE EXHAUST CONTROL SWITCH
EXH FC	FLEXIBLE CONNECTION OR FAIL CLOSED	TCP	TEMPERATURE CONTROL PANEL	 	VISUAL STROBE AND AUDIBLE HORN
FCU	FAN COIL UNIT	TDH	TOTAL DYNAMIC HEAD	 <u>لاک</u>	REFRIGERANT LEAK DETECTION SENSOR
FF	FINISH FLOOR OR FINAL FILTER	THRU	THROUGH	 —— " и шили	
FFE	FINISH FLOOR ELEVATION	TI	TENANT IMPROVEMENT		PIPE RISE
FPB	FLOOR FAN POWERED BOX	TS	TEMPERATURE SENSOR		PIPE DROP PIPE BRANCH
FR		TSP	TOTAL STATIC PRESSURE		GATE VALVE
FT	FIRE/SMUKE DAMPER	UC	UNDERCUT DOOR		GLOBE VALVE CHECK VALVE
G	GAS	UNO	UNLESS NOTED OTHERWISE		
GA GALV	GAUGE, GAGE GALVANIZED	UTR V	VENT		CIRCUIT SETTER
GLV	GLOBE VALVE	VAV	VARIABLE AIR VOLUME		REDUCER STRAINER
GN GND	GENERAL NOTE GROUND	VD VFI	VOLUME DAMPER VELOCITY		UNION
GPM	GALLON PER MINUTE	VFD	VARIABLE FREQUENCY DRIVE	<u> </u>	AIR VENT VALVE PRESSURE GAUGE
HP HP	HORSEPOWER HIGH PRESSURE	W/ W/O	WITH WITHOUT		
HP	HEAT PUMP	WG	WATER GAUGE		CONTROL VALVE PRESSURE REDUCING VALVE
HPC HPS	HIGH PRESSURE CONDENSATE HIGH PRESSURE STEAM	WMS WPD	WIRE MESH SCREEN WATER PRESSURE DROP	 	PRESSURE & TEMPERATURE RELIEF VALVE PIPE ANCHOR
HRU	HEAT RECOVERY UNIT	WSHP	WATER SOURCE HEAT PUMP		· -·· -··
HVAC HW	HEATING, VENTILATION & AIR CONDITIONING HEATING WATER	WT XFMR	WEIGHT TRANSFORMER		
<u> </u>					

DEMOLITION NOTES

1. THE MECHANICAL DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE THE DRAWINGS TO DETERMINE THE LOCATION OF EQUIPMENT OR UTILITIES. SEE ARCHITECTURAL PLANS, WHERE PROVIDED ON PROJECT, FOR EXTENT OF DEMOLITION.

 ITEMS NOT INDICATED TO BE REMOVED SHALL BE PROTECTED IN PLACE.
 OWNER SHALL HAVE FIRST RIGHT OF REFUSAL FOR ALL ITEMS INDICATED TO BE REMOVED. PENDING OWNER'S INSPECTION AND REVIEW, ALL SUCH ITEMS SHALL BE REMOVED INTACT, FULLY FUNCTIONAL AND SUITABLE FOR REUSE, AND SHALL BE PROTECTED FROM DAMAGE. CONTRACTOR SHALL CONFIRM WITH THE OWNER'S REPRESENTATIVE ACCEPTANCE OR REFUSAL OF SUCH ITEMS. ALL ITEMS ACCEPTED BY THE OWNER SHALL BE DELIVERED BY THE CONTRACTOR TO ONSITE STORAGE LOCATIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE. ALL ITEMS REFUSED BY THE OWNER SHALL BE DISPOSED OF BY THE CONTRACTOR IN AN APPROVED MANNER.
 NO EXISTING EQUIPMENT OR MATERIAL SHALL BE REUSED WITHOUT THE SPECIFIC APPROVAL OF THE OWNER'S REPRESENTATIVE.

5. REMOVAL OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE SATISFACTORY PERFORMANCE OF THE GENERAL WORK. NOT ALL EXISTING CONDITIONS ARE DETAILED ON THE DRAWINGS. CONTRACTOR SHALL SURVEY THE SITE AND MAKE ALL NECESSARY CHANGES REQUIRED BASED ON THE EXISTING CONDITIONS FOR THE PROPER INSTALLATION OF NEW WORK.

6. UNLESS NOTED OTHERWISE, EXISTING PIPING AND COMPONENTS RENDERED DEFUNCT AS PART OF THIS PROJECT SHALL BE ADDRESSED IN THE FOLLOWING MANNER: DEFUNCT PIPING LOCATED IN CONCEALED AREAS WITHIN EXISTING TO REMAIN WALLS, BELOW SLAB, OR BELOW GRADE SHALL BE ABANDONED IN PLACE OR REMOVED AS NECESSARY TO AVOID INTERFERENCE WITH NEW WORK. EXISTING DEFUNCT PIPING AND COMPONENTS LOCATED IN EXPOSED AREAS AND IN ATTIC SPACE SHALL BE REMOVED TO THE NEAREST OPERATIONAL PIPING MAIN AND CAPPED, INCLUDING ALL ASSOCIATED HANGERS AND STRUCTURAL SUPPORTS. EXISTING DEFUNCT VENTS THROUGH ROOF SHALL BE REMOVED. COORDINATE REMOVAL WITH ROOFING CONTRACTOR.

 CONTRACTOR SHALL FIELD VERIFY EXISTING PIPING & DUCT RUNS, REUSE AS REQUIRED AND REMOVE ALL UNUSED DUCT AND PIPING. UNUSED PIPING & DUCT IN INACCESSIBLE LOCATIONS (WALLS/SHAFTS TO CAN BE ABANDONED IN PLACE
 THE EXISTING CONDITIONS SHOWN ARE FROM AVAILABLE RECORD DRAWINGS AND SHOWN FOR REFERENCE CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITIONS AT SITE PRIOR TO SUBMITTING BID. ALL DEMOLITION, ALTERATION, EXTENSION, RELOCATION, REHABILITATION WORK SHALL BE INCLUDED IN CONTRACT. NO ADDITIONAL ALLOWANCE OR CHANGE ORDERS WILL BE ACCEPTED.

9. CONTRACTOR IS RESPONSIBLE TO RELOCATE OR REMOVE FROM WALLS, CEILINGS, FLOOR SPACES, ETC. ANY EXISTING PIPING, DUCT, FIRE-SMOKE DAMPERS, OR OTHER MECHANICAL EQUIPMENT WHICH INTERFERES WITH PLANNED REMODEL WORK.

10. NOTIFY THE ENGINEER IMMEDIATELY WHEREVER EXISTING EQUIPMENT IS ENCOUNTERED WHICH MUST BE RELOCATED DUE TO THE NEW CONSTRUCTION, OR NOT INDICATED ON "AS-BUILT" DRAWINGS OR WAS BURIED UNDERGROUND OR EMBEDDED IN STRUCTURE WALLS.

 CAREFULLY PROTECT ALL WALLS, TRIM, FLOORS, EQUIPMENT, UTILITY LINES AND MATERIALS. WHEN WORKING ON FINISHED SURFACES, LIMIT DAMAGE TO THE SMALLEST AREA POSSIBLE AND RESTORE TO THE ORIGINAL CONDITION ALL SURFACES WHICH ARE DAMAGED BECAUSE OF THE INSTALLATION OF THIS WORK.
 EQUIPMENT, MATERIALS AND SUPPLIES TEMPORARILY REMOVED FOR PROTECTION SHALL BE REPLACED IN ORIGINAL LOCATIONS. ANY MATERIALS DAMAGED SHALL BE

REPLACED WITH NEW MATERIALS OF LIKE KIND AND QUALITY.
13. DEMOLITION WORK SHALL BE DONE IN A MANNER WHICH WILL NOT CAUSE UNNECESSARY INCONVENIENCE OR DANGER TO USERS OF THE PREMISES AND ADJACENT SITE, AND NOT INTERFERE WITH ITS OPERATION. ANY DEMOLITION WORK TO BE PERFORMED MUST BE PLANNED IN ADVANCE.

 RESEAL ALL PENETRATIONS OR OPENING THROUGH WALLS, CEILING, FLOORS, ETC., TO MAINTAIN THE RATING OF STRUCTURE.

 ALL REMOVED MATERIALS AND EQUIPMENT WHICH ARE SALVAGED MATERIALS SHALL REMAIN IN THE PROPERTY OF THE OWNER. DELIVER SUCH SALVAGED MATERIALS AND EQUIPMENT ON THE PREMISES AS DIRECTED BY OWNER AND NEATLY PILE OR STORE AND PROTECT FROM DAMAGE. DISPOSE OF ALL HAZARDOUS MATERIAL PER FEDERAL, STATE AND LOCAL REGULATIONS AND OTHER AGENCIES HAVING JURISDICTION.
 ALL DEMOED, ALTERED AND RELOCATED COMPONENTS SHALL BE REFLECTED ON THE AS-BUILT RECORD DOCUMENTS.

MECHANICAL SCOPE OF WORK

MECHANICAL SCOPE INCLUDES REMODEL OF EXISTING DINING ROOMS IN AN EXISTING BUILDING. WORK INCLUDES REVISED DUCTWORK AND AIR DISTRIBUTION BASED ON THE ARCHITECTURAL REFLECTIVE CEILING AND LIGHTING PLANS. EXISTING FAN COIL UNITS ARE TO REMAIN AND BE REUSED. NEW KITCHEN EXHAUST FAN AND MAKE-UP AIR UNIT FOR TYPE 1 HOOD - PIZZA OVEN. GREASE DUCTWORK WITH FIRE WRAP FROM HOOD TO EXHAUST FAN ON ROOF. MAKE-UP AIR DUCT FROM HOOD TO MAKE-UP AIR UNIT ON ROOF.

MECHANICAL GENERAL NOTES

- ALL DRAWINGS ARE CONSIDERED TO BE PART OF THE CONTRACT DOCUMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REVIEW AND COORDINATION OF ALL DRAWINGS PRIOR TO ANY CONSTRUCTION, INCLUDING STRUCTURAL, PLUMBING, AIR CONDITIONING AND ELECTRICAL. ANY DISCREPANCIES THAT OCCUR SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE START OF CONSTRUCTION SO THAT A CLARIFICATION CAN BE ISSUED. ANY WORK PERFORMED IN CONFLICT WITH THE CONTRACT DOCUMENTS OR ANY CODE REQUIREMENT SHALL BE CORRECTED BY THE
- ALL SYMBOLS AND ABBREVIATIONS USED ON THE DRAWINGS ARE CONSIDERED TO BE CONSTRUCTION STANDARDS. IF CLARIFICATION IS REQUIRED, THE CONTRACTOR SHALL NOTIFY ENGINEER PRIOR TO PROCEEDING WITH THE WORK.

CONTRACTOR AT HIS OWN EXPENSE, AND AT NO EXPENSE TO THE OWNER.

- 3. DO NOT SCALE DRAWINGS. ALL DIMENSIONS AND JOB SITE CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE JOB SITE PRIOR TO BID SUBMITTAL, START OF CONSTRUCTION AND/OR FABRICATION OF MATERIALS. IF DISCREPANCIES ARE ENCOUNTERED, THE ENGINEER SHALL BE NOTIFIED FOR CLARIFICATION.
- . THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, EQUIPMENT, TRANSPORTATION AND SERVICES NECESSARY FOR COMPLETION OF THE WORK AND PROVIDE A FULLY OPERATIONAL SYSTEM. ALL MATERIALS AND WORK SHALL COMPLY WITH APPLICABLE CODES AND GOVERNING REGULATIONS AND MEET THE APPROVAL OF THE CITY AND STATE FIRE MARSHALL.
- CONTRACTOR SHALL PROVIDE AND BE RESPONSIBLE FOR PROTECTION AND REPAIR OF ADJACENT EXISTING SURFACES AND AREAS WHICH MAY BE DAMAGED AS A RESULT OF DEMOLITION AND/OR NEW WORK.
- 6. ALL EQUIPMENT THAT IS REMOVED AND NOT REUSED SHALL BE COORDINATED WITH, AND/OR RETURNED TO, THE BUILDING OWNER.
- ALL EXISTING DUCT TAPS THAT ARE REMOVED AND NOT REUSED SHALL BE CAPPED AIRTIGHT AND SEALED WITH "MIRACLE" DUCT SEALER AND D-617 OR EQUAL.
- 8. VERIFY FINAL LOCATION OF THERMOSTATS WITH ARCHITECT AND/OR TENANT CONSTRUCTION COORDINATOR PRIOR TO ANY INSTALLATION WORK.
- 9. CONTRACTOR SHALL PROVIDE RECORD/AS BUILT DOCUMENTS TO CONSTRUCTION COORDINATOR, ARCHITECT AND ENGINEER AT COMPLETION OF CONSTRUCTION.
 10. MAINTAIN NET FREE AREA EQUAL TO DUCT SIZE WHERE FIRE DAMPERS OCCUR.
- 11. ROOM THERMOSTATS SHALL BE CAPABLE OF BEING SET TO MAINTAIN SPACE TEMPERATURE SET POINTS FOR 55° F TO 85° F AND SHALL BE CAPABLE OF OPERATING THE HEATING AND COOLING IN SEQUENCE. THERMOSTATS SHALL BE ADJUSTABLE TO PROVIDE A TEMPERATURE RANGE OF UP TO 5° F BETWEEN FULL HEATING AND FULL COOLING BEING SUPPLIED. TEMPERATURE CONTROL SYSTEM SHALL OPERATE IN ACCORDANCE WITH THE BASE BUILDING SEQUENCE OF OPERATION
- 12. PROVIDE MINIMUM DUCT RADIUS ON ELBOWS AT 1-1/2 TIMES DUCT SIZE.
- ALL CEILING DIFFUSERS ARE 4-WAY THROW UNLESS NOTED OTHERWISE.
 DIFFUSERS SHALL BE ADJUSTED BY MECHANICAL CONTRACTOR AND/OR TEST & BALANCE CONTRACTOR FROM 4-WAY TO 3-WAY OR 2-WAY WHEN WITHIN 3'-0" OF ADJACENT WALL OR CORNER. SUBMIT PROPOSED ADJUSTMENTS IN WRITING PRIOR TO ADJUSTING.
- 14. CONTRACTOR SHALL STRICTLY COORDINATE ALL CEILING DIFFUSERS AND GRILLES WITH ARCHITECTURAL REFLECTED CEILING PLAN. IF ANY DISCREPANCIES ARE ENCOUNTERED THE ENGINEER SHALL BE NOTIFIED FOR CLARIFICATION. VERIFY WITH OWNERS REPRESENTATIVE IN FIELD PRIOR TO INSTALLATION.
- 15. MATERIALS EXPOSED WITHIN DUCT OR PLENUM SHALL COMPLY WITH SECTION 602.2 OF THE 2019 CMC. ALL MATERIALS EXPOSED WITHIN THE CEILING PLENUM SHALL HAVE A FLAME-SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50.
- 16. PROVIDE SMOKE DETECTORS IN MAIN SUPPLY AIR DUCTS OF AIR MOVING SYSTEMS EXCEEDING 2,000 CFM AND COMBINATION OF SYSTEMS SERVING AREAS PERMANENTLY OPEN TO EACH OTHER WHOSE COMBINED SUPPLY AIR EXCEEDS 2,000 CFM PER SECTION 608.0 OF THE 2019 CMC.
- 17. MECHANICAL REFRIGERATION SYSTEMS SHALL COMPLY WITH REQUIREMENTS OF SECTION 605 OF THE 2019 CFC.
- ENVIRONMENTAL AIR DUCTS SHALL NOT TERMINATE LESS THAN 3-FT. FROM A PROPERTY LINE, FORCED AIR INLET LOCATED WITHIN 10-FT AND 3-FT FROM OPENINGS INTO A BUILDING, PER CMC 502.2.1.
- 19. HEATING HOT WATER AND CHILLED WATER PIPING SHALL BE INSTALLED AS HIGH AS POSSIBLE.
- 20. THE CONTRACTOR SHALL COORDINATE ALL CEILING ACCESS PANELS FOR SERVICING MECHANICAL EQUIPMENT/DEVICES WITH THE ARCHITECT AND INTERIOR DESIGNER AS APPLICABLE.
- 21. PRIOR TO ROUGH-IN OF ELECTRICAL. PROVIDE COORDINATION SHOP DRAWINGS OF T-STAT LOCATIONS TO ARCH./ENG. FOR REVIEW.
- 22. DUCT SEALING:
 22.1. DUCTWORK SHALL BE SEALED PRIOR TO DELIVERY TO JOB SITE.
 22.2. DUCTWORK SHALL BE SEALED DURING DELIVERY.
 22.3. DUCTWORK SHALL BE SEALED UPON INSTALLATION.
 22.4. OPENINGS INTO EQUIPMENT AND DUCTWORK SHALL BE SEALED DURING CONSTRUCTION.
- 23. ALL CONTROL WIRING ROUTED IN CEILING PLENUM SHALL BE CLEARLY IDENTIFIED & SECURED TO DUCTWORK OR TIGHT TO STRUCTURE TO PREVENT DAMAGE DURING FUTURE TENTANT IMPROVEMENT PROJECTS.
- 24. THE CONTRACTOR SHALL VERIFY ALL DIFFUSER/GRILLE/REGISTER/BORDER AND FRAME TYPES WITH THE ARCHITECTURAL REFLECTED CEILING PLAN PRIOR TO ORDERING. COORDINATE ALL FINISHES WITH ARCHITECT.
- 25. ALL HVAC SYSTEMS INCLUDING HYDRONIC SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH AN APPROVED METHOD PER THE CMC SECTION 314.1, CALGREEN AND THE ENERGY EFFICIENCY STANDARDS.
- 26. THROUGH-PENETRATIONS AND MEMBRANE PENETRATIONS SHALL BE PROTECTED BY AN APPROVED PENETRATION FIRESTOP SYSTEM OR MEMBRANE PENETRATION FIRESTOP SYSTEM INSTALLED AS TESTED IN ACCORDANCE WITH ASTM E 814 OR UL 1479, WITH MINIMUM POSITIVE PRESSURE DIFFERENTIAL OF 0.01 INCH (2.49 PA) OF WATER OR AS OTHERWISE PERMITTED BY CBC, SECTION 714. LISTED THROUGH-PENETRATION FIRESTOP SYSTEMS AND MEMBRANE PENETRATIONS SHALL BE INSTALLED IN ACCORDANCE WITH THE INSTALLATION FOR DETAILS LISTED SYSTEMS. LISTED THROUGH-PENETRATION FIRESTOP SYSTEMS, MEMBRANE PENETRATION PROTECTION AND OTHER PERMITTED MEANS AND METHODS OF PENETRATION PROTECTION SHALL BE SUBMITTED FOR OSHPD FDD REVIEW AND APPROVAL PRIOR TO INSTALLATION.
- 27. PROVIDE BALANCING VOLUME DAMPERS IN EACH BRANCH DUCT AND IN EACH MAIN DUCT TO PROVIDE FOR COMPLETE AIR BALANCING. PROVIDE ADEQUATE ACCESS. OPPOSED BLADE DAMPERS (OBD'S) ARE NOT CONSIDERED BALANCING DAMPERS. COORDINATE ALL LOCATIONS WITH ARCHITECT'S REFLECTED CEILING PLAN WHERE REMOTE BALANCING DAMPERS ARE REQUIRED.
- 28. PROVIDE INTERNALLY LINED DUCTWORK FOR SUPPLY AND RETURN AIR PLENUMS ON ALL FAN COILS WITH MINIMUM ONE-INCH THICK ACOUSTICAL DUCT LINER.
- 29. INSTALL DIELECTRIC INSULATION WHERE COPPER PIPES CONNECT TO FERROUS PIPES, COMPONENTS AND EQUIPMENT.
- 30. OUTDOOR AIR SUPPLY AND EXHAUST EQUIPMENT SHALL BE INSTALLED WITH DAMPERS THAT AUTOMATICALLY CLOSE UPON FAN SHUTDOWN.

EQUIPMENT ANCHORAGE AND SYSTEM BRACING

- . ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2019 CALIFORNIA BUILDING CODE REQUIREMENTS IN ACCORDANCE WITH THE AMERICAN SOCIETY OF CIVIL ENGINEERS - ASCE 7-10, SECTION 13.6 AND TABLE 13.6-1.
- a. ALL PERMANENT EQUIPMENT AND COMPONENTS.b. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD
- WIRED) TO THE BUILDING UTILITY SERVICE SUCH AS ELECTRICITY, GAS OR WATER. c. MOVABLE EQUIPMENT WHICH IS STATION IN ONE PLACE FOR MORE THAN 8 HOURS AND
- HEAVIER THAN 400 POUNDS ARE REQUIRED TO BE ANCHORED WITH TEMPORARY ATTACHMENTS. THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED
- TO THE STRUCTURE, BUT THE ATTACHMENT NEED NOT TO BE DETAILED ON PLAN. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.
- a. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
- b. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR HUNG FROM WALL.
- 3. FOR THOSE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPROVED DRAWINGS, THE INSTALLATION SHALL BE INSTALLED PER SMACNA GUIDELINES AND/OR MANUFACTURER'S RECOMMENDATIONS.
- 4. SEISMIC ANCHORAGE OF EQUIPMENT AND BRACING OF PIPING/DUCTWORK SYSTEMS SHALL BE PROVIDED IN ACCORDANCE WITH THE AMERICAN SOCIETY OF CIVIL ENGINEERS ASCE 7-10, SECTION 13.6 AND TABLE 13.6-1.

APPLICABLE CODES

- 2019 CALIFORNIA BUILDING CODE
- 2019 CALIFORNIA MECHANICAL CODE2019 CALIFORNIA PLUMBING CODE
- 2019 CALIFORNIA ELECTRICAL CODE
- 2019 CALIFORNIA FIRE CODE2019 CALIFORNIA ENERGY STANDARDS
- 2019 CAL GREEN CODE ALL OTHER APPLICABLE LOCAL AND STATE LAWS AND REGULATIONS



																	MAKE UP AIR	UNIT													
								SUPF	PLY FAN					E	VAPORATIVE CO	OLING COIL				HEATING											
TAG	#	MANUFACTURER	MODEL NUMBER	SERVICE	QTY	DRIVE TYPE	AIR FLOW (CFM)	V EXTERNAL STATIC PRESSURE (IN WG)	TOTAL STATIC PRESSURE (IN WG)	FAN SPEED (RPM)	MOTOR (BHP)	MOTOR (HP)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	COOLING MEDIA	REQUIRED FLOW (GPM)	GA TOTAL CAPACITY (BTU/HR)	S INPUT PRESSURE (PSI)	OUTPUT CAPACITY (BTU/HR)	EAT DB (°F)	LAT DB (°F)	MCA (A)	MOCP (A)	VOLTAGE (V)	PHASE	HERTZ (HZ)	DETAIL REFERENCE	CONTROL DIAGRAM	OPERATING WEIGHT (LBS)	REMARKS
MUA	1	GREENHECK	IG-108-H10	KITCHEN HOOD	1	BELT	800	0.5	0.6	1,049	0.24	1/3	83	67	68	CELdek	0.2	75,000	1/2	60,000	34.7	69.4	5.2	15	208	3	60	6 / M-5.1	4 / M-4.1	1,200	EVAPORATIVE COOLING WITH AUTO DRAIN AND FLUSH CONTROLS, 2-STAGE INDIRECT GAS HEATING, DOUBLE WALL INSULATION, PERMATECTOR COATING, AIRFLOW PROVING CONTACT FOR KITCHEN EXHAUST FAN INTERLOCK AND REMOTE CONTROL PANEL. FURNISH WITH FACTORY ROOF CURB.

										EXHAUST FA	N								
TAG	#	MANUFACTURER	MODEL NUMBER	SERVICE	TYPE	DRIVE TYPE	AIR FLOW (CFM)	EXTERNAL STATIC PRESSURE (IN WG)	FAN SPEED (RPM)	MOTOR ENCLOSURE	MOTOR (BHP)	MOTOR (HP)	ELECTRICAL CON VOLTAGE (V)	NECTION PHASE	HERTZ (HZ)	DETAIL REFERENCE	CONTROL DIAGRAM	OPERATING WEIGH (LBS)	REMARKS
KEF	1	GREENHECK	CUBE-141HP-5	KITCHEN HOOD	UPBLAST	BELT	1,000	1.0	1,654	ODP	0.39	0.5	208	3	60	8 / M-5.1	4 / M-4.1	150	SHALL BE UL-762 FOR GREASE EXHAUST, WITH PITCHED 12 INCH FACTORY ROOF CURB, VENTED CURB EXTENDER, HINGED CURB BASE AND GREASE TRAP.



ect Nam	ie: LAK	ESIDE COMMONS DINING Report Page:	Page 4 of
ect Addr	ress: 1950	0 SILVERLEAF CIRCLE Date Prepared:	2020-01-
C	۲	NRCA-MCH-02-A Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap.	
0	۲	NRCA-MCH-03-A Constant Volume Single Zone HVAC NOTE: This form does not automatically move to "Yes". If Constant Volume Single Zone HVAC Systems are included in the scope, permit applicant should move this form to "Yes".	
0	۲	NRCA-MCH-04-A Air Distribution Duct Leakage	
0	۲	NRCA-MCH-05-A Air Economizer Controls	L L
C	۲	NRCA-MCH-06-A Demand Control Ventilation Systems Acceptance must be submitted for all systems required to employ demand controlled ventilation (refer to §120.1(c)3) can vary outside ventilation flow rates based on maintaining interior carbon dioxide (CO2) concentration setpoints.	Ц
0	۲	NRCA-MCH-07-A Supply Fan Variable Flow Controls	
0	۲	NRCA-MCH-08-A Valve Leakage Test	
\bigcirc	۲	NRCA-MCH-09-A Supply Water Temperature Reset Controls	
0	۲	NRCA-MCH-10-A Hydronic System Variable Flow Controls	
0	۲	NRCA-MCH-11-A Automatic Demand Shed Controls	
0	۲	NRCA-MCH-12-A FDD for Packaged Direct Expansion Units	
0	۲	NRCA-MCH-13-A Automatic FDD for Air Handling Units and Zone Terminal Units Acceptance	
0	۲	NRCA-MCH-14-A Distributed Energy Storage DX AC Systems Acceptance NOTE: This form does not automatically move to "Yes". If Distributed Energy Storage DX AC Systems are included in the scope, permit applicant should move this form to "Yes".	Ц
0	۲	NRCA-MCH-15-A Thermal Energy Storage (TES) System Acceptance NOTE: This form does not automatically move to "Yes". If Chilled Water Storage, Ice-on-Coil Internal Melt, Ice-on-Coil External Melt, Ice Harvester, Brine, Ice-Slurry, Eutectic Sait, Clathrate Hydrate Slurry (CHS), Cryogenic or Encapulated (Ice Ball) Systems are included in the scope, permit applicant should move this form to "Yes".	
0	۲	NRCA-MCH-16-A Supply Air Temperature Reset Controls	
0	۲	NRCA-MCH-17-A Condenser Water Temperature Reset Controls	
0	۲	NRCA-MCH-18 Energy Management Control Systems	
0	۲	NRCA-MCH-19 Occupancy Sensor Controls	
0	۲	NRCA-MCH-20 Multi-Family Ventilation	
0	۲	NRCA-MCH-21 Multi-Family Envelope Leakage	

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CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards

STATE OF CALIFORNIA				
Mechanical System	าร			
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Project Name: LAKESIDE		Report Page		Page 7 of
Project Address: 1950 SIL	VERLEAF CIRCLE	Date Prepared:		2020-01-2
		Construction of Management		
DOCUMENTATION AUT	HOR'S DECLARATION STATEMENT	d complete		
L. I certify that this certific	ate of compliance documentation is accurate and	a complete.		
Jocumentation Author Na	me: TK1SC	Documentation Author Signature		
Company:	TK1SC	Signature Date:	01/20/2020	
Address:	15231 LAGUNA CANYON RD, STE 100	CEA/ HERS Certification Identifica	tion (if applicable):	
City/State/Zip:	IRVINE, CA 92618	Phone:	949-751-5800	
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CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards

January 2020

January 2020

anical Systems	
H-E (Created 1/20)	
	Report Page: Page 2
Address: 1950 SILVERI FAF CIRCLE	Date Prenared 2020-0
EPTIONAL CONDITIONS	
ile is auto-filled with uneditable comments because of selection	ns made or data entered in tables throughout the form.
ptional conditions apply to this project.	
ITIONAL REMARKS	
le includes remarks made by the permit applicant to the Autho	rity Having Jurisdiction.
C SYSTEM SUMMARY (DRY & WET SYSTEMS)	
ction Does Not Apply	
UPS	
stion Does Not Apply	
I SYSTEIVIS & AIR ECONOWIZERS	
non Does Not Apply	
EM CONTROLS	
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TLATION AND INDOOR AIR QUALITY	
ction Does Not Apply	
MINAL BOX CONTROLS	
ztion Does Not Apply	
RIBUTION (DUCTWORK AND PIPING)	
nstructions: Complete the following tables to show compliance	with mandatory pipe insulation requirements found in §120.3 and prescriptive requirements found in
(]) for duct leakage testing.	
akage Sealing	
wers to the questions below	Duct leakage testing triggered for
o the following duct system(s):	these systems?
ontinued	

roject Na		UMPL	ANCE				NRCC-MCH
	ame:	LAKES	DE COMMONS DIN	ING	Report Page:		Page 3 of
roject Ad	ddress:	1950 S	ILVERLEAF CIRCLE		Date Prepared:		2020-01-2
able Cor	ntinued						
11	No	T	he scope of the pro	ject includes only duct systems serving health	are facilites.		
12	Yes	- 0	uct system provide	s conditioned air to an occupiable space for a	constant volume, single zone, space-conditioning	system.	
13	Yes	- T	he space condition	ing system serves less than 5,000 ft² of condition	oned floor area.		
14	No	• T	he <u>combined</u> surfa	ce area of the ducts in the following locations i	s more than 25% of the total surface area of the	entire duct system:	
		_	01	Idoors			
				a space directly under a roof that has a U-facto quirements of <u>§140.3(a)1B</u> or if the roof has fix	or greater than the U-factor of the ceiling, or if th ed vents or openings to the _outside/ uncondition	e roof does not meet the oned spaces	
			ln 📃	an unconditioned crawlspace			
			ln 📃	other unconditioned spaces			
				ject includes extending an existing duct system	n. which is constructed, insulated or sealed with a	asbestos.	
15	No	• T	he scope of the pro	Jeet includes exterioring an existing addesyster	,,		
15 16	No No	T 🚽	he scope of the pro he scope of the pro lagnostic testing in	ject includes an existing duct system that is do accordance with procedures in the <u>Reference</u>	cumented to have been previously sealed as con Nonresidential Appendix NA2.	firmed through field verit	ication and
15 16 17 1. COOL his Section	No No LING TO	VERS	he scope of the pro- he scope of the pro- lagnostic testing in ouct system shall be	ject includes an existing duct system that is do accordance with procedures in the <u>Reference</u> sealed in accordance with the California Mech	cumented to have been previously sealed as con <u>Nonresidential Appendix NA2</u> . nanical Code. Add	firmed through field veri Duct System(s) Rem	ication and nove Last
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DECLAR	RATION OF	REQUIRED CERTIFICATES OF VERIFICATION			1
ne mstru ole E. Ad ated by presiden	ditional Rer a HERS Prov ntial_Docum	narks. These documents must be completed by a HERS Rater viders registry, but drafts can be found online at <u>https://ww</u> <u>ients/NRCV/</u>	 and provided to the building inspector during construction <u>w.energy.ca.gov/title24/2019standards/2019_compliance</u> 	e_documents/ 	wny in iust be
YES	NO		Form/Title	Field In:	spector
0		NRCV-MCH-04-H Duct Leakage Test NOTE: Must be completed by a HERS Rater			
	۲	NRCV-MCH-24 Enclosure Air Leakage Worksheet NOTE: Must be completed by a HERS Rater			
0		NRCV-MCH-27 High-rise Residential		Ĩ	
0	۲	NOTE: Must be completed by a HERS Rater			

state of california Mechanical Systems				
NRCC-MCH-E (Created 1/20)				
CERTIFICATE OF COMPLIANCE	DINING			
Project Address: 1950 SILVERLEAF CIRC	CLE			
O. MANDATORY MEASURES DOCU		ON		
Table Instructions: Indicate where man	datory measures are do	ocumented in the pla	n set or constru	ction d
the plan sheet or construction documer	at location as "N/A", an	y active cells that are	e left blank will i	result i
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Compliance with Mandatory Measures	documented through			
MCH Mandatory Measures Note Block:		tes		

		KITCHEN	AIR BALA	NCE SCHE	DULE	
				TRANSFER		
UNIT NO.	SERVICE	O.S.A. CFM	E.A. CFM	AIR CFM	PRESSURE	REMARK
						PIZZA O\
KEF-1	KITCHEN HOOD		-1,000		-1,000	TÔ MEDI
						INTERLÔ
MUA-1	KITCHEN HOOD	800		200	1,000	FROM DI
TOTAL		800	-1.000	200	0	-

January 2020

		NRCC-MCH-E
	Report Page:	Page 6 of 7
	Date Prepared:	2020-01-20
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n set or constru e left blank will	ection documentation. For any mandatory mee result in non-compliance in Table C.	nsures that do not apply, mark
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January 2020

		KITCHEN	AIR BALA	NCE SCHE	DULE	
JNIT NO.	SERVICE	O.S.A. CFM	E.A. CFM	TRANSFER AIR CFM	PRESSURE	REMARKS
KEF-1	KITCHEN HOOD		-1,000		-1,000	PIZZA OVERN BELOW THE HOOD IS FOR LIGHT TO MEDIUM PRODUCTION
MUA-1		800		200	1,000	INTERLOCK W/ KEF-1. TRANSFER AIR (CFM) FROM DINING ROOM
TOTAL		800	-1,000	200	0	

TITLE-24 MANDATORY MEASURES EQUIPMENT AND SYSTEMS EFFICIENCY

- 1. ANY APPLIANCE FOR WHICH THERE IS A CALIFORNIA STANDARD ESTABLISHED IN THE APPLIANCE EFFICIENCY STANDARDS MAY BE INSTALLED ONLY IF THE MANUFACTURER HAS CERTIFIED TO THE COMMISSION, AS SPECIFIED IN THOSE REGULATIONS, T HAT THE APPLIANCE COMPLIES WITH THE APPLICABLE STANDARD FOR THAT APPLIANCE.
- 2. PIPING AND DUCTING SYSTEMS SHALL BE INSULATED IN ACCORDANCE WITH THE SECTIONS 120.3, 120.4, 120.7 OF TITLE 24 ENERGY EFFICIENCY STANDARDS, CHAPTER 6 OF THE 2019 CMC, AND ALL CODES HAVING JURISDICTION.
- 3. ALL HVAC SYSTEMS SHALL MEET THE EFFICIENCY AND CONTROL REQUIREMENTS PER SECTION 110.2 AND 120.2 E.E.S.
- 4. ALL HVAC EQUIPMENT AND APPLIANCES SHALL MEET THE REQUIREMENTS PER SECTION 110.1–110.3, 110.5, 120.1–120.4 TITLE–24 ENERGY STANDARDS. 5. EACH SPACE CONDITIONING SYSTEM SHALL BE INSTALLED WITH AN AUTOMATIC TIME
- SWITCH WITH AN ACCESSIBLE MANUAL OVERRIDE THAT ALLOW OPERATION OF THE SYSTEM DURING OFF-HOURS FOR UP TO 4 HOURS. THE TIME SWITCH SHALL BE CAPABLE OF PROGRAMMING DIFFERENT SCHEDULES FOR WEEKDAYS AND WEEKENDS, INCORPORATE AN AUTOMATIC HOLIDAY "SHUT-OFF" FEATURE THAT TURNS OFF ALL LOADS FOR AT LEAST 24 HOURS, THEN RESUMES THE NORMALLY SCHEDULED OPERATION, AND HAS PROGRAM BACKUP CAPABILITIES THAT PREVENT THE LOSS OF THE DEVICE'S PROGRAM AND TIME SETTING FOR AT LEAST 10 HOURS IF POWER IS INTERRUPTED.
- 6. EACH SPACE CONDITIONING SYSTEM SHALL BE INSTALLED WITH CONTROLS THAT TEMPORARILY RESTART AND TEMPORARILY OPERATE THE SYSTEM AS REQUIRED TO MAINTAIN A SETBACK HEATING AND COOLING THERMOSTAT SETPOINT.
- 7. EACH SPACE CONDITIONING ZONE SHALL BE CONTROLLED BY AN INDIVIDUAL THERMOSTATIC CONTROL THAT RESPONDS TO TEMPERATURE WITHIN THE ZONE. WHERE USED TO CONTROL HEATING, THE CONTROL SHALL BE ADJUSTABLE DOWN TO 55°F OR LOWER. FOR COOLING, THE CONTROL SHALL BE ADJUSTABLE UP TO 85°F OR HIGHER. WHERE USED TO CONTROL BOTH HEATING AND COOLING, THE CONTROL SHALL BE CAPABLE OF PROVIDING A DEAD BAND OR AT LEAST 5"F WITHIN WHICH THE SUPPLY OR HEATING AND COOLING IS SHUT OFF OF REDUCED TO A MINIMUM.
- 8. THERMOSTATS SHALL HAVE NUMERIC SETPOINTS IN 'F.
- 9. THERMOSTATS SHALL HAVE ADJUSTABLE SETPOINT STOPS ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL.
- 10. GRAVITY OR AUTOMATIC DAMPERS INTERLOCKED AND CLOSED ON FAN SHUTDOWN SHALL BE PROVIDED ON THE OUTSIDE AIR INTAKES AND DISCHARGES OF ALL SPACE CONDITIONING AND EXHAUST SYSTEMS.
- 11. ALL GRAVITY VENTILATING SYSTEMS SHALL BE PROVIDED WITH AUTOMATIC OR READILY ACCESSIBLE MANUALLY OPERATED DAMPERS IN ALL OPENINGS TO THE OUTSIDE, EXCEPT FOR COMBUSTION AIR OPENINGS.
- 12. ALL BALANCING: ALL SPACE CONDITIONING AND VENTILATION SYSTEMS SHALL BE BALANCED TO THE QUANTITIES SPECIFIED IN THESE PLANS, IN ACCORDANCE WITH AND PERFORMED BY A COMPANY CERTIFIED BY THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) PROCEDURAL STANDARDS (1983), OR ASSOCIATED AIR BALANCE COUNCIL (AABC) NATIONAL STANDARDS (1986).
- 13. OUTSIDE AIR CERTIFICATION: THE SYSTEM SHALL PROVIDE THE MINIMUM OUTSIDE AIR AS SHOWN ON THE MECHANICAL DRAWINGS, AND SHALL BE MEASURED AND CERTIFIED BY THE INSTALLING LICENSED C-20 MECHANICAL CONTRACTOR.
- 14. THE AIR CONDITIONING SYSTEM SHALL BE ENERGIZED 1 HOUR IMMEDIATELY PRIOR TO OCCUPANCY TO PROVIDE THE MINIMUM REQUIRED VENTILATION RATE.

CALGREEN MANDATORY MEASURE NOTES

1. PROVIDE TESTING AND ADJUSTING OF SYSTEMS IN ACCORDANCE WITH CALGREEN SECTION 5.410.4.

- 2. THE PERMANENT HVAC SYSTEM SHALL ONLY BE USED DURING CONSTRUCTION IF NECESSARY TO CONDITION THE BUILDING OR AREAS OF ADDITION OR ALTERATION WITHIN THE REQUIRED TEMPERATURE RANGE FOR MATERIAL AND EQUIPMENT INSTALLATION. IF THE HVAC SYSTEM IS USED DURING CONSTRUCTION, USE RETURN AIR FILTERS WITH A MINIMUM EFFICIENCY REPORTING VALUE (MERV) OF 8, BASED ON ASHRAE 52.2-1999. REPLACE ALL FILTERS IMMEDIATELY PRIOR TO OCCUPANCY, OR, IF THE BUILDING IS OCCUPIED DURING ALTERATION, AT THE CONCLUSION OF CONSTRUCTION. (CALGREEN SECTION 5.504.1)
- 3. AT THE TIME OF ROUGH INSTALLATION, DURING STORAGE ON THE CONSTRUCTION SITE AND UNTIL FINAL STARTUP OF THE HEATING, COOLING AND VENTILATING EQUIPMENT, ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, SHEET METAL OR OTHER METHODS ACCEPTABLE TO THE ENFORCING AGENCY TO REDUCE THE AMOUNT OF WATER, DUST AND DEBRIS, WHICH MAY ENTER THE SYSTEM. (CALGREEN SECTION 4.501 OR 5.504.3)
- 4. ALL PAINTS, ADHESIVES, SEALANTS AND CAULKS SHALL MEET THE REQUIREMENTS OF CALGREEN SECTION 4.504.2 OR 5.504.4.
- 5. IN MECHANICALLY VENTILATED BUILDINGS, PROVIDE REGULARLY OCCUPIED AREAS OF THE BUILDING WITH AIR FILTRATION MEDIA FOR OUTSIDE AND RETURN AIR THAT PROVIDES ATLEAST A MINIMUM EFFICIENCY REPORTING VALUE (MERV) OF MERV-13 SHALL BE INSTALLED PRIOR TO OCCUPANCY, AND RECOMMENDATIONS FOR MAINTENANCE WITH FILTERS OF THE SAME VALUE SHALL BE INCLUDED IN THE OPERATIONS AND MAINTENANCE MANUAL. (CALGREEN SECTION 5.504.5.3) 5.1. EXCEPTION: EXISTING MECHANICAL EQUIPMENT



PART 1-GENERAL

1.01 GENERAL CONDITIONS

- A. GENERAL DESCRIPTION
- 1. AIR CONDITIONING FOR INDICATED AREA COMPLETE WITH SUPPLY DUCTS, RETURN AIR DUCTS, AIR DISTRIBUTION EQUIPMENT AND CONTROLS. 2. AIR CONDITIONING UNITS COMPLETE WITH REQUIRED SUPPLY FANS, COOLING COILS, FILTERS, DUCTWORK,
- DIFFUSERS, GRILLES, DAMPERS, CONTROLS AND OTHER ITEMS HEREIN SPECIFIED, VENTILATION OF MISCELLANEOUS ROOMS WITH EXHAUST FANS. DUCTING AND CONTROLS.

4. REMOVAL OF EXISTING DUCTWORK AND PIPING AS INDICATED ON THE DRAWINGS. 1.02 RELATED WORK INCLUDED IN THIS SECTION

- A. FURNISH ELECTRICAL DEVICES NECESSARY FOR MECHANICAL WORK, EXCEPT DISCONNECTS UNLESS INDICATED B. LINE AND LOW VOLTAGE WIRING FOR MECHANICAL CONTROLS INCLUDING FINAL CONNECTIONS.
- CONDUIT FOR LINE AND LOW VOLTAGE WIRING FOR MECHANICAL CONTROLS. D. RESPONSIBILITY FOR OBTAINING CLARIFICATION OF DISCREPANCIES BETWEEN MECHANICAL AND ELECTRICAL WORK
- PRIOR TO PROCEEDING WITH THE WORK E. RESPONSIBILITY FOR PROPER OPERATION OF AUTOMATIC PNEUMATIC/ELECTRIC CONTROLS AND EQUIPMENT AND OF ELECTRIC POWER-DRIVEN EQUIPMENT FURNISHED UNDER THIS SECTION. F. MISCELLANEOUS STEEL FOR DUCTS AND PIPES HANGERS AND SUPPORTS INCLUDING STRUCTURAL CALCULATIONS

PREPARED BY A CALIFORNIA LICENSED STRUCTURAL ENGINEER. 1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. CONCRETE WORK INCLUDING MISCELLANEOUS METAL IN CONNECTION WITH PITS, TRENCHES AND CATCH BASINS WITH FOUNDATIONS OR CONCRETE PADS UNDER ROOFTOP PACKAGE UNITS, BOILER UNITS, PUMP AND OTHER MECHANICAL EQUIPMENT. TEMPLATES FOR SPACING AND SIZES OF CONCRETE PADS AND ANCHOR BOLTS UNDER THIS SECTION
- B. ELECTRICAL WORK AS FOLLOWS WILL BE PROVIDED ELECTRICAL CONTRACT SCOPE: 1 CONDUIT FOR LINE WIRING FOR FOUIPMENT AND DEVICES AS INDICATED OR SPECIFIED EXCEPT CONDUIT FOR LINE AND LOW VOLTAGE WIRING FOR MECHANICAL CONTROLS AS SPECIFIED UNDER DIVISION 15.
- 2. LINE WIRING FOR EQUIPMENT AND DEVICES AS INDICATED OR SPECIFIED HEREIN EXCEPT LINE AND LOW VOLTAGE WIRING FOR MECHANICAL CONTROLS AS SPECIFIED UNDER DIVISION 15. PROVIDING DISCONNECT SWITCHES 4. INSTALLING ELECTRICAL DEVICES SUCH AS STARTERS AND DISCONNECTS, AND WHEN INDICATED, FURNISHING
- ALL SUCH DEVICES. C. BUILDING MANAGEMENT AND CONTROL SYSTEM TEMPERATURE CONTROLS.

1.04 QUALITY ASSURANCE

- A. CODES AND STANDARDS: IN ADDITION TO THE REQUIREMENTS OF ALL GOVERNING CODES, ORDINANCES AND AGENCIES, CONFORM TO THE REQUIREMENTS OF THE FOLLOWING CODES AND STANDARDS:
- 1. APPLICABLE CITY REGULATIONS AND ORDINANCES 2. CALIFORNIA BUILDING CODE, 2019 EDITION
- 3. CALIFORNIA MECHANICAL CODE, 2019 EDITION THE CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, 2019
- 5. HEALTH AND SAFETY CODE, STATE OF CALIFORNIA 6. NATIONAL BOARD OF FIRE UNDERWRITERS PUBLICATIONS:
- a. PAMPHLET # 70 NATIONAL ELECTRICAL CODE b. PAMPHLET # 90A AIR CONDITIONING SYSTEMS

1.05 SUBMITTALS

- A. SHOP DRAWINGS: BEFORE ANY OF THE MATERIALS OF THIS SECTION ARE DELIVERED AT THE JOBSITE, SUBMIT COMPLETE SHOP DRAWINGS. SHOW ALL DETAILS OF ALL DUCTWORK, PIPING AND EQUIPMENT PADS. THE SHOP DRAWINGS SHALL REPRESENT A COORDINATED SET OF DRAWINGS WITH OTHER DISCIPLINES. B. PRODUCT DATA:
- 1. SUBMIT COPIES OF ALL MANUFACTURERS' PRODUCT DATA SIMULTANEOUSLY WITH ALL SHOP DRAWING SUBMITTALS.
- 2. PRODUCT DATA TO INCLUDE ALL AIR CONDITIONING EQUIPMENT, HANGERS, FANS, DUCTWORK CONSTRUCTION, PIPING, AND OTHER STANDARD ITEMS AS REQUIRED TO COMPLEMENT SHOP DRAWINGS FOR A SUBMITTAL INDICATING ALL PRODUCTS TO BE USED ON THIS WORK. 3. MANUFACTURERS AND SUPPLIERS OF EQUIPMENT SHALL PROVIDE ALL DATA NECESSARY FOR COMPLIANCE
- WITH THE STATE OF CALIFORNIA ENERGY EFFICIENCY CODE: COMPLIANCE CERTIFICATION FOR ALL EQUIPMENT SHALL BE INCLUDED IN EQUIPMENT SUBMITTALS.
- C. RECORD DRAWINGS: MAINTAIN THROUGHOUT THE PROGRESS OF THE WORK PROJECT RECORD DRAWINGS AND SUBMIT TO THE ARCHITECT AT COMPLETION OF WORK D. OPERATING MANUALS AND MAINTENANCE MANUALS:
- SUBMIT COPIES OF ALL OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS. 2. FULLY INSTRUCT OWNER OPERATING PERSONNEL AND DEMONSTRATE PERFORMANCE, OPERATION AND MAINTENANCE OF EQUIPMENT. AMOUNT OF TIME ALLOCATED FOR SAID INSTRUCTION AND DEMONSTRATIONS OF EQUIPMENT AND SYSTEMS SHALL BE PART OF THESE OBLIGATIONS. SUBMIT A LETTER TO ARCHITECT SIGNED BY OWNER REPRESENTATIVE WHO WILL OPERATE SYSTEM STATING THAT HE IS FULLY INSTRUCTED BY CONTRACTOR ABOUT OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEM
- 3. SUBMIT ONE ADDITIONAL SET OF APPROVED INSTRUCTIONS AND ONE ADDITIONAL SET OF APPROVED 11 INCH X 17 INCH CONTROL DIAGRAMS SUITABLY FRAMED BEHIND GLASS FOR MOUNTING AS DIRECTED.

1.06 PRODUCT HANDLING

A. PROTECTION: TAKE ALL PRECAUTIONS NECESSARY TO PROTECT THE MATERIALS OF THIS SECTION BEFORE, DURING, AND AFTER INSTALLATION. B. REPLACEMENTS: IN THE EVENT OF DAMAGE, IMMEDIATELY REPAIR ALL DAMAGED AND DEFECTIVE WORK TO THE APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO OWNER.

1.07 JOB CONDITIONS

A. EXAMINATION OF THE SITE: EXAMINE THE SITE AND INCLUDE ALL CONDITIONS IN BID PROPOSAL UNDER WHICH WORK IS TO BE PERFORMED. 1.08 MISCELLANEOUS

A. LOCATIONS AND ACCESSIBILITY: CONTRACTOR SHALL FULLY INFORM HIMSELF REGARDING PECULIARITIES AND LIMITATIONS OF SPACES AVAILABLE FOR INSTALLATION OF WORK UNDER THIS SECTION. VALVES, MOTORS, CONTROLS AND OTHER DEVICES REQUIRING SERVICE. MAINTENANCE AND ADJUSTMENT SHALL BE PLACED IN FULLY ACCESSIBLE POSITIONS AND LOCATIONS. PROVIDE ACCESS DOORS WHERE REQUIRED IN DUCTWORK OR CONSTRUCTION WHETHER SPECIALLY DETAILED OR NOT, AND RENDER ALL SUCH DEVICES ACCESSIBLE. B DRAWINGS INDICATE DESIRED LOCATION AND ARRANGEMENT OF DUCTWORK PIPING FOUIPMENT AND OTHER ITEMS, AND ARE TO BE FOLLOWED AS CLOSELY AS POSSIBLE. ALL OFFSETS AND INTERFERENCES MAY NOT BE INDICATED DUE TO THE SCALE OF THE DRAWINGS. CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR COORDINATING WORK WITH ALL OTHER TRADES. WORK SPECIFIED AND NOT CLEARLY DEFINED BY THE DRAWINGS SHALL BE INSTALLED AND ARRANGED IN A MANNER SATISFACTORY TO ARCHITECT. IN THE EVENT CHANGES IN INDICATED LOCATIONS AND ARRANGEMENTS ARE DEEMED NECESSARY BY ARCHITECT, THEY SHALL BE MADE BY CONTRACTOR WITHOUT ADDITIONAL CHARGES PROVIDED THE CHANGE IS ORDERED BEFORE WORK IS INSTALLED AND NO EXTRA MATERIALS ARE REQUIRED.

PART 2-PRODUCTS 2.01 PIPE HANGERS

- A. HANGERS SHALL BE COMPLETE WITH THREADED STEEL RODS AND VIBRATION ISOLATORS, SOUND AND ELECTROLYSIS ISOLATORS AS REQUIRED AND HEREINAFTER SPECIFIED. CONCRETE INSERTS SHALL BE FURNISHED AND INSTALLED UNDER THIS SECTION. B. 2-1/2 INCHES AND SMALLER: GRINNELL 104 OR APPROVED EQUAL.
- C. 3 INCHES AND LARGER: GRINNELL 260. D. CONCRETE INSERTS: GRINNELL 280.

2.02 INSULATION

- A. ALL INSULATION SHALL COMPLY WITH CALIFORNIA CODE OF REGULATIONS. TITLE 24. B. INSTALL PIPE INSULATION AFTER PIPING IS INSTALLED, TESTED AND APPROVED, AND IS IN CLEAN DRY CONDITION.
- FIRMLY BUTT INSULATION JOINTS. C. UNIONS: INSULATE IN SAME MANNER AS FITTINGS, FLANGES AND VALVE BODIES. CONSPICUOUSLY MARK LOCATIONS ON PIPE COVERINGS. D. THERMAL DUCT INSULATION: INSULATE ALL CONCEALED COLD SUPPLY AIR, RETURN AIR AND PLENUMS UNLESS OTHERWISE SPECIFIED, WITH JOHNS MANVILLE MICROLITE FIBERGLASS DUCT INSULATION, WRAPPED ENTIRELY AROUND DUCT WITH JOINTS LAPPED AT LEAST 2 INCHES AND SECURED WITH 16 GAUGE GALVANIZED WIRE ON 12 INCH CENTERS. INSULATION VALUE SHALL COMPLY WITH TITLE 24 REQUIREMENTS. INSULATION SHALL COVER ALL
- SURFACES INCLUDING STANDING SEAMS E. MECHANICAL FASTENERS SHALL BE FLUSH WITH THE LINER SURFACE AND SHALL START WITHIN 2 INCHES OF THE LEADING EDGE OF EACH SECTION AND WITHIN 3 INCHES OF THE LEADING EDGE OF ALL CROSS JOINTS WITHIN THE DUCT SECTION. ALL EXPOSED EDGES AND THE LEADING EDGE OF ALL CROSS JOINTS OF THE LINER SHALL BE HEAVILY COATED WITH AN APPROVED FIRE RESISTANT ADHESIVE. THE DUCT LINER SHALL BE CUT TO ASSURE SNUG CLOSING CORNER JOINTS. THE BLACK SURFACE OF THE LINER SHALL FACE THE AIR STREAM. TRANSVERSE JOINTS SHALL BE NEATLY BUTTED, AND HEAVILY COATED WITH AN APPROVED FIRE RESISTANT ADHESIVE.

F. LINED DUCT: WHERE INDICATED, LINE DUCTS AS HEREINBEFORE SPECIFIED FOR EXPOSED COLD SUPPLY AIR DUCTS. 2.03 DUCTS AND SHEET METAL WORK

- PROVIDE DUCTS, PLENUMS, ACCESS DOORS, FRESH AIR INTAKES AND EXHAUSTS AS INDICATED AND REQUIRED. ALL DUCTWORK SHALL BE CONSTRUCTED, ERECTED AND TESTED IN ACCORDANCE WITH THE MOST RESTRICTIVE OF LOCAL REGULATIONS, PROCEDURES DETAILED IN THE ASHRAE HANDBOOK OF FUNDAMENTALS OR THE APPLICABLE STANDARDS ADOPTED BY THE SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION. PROVIDE PREFABRICATED SPIRAL LOCKSEAM DUCTS AND FITTINGS AND RECTANGULAR DUCTS OF GALVANIZED STEEL. PRIMARY COLD SUPPLY AIR SHALL BE MEDIUM PRESSURE, 4 INCH S.P. DISTRIBUTION DUCTWORK DOWNSTREAM OF VAV BOXES SHALL BE LOW PRESSURE, 1 INCH S.P. OUTSIDE AIR AND EXHAUST AIR DUCTWORK SHALL BE LOW PRESSURE, 2 INCH S.P. A. FINAL CONNECTIONS TO CEILING DIFFUSER BOXES AND LINEAR DIFFUSERS SHALL BE MADE WITH FLEXIBLE GLASS
- FIBER DUCT. CASCO SILENT FLEX-II. CONNECTIONS OF FLEXIBLE DUCT TO ROUND DUCTS SHALL BE MADE WITH ½ INCH WIDE POSITIVE LOCKING STRAPS B. ALL CONNECTIONS TO MAIN COLD SUPPLY DUCTS SHALL BE MADE WITH LOW LOSS FITTINGS. C. FLAT DUCT SURFACES SHALL BE CRIMPED DIAGONALLY REGARDLESS OF SIZE. LONGITUDINAL JOINTS IN ALL DUCT SIZES MAY BE FLAT-LOCK JOINTS. TRANSVERSE JOINTS AND INTERMEDIATE BRACING SHALL BE CONSTRUCTED OF
- GALVANIZED SHEET METAL OR GALVANIZED STRUCTURAL ANGLES IN ACCORDANCE WITH REQUIREMENTS OF THE ASHRAF GUIDE AND PUBLIC AUTHORITIES HAVING JURISDICTION D. LOCK JOINTS SHALL BE HAMMERED TO MAKE THEM AIRTIGHT. INSIDE OF DUCT SHALL PRESENT A SMOOTH SURFACE TO FLOW OF AIR. E. CHANGES IN SIZE OF DUCTS SHALL INCREASE GRADUALLY WITH A SLOPE OF NOT MORE THAN 12 INCHES IN 5 FEET
- WHERE POSSIBLE, BUT NOT MORE THAN 12 INCHES IN 3 FEET IN ANY EVENT. F. TURNS SHALL BE MADE WITH A THROAT RADIUS OF NOT LESS THAN THE DUCT WIDTH. G. HORIZONTAL DUCTWORK SHALL BE STRONGLY SUPPORTED WITH GALVANIZED HANGERS IN ACCORDANCE WITH THE
- REQUIREMENTS OF THE ASHRAE GUIDE AND PUBLIC AUTHORITIES HAVING JURISDICTION H. PROVIDE DOUBLE THICKNESS TURNING VANES AT ALL SHARP RIGHT ANGLE TURNS. I. PLENUMS SHALL BE MADE OF 18 GAUGE GALVANIZED SHEET STEEL REINFORCED HORIZONTALLY ON A MAXIMUM OF 48 INCH CENTERS BY 1-1/2 X 1-1/4 X 1/8 INCH GALVANIZED ANGLES AND REINFORCED VERTICALLY BY 1-1/2 INCH STANDING SEAMS.
- PLENUM ACCESS DOORS 24 X 54 INCH MINIMUM SIZE SHALL BE GALVANIZED SHEET STEEL DOORS AND FRAMES PROPERLY REINFORCED TO PREVENT BREATHING. DOOR SHALL BE OF SAME GAUGE AS THE DUCT OR CASING AND SHALL HAVE 1 INCH INSULATION WITH GALVANIZED SHEET STEEL ON BOTH SIDES. EACH DOOR SHALL BE HUNG ON 5% TEE HINGES WITH ONE OR MORE CATCHES WHICH ARE OPERABLE FROM BOTH SIDES AND SIMILAR TO VENTFABRICS, INC. 260 VENTLOCK HATCH. DOORS SHALL BE HUNG TO OPEN AGAINST PRESSURE AND SHALL BE FITTED WITH FELT TO ENSURE AIRTIGHTNESS.
- K. FLEXIBLE CONNECTIONS FOR AIR DUCTS SHALL BE 16 OZ. AIRTIGHT VENTGLASS NONCOMBUSTIBLE FABRIC WITH FIRE RETARDANT NEOPRENE COATING ON OUTSIDE. ATTACH TO DUCTWORK BY LOCK SEAM. INSTALL NOT MORE THAN 6 INCHES LONG. PROVIDE WHERE REQUIRED OR INDICATED L. SEAL JOINTS ON MAIN COLD SUPPLY AIR DUCTS AT EACH FLOOR WITH UL CLASSIFIED SEALANT. SEALANT SHALL BE

2.04 GREASE EXHAUST DUCTWORK

SPECIFICALLY DESIGNED TO SEAL HIGH PRESSURE DUCTWORK.

- A. MATERIAL: STAINLESS STEEL OF THE FOLLOWING GAUGES: DUCT AREA 4 SQ. FT. AND LESS, 16 GAUGE, DUCT AREA OVER 4 SQ. FT., 14 GAUGE. CARBON STEEL MAY BE SUBSTITUTED IN LIEU OF STAINLESS STEEL. B. JOINT AND SEAMS SHALL BE MADE OF A CONTINUOUS LIQUID-TIGHT WELD OR BRAZE MADE ON THE EXTERNAL
- SURFACE OF THE DUCT. C. CONSTRUCT HORIZONTAL DUCT WITH LONGITUDINAL SEAMS PLACE TOPSIDE. D. A GREASE DUCT SERVING A TYPE I HOOD WHICH PENETRATES A CEILING, WALL OR FLOOR SHALL BE ENCLOSED IN A
- RATED DUCT ENCLOSURE OR WRAPPED WITH A FIRE WRAPPING PRODUCT WHICH IS UL LISTED AND APPROVED FOR LISE IN GREASE DUCT SYSTEMS FROM THE POINT OF PENETRATION. THE DUCT ENCLOSURE SHALL BE SEALED AROUND THE DUCT AT THE POINT OF PENETRATION AND VENTED TO THE EXTERIOR THROUGH WEATHER-PROTECTED OPENINGS. THE ENCLOSURE SHALL BE SEPARATED FROM THE DUCT BY AT LEAST 3 AND NOT MORE THAN 12 INCHES AND SHALL SERVE A SINGLE GREASE EXHAUST DUCT SYSTEM.

- E. PROVIDE CLEANOUT DOORS FOR EVERY 15 FEET OF DUCT RUN, AT EACH CHANGE IN DUCT DIRECTION, ONE PER FLOOR ON VERTICAL SECTIONS, AT TOP OF DUCT RISERS AND WHERE INDICATED ON PLANS. DOORS SHALL BE LARGE ENOUGH TO PERMIT CLEANING AND INSPECTION, MINIMUM OF 24 INCH X 24 INCH. DOORS SHALL BE TIGHT FITTING CONSTRUCTED OF STAINLESS STEEL OF THICKNESS NOT LESS THAN THAT OF THE DUCTS. ACCESS DOORS SHALL BE PROVIDED WITH AN APPROVED NON-COMBUSTIBLE GASKETING MATERIAL FOR AIRTIGHT SEALING AND BE FASTENED WITH CAM TYPE LATCHES. ALL DOORS SHALL BE LOCATED IN THE SIDE OF A HORIZONTAL DUCT WITH THE LOWER EDGE OF A SIDE OPENING NOT LESS THAN 1-1.2 INCHES FROM THE BOTTOM OF THE DUCT. GENERAL CONTRACTOR SHALL COORDINATE ALL ACCESS PANELS REQUIRED IN WALLS, CEILINGS AND RATED ENCLOSURE TO ACCESS CLEANOUTS.
- F. DUCT SYSTEMS SERVING A TYPE I HOOD SHALL BE SO CONSTRUCTED AND INSTALLED THAT GREASE CANNOT
- FOOT TOWARD THE HOOD OR TOWARD AN APPROVED GREASE RESERVOIR. G. DUCT BRACING AND SUPPORTS SHALL BE OF NONCOMBUSTIBLE MATERIAL ATTACHED TO STRUCTURE. MECHANICAL
- LIMITATIONS OF THE BUILDING CODE. H. WELDING: WELDS TO BE IN ACCORDANCE WITH SMACNA, ASHRAE, UMC AND AWS STANDARDS.
- I. ALL DUCTWORK FOR KITCHEN VENTILATION SYSTEMS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF UMC AND ALL APPLICABLE CODES OR STANDARDS
- K. UNLESS SHOWN OR NOTED OTHERWISE, ALL ELBOWS AND OFFSETS SHALL BE SMOOTH RADIUS WITHOUT TURNING VANES. CENTERLINE RADIUS TO WIDTH RATIO SHALL BE 1.5 MINIMUM.

2.05 TURNING VANES A. BOTH DIMENSIONS LESS THAN 48 INCHES: SINGLE VANE OR APPROVED DOUBLE THICKNESS AIRFOIL VANES. B. EITHER DIMENSION GREATER THAN 48 INCHES: DOUBLE THICKNESS AIRFOIL VANES OF APPROVED PATTERN. C. RECTANGULAR SMOOTH RADIUS ELBOWS: PROVIDE MULTIPLE SPLITTER VANES.

- 2.06 GREASE DUCT FIRE WRAP A. PROVIDE 3M FIRE BARRIER DUCT WRAP 615+ OR EQUAL. PRODUCT SHALL BE A FIRE RESISTANT WRAP CONSISTING
- OF A BLANKET ENCAPSULATED WITH A FOIL, DESIGNED AND TESTED FOR APPLICATION ON KITCHEN GREASE EXHAUST DUCTS. B. BLANKET SHALL BE 1.38 LBS./SQ. FT. DENSITY WITH 0 FLAME SPREAD AND 0 SMOKE DEVELOPED WHEN TESTED IN ACCORDANCE WITH ASTM E 84. BLANKET AND INSTALLATION SHALL BE UL LISTED FOR INSTALLATION AS A
- TWO-HOUR ENCLOSURE. BLANKET SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 96, 1998 EDITION. C. ALL DETAILS OF INSTALLATION SHALL BE PROVIDED BY THE MANUFACTURER AND SHALL BE UL LISTED FOR TWO-HOUR APPLICATION ON KITCHEN GREASE EXHAUST DUCTS.

2.07 DAMPERS

- A. PROVIDE BALANCING VOLUME DAMPERS IN EACH BRANCH DUCT AND IN EACH MAIN DUCT OF CONSTANT VOLUME SYSTEMS TO PROVIDE FOR COMPLETE AIR BALANCING. FIT EACH MANUAL VOLUME DAMPER WITH BEARINGS AND AN ADJUSTING DEVICE HAVING A LOCKING MECHANISM. PROVIDE ACCESS PANELS IF CONCEALED OR INACCESSIBLE THROUGH CEILING OR WALL
- B. BALANCING DAMPERS WHERE NEITHER DIMENSION OF DUCT EXCEEDS 17 INCHES MAY BE A JOB FABRICATED BUTTERFLY TYPE CONSISTING OF A BLADE CONSTRUCTED OF 18 GAUGE GALVANIZED STEEL SECURELY RIVETED OR WELDED AT ITS CENTER AXIS TO A SQUARE OPERATING ROD
- BALANCING DAMPERS WHERE EITHER DIMENSION EXCEEDS 18 INCHES SHALL BE AIR BALANCE AC-116, OPPOSED BLADE TYPE.
- EDGE SEALS AND ADJUSTABLE COUNTERWEIGHTS.

2.08 ROOF MOUNTED UPBLAST KITCHEN GREASE EXHAUST FAN A. GREENHECK MODEL CUBE, CENTRIFUGAL BLOWER, BELT-DRIVEN TYPE. FAN SHALL BE LICENSED TO BEAR THE AMCA RATINGS SEAL FOR AIR AND SOUND PERFORMANCE TO BE UL LISTED.

- GAUGE ALUMINUM CONSTRUCTION WITH ALL SPUN PARTS HAVING A ROLLED BEAD FOR ADDED RIGIDITY. C. GENERAL DESCRIPTION: DISCHARGE AIR DIRECTLY AWAY FROM THE MOUNTING SURFACE. 2. UPBLAST FAN SHALL BE FOR ROOF MOUNTED APPLICATIONS
- 3. PERFORMANCE CAPABILITIES UP TO 30,000 CUBIC FEET PER MINUTE (CFM) AND STATIC PRESSURE TO 5 INCHES OF WATER GAUGE. 4. FANS ARE AVAILABLE IN FOURTEEN SIZES WITH NOMINAL WHEEL DIAMETERS RANGING FROM 9 INCHES THROUGH 48 INCHES (098 - 480 UNIT SIZES).
- 5. MAXIMUM CONTINUOUS OPERATING TEMPERATURE IS 400 FAHRENHEIT (204.4 CELSIUS) 6. EACH FAN SHALL BEAR A PERMANENTLY AFFIXED MANUFACTURE'S ENGRAVED METAL NAMEPLATE CONTAINING THE MODEL NUMBER AND INDIVIDUAL SERIAL NUMBER D. WHEEL:
- . MATERIAL TYPE: ALUMINUM NON-OVERLOADING, BACKWARD INCLINED CENTRIFUGAL WHEEL 3. STATICALLY AND DYNAMICALLY BALANCED IN ACCORDANCE TO AMCA STANDARD 204-05
- 4. THE WHEEL CONE AND FAN INLET WILL BE MATCHED AND SHALL HAVE PRECISE RUNNING TOLERANCES FOR MAXIMUM PERFORMANCE AND OPERATING EFFICIENCY E. MOTORS: 1. AC INDUCTION MOTOR
- a. MOTOR ENCLOSURE: OPEN DRIP PROOF (ODP) OPENING IN THE FRAME BODY AND OR END BRACKETS b. MOTORS ARE PERMANENTLY LUBRICATED. HEAVY DUTY BALL BEARING TYPE TO MATCH WITH THE FAN LOAD AND PRE-WIRED TO THE SPECIFIC VOLTAGE AND PHASE MOUNTED ON VIBRATION ISOLATORS, OUT OF THE AIRSTREAM d. FOR MOTOR COOLING THERE SHALL BE FRESH AIR DRAWN INTO THE MOTOR COMPARTMENT THROUGH AN AREA FREE OF DISCHARGE CONTAMINANTS
- e. ACCESSIBLE FOR MAINTENANCE F. SHAFT AND BEARINGS 1. FAN SHAFT SHALL BE GROUND AND POLISHED SOLID STEEL WITH AN ANTI-CORROSIVE COATING 2. PERMANENTLY SEALED BEARINGS OR PILLOW BLOCK BALL BEARINGS 3. BEARING SHALL BE SELECTED FOR A MINIMUM L10 LIFE IN EXCESS OF 100,000 HOURS (EQUIVALENT TO L50 AVERAGE LIFE OF 500,000 HOURS), AT MAXIMUM CATALOGED OPERATING SPEED
- 4. BEARINGS ARE 100 PERCENT FACTORY TESTED 5. FAN SHAFT FIRST CRITICAL SPEED IS AT LEAST 25 PERCENT OVER MAXIMUM OPERATING SPEED G. HOUSING:
- COMPARTMENT HOUSING. GALVANIZED MATERIAL IS NOT ACCEPTABLE HOUSING SHALL HAVE A RIGID INTERNAL SUPPORT STRUCTURE 3. WINDBAND TO BE ONE PIECE UNIQUELY SPUN ALUMINUM CONSTRUCTION AND MAINTAIN ORIGINAL MATERIAL
- THICKNESS THROUGHOUT THE HOUSING 4. WINDBAND TO INCLUDE AN INTEGRAL ROLLED BEAD FOR STRENGTH 5. CURB CAP BASE TO BE FULLY WELDED TO WINDBAND TO ENSURE A LEAK PROOF CONSTRUCTION. TACK
- WELDING, BOLTING, AND CAULKING ARE NOT ACCEPTABLE 6. CURB CAP TO HAVE INTEGRAL DEEP SPUN INLET VENTURI AND PRE-PUNCHED MOUNTING HOLES TO ENSURE CORRECT ATTACHMENT TO CURB
- 7. DRIVE FRAME ASSEMBLIES SHALL BE CONSTRUCTED OF HEAVY GAUGE STEEL AND MOUNTED ON VIBRATION ISOLATORS 8. BREATHER TUBE SHALL BE 10 SQUARE INCHES IN SIZE FOR FRESH AIR MOTOR COOLING, AND DESIGNED TO
- ALLOW WIRING TO BE RUN THROUGH IT H. VIBRATION ISOLATION: DOUBLE STUDDED OR PEDESTAL STYLE TRUE ISOLATORS NO METAL TO METAL CONTACT
- 3. SIZED TO MATCH THE WEIGHT OF EACH FAN I DISCONNECT SWITCHES: NEMA RATED: NEMA 1: INDOOR APPLICATION NO WATER. FACTORY STANDARD.
- 2. POSITIVE ELECTRICAL SHUT-OFF 3. WIRED FROM FAN MOTOR TO JUNCTION BOX INSTALLED WITHIN MOTOR COMPARTMENT J. DRIVE ASSEMBLY: . BELTS, PULLEYS, AND KEYS OVERSIZED FOR A MINIMUM OF 150 PERCENT OF DRIVEN HORSEPOWER 2. BELT: STATIC FREE AND OIL RESISTANT 3. FULLY MACHINED CAST IRON TYPE, KEYED AND SECURELY ATTACHED TO THE WHEEL AND MOTOR SHAFTS
- 4. MOTOR PULLEYS ARE ADJUSTABLE FOR FINAL SYSTEM BALANCING 5. READILY ACCESSIBLE FOR MAINTENANCE K. DRAIN TROUGH: ALLOWS FOR ONE-POINT DRAINAGE OF WATER, GREASE, AND OTHER RESIDUES
- L. MOUNTING PLATE: 1. ATTACHED AND SEALED TO THE WALL PRIOR TO INSTALLATION OF UNIT M. OPTIONS/ACCESSORIES: AUTO BELT TENSIONEF
- a. AUTOMATIC TENSIONING DEVICE THAT ADJUSTS FOR THE CORRECT BELT TENSION, ONLY FOR SINGLE 2. ROOF CURBS:
- WOOD NAILER b. MOUNTED ONTO ROOF WITH FAN
- c. MATERIAL: GALVANIZED d. INSULATION THICKNESS: 1 INCHES
- 3. CURB EXTENSION a. TYPE: VCE - VENTED CURB EXTENSION b. MATERIAL TYPE: GALVANIZED
- 4 CURB SEAL
- FAHRENHEIT b. TYPICALLY MOUNTED BETWEEN THE FAN CURB CAP AND THE ROOF CURB 5. HINGED BASE: a. ALUMINUM HINGES
- b. HINGES AND RESTRAINT CABLES ARE MOUNTED TO A BASE (SLEEVE) 6. HEAT BAFFLE

2.09 GAS-FIRED MAKE-UP AIR UNIT WITH EVAPORATIVE COOLING

A. PROVIDE PACKAGED, ROOFTOP HEATING AND MAKEUP AIR, POWER VENTED UNITS BY GREENHECK MODEL IG SERIES, DESIGNED FOR ROOFTOP OR SLAB MOUNTING B. THE UNIT HOUSING SHALL HAVE A FINISH RATED FOR SALT SPRAY AT 1,000 HOURS. CONTROL, BURNER, AND BLOWER SERVICE COMPARTMENT DOORS SHALL BE HINGED. PROVIDE FACTORY ROOF CURB. C. UNIT WITH INTEGRAL INDIRECT GAS-FIRED HEATING AND EVAPORATIVE COOLING SHALL BE FULLY ASSEMBLED AT THE FACTORY AND CONSIST OF AN INSULATED METAL CABINET, CURB ASSEMBLY, MOTORIZED INTAKE DAMPER, EVAPORATIVE COOLING MODULE, CONDENSATE DRAIN PAN, P TRAP, SENSORS, SUPPLY AIR BLOWER ASSEMBLY, AND ELECTRICAL CONTROL UNIT WITH ALL SPECIFIED COMPONENTS AND INTERNAL ACCESSORIES FACTORY INSTALLED AND TESTED AND PREPARED FOR SINGLE-POINT HIGH VOLTAGE CONNECTION.

A, MATERIALS: FORMED, DOUBLE WALL INSULATED METAL CABINET, FABRICATED TO PERMIT ACCESS TO INTERNAL COMPONENTS FOR MAINTENANCE. 1. OUTSIDE CASING: 18 GAUGE, GALVANIZED (G90) STEEL MEETING ASTM A653 FOR COMPONENTS THAT DO NOT RECEIVE A PAINTED FINISH. PRE-PAINTED COMPONENTS AS SUPPLIED BY THE FACTORY SHALL HAVE POLYESTER

- URETHANE POWDER COAT 2. INTERNAL ASSEMBLIES: 24 GAUGE GALVANIZED (G90) STEEL EXCEPT FOR MOTOR SUPPORTS WHICH SHALL BE MINIMUM 14 GAUGE GALVANIZED (G90) STEEL.
- B. COMPLY WITH NFPA 90A AND NFPA 90B AND EROSION REQUIREMENTS OF UL 181. MATERIALS: FIBERGLASS INSULATION. IF INSULATION OTHER THAN FIBERGLASS IS USED, IT MUST ALSO MEET THE FIRE HAZARD CLASSIFICATION SHOWN BELOW.
- a. THICKNESS: 1 INCH (25 MM) TESTED IN ACCORDANCE WITH ASTM C 411.
- THICK OR 1 INCH THICK RIGID FIBERGLASS INSULATION, COVERED ON ONE SURFACE WITH INTEGRAL ALUMINUM FOIL

2. SHALL HAVE AN INTEGRAL COMBUSTION GAS BLOWER.

SHALL INCORPORATE A FORMED DRIP EDGE.

VOLTAGE POWER SUPPLY CONNECTIONS.

F. INDIRECT GAS-FIRED FURNACE:

CONTROLS.

1. DOOR FRAMES: 1 IN. X 1 IN. X 1/8 IN. STAINLESS STEEL ANGLES, WELDED.-

BECOME POCKETED IN ANY PORTION THEREOF, AND THE SYSTEM SHALL SLOPE NOT LESS THAN 1/4 INCH PER LINEAR FASTENERS SHALL NOT PENETRATE DUCT WALLS. SUPPORTS SHALL BE NOT LESS THAN THE GAUGE REQUIRED FOR GREASE DUCT CONSTRUCTION AND DESIGNED TO CARRY GRAVITY AND LATERAL LOADS WITHIN THE STRESS

GENERAL CONTRACTOR SHALL COORDINATE DUCT LOCATIONS AND FINAL CONNECTION TO KITCHEN EQUIPMENT.

D. BACKDRAFT DAMPERS: RUSKIN CBD2 AND CBD6 WITH EXTRUDED ALUMINUM FRAMES, ALUMINUM BLADES, AND VINYL

B. BLOWERS SHALL BE OF THE BELT DRIVE, UPBLAST VERTICAL DISCHARGE TYPE. HOUSING SHALL CONSIST OF HEAVY

1. CONSTRUCTED OF HEAVY GAUGE ALUMINUM INCLUDES EXTERIOR HOUSING, CURB CAP, WINDBAND, AND MOTOR

a. TYPE: GPIP - FOR PITCHED ROOFS, WELDED STRAIGHT SIDE CURB WITH 2 INCH FLASHING FLANGES AND

a. HIGH TEMP SEAL - AMORPHOUS SILICA FIBER TAPE SEAL, RATED FOR CONTINUOUS DUTY AT 2000 DEGREES

ALLOWS THE FAN TO TILT AWAY FOR ACCESS TO WHEEL AND DUCTWORK FOR INSPECTION AND CLEANING a. 1 INCH THICK INSULATION SHIELD THAT PREVENTS HEAT FROM RADIATING INTO THE MOTOR COMPARTMENT

URETHANE PAINT ON 18 GAUGE G60 GALVANIZED STEEL. BASE RAIL IS 12 GAUGE, GALVAZINED (G90) STEEL. COMPONENTS THAT RECEIVE A PAINTED FINISH PER A/E SPECIFICATION SHALL BE PAINTED WITH A POLYESTER

b. FIRE HAZARD CLASSIFICATION: MAXIMUM FLAME SPREAD OF 25 AND SMOKE DEVELOPED OF 50, WHEN c. LOCATION AND APPLICATION: FLOOR OF EACH UNIT SHALL BE INSULATED WITH EITHER ONE HALF INCH

C. ACCESS PANELS: UNIT SHALL BE EQUIPPED WITH REMOVABLE ACCESS PANELS TO PROVIDE EASY ACCESS TO ALL MAJOR COMPONENTS. ACCESS PANELS SHALL BE FABRICATED OF 18 GAUGE STEEL. REMOVABLE ACCESS PANELS

D. SUPPLY AIR BLOWER ASSEMBLY: BLOWER ASSEMBLY CONSISTS OF AN ELECTRIC MOTOR AND A BELT DRIVEN, DOUBLE WIDTH, DOUBLE INLET FORWARD CURVE BLOWER. ASSEMBLY SHALL BE MOUNTED ON HEAVY GAUGE GALVANIZED RAILS AND FURTHER MOUNTED ON MINIMUM 1.125 INCH THICK NEOPRENE VIBRATION ISOLATORS. E. CONTROL PANEL / CONNECTIONS: UNIT SHALL HAVE AN ELECTRICAL CONTROL CENTER WHERE ALL HIGH AND LOW VOLTAGE CONNECTIONS ARE MADE. CONTROL CENTER SHALL BE CONSTRUCTED TO PERMIT SINGLE-POINT HIGH

1. SHALL BE ETL CERTIFIED AS A COMPONENT OF THE UNIT. 3. SHALL BE ETL CERTIFIED FOR INSTALLATION DOWNSTREAM OF A COOLING COIL. 4. SHALL HAVE FAULT SENSORS TO PROVIDE FAULT CONDITIONS TO OPTIONAL DIGITAL CONTROLLER OR BUILDING 5. SHALL HAVE 4-PASS TUBULAR HEAT EXCHANGERS, CONSTRUCTED OF TYPE 409 STAINLESS STEEL. HEAT EXCHANGER TUBES SHALL BE INSTALLED ON THE VEST PLATE BY MEANS OF SWAGED ASSEMBLY. WELDED CONNECTIONS ARE NOT ACCEPTABLE. HEAT EXCHANGER TUBES SHALL BE SUPPORTED BY A MINIMUM OF TWO FABRICATED ASSEMBLIES THAT SUPPORT THE TUBES AND ALSO PERMIT EXPANSION AND CONTRACTION OF THE TUBES

- 6. HEAT EXCHANGER SHALL HAVE A ONE YEAR WARRANTY. 7. SHALL BE ENCASED IN A WEATHER-TIGHT METAL HOUSING WITH INTAKE AIR VENTS, LARGE, METAL LIFT-OFF OR HINGED DOOR SHALL PROVIDE EASY ACCESS TO THE ENCLOSED VEST PLATE, CONTROL CIRCUITRY, GAS TRAIN, BURNER ASSEMBLY AND EXHAUST BLOWER. 8. SHALL INCLUDE A KIT FOR OUTDOOR MOUNTING WITH VERTICAL STACK VENTING.
- G. CONDENSATE DRAIN PAN: DRAIN PAN SHALL BE AN INTEGRAL PART OF THE MAU WHENEVER A COOLING OPTION IS INCLUDED. PAN SHALL BE FORMED OF WELDED AUSTENITIC STAINLESS STEEL SHEET MATERIAL AND PROVIDED WITH A WELDED STAINLESS STEEL DRAIN CONNECTION AT THE FRONT FOR CONNECTION TO A P TRAP. DRAIN PAN SHALL BE SLOPED IN TWO DIRECTIONS TO PROVIDE POSITIVE DRAINING AND DRAIN CONNECTOR SHALL BE SEALED AT
- PENETRATION THROUGH CABINET WALL. H. P TRAP: IF THE UNIT IS EQUIPPED WITH A CONDENSATE DRAIN PAN, CONTRACTOR SHALL PROVIDE, OR FABRICATE, AND INSTALL AN APPROPRIATE P TRAP. IN ACCORDANCE WITH ALL LOCAL AND AREA CODES AND BEST PRACTICES. I. EVAPORATIVE COOLING MODULE: MEDIA HOLDER AND SUMP PAN SHALL BE FABRICATED OF STAINLESS STEEL AND SHALL USE CELDEK MEDIA. GUTTER AND SUMP SHALL BE SIZED TO SUPPLY THE SYSTEM WITH ENOUGH WATER TO OPERATE AT ITS MAXIMUM FLOW RATE AND NOT OVERFLOW WHEN THE SYSTEM IS SHUT DOWN. COOLING MODULE
- SHALL BE EQUIPPED WITH AUTO DRAIN FLUSH. J. DAMPERS: MOTORIZED INTAKE AIR DAMPERS OF LOW LEAKAGE TYPE SHALL BE FACTORY INSTALLED. K. SENSORS ARE CONSIDERED TO BE PART OF VARIOUS OPTIONAL OPERATIONAL MODES OR DEVICE CONTROLLERS AND ARE TO BE FACTORY SUPPLIED AND INSTALLED AS SPECIFIED BY THE A/E.
- L. CURB ASSEMBLY: A CURB ASSEMBLY MADE OF 14 GAUGE GALVANIZED STEEL SHALL BE PROVIDED BY THE FACTORY FOR ASSEMBLY AND INSTALLATION AS PART OF THIS DIVISION. THE CURB ASSEMBLY SHALL PROVIDE PERIMETER SUPPORT OF THE ENTIRE UNIT AND SHALL HAVE DUCT ADAPTERS FOR SUPPLY AIR. CURB ASSEMBLY SHALL ENCLOSE THE UNDERSIDE OF THE UNIT AND SHALL BE SIZED TO FIT INTO A RECESS IN THE BOTTOM OF THE UNIT. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH ROOFING CONTRACTOR TO ENSURE CURB UNIT IS PROPERLY FLASHED TO PROVIDE PROTECTION AGAINST WEATHER/MOISTURE PENETRATION. CONTRACTOR SHALL PROVIDE AND INSTALL APPROPRIATE INSULATION FOR THE CURB ASSEMBLY.
- BLOWER A. BLOWER SECTION CONSTRUCTION, SUPPLY AIR: BELT DRIVE MOTOR AND BLOWER SHALL BE ASSEMBLED ONTO A MINIMUM 14 GAUGE GALVANIZED STEEL PLATFORM AND MUST HAVE NEOPRENE VIBRATION ISOLATION DEVICES, MINIMUM OF 1 - 1/8 INCHES THICK. B. BLOWER ASSEMBLIES: SHALL BE STATICALLY AND DYNAMICALLY BALANCED AND DESIGNED FOR CONTINUOUS
- OPERATION AT MAXIMUM RATED FAN SPEED AND HORSEPOWER. C. CENTRIFUGAL BLOWER HOUSING: FORMED AND REINFORCED STEEL PANELS TO MAKE CURVED SCROLL HOUSING WITH SHAPED CUTOFF.
- D. FORWARD CURVED BLOWER (FAN) WHEELS: GALVANIZED OR ALUMINUM CONSTRUCTION WITH INLET FLANGE AND SHALLOW BLADES CURVED FORWARD IN DIRECTION OF AIRFLOW. MECHANICALLY ATTACHED TO SHAFT WITH SET SCREWS E. BLOWER SECTION MOTOR SOURCE QUALITY CONTROL: BLOWER PERFORMANCE SHALL BE FACTORY TESTED FOR
- FLOW RATE, PRESSURE, POWER, AIR DENSITY, ROTATION SPEED AND EFFICIENCY, RATINGS ARE TO BE ESTABLISHED IN ACCORDANCE WITH AMCA 210, "LABORATORY METHODS OF TESTING FANS FOR RATING". MOTORS
- A. GENERAL: BLOWER MOTORS GREATER THAN .75 HORSEPOWER SHALL BE "NEMA PREMIUM" UNLESS OTHERWISE INDICATED, COMPLIANCE WITH EPACT MINIMUM ENERGY-FEEICIENCY STANDARDS FOR SINGLE SPEED ODP AND TE ENCLOSURES IS NOT ACCEPTABLE. MOTORS SHALL BE HEAVY-DUTY, PERMANENTLY LUBRICATED TYPE TO MATCH THE FAN LOAD AND FURNISHED AT THE SPECIFIED VOLTAGE, PHASE AND ENCLOSURE. DRIVES SHALL BE SIZED FOR A MINIMUM OF 150% OF DRIVEN HORSEPOWER AND PULLEYS SHALL BE FULLY MACHINED CAST-TYPE, KEYED AND FULLY SECURED TO THE FAN WHEEL AND MOTOR SHAFTS. ELECTRIC MOTORS OF TEN HORSEPOWER OR LESS SHALL BE SUPPLIED WITH AN ADJUSTABLE DRIVE PULLEY. COMPLY WITH REQUIREMENTS IN DIVISION 23 05 13, MATCHED
- WITH FAN LOAD. B. MOTORS SHALL BE 60 CYCLE, 3 PHASE, 208 VOLT.
- UNIT CONTROLS
- A. THE UNIT SHALL BE CONSTRUCTED SO THAT IT CAN FUNCTION AS A STAND-ALONE HEATING AND COOLING SYSTEM CONTROLLED BY FACTORY-SUPPLIED CONTROLLERS, THERMOSTATS AND SENSORS OR IT CAN BE OPERATED AS A HEATING AND COOLING SYSTEM CONTROLLED BY A BUILDING MANAGEMENT SYSTEM (BMS). B. REMOTE PANEL: MANUFACTURER SHALL PROVIDE AND CONTRACTOR SHALL INSTALL A COMMERCIAL KITCHEN TYPE REMOTE PANEL THAT FUNCTIONS AS A REMOTE INDICATOR OF OWNER-SELECTED OPERATING PARAMETERS. C. SENSORS TO BE PROVIDED WITH THE UNIT INCLUDE:
- 1 HEATING INLET AIR SENSOR
- 2. COOLING INLET AIR SENSOR D. DIRTY FILTER SENSOR

2.10 DIFFUSERS, REGISTERS AND GRILLES

- A. AIR DISTRIBUTION EQUIPMENT SHALL BE OF SIZES AND CAPACITIES INDICATED, FURNISHED IN FACTORY FINISHED ENAMEL OF COLOR SELECTED. SUBMIT PAINT SAMPLES FOR APPROVAL. B. SQUARE CEILING DIFFUSERS: TITUS MODEL OMNI-AA, ALUMINUM PLAQUE DIFFUSER. MOUNTING SHALL BE ADAPTED TO CEILING SUSPENSION SYSTEM. USE MODULAR FACE SIZE 24 X 24 INCHES.
- D. SQUARE RETURN AIR GRILLES: TITUS MODEL 350FL, ALUMINUM CONSTRUCTION TO MATCH CEILING DIFFUSERS. 3/4 INCH BLADE SPACING, 35 DEGREE FIXED DEFLECTION, LAY-BORDER. PROVIDE WITH SQUARE TO ROUND ADAPTER AS REQUIRED E. FLOW BAR LINEAR DIFFUSERS: TITUS FLOWBAR SYSTEM, MODEL FL, IS THE BASIS OF DESIGN. COMPARABLE
- PRODUCTS MAY BE SUBMITTED AS A SUBSTITUTION PROVIDED. THEY ARE IN FULL COMPLIANCES WITH ALL SECTIONS OF THIS SPECIFICATION AND MEET THE PERFORMANCE REQUIREMENTS. THE CONTRACTOR SHALL NOTE THAT IF THE SUBSTITUTION ADDS COSTS TO ANY OTHER SECTION OR DIVISIONS/TRADES,OR CAUSES THE ENGINEER AND/OR ARCHITECT TO INCUR REDESIGN COSTS, THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE REIMBURSEMENT OF ALL THESE COSTS.
- (a) PROVIDE ALL MATERIALS AND EQUIPMENT REQUIRED FOR A COMPLETE INSTALLATION OF ALL LINEAR AND MODULAR SLOT AIR DISTRIBUTION SYSTEMS AS SHOWN ON THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND/OR INDICATED IN THE ARCHITECTURAL OR MECHANICAL SPECIFICATIONS. THE SYSTEMS SHALL BE COMPLETE IN EVERY RESPECT AND SHALL INCLUDE ALL REQUIRED APPURTENANCES. MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL PLENUMS. HOODS. BLANK-OFFS AND ASSOCIATED SHEET METAL COMPONENTS INCLUDING ALL DUCT CONNECTIONS THERETO. (b) PROVIDE ENDS AND CORNERS AS REQUIRED. ENDS SHALL BE BUTT TYPE, FIELD INSTALLED, OR MITERED
- PICTURE FRAME TYPE FACTORY INSTALLED, AS INDICATED HEREIN OR SHOWN ON THE DRAWINGS. CORNERS SHALL BE MITERED ONE PIECE UNIT. (c) PATTERN CONTROLLERS SHALL BE ONE PIECE EXTRUDED ALUMINUM, 24 INCHES LONG MAXIMUM, POSITIONED BETWEEN SPRING LOADED SPACERS, PATTERN CONTROLLERS SHALL ALLOW THE AIRSTREAM TO BE DIRECTED FLAT AGAINST THE CEILING IN EITHER DIRECTION OR DOWNWARD AS WELL AS ALLOWING THROW REDUCTION EVERY TWO FEET ALONG THE ENTIRE LENGTH OF THE LINEAR SLOT DIFFUSERS. THE AIRSTREAM SHALL BE
- MAINTAINED AT THE CEILING PLANE AND SHALL NOT DUMP WHEN VOLUME IS REDUCED. ONLY EXTRUDED ALUMINUM PATTERN CONTROLLERS ARE ACCEPTABLE. WHERE SHOWN OR NOTED PATTERN CONTROLLERS SHALL BE DESIGNED TO ALLOW THE AIRSTREAM TO BE JETTED INTO THE OCCUPIED SPACE AND BE ADJUSTABLE TO VECTOR THE AIRSTREAM AS REQUIRED. (d) PLENUMS SHALL BE MINIMUM 24-GAUGE GALVANIZED STEEL AND LINED INSIDE WITH BLACK MATTE FIBERGLASS INSULATION. HOODS SHALL BE 51 PERCENT FREE AREA AND CONSTRUCTED OF 24-GAUGE PERFORATED SHEET METAL PAINTED FLAT BLACK
- (e) AIR TEST AND BALANCE OF LINEAR AND MODULAR SLOT DIFFUSERS SYSTEMS SHALL BE BY THIS SECTION AND BE IN ACCORDANCE WITH THE TESTING AND BALANCING PORTION SECTION OF THE SPECIFICATIONS. POSITION ALL FLOWBAR PATTERN CONTROLLERS IN THEIR NORMAL OPERATION POSITIONS AND PERFORM ALL AIR TESTING AND BALANCING OF ALL SLOT DIFFUSER SYSTEMS IN FULL ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- (f) ALL SLOT DIFFUSERS SHALL BE PERFORMANCE TESTED WITH AIR PLENUMS AS A COMPOSITE ASSEMBLY IN FULL ACCORDANCE WITH ASHRAE, AND/OR ARI STANDARDS, IF REQUESTED, THE CONTRACTOR SHALL PROVIDE FOR A VISIT BY THE MECHANICAL CONSULTING ENGINEER TO THE PRODUCT TESTING LABORATORY TO VERIFY PERFORMANCE DATA AND TESTING PROCEDURES. ALL COST ASSOCIATED THERETO SHALL BE PROVIDED AT THE EXPENSE OF THE CONTRACTOR. (g) THE LINEAR SLOT DIFFUSERS SHALL HAVE TWO SLOTS UNLESS SHOWN OTHERWISE.
- (h)FOR LAY-IN CEILING, PROVIDE HANGER WIRE SUPPORT CLIPS THAT INTEGRATE WITH THE LINEAR SLOT DIFFUSERS ALLOWING THE LINEAR SLOT DIFFUSERS TO BE SUPPORTED FROM THE BUILDING STRUCTURE WITHOUT CEILING WIRE. PROVIDE SPLINE CLIPS TO SECURE JOINTS AS REQUIRED. (i) FOR HARD-LID CEILINGS, PROVIDE CLIPS THAT ARE INTEGRAL WITH THE LINEAR SLOT DIFFUSERS ALLOWING THE DIFFUSERS TO BE SECURED DIRECTLY TO THE CEILING FRAMING WITHOUT THE REQUIREMENTS FOR HANGER
- SUPPORTS. PROVIDE SPLINE CLIPS TO SECURE JOINTS AS REQUIRED. PROVIDE BORDER, MOUNTING, TYPE AS INDICATED ON CONSTRUCTION DOCUMENTS. F. PROVIDE BRANCH BALANCING DAMPER WITH REMOTE DAMPER OPERATOR BY POTTORFF OR YOUNG REGULATOR IN INACCESSIBLE LOCATIONS WHERE NO ACCESS PANELS ARE INDICATED ON THE DRAWINGS.
- 2.11 HVAC INSTRUMENTATION AND CONTROLS
- A. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE EXISTING CONTROLS SYSTEM AT THE JOB SITE PRIOR TO PROPOSAL OF WORK TO ASSURE THAT SCOPE IS ADEQUATELY UNDERSTOOD.
- 2.12 EQUALS AND SUBSTITUTIONS
- A. IN ADDITION TO MANUFACTURERS SPECIFIED, THE FOLLOWING SHALL ALSO BE CONSIDERED EQUAL, PROVIDING CORRESPONDING MODELS MEET SPECIFIED REQUIREMENTS. EQUIVALENT SUBSTITUTED EQUIPMENT NAMED HEREIN SHALL BE SUBMITTED TO ARCHITECT FOR APPROVAL. SUBMIT ALTERNATE SELECTIONS AT TIME OF BID LISTING MAJOR EQUIPMENT.
- ITEM: MANUFACTURER: 1. PIPE HANGERS & SUPPORTS: FEE & MASON, ELCEN
- 2. INSULATION: OWENS-CORNING, CERTAINTEED, KNAUF
- 3. GAS-FIRED MAKE-UP AIR UNITS: REZNOR, DAIKIN 4. DAMPERS: POTTORFF, GREENHECK
- 5. FANS: COOK, TWIN CITY 6. DIFFUSERS, REGISTERS, GRILLES: PRICE, KRUEGER

PART 3-EXECUTION

- 3.01 STATEMENT
- A. ALL HEATING, VENTILATION AND AIR CONDITIONING SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ALL GOVERNING AUTHORITIES.

3.02 LOCATIONS AND ACCESSIBILITY

- A. DRAWINGS INDICATE DESIRED LOCATION AND ARRANGEMENT OF PIPING, DUCTWORK, EQUIPMENT AND OTHER ITEMS, AND ARE TO BE FOLLOWED AS CLOSELY AS POSSIBLE. ALL OFFSETS AND INTERFERENCES MAY NOT BE INDICATED DUE TO THE SCALE OF THE DRAWINGS. COORDINATE WORK WITH ALL OTHER TRADES. B. VALVES, MOTORS, CONTROLS AND OTHER DEVICES REQUIRING SERVICE, MAINTENANCE AND ADJUSTMENT SHALL BE
- PLACED IN FULLY ACCESSIBLE POSITIONS AND LOCATIONS. PROVIDE ACCESS DOORS WHERE REQUIRED IN DUCTWORK AND CONSTRUCTION AND RENDER ALL SUCH DEVICES ACCESSIBLE.
- 3.03 EQUIPMENT IDENTIFICATION
- A. ALL MAJOR EQUIPMENT SHALL BEAR FIRMLY ATTACHED METAL NAMEPLATES WHICH STATE NAME OF MANUFACTURER, MODEL NUMBER AND ELECTRICAL DATA. AN ADDITIONAL PERMANENT LABEL SHALL BE AFFIXED TO EACH EQUIPMENT WHICH WILL CLEARLY INDICATE BY NUMBER WHICH OPERATING AND MAINTENANCE MANUAL EXPLAINS MAINTENANCE REQUIREMENTS IN DETAIL.
- 3.04 INITIAL LUBRICATION, ADJUSTING AND FILLING SYSTEMS
- A. BEFORE OPERATING ANY MECHANICAL SYSTEMS, EQUIPMENT BEARINGS SHALL BE LUBRICATED AND BOLTS, PULLEYS, AND OTHER MOVING PARTS CHECKED FOR ALIGNMENT AND TOLERANCES IN ACCORDANCE WITH MANUFACTURER S OPERATING INSTRUCTIONS. PIPING AND LIQUID SYSTEMS SHALL BE FLUSHED OUT AND FILLED WITH OPERATING FLUIDS. AFTER TESTS, VALVES AND OTHER PARTS OF WORK SHALL BE ADJUSTED FOR QUIET OPERATION. STRAINERS SHALL BE CLEANED OUT BY REMOVING AND WASHING BASKET OR SCREEN. COMPRESSORS SHALL HAVE LUBRICATING OIL CHANGED. VIBRATIONS AND NOISE SHALL BE SUPPRESSED.

3.05 CLEANING OF EQUIPMENT, MATERIALS AND PREMISES

A. CLEAN EQUIPMENT AND MATERIALS THOROUGHLY. LEAVE SURFACES TO BE PAINTED SMOOTH, CLEAN, AND READY FOR PAINTERS. CLEAN ENTIRE PREMISE OF UNUSED MATERIALS, RUBBISH, DEBRIS, GREASE SPOTS AND DIRT LEFT BY SUBCONTRACTORS. REMOVE, CLEAN AND REPLACE PIPELINE STRAINERS AFTER SYSTEMS HAVE BEEN IN OPERATION FOR A PERIOD OF 30 CALENDAR DAYS.

SPECIFICATIONS

2. TEST AND RECORD MOTOR FULL LOAD AMPERES. DESIGN CEM

- 9. TEST AND RECORD ENTERING AIR TEMPERATURE (W.B. COOLING).
- ON THE DRAWINGS.
- CALCULATIONS.

K. DUCT LEAKAGE TESTING:

CONDITIONS.

- TOTAL DESIGN CFM FOR THE SECTION BEING TESTED. PRESSURE TEST RATING PRESSURE 1 IN. 1.5 IN. 2 IN. 2.5 IN.

4 IN. 4.5 IN. 6 IN. 6.5 IN.

L. SPACE PRESSURE TESTING

1. FOR SEPARATE AIR SYSTEMS SERVING SEPARATE ROOMS, BALANCE CONTRACTOR SHALL PERFORM SPACE PRESSURE TESTING 2. PRESSURE MEASUREMENTS SHALL BE RECORDED FOR EACH SYSTEM AT SYSTEM BOUNDARIES AND OUTSIDE PRESSURE TESTING SHALL OCCUR WITH DOORS CLOSED.

3.11 CONNECTION

- 3.12 TESTS
- 3.13 INSTALLATION
- 3.14 AIR DISTRIBUTION EQUIPMENT LOCATIONS
- 3.15 TURNING VANES

3.16 DUCT LINING

3.18 CAPPING OF DUCT

CLARIFICATION.

DESIGN TEAM FOR REVIEW.

3.20 THERMOSTAT LOCATION

SUNLIGHT

A. HOLD HORIZONTAL PIPE RUNS FIRMLY IN PLACE USING APPROVED STEEL AND IRON HANGERS, SUPPORTS, AND/OR PIPE RESTS UNLESS OTHERWISE INDICATED SUSPEND HANGER RODS FROM CONCRETE INSERTS OR FROM APPROVED BRACKETS, CLAMPS OR CLIPS, HANG PIPES INDIVIDUALLY OR IN GROUPS IF SUPPORTING STRUCTURE IS ADEQUATE TO SUPPORT WEIGHT OF PIPING AND FLUID. EXCEPT FOR BURIED PIPING, HANG OR SUPPORT PIPE RUNS SO THEY MAY EXPAND OR CONTRACT FREELY WITHOUT STRAIN TO PIPE OR EQUIPMENT B. HORIZONTAL STEEL PIPING: PROVIDE HANGERS OR SUPPORTS EVERY 10 FEET EXCEPT EVERY 8 FEET FOR PIPING UNDER 1 INCH IN DIAMETER, UNLESS OTHERWISE SPECIFIED. C. HORIZONTAL COPPER TUBING: FOR 2 INCH DIAMETER AND OVER, PROVIDE HANGERS, EVERY 10 FEET, FOR 1-1/2 INCH DIAMETER AND SMALLER, EVERY 6 FEET D. VERTICAL PIPING: SUPPORT AT EVERY FLOOR WITH WROUGHT IRON PIPE CLAMPS.

E. BRANCHES: PROVIDE SEPARATE HANGERS OR SUPPORTS FOR BRANCH LINES 6 FEET OR MORE IN LENGTH.

A. INSTALL PER MANUFACTURER S RECOMMENDATIONS.

3.06 HANGERS AND SUPPORTS

3.07 EQUIPMENT AND MATERIALS

3.09 EXPANSION AND CONTRACTION

1. SUPPLY AIR SYSTEMS.

3. HYDRONIC SYSTEMS.

HEREIN.

4. REPORT AND REPORT FORMS.

3.10 SYSTEM BALANCING

3.08 ACCESSIBILITY

A. INSTALL WORK READILY ACCESSIBLE FOR NORMAL OPERATION, READING OF INSTRUMENTS, ADJUSTMENT, SERVICE INSPECTION AND REPAIR. PROVIDE ACCESS PANELS WHERE INDICATED AND REQUIRED.

A. INSTALL PIPING SUBJECT TO EXPANSION AND CONTRACTION WITH EXPANSION LOOPS MADE UP OF BENDS OR FITTINGS, EXPANSION JOINTS, SWING JOINTS, OR OTHER APPROVED METHODS OR DEVICES. BRANCH LINES FROM MAIN SUBJECT TO EXPANSION AND CONTRACTION SHALL HAVE A SWING JOINT AT POINT OF CONNECTION WITH THE MAIN. RISERS WHICH PASS THROUGH ONE OR MORE FLOORS SHALL HAVE SWING JOINTS AT THEIR BASE. ANCHOR LINES SUBJECT TO EXPANSION AND CONTRACTION BY APPROVED METHODS TO RESTRICT MOVEMENT.

A. SECTION INCLUDES: TESTING, ADJUSTING AND BALANCING OF MECHANICAL EQUIPMENT AND SYSTEMS. B. PROVIDE AND BE RESPONSIBLE FOR PROTECTION AND REPAIR OF ADJACENT SURFACES AND AREAS WHICH MAY BECOME DAMAGED AS A RESULT OF WORK OF THIS SECTION. PROTECT WORK HEREUNDER UNTIL COMPLETION AND FINAL ACCEPTANCE. REPAIR OR REPLACE DAMAGED OR DEFECTIVE WORK TO ORIGINAL SPECIFIED CONDITIONS, AT NO EXTRA COST TO THE OWNER

2. RETURN AIR, FRESH AIR AND EXHAUST AIR SYSTEMS.

C. ALL PERFORMANCE TESTING AND BALANCING OF THE MECHANICAL SYSTEMS INCLUDING:

D. SUBMITTALS: SUBMIT A COMPLETE TESTING AND BALANCING PROCEDURE INDICATING ALL TEST EQUIPMENT THAT WILL BE USED, TESTING PROCEDURES, TEST DATA SHEETS, SYSTEMS SCHEMATICS AND POINTS OF TESTING.

1. TEST AND BALANCE DATA: SUBMIT TEST AND BALANCE DATA ON COMPLETION OF WORK UNDER THIS SECTION. 2 CERTIFICATION: CERTIFY IN WRITING THAT SYSTEM HAS BEEN ADJUSTED AND BALANCED AND DESIGN CONDITIONS HAVE BEEN ATTAINED.

E. CONTRACTOR SHALL PROVIDE TO THE ARCHITECT. HVAC CONTRACTOR AND ELECTRICAL CONTRACTOR REQUIREMENTS FOR DRIVE CHANGES, INSTALLATION OF ADDITIONAL DAMPERS, VANES, GRILLE BAFFLES OR OTHER ITEMS AS MAY BE REQUIRED TO BALANCE THE SYSTEM TO THE OWNER S SATISFACTION. F. VERIFICATION OF CONDITIONS: PRIOR TO TESTING AND BALANCING, BALANCING CONTRACTOR SHALL INSPECT EQUIPMENT AND MATERIALS TO ASSURE THAT ALL BALANCING OPERATIONS CAN BE PERFORMED. BALANCE SUBCONTRACTOR SHALL ARRANGE WITH HVAC CONTRACTOR AND ELECTRICAL CONTRACTOR FOR SATISFACTORY CORRECTION OF ALL DEFECTS IN WORKMANSHIP AND/OR MATERIAL THAT COULD AFFECT THE WORK SPECIFIED

G. SYSTEM OPERATION: CONTRACTOR SHALL COORDINATE WITH HVAC SPECIFICATIONS AND CONTROLS SPECIFICATIONS AND CONTRACTORS TO HAVE ALL PARTS OF SYSTEMS IN FULL OPERATION AND SHALL CONTINUE THE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING H. SYSTEM TESTING AND BALANCING SHALL BE PERFORMED BY AN INDEPENDENT AGENCY CERTIFIED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NEBB. I. ALL TEST INSTRUMENTS SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER. TEST

INSTRUMENTS SHALL HAVE CERTIFICATION BY THE MANUFACTURER OR BY AN APPROVED TEST LABORATORY WITHIN ONE YEAR OF THE TESTING DATE. J. AIR DISTRIBUTION TESTING AND BALANCING:

1. TEST AND ADJUST BLOWER RPM TO DESIGN REQUIREMENTS.

3. MAKE PITOT TUBE TRANSVERSE OF MAIN SUPPLY, RETURN, EXHAUST AND OUTSIDE AIR DUCTS AND OBTAIN 4. TEST AND RECORD SYSTEM STATIC PRESSURES, SUCTION AND DISCHARGE.

5. TEST AND ADJUST SYSTEM FOR DESIGN EXHAUST AIR CFM. 6. TEST AND ADJUST SYSTEM FOR DESIGN OUTSIDE AIR CFM.

7. IF MORE THAN ONE OUTSIDE AIR DESIGN CONDITION EXISTS (DEMAND CONTROL VENTILATION), BALANCE REPORT SHALL INCLUDE SEPARATE TESTS FOR MINIMUM CONDITION AND MAXIMUM CONDITION. 8. TEST AND RECORD ENTERING AIR TEMPERATURE (D.B. HEATING AND COOLING).

10. TEST AND RECORD LEAVING AIR TEMPERATURES (D.B. HEATING AND COOLING).

11. TEST AND RECORD LEAVING AIR TEMPERATURE (W.B. COOLING). 12. ADJUST ALL MAIN SUPPLY AND RETURN AIR DUCTS TO PROPER DESIGN CFM.

13. TEST AND ADJUST EACH VAV BOX TO WITHIN PLUS-MINUS 5% OF DESIGN. 14. TEST AND ADJUST EACH DIFFUSER, GRILLE AND REGISTER TO WITHIN PLUS-MINUS 5% OF THE AMOUNT SHOWN

15. EACH GRILLE, DIFFUSER AND REGISTER SHALL BE IDENTIFIED AS TO LOCATION AND AREA. 16. SIZE, TYPE AND MANUFACTURER OF DIFFUSERS, GRILLES, REGISTERS AND ALL TESTED EQUIPMENT SHALL BE IDENTIFIED AND LISTED. MANUFACTURER S RATINGS ON ALL EQUIPMENT SHALL BE USED TO MAKE REQUIRED

17. READINGS AND TESTS OF DIFFUSERS, GRILLES AND REGISTERS SHALL INCLUDE THE REQUIRED FPM VELOCITY AND TEST VELOCITY, REQUIRED CFM AND TEST RESULT CFM AFTER ADJUSTMENTS. 18. IN COOPERATION WITH THE CONTROL MANUFACTURER S REPRESENTATIVE, THE SETTING ADJUSTMENT OF AUTOMATICALLY OPERATED CONTROLS TO OPERATE AS SPECIFIED, INDICATED AND/OR NOTED. 19. ALL DIFFUSERS, REGISTERS AND GRILLES AND ALL EQUIPMENT SHALL BE ADJUSTED TO MAINTAIN THE DESIGN

1. TEST APPARATUS SHALL BE A HIGH PRESSURE PORTABLE BLOWER WITH AN ORIFICE FLOW MEASURING DEVICE. EACH ORIFICE ASSEMBLY SHALL BE ACCURATELY CALIBRATED WITH ITS OWN CALIBRATION CURVE. 2. CONTRACTOR TO CLOSE OFF AND SEAL ALL OPENINGS IN THE DUCT SECTION TO BE TESTED. 3. EACH SECTION DUCT MAINS SHALL BE TESTED AT A PRESSURE CORRESPONDING TO ITS PRESSURE RATED, AS TABULATED BELOW. TOTAL ALLOWABLE LEAKAGE AT THE TESTING PRESSURE SHALL NOT EXCEED 2.5% OF THE

4. DUCT SYSTEM FOR SMOKE CONTROL SHALL BE TESTED IN ACCORDANCE WITH SECTION 905 OF THE CALIFORNIA BUILDING CODE BY THE REQUIRED SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY.

A. CONNECTIONS BETWEEN TWO DISSIMILAR METAL PIPES SHALL BE MADE WITH DIELECTRIC UNIONS.

A. FURNISH NECESSARY LABOR AND EQUIPMENT FOR TESTING.

A. COOLING TOWERS, BOILER, PUMPS, AIR HANDLING UNITS, EXHAUST FANS AND OTHER EQUIPMENT SHALL BE INSTALLED ON CONCRETE BASES AND BOLTED TO VIBRATION ISOLATORS AND THEN ANCHORED TO STRUCTURES.

A. AIR DISTRIBUTION EQUIPMENT LOCATIONS SHALL BE COORDINATED WITH ARCHITECTURAL DRAWINGS.

A. TURNING VANES SHALL BE INSTALLED IN ALL RIGHT ANGLE SHARP TURNS IN DUCTS.

A. WHERE INDICATED, SPECIFIED DUCT DIMENSIONS ARE NET CLEAR DIMENSIONS, I.E., CLEAR DIMENSIONS, AFTER INSULATION HAS BEEN INSTALLED. 3.17 REPAIR OR EXISTING SURFACES

A. CONTRACTOR SHALL PROVIDE AND BE RESPONSIBLE FOR PROTECTION AND REPAIR OF ADJACENT EXISTING SURFACES AND AREAS THAT MAY HAVE BEEN DAMAGED AS A RESULT OF DEMOLITION AND NEW WORK.

A. ALL EXISTING DUCTS THAT ARE REMOVED AND NOT REUSED SHALL BE CAPPED AIRTIGHT AND SEALED WITH "MIRACLE" DUCT SEALER AND D-617 OR EQUAL 3 19 CEILING DIFFUSER COORDINATION

A. CONTRACTOR SHALL STRICTLY COORDINATE ALL CEILING DIFFUSERS AND GRILLES WITH ARCHITECTURAL REFLECTED CEILING PLAN. IF ANY DISCREPANCIES ARE ENCOUNTERED, THE ENGINEER SHALL BE NOTIFIED FOR

A. CONTRACTOR SHALL COORDINATE FINAL LOCATION OF ALL THERMOSTATS WITH ARCHITECT AND TENANT CONSTRUCTION COORDINATOR PRIOR TO ANY ROUGH-IN INSTALLATION WORK. COORDINATED SHOP DRAWINGS SHOWING THERMOSTATS, SENSORS, SWITCHES, AND ALL OTHER WALL DEVICES SHOULD BE PROVIDED TO THE B. PROVIDE INSULATED BACKING ON ALL THERMOSTATS LOCATED ON EXTERIOR WALLS SO FLUCTUATIONS IN WALL TEMPERATURE DO NOT PROVIDE FALSE READINGS. VERIFY THAT THERMOSTATS WILL NOT BE INSTALLED IN DIRECT C. PROVIDE WHITE THERMOSTAT COVERS FOR ALL LOCATIONS WITHIN SCOPE OF WORK.

3.21 AS-BUILT DRAWINGS

- A. CONTRACTOR SHALL PROVIDE RECORD AS-BUILT DRAWINGS TO TENANT CONSTRUCTION COORDINATOR AND ARCHITECT AT THE COMPLETION OF TENANT CONSTRUCTION.
- 3.22 THERMOSTAT REQUIREMENTS
- A. ROOM THERMOSTATS SHALL BE CAPABLE OF BEING SET TO MAINTAIN SPACE TEMPERATURE SET POINTS FOR 55 DEGREES TO 85 DEGREES AND SHALL BE CAPABLE OF OPERATING THE HEATING AND COOLING IN SEQUENCE. THERMOSTATS SHALL BE ADJUSTABLE TO PROVIDE A TEMPERATURE RANGE OF 5 DEGREES BETWEEN FULL HEATING AND FULL COOLING BEING SUPPLIED. TEMPERATURE CONTROL SYSTEM SHALL OPERATE IN ACCORDANCE WITH THE BASE BUILDING SEQUENCE OF OPERATION.
- 3.23 DUCT ELBOWS

A. PROVIDE MINIMUM DUCT RADIUS ON ELBOWS AT ONE AND ONE HALF TIMES DUCT SIZES.

3.24 DIFFUSER THROW PATTERN

- A. ALL CEILING DIFFUSERS SHOWN ON THE PLANS SHALL BE PROVIDED AS FOUR WAY THROW UNLESS OTHERWISE NOTED. PATTERN BLADES SHALL BE SET IN A HORIZONTAL POSITION UNLESS OTHERWISE NOTED. 3.25 DUCTWORK REQUIREMENTS OF 2019 CALIFORNIA MECHANICAL CODE
- A. ALL DUCTWORK SHALL CONFORM TO CHAPTER 6 OF THE CALIFORNIA MECHANICAL CODE.
- 3.26 DUCT AND EQUIPMENT REQUIREMENTS OF 2019 TITLE 24
- A. ALL SUPPLY AIR DUCTS AND FIRE DAMPERS SHALL BE INSTALLED PER TITLE 24 REGULATIONS. B. ALL MECHANICAL EQUIPMENT SHALL BE CERTIFIED BY THE MANUFACTURER FOR COMPLIANCE WITH TITLE 24 ENERGY REQUIREMENTS.
- 3.27 ACCESS REQUIREMENTS
- A. PROVIDE ACCESS AND CLEARANCE REQUIREMENTS PER 2019 CALIFORNIA MECHANICAL CODE AND MANUFACTURE INSTALLATION WHICHEVER IS MORE RESTRICTIVE.
- 3.28 DUCTWORK PROTECTION DURING CONSTRUCTION
- A AT THE TIME OF ROUGH INSTALLATION OF DURING STORAGE ON THE CONSTRUCTION SITE AND UNTIL FINAL STARTUP OF THE HEATING AND COOLING EQUIPMENT, ALL DUCTS AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE AND PLASTIC TO REDUCE THE AMOUNT OF DUST AND DEBRIS WHICH MAY COLLECT IN THE SYSTEM

3.29 TEMPORARY VENTILATION DURING CONSTRUCTION

A. THE PERMANENT HVAC SYSTEM SHALL ONLY BE USED DURING CONSTRUCTION IF NECESSARY, TO CONDITION THE BUILDING WITHIN THE REQUIRED TEMPERATURE RANGE FOR MATERIAL AND EQUIPMENT INSTALLATION. IF THE HVAC SYSTEM IS USED DURING CONSTRUCTION, USE RETURN AIR FILTERS WITH MERV-13 FILTRATION. REPLACE ALL FILTERS IMMEDIATELY PRIOR TO OCCUPANCY.

END OF SECTION







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3M ^{tot} Fire Barrier Duct Wrap 615+ Commercial Grease Duct Systems (Figure 4) 1 or 2-Hour Shaft Alternative Zero Clearance to Combustibles Suggested Roof Vent Duct Roof Assembly Roof Flashing Vent Flashing Two layers 3M^{tot} Fire Barrier Duct Wrap 615+ Firestopping System for Rated Roof Assemblies Only Extend wrap a min. distance that meets local code requirements for clearance to combustibles Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details. 		RUN CONDITIONS: • START KITO • STOP KITC • ANY STAR THE KITCH ANSUL SYSTEM IN • UPON ACTI • MAKE-UP • KITCHEN E
FIRE WRAP ROOF TRANSITION	7	EXHAUST AND
3M" Fire Barrier Duct Wrap 615+ Typical Through Penetration Firestop System (Figure 19) 1-Hoar Through Penetration Firestop System (Figure 19) 1-Hoar Through Penetration Systems Fire-Rated Wood/Gypoum Floor/Ceiling Assembly 2-Dut 3. One or two layers 3M" Fire Barrier Duct Wrap 615+ 4. Banding or pinning 5. Mr Fire Barrier Takking Material PM 4, 4 pef mineral wood, or scrap duct wrap (min. 33% compressed) 6. Mr "Fire Barrier Takking Material PM 4, 4 pef mineral wood, or scrap duct wrap (min. 33% compressed) 7. Mr "Fire Barrier Takking Material PM 4, 4 pef mineral wood, or scrap duct wrap (min. 33% compressed) 8. Swafer Takking Material PM 4, 4 pef mineral wood, or scrap duct wrap (min. 33% compressed) 8. Write Status Takking Material PM 4, 5 (15 Mm) depth. Note: Sealant 1005 SL, or 3M" Fire Barrier Silicone Sealant 2000+ Note: Sealant to be applied at a minimum 58" (15 Mm) depth. Note: System integrity is limited by quality of installation. Consult current independent using laboratories (e.g. Interids, CL1) for Design or System Denatit.		3M [™] Fire Barrie Grease Duct Syst Suggested Greas 1. Two layers 3M [™] Fi 2. Scotch* Filament T 3. Steel banding 1/2" typical for permand 4. 6" (152.4mm) long Insulation Pins wit — OR — 5. 12 Gauge cupped I 6. 3" (76.2mm) min. 7. 3" (76.2mm) min. 8. Cutout Duct Wrap Note: System integr Consult current ind (e.g. Intertek, UL) f
FIRE WRAP THROUGH PENETRATION	8	GREAS
	•	Four approved g
 First layer 3M: Firs Barrier Duct Wap 615- cut sum size as cover Access door cover - 16 gauge Inculation pins (impaing pins) - welded (optional) First layer 3M: Firs Barrier Duct Wap 615- cut sum size as cover Second layer 3M: Firs Barrier Duct Wap 615- cut sum size as cover Second layer 3M: Firs Barrier Duct Wap 615- cut sum size as cover Adminium tape covering all exposed edges A "4 (02mm) long steel hollow tubing to fit threaded rold Are System Mitter 2D and And Mitter 2D and And Mitter 2D and Mitter 2D and Mitter 2D and Mitter 2D and Xing Ammitter 2D and Ammitte		 With the Butt-Joint Inner Lattechnique, the inner layer of blanket. The outer layer blar and then the exposed edge is in Figure 2A. Ia. First layer of 3M^{rm} Fir Ib. Second layer of 3M^{rm} (12) Steel banding 1/2" (12) 3" (76.2mm) min. long 4. Tightly butted joint 2B. Telescoping 3" (76.2mm) With the Telescoping Overlation on edge covered by the next 1a. First layer of 3M^{rm} Fir Ib. Second layer of 3M^{rm} (12) Steel banding 1/2" (12) 3" (76.2mm) min. long 2. Steel banding 1/2" (12) 3" (76.2mm) min. long 2. Steel banding 1/2" (12) 3" (76.2mm) min. long 2C. Checkerboard 3" (76.2mm) Checkerboard 3" (76.2mm) Check blankets with both edges expression of 3M^{rm} 12. Steel banding 1/2" (12) 3" (76.2mm) min. long 2D. Butt Joint with Collar With the Butt Joint and Coll tightly together and 6" (152. centered over the joint, over minimum as shown in Figur 1a. First layer of 3M^{rm} Fir Second layer of 3M^{rm} Fir Second layer of 3M^{rm} Fir Second layer of 3M^{rm} Fir 3" (76.2mm) min. long
FIRE WRAP DUCT HANGER SUPPORTS	9	FIRE

H001) INF(ORMATION	- Job#	39732	259														PATENT	NUMBERS			
				MAX.		NCF DESIG	Ι ΤΟΤΔΙ ΕΧΗ			EXH	AUST PLENI RISER(S)	UM					HOOL) CONFIG.	AC-PSP (United States) –	US Patent 7963830 B2		
NO.	TAG	MODEL	LENGTH	COOKING TEMP.	G DUTY	CFM/f	t CFM	WIDTH	LENG.	HEIGHT	DIA.	CFM	VEL.	S.P.	SUPPLY CFM	HOOD CONSTRUC	FION END TO END	ROW	AC-PSP Ŵ AC-PSP Is	/all (Canada)´— C. sland (Canada) —	A Patent 2820509 CA Patent 2520330		
1	0065	5424 ND-2-PSP-F	4'7"	600 Dec	g. Heavy	y 218	1000	10"	9"	4"		1000	1600	-0.620"	800	430 SS Where Expose	d ALONE	ALONE					
HOOL	HOOD INFORMATION																						
HOOD	-				FILTER(S)						LIGHT(S))						UTILI" FIRF SYSTE	TY_CABINET(S) TM	FLECTRICAL	SWITCHES	FIRE	HOOD
NO.	TAG	TYP	E	QTY.	HEIGHT L	LENGTH EF	FICIENCY @ 7 M	ICRONS	QTY.		TYPE		GU/	re Ard	LOCATION	SIZE	TYPE		SIZE	MODEL #	QUANTITY	SYSTEM PIPING	HANGING WGHT
1	0065	Captrate S	olo Filter	3	20"	16"	85% See Filter S	Spec.	2	L5	5 Series E	26	N	10	Left	12"x54"x24"	Ansul R102		3.0			YES	413 LBS
PERI	PERFORATED SUPPLY PLENUM(S)																						
HOOD NO.	TAG	POS. LENG	GTH WIDTH	HEIGHT	T TYPE	WIDTH LI	RISER(S) ENG. DIA.	CFM	S.P.														
1	0065	Front 67	" 14"	6"	MUA	12"	28"	800	0.191"														

Fire System Information – Job#3973259

	Tag	TYPE		FL∩W	INJIALLAHVN			
SYSTEM NO.			SIZE	POINTS	SYSTEM	LOCA		
	1	0068	Ansul R102	3.0	2	Fire Cabinet Left		

_	SCALE —	10	EVAPORATO
			GREASE EXHAUST
			FACTORY FURNISH
			SLOTTED AIR VENT ON SIDES (TYP.) -
			MIN. 6"HT. CURB FLASHING. SEE ARCH. DWG'S ———
_	SCALE	11	UPBLA
_	SCALE	12	
	-		

M-5.1