GENERAL NOTES

- 1. ALL PLUMBING WORK SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF PLUMBING CODE OF NEW YORK STATE 2020 AND ALL AUTHORITIES HAVING JURISDICTION.
- 2. EXTERIOR UTILITIES ARE DIAGRAMMATIC AND EXACT LOCATION AND INVERT ELEVATIONS SHALL BE AS INDICATED OR AS REQUIRED TO MEET EXISTING CONDITIONS. COORDINATE WORK WITH SITE PLAN.
- 3. PROVIDE ALL REQUIRED OFFSETS, FITTINGS, VALVES, TRAPS, DRAINS, ETC., EVEN THOUGH TROUGH NOT INDICATED DUE TO SMALL SCALE OF THE DRAWING.
- 4. CHECK DRAWINGS OF OTHER TRADES AND ARRANGE WORK TO AVOID CONFLICTS.
- 5. INSTALL PIPING TO MAINTAIN MAXIMUM HEADROOM AND ABOVE ARCHITECT'S APPROVED CEILING HEIGHTS.
- 6. RUN PIPING IN WALL CHASES, RECESSES, PIPE SHAFTS, AND HUNG CEILING
- WHERE SAME ARE PROVIDED OR SPECIALLY APPROVED. 7. INSTALL PIPING UNDER THE BUILDING AS HIGH AS POSSIBLE. DO NOT PERMANENTLY CLOSE UP, FUR IN, OR COVER PIPING BEFORE EXAMINATION AND TEST.
- 8. PROVIDE CONTROL GATE VALVES WHERE NOTED OR REQUIRED FOR COMPLETE REGULATING CONTROL OF ALL SYSTEM, PLUMBING FIXTURES, AND EQUIPMENT.
- 9. VALVES SHALL BE INSTALLED ACCESSIBLE BUT NO VALVES SHALL BE INSTALLED WITH HANDLES POINTING DOWN.
- 10. PROVIDE BALANCING GLOBE VALVES ON ALL HOT WATER CIRCULATING
- BRANCHES AS REQUIRED. 11. USE REDUCING FITTINGS FOR CHANGES OF PIPE SIZE. USE NO BUSHING EXCEPT WITH SPECIAL PERMISSION.
- 12. USE EXTRA HEAVY PIPE FOR NIPPLES WHERE UNTHREADED PORTION IS LESS THAN 1-1/2". USE NO CLOSE NIPPLES, EXCEPT WITH SPECIAL PERMISSION; USE ONLY SHOULDER NIPPLES.
- 13. PROVIDE UNIONS OR FLANGES AT CONNECTIONS TO RISERS, BYPASSES, AND FOUIPMENT.
- 14. RUN LOCAL HORIZONTAL DRAINAGE PIPING AT GRADE OF 1/4" PER FOOT WHEREVER POSSIBLE BUT NOT LESS THAN 1/8" PER FOOT; HOUSE DRAINAGE AT 1/8" PER FOOT UNLESS OTHERWISE NOTED, AND OUTSIDE DRAINAGE PIPING AS INDICATED OR REQUIRED.
- 15. RUN VENT PIPING WITH LONG-TURN ELBOWS AT CHANGES IN DIRECTION, PITCH TO DRAIN OUT CONDENSATION, AND CONNECT AT BASE TO PREVENT ACCUMULATION OF RUST.
- 16. PROVIDE CLEANOUTS (FULL SIZE UP TO 4" AND AT LEAST HALF-SIZE FOR LARGER PIPES WITH 4" MINIMUM), WHERE INDICATED, APPROXIMATELY EVERY 50 FT. ON HORIZONTAL DRAINAGE PIPING, AT CHANGES IN DIRECTION, AT BASE OF LEADERS, SOIL AND WASTE STACKS AND AS REQUIRED.
- 17. PROVIDE DRAIN BIBS AT BASE OF ALL WATER RISERS.
- 18. ALL SUBMERGED INLETS AND INSIDE HOSE CONNECTIONS SHALL BE PROVIDED WITH APPROVED TYPE VACUUM BREAKERS.
- 19. 19. PROVIDE ALL REQUIRED WATER PIPING FOR HEATING VENTILATING AND AIR CONDITIONING EQUIPMENT TO WITHIN 10 FT. OF THE EQUIPMENT CONNECTION AND

SPECIFICATIONS

COMPLETION OF HIS WORK.

- 1. ALL NEW PLUMBING WORK SHALL CONFORM TO PLUMBING COL NEW YORK STATE 2020.
- 2. ALL MATERIALS USED SHALL BE NEW, UNLESS OTHERWISE NOTE 3. THE PLUMBING CONTRACTOR SHALL ASSUME ALL RESPONS FOR HIS WORK AND MATERIALS AND SHALL GUARANTEE THE OF HIS CONTRACT FOR A PERIOD OF ONE YEAR FROM THE DA
- 4. PLUMBING CONTRACTOR SHALL CONSULT AND COOPERATE WITH GENERAL CONTRACTOR, HEATING AND VENTILATING CONTRA ELECTRICAL CONTRACTOR, ETC., IN ORDER TO AVOID INTERFE DURING INSTALLATION OF PIPING, EQUIPMENT, ETC.
- 5. PLUMBING CONTRACTOR SHALL DO ALL FILING OF PLANS WITH LOCAL AUTHORITIES AND PAY ALL FILING FEES AS REQUIRE LAW. HE SHALL OBTAIN ALL WORK PERMITS AND WRITE-OFF EFFECT THIS INSTALLATION IN A LEGAL MANNER.
- 6. PLUMBING CONTRACTOR SHALL PERFORM ALL TESTS REQUIRE THE LOCAL AUTHORITIES HAVING JURISDICTION AND SUBMI WORK TO ALL INSPECTIONS REQUIRED BY THEM AT NO ADDI COST TO THE CLIENT. CONTRACTOR SHALL FURNISH CERTIFICATES OF INSURANCE AS REQUIRED BY THE LAW.
- 7. PLUMBING CONTRACTOR SHALL MAKE ALL FINAL CONNECTION ALL PLUMBING EQUIPMENT REGARDLESS OF WHETHER SHOWN WITHOUT ANY ADDITIONAL COST TO THE CLIENT.
- 8. PLUMBING CONTRACTOR SHALL CHECK JOB SITE FOR EX PLUMBING AND SIZES BEFORE BIDDING ON THE JOB.
- 9. PLUMBING CONTRACTOR SHALL DO ALL NECESSARY C EXCAVATION, BACK-FILLING FOR THE INSTALLATION OF
- PLUMBING AND PATCHING BACK TO ORIGINAL STATE. 10. ALL NEW PLUMBING CONNECTIONS TO THE NEW PLU EQUIPMENT SHALL BE IN ACCORDANCE WITH THE 2018 PLU CODE OF NEW YORK STATE 2020 AND THE MANUFACTU SPECIFICATIONS.
- 11. ALL NEW UNDERGROUND SOIL, WASTE, VENT PIPING AND FITTINGS SHALL BE SCHEDULE 40 PVC.
- 12. ALL NEW SOIL, WASTE, VENT PIPING AND FITTINGS ABOVE FINISH FLOOR SHALL BE SCHEDULE 40 PVC.
- 13. ALL NEW COLD WATER PIPING, HOT WATER PIPING AND FITTINGS SHALL BE COPPER TUBING TYPE "L" WITH COPPER FITTINGS UTILIZING APPROVED LEAD FREE SOLDER.
- 14. ALL NEW COLD WATER PIPING, HOT WATER PIPING AND FITTINGS SHALL BE COVERED WITH 1/2" FIBERGLASS PIPE INS MANUFACTURED BY OWENS CORNING FIBERGLASS, 2 INSULATION OR APPROVED EQUAL. ALL EXPOSED PIP AND VALVES SHALL ALSO BE COVERED WITH ZESTO JACKETING, WITH WELDED SEALS.
- 15. ALL NEW PIPING HANGERS AND SUPPORTS SHALL COMP PLUMBING CODE OF NEW YORK STATE 2020.
- 16. ALL NEW COLD AND HOT WATER SUPPLY PIPING SHALL HAVE ANGLE

	HOT WATER HEATER												
TAG	LOCATION	TYPE	TANK CAPACITY (GAL)	FIRST HOUR FLOW (GPH)	RECOVERY RATE (GPM)	TEMP. RISE (°F)	FUEL TYPE	INPUT	ELECTRIC DATA VOLT/PH./HZ.	BASIS OF DESIGN MFR.	MODEL	OPERATING WEGHT (LB.)	REMARKS
ЕН ШН	SEE PLAN	POINT OF USE	2.5	_	7	90	ELECTRIC	1.44 W	120/1/60	AO SMITH	EPU-2.5	38	1
REMARKS	EMARKS:												

1. COORDINATE LOCATION OF ELECTRICAL CONNECTION IN THE FIELD. TANK CONSTRUCTION SHALL BE ASME CERTIFIED.

SPECIALTY PLUMBING FIXTURES

TAG	FIXTURE FUNCTION	DESCRIPTIOON	BASIS OF DESIGN MANUFACTURER	MODEL	REMARKS
CODP	FLOOR CLEANOUT	PVC BODY, ROUND HEAVY DUTY CAST IRON TOP, POLY-PROPILENE AR ABB PLUG, ADJUSTABLE TO FINISHED FLOOR	SIOUX CHIEF	851	2,4
СО	CLEANOUT	PVC BODY, ROUND PVC TOP, CLEANOUT PLUG SHALL INCLUDE A 1/4-20 THREADED BRASS INSERT FOR OPTIONAL ATTACHMENT OF COVER.	SIOUX CHIEF	875	2,4
FD	FLOOR DRAIN	5" ROUND GRATE, 2" BOTTOM OUTLET, DUCO CAST IRON BODY WITH FLASHING COLLAR AND POLISHED BRONZE ADJUSTABLE STRAINER HEAD, AND TRAP PRIMER CONNECTION.	J.R. SMITH	2010	
НВ	HOSE BIBB	CAST BRASS CONSTRUCTION, HEX SHOULDER, ½" MALE NPT WITH TEE HANDLE AND VACUUM BREAKER	WATTS	SC8-5	
M∨	UNDER SINK THERMOSTATIC MIXING VALVE	VALVE SHALL BE STANDARD ASSE 1070 CERTIFIED AND 3RD PARTY CERTIFIED AS LEAD FREE. VALVE SHALL HAVE BRONZE BODY, COPPER ENCAPSULATED THERMOSTAT, BRASS AND ENGINEERED POLYMER INTERNALS, STAINLESS STEEL SPRING, LOCKING TEMPERATURE ADJUSTMENT, INTEGRAL CHECK VALVES ON INLETS, IPS CONNECTIONS, MOUNTING BRACKET. MINIMUM FLOW 0.25 GPM@, MAXIMUM HOT WATER TEMPERATURE 180°F. TEMPERATURE ADJUSTMENT RANGE 95°F TO 120°F. TEMPERATURE SETTING 105°F.	LEONARD	170-LF-BP	
RPZ-A	REDUCED PRESSURE ZONE BACKFLOW PREVENTER 2½" TO 10"	THE ASSEMBLY LEAD FREE CONSTRUCTION SHALL CONSIST OF A PRESSURE DIFFERENTIAL RELIEF VALVE LOCATED IN A ZONE BETWEEN TWO POSITIVE SEATING CHECK VALVES AND CAPTURED SPRINGS. BACK-SIPHONAGE PROTECTION SHALL INCLUDE PROVISION TO ADMIT AIR DIRECTLY INTO THE REDUCED PRESSURE ZONE VIA A SEPARATE CHANNEL FROM THE WATER DISCHARGE CHANNEL. THE ASSEMBLY SHALL INCLUDE TWO TIGHTLY CLOSING SHUTOFF VALVES BEFORE AND AFTER THE VALVE AND TEST COCKS. THE ASSEMBLY SHALL MEET THE REQUIREMENTS OF ASSE STD. 1013; AWWA STD. C511-92; AND UL CLASSIFIED FILE NO. EX3185.	WATTS	LF-909-NRS	4
RPZ-B	REDUCED PRESSURE ZONE BACKFLOW PREVENTER 2" AND BELOW	THE ASSEMBLY SHALL CONSIST OF TWO POSITIVE SEATING CHECK MODULES WITH CAPTURED SPRINGS AND RUBBER SEAT DISCS. THE CHECK MODULE SEATS AND SEAT DISCS SHALL BE REPLACEABLE. SERVICE OF ALL INTERNAL COMPONENTS SHALL BE THROUGH A SINGLE ACCESS COVER SECURED WITH STAINLESS STEEL BOLTS, SHALL BE CONSTRUCTED USING LEAD FREE* CAST COPPER SILICON ALLOY. THE ASSEMBLY SHALL ALSO INCLUDE TWO RESILIENT SEATED ISOLATION VALVES; FOUR TOP MOUNTED, RESILIENT SEATED TEST COCKS. THE VALVE BODY SHALL UTILIZE A COATING SYSTEM WITH BUILT IN ELECTROCHEMICAL CORROSION INHIBITOR AND MICROBIAL INHIBITOR	WATTS	LF-007	4
TS	TRAP SEAL	INLINE FLOOR DRAIN TRAP SEAL WITH UV RESISTANT ABS PLASTIC FRAME, SILICON RUBBER SEALING FLAPPER AND FOUR FLEXIBLE SEALING RIBS.	MIFAB	MI-GARD	
WH	WALL HYDRANT	CONCEALED NON-FREEZE KEY OPERATED WALL HYDRANT WITH NICKEL BRONZE BOX AND DOOR, CHROME PLATED HYDRANT FACE, INTEGRAL VACUUM BREAKER, 18" LONG, 3/4" HOSE CONNECTION, 3/4" FEMALE x 1" MALE PIPE CONNECTION, ALL BRONZE HEAD, SEAT CASTING AND INTERNAL WORKING PARTS, BRONZE WALL CASING, AND LOOSE KEY.	WATTS	HY-725-18	5

UNLESS OTHERWISE INDICATED SIZE SHALL MATCH SIZE OF RESPECTIVE PIPE IT CONNECTS TO.

CLEANOUT SHALL BE SAME SIZE AS PIPE BEING SERVED. LENGTH SHALL BE DETERMINED IN THE FIELD BASED ON ACTUAL CONDITIONS ..

SIZE SHALL MATCH THE PIPE SIZES SHOWN ON PLANS.

WALL OPENING 5.25 X 6.25. CONTRACTOR TO COORDINATE LENGTH WITH FIELD CONDITIONS. THIS SCHEDULE IS COMPREHENSIVE. ALL MARKS MAY OR MAY NOT BE USED ON PLANS.

					PLUMBING FIXTURE S	CHEDULE					
TAO			RATED		MAKE AND MODELS			CONNECTIO	DN SIZE (IN.)	
TAG	DESCRIPTION	IYPE	FLOW	FIXTURE	VALVE	FAUCET / TRIM	C.W.	H.W.	WASTE	VENT	REMARKS
LAV	LAVATORY	WALL MOUNT	0.5 GPM	AMERICAN STANDARD "COMRADE" MODEL 0124.024, 20 x 18¼ WALL MOUNT, VITREOUS CHINA WITH FAUCET LEDGE, 4" ON CENTERS FAUCET HOLES, 1¼" TRAP.	AMERICAN STANDARD SERIES "SELECTRONIC" BELOW DECK THERMOSTATIC WATER MIXING VALVE TO BE USED WITH "SELECTRONIC" & METERING FAUCETS. ASSE 1070 CERTIFIED DOWN TO 0.35 GPM. ANTI-SCALD PROTECTION, BUILT-IN CHECK VALVES PREVENT CROSS-FLOW, ADJUSTABLE TEMPERATURE.	AMERICAN STANDARD SERIES "SELECTRONIC" ELECTRONIC PROXIMITY LAVATORY FAUCET MODEL 6059.105, HARD WIRED AC POWERED, 0.5 GPM PRESSURE COMPENSATING, VANDAL-RESISTANT MULTI-LAMINAR SPRAY. CAST BRASS SPOUT WITH PROGRAMMABLE, MULTI-FUNCTION SENSOR, SELF-CLEANING SOLENOID VALVE	¥2	1/2	1½	1½	HANDICAPPED ACCESSIBLE. MCGUIF PRO WRAP FOR EXPOSED WASTE, COLD WATER PIPING
wc	WATER CLOSET	FLUSH VALVE	1.6 GPF	AMERICAN STANDARD WALL MOUNTED ELONGATED "AFWALL FLOWISE" MODEL 2257.001. VITREOUS CHINA, HIGH EFFICIENCY LOW CONSUMPTION, ELONGATED BOWL, CONVENTIONAL GLAZE, 2–1/8" TRAPWAY, DIRECT-FED SIPHON JET ACTION,	SLOAN REGAL MANUAL FLUSHOMETER MODEL REGAL 111–1.6. POLISHED CHROME FINISH, TOP SPUD, SINGLE FLUSH, DIAPHRAGM VALVE, VALVE BODY MATERIAL SEMI-RED BRASS.	_	1	_	4	2	SEAT: AMERICAN STANDARD "EVERCLEAN" ROUND FRONT MODE 5282.011 SOLID PLASTIC, COMPLE BOLTS, NUTS AND WASHERS

	STOP VALVES INSTALLED UNDER ALL NEW PLUMBING FIXTURES.
DDE OF	17. ALL NEW EXPOSED PIPING AND FITTINGS AT FIXTURES SHALL BE HEAVY PIPING PASSING THROUGH WALLS ON BOTH SIDES.
ED.	18. PROVIDE HEAVY CHROME PLATED ESCUTCHEON PLATES AROUND ALL NEW PIPING PASSING THROUGH WALLS ON BOTH SIDES.
SIBILITY WORK	19. ALL NEW VALVES SHALL BE FAIRBANKS 125 P.S.I. OR APPROVED EQUAL.
TH THE	20. PLUMBING CONTRACTOR SHALL SUBMIT ALL SHOP DRAWINGS ON NEW PLUMBING FIXTURES AND EQUIPMENT FOR APPROVALS BEFORE INSTALLATION OF SAME.
ACTOR, ERENCE	21. ALL DOMESTIC WATER SYSTEMS SHALL BE FLUSHED AND SANITIZED IN ACCORDANCE WITH THE PLUMBING CODE OF NEW YORK STATE 2020: SECTION 610.1 AND LOCAL ADMINISTRATIVE AUTHORITY.
TH THE ED BY FFS TO	TESTING: DOMESTIC COLD, HOT WATER SYSTEMS SHALL BE TESTED TO A HYDROSTATIC PRESSURE OF 150 PSI. THE TEST PRESSURE SHALL BE HELD FOR A PERIOD OF NOT LESS THAN 2 HOURS AND SHALL NOT DROP MORE THAN 2 PSI DUPING THE TEST PERIOD TO
ED BY IT THE TIONAL H ALL	BE CONSIDERED TIGHT. SANITARY SEWER SYSTEM SHALL BE TESTED IN ACCORDANCE WITH PLUMBING CODE OF NEW YORK STATE 2020. THE SYSTEM SHALL BE PROVEN TIGHT UNDER 10'-0" HEAD OVER NEW BUILDING ROOF FOR A PERIOD OF 2 HOURS AND THE WATER LEVEL MUST REMAIN CONSTANT THROUGHOUT THE TEST WITHOUT
NS TO HEREIN	22. ALL NEW COMPRESSED AIR AND VACUUM PIPING SHALL BE COPPER TUBING TYPE "L" WITH COPPER FITTINGS UTILIZING APPROVED LEAD EREF. SOLDER.
UTTING, NEW	23. HORIZONTAL STORM PIPING SHALL BE COVERED WITH 1" FIBERGLASS PIPE INSULATION AS MANUFACTURED BY OWENS CORNING FIBERGLASS 25C-P PIPING INSULATION OR APPROVED EQUAL.
JMBING JMBING URER'S	

ISULATION	AS
25C-P PII	PING
PING, FITT	INGS
DN 2000	PVC
PLY WITH	THE

<u>ABB</u>	<u>REVIA</u>	<u> TIONS</u>		SYMBOL LIS	<u>ST</u>			
AFF	ABOVE FIN	ISHED FLO	OR			- NEW EQUIPMENT		
AFG BT	BATH TUB	ISHED GRA	.DE			- NEW CW PIPE		
CAP.	CAPACITY					- NEW HW PIPE 110°F		
CD CHV		TE DRAIN VENT		· · ·		- NEW HWR PIPE - NEW FILTERD WATER PIPE		
CHW	CHEMICAL	WASTE			120	• NEW HW 120°F		
CO	CLEANOUT				140	- NEW HW 140°F		
CODP COMB.	CLEANOU I COMBUSTIC	WITH DECH N	K PLAIE	G	— G	- NEW GAS PIPING		
COWP	CLEANOUT	WITH WAL	L PLATE			- NEW WARM WATER PIPING		
CW	COLD WATE					- NEW SANITARY PIPE ABOVE SLAB/GRADE		
DF DCV	DOUBLE CH	IECK VALV	Έ			- NEW VENT PIPE		
DCDV	DOUBLE CH	IECK DETE	CTOR VALVE		GW	- NEW GREASE WASTE PIPE ABOVE SLAB/GRADE		
ESE	EMERGENC` WASH STA	Y SHOWER TION	AND EYE	ST	ST	- NEW STORM DRAIN PIPE ABOVE SLAB/GRADE		
FD	FLOOR DRA	AIN				- NEW UNDER SLAB STORM DRAIN PIPE		
FS FW	FLOOR SINI	< VATER			·	- EXISTING EQUIPMENT - EXISTING CW PIPE		
G	GAS	,,,,,				- EXISTING HW PIPE		
HS	HAND SINK					- EXISTING HWR PIPE		
HSH HW	HANDICAP HOT WATER	SHOWER R MIN. 120	۴F	· · ·	·	- EXISTING FW PIPE		
HWH	HOT WATER	R HEATER			120	- EXISTING HW WATER 120°F PIPE		
HWR	HOT WATER	R RE-CIRC	ULATION	140	— 140 — — —	- EXISTING HIGH TEMPERATURE WATER PIPE		
KSK L	STORM DR	ink AIN LEADEI	२			- EXISTING WARM WATER PIPE		
LAV	LAVATORY					- EXISTING SANITARY PIPE ABOVE SLAB		
MAX.						- EXISTING SANITARY PIPE UNDER SLAB/GRADE		
MFR. MIN.	MANUFACT	JRER				- EXISTING VENT PIPE		
MS	MOP SINK			ST	— ST —	- EXISTING STORM PIPE ABOVE GRADE/SLAB		
MV		ATIC MIXIN	G VALVE	US-ST ·	05-51	- EXISTING UNDER SLAB/GRADE STORM PIPE		
NO	NORMALLY	OPEN			Э	PIPE DOWN		
NT	NEUTRALIZ	ATION TAN	К		0	PIPE UP		
OPER.					_	PIPE "T" DOWN		
PD	PUMPED DI	RAIN				PIPE "T" UP		
PW	PUMPED W	ASTEWATE	२)	_	PIPE 45° DOWN		
RD RD&O	ROOF DRAI	N N WITH ON	/FRFLOW	·//·	0	"P" TRAP (PLAN VIEW)		
RDS	ROOF DRAI	Ν		函		GATE VALVE		
S	SECONDAR	Y/EMERGEI	NCY	函		BALL VALVE		
SH	SHOWER					GLOBE VALVE		
SL	SECONDAR	Y STORM [DRAIN LEADER	שר שו		BUTTERFLY VALVE		
PHS ST	STORM	NG				MOTORIZED VALVE (ELECTRIC)		
TEMP.	TEMPERATU	JRE		\mathbb{N}		CHECK VALVE		
TP	TRAP PRIM	ER		∑ Z		ANCLE VALVE		
VTR	VENT THRC	UGH ROOF	-	」 一				
V	VENT					RELIEF VALVE	ION A US S IS	÷
VB W	VACUUM B	REAKER		₩			E SSI	B ∖
WC	WATER CLO	DSET				OS&Y VALVE WITH TAMPER SWITCH		
WH	WALL HYDF	RANT				THERMOSTATIC MIXING VALVE		
WW WMB	WORM WAI WASHING M	ER 1ACHINE BI	ОХ	• » h				ON TER
						WALL HYDRANT	AL	TATI AL
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H.W.	WASTE	/ VENT	-	REMARKS			LTEF ROLL	ЙЯ L М А [
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<i>\</i> ∕2	11/2	11/4	PRO WRAP FOR COLD WATER P	R EXPOSED WASTE, HOT	&		VEYC	ER (
								RING
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	<u>л</u>		SEAT: AMERICA	NN STANDARD ROUND FRONT MODEL				× H
			5282.011 SOLIE BOLTS, NUTS A) PLASTIC, COMPLETE WI ND WASHERS	TH			D, T
								LOW



P-100







ABBREVIATIONS

А	AMPERE	FLA	FULL LOAD AMPERE
AHU	AIR HANDLING UNIT	GC	GENERAL CONTRACTOR
ACCU	AIR COOLED CONDENSING UNIT	HP	HEAT PUMP, HORSEPOWER
AFF	ABOVE FINISHED FLOOR	KW	KILOWATT
AS	AIR SEPARATOR	LAT	LEAVING AIR TEMPERATURE
BTUH	BRITISH THERMAL UNIT	LB	POUNDS
CFM	CUBIC FEET PER MINUTE	COND.	CONDENSATE
COND	. CONDENSATE	LWT	LEAVING WATER TEMPERATURE
D	DRAIN	MBH	1000 BTUH
DB	DRY BULB	MCA	MINIMUM CIRCUIT AMPACITY
DN	DOWN	MD	MOTORIZED DAMPER
EAT	ENTERING AIR TEMPERATURE	MOP	MAXIMUM OVERCURENT PROTECTION
EBH	ELECTRIC BASEBOARD HEATER	NTS	NO TO SCALE
EER	ENERGY EFFICIENCY RATIO	PSI	POUNDS PER SQUARE INCH
EF	EXHAUST FAN	S.G.	SUPPLY GRILLE
EUH	ELECTRIC UNIT HEATER	VD	VOLUME DAMPER
ESP	EXTERNAL STATIC PRESSURE	W	WATT
ERV	ENERGY RECOVERY VENTILATOR	W/	WITH
EWT	ENTERING WATER TEMPERATURE	WB	WET BULB
FC	FLEXIBLE CONNECTION	WMS	WIRE MESH SCREEN
FD	FIRE DAMPER		

GENERAL NOTES

- GENERAL NOTES ON THIS DRAWING ARE APPLICABLE TO EACH MECHANICAL DRAWING OF THIS SET. SEE EACH DRAWING FOR SPECIFIC NOTES APPLICABLE TO THAT DRAWING.
- 2. OUTSIDE AIR INTAKE OPENINGS FOR VENTILATION AIR SHALL BE LOCATED 10 FEET MEASURED IN ANY DIRECTION FROM ANY FLUES, VENTS, CHIMNEYS, GAS METERS, GAS REGULATORS, PLUMBING VENTS UNLESS TOP OF SUCH INTAKE OPENING IS 2 FEET BELOW ANY OF THE LISTED ITEMS.
- 3. OVERHEAD PIPING IN SPACES WITHOUT HUNG CEILINGS SHALL BE RUN AS CLOSE TO ROOF DECK AS PRACTICABLE, AS CLOSE TO PARALLEL JOISTS AS POSSIBLE AND ABOVE LIGHTING FIXTURES TO CONCEAL PIPING.
- 4. COORDINATE LIGHTING FIXTURE LAYOUT AND ACCESSORIES INSTALLED BY OTHER TRADES SO AS TO PRESENT A NEAT AND ATTRACTIVE INSTALLATION THROUGHOUT THE ENTIRE BUILDING.
- 5. ARRANGE PIPING AND DUCTWORK, PARTICULARLY ABOVE CEILING, AS REQUIRED TO CLEAR STRUCTURE, DUCTS, CONDUIT, ETC. ALLOWING SPACE FOR PIPE HANGERS, EXPANSION LOOPS AND ACCESS TO VALVES, FILTERS AND MAINTENANCE OF EQUIPMENT.
- 6. EQUIPMENT WITH FILTERS SHALL BE INSTALLED SO THAT FILTERS CAN BE EASILY REMOVED AND REPLACED.
- 7. COORDINATE LOCATION AND INSTALLATION OF EQUIPMENT WITH OTHER TRADES.
- 8. THERMOSTATS SHALL BE LOCATED AS INDICATED. INSTALL AT 5'-0" ABOVE FINISH FLOOR
- 9. VALVES AND SPECIALTIES SHALL BE LINE SIZE, EXCEPT FOR CONTROL AND BALANCING VALVES OR UNLESS NOTED OTHERWISE.
- 10. EXTEND DRAIN LINES TO NEAREST FLOOR DRAIN OR AS INDICATED. ROUTING SHALL NOT INTERFERE WITH PASSAGEWAYS AND MAINTENANCE. DRAINS FROM AIR CONDITIONING CONDENSATE DRAIN PANS SHALL BE TRAPPED. SLOPE SUSPENDED CONDENSATE DRAIN PIPING AT 1/8" PER FOOT (1 PER 100).
- 11. PIPING AND DUCTWORK INSULATION SHALL BE RUN CONTINUOUSLY THROUGH NON-RATED FLOORS, WALLS AND PARTITIONS, UNLESS OTHERWISE NOTED.
- 12. NO PIPING SHALL BE SMALLER THAN 1/2" UNLESS OTHERWISE NOTED.
- 13. RUNOUTS SHALL PITCH DOWN IN DIRECTION OF FLOW A MINIMUM OF 1/8" PER FOOT.
- 14. PROVIDE UNION OR FLANGED CONNECTIONS AT EACH PIECE OF EQUIPMENT AND ON BOTH SIDES ON CONTROL VALVES AND PRESSURE REGULATING VALVES. PROVIDE SHUT-OFF VALVES ON BOTH SIDES OF AUTOMATIC VALVES.
- 15. RELIEF VALVE DRAIN PIPING SHALL BE EXTENDED TO 6" (150) ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED.
- 16. PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE SPECIFICATION. ADDITIONAL SUPPORTS OR HANGERS SHALL BE ADJACENT TO ELBOWS, TO PREVENT WEIGHT OF PIPING BEING PLACED ON THE EQUIPMENT.
- 17. CORRECT SETTING ON BALANCING FITTINGS SHALL BE PERMANENTLY MARKED.
- 18. LOCATE AND SIZE CONCRETE PADS AND CURBS FOR MECHANICAL EQUIPMENT IN ACCORDANCE WITH ACTUAL EQUIPMENT PURCHASED.
- 19. FOR LOCATION OF MOTOR STARTERS, SEE ELECTRICAL DRAWINGS.
- 20. ALL DUCT SIZES INDICATED ON THE DRAWINGS ARE CLEAR INSIDE DIMENSIONS.

SYMBOL LIS	<u>ST</u>
	NEW WORK
C	NEW CONDENSATE
———————————————————————————————————————	PIPE DOWN
O	PIPE UP
F	VOLUME DAMPER
	FIRE DAMPER
	MOTORIZED DAMPER
$(\overline{\mathbf{T}})$	THERMOSTAT
\otimes	KEYED NOTE
$\langle X \rangle$	EQUIPMENT TAG
(XXX)	AIR FLOW IN CUBIC PER MINUTE
	SUPPLY AIRFLOW
~ ~/-	RETURN AIRFLOW
AB XX	EQUIPMENT DESIGNATOP REPRESENTS E DESIGNATION, BOTT REPRESENTS EQUIP
NOTE: NOT ALL ABBREVIA APPEAR ON THE D	ATIONS AND SYMBOLS DRAWINGS FOR THIS PR

KEY NOTES:

- UNIT, MODEL MXZ-SM60NAM, 60.0 MBH COOLING, 65.0 MBH HEATING CAPACITY, 208/230V/1PH/60HZ, 5,230 WATTS, 46 MCA, 55 MOCP, R-410A, COMPRESSOR RLA-19.0, LRA-22.0, TOTAL WEIGHT-300 LBS.
- VPUMP SYSTEM, MODEL MSZ-EF09NAS, 9,000 BTUH COOLING, 10,900 BTUH HEATING (3) CAPACITY, 208/230V/1PH/60HZ, 370 CFM MAX. COOLING/420 CFM MAX HEATING, 30 WATTS MOTOR OUTPUT, TOTAL WEIGHT-26 LBS. PROVIDE WALL MOUNTED THERMOSTAT AS RECOMMENDED BY THE MANUFACTURER. INSTALL ONLY IN COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL REQUIRED HANGING RODS, INLINE VIBRATION ISOLATORS, MOUNTING BRACKETS.
- $\langle 4 \rangle$ provide mitsubishi horizontal air handling unit for multi-zone heat pump SYSTEM, MODEL SVZ-KP36NA, 36,000 BTUH, 0.5" E.S.P. 900 CFM MAX., LBS. PROVIDE WALL MOUNTED THERMOSTAT AS RECOMMENDED BY THE MANUFACTURER. INSTALL ONLY IN COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL REQUIRED HANGING RODS, INLINE VIBRATION ISOLATORS, MOUNTING BRACKETS.
- WATTS, 2,560 BTUH, 120V/1PH/60HZ WITH BUILT-IN THERMOSTAT.
- (7) PROVIDE CEILING MOUNTED CENTRIFUGAL TOILET EXHAUST FAN, PANASONIC, MODEL FV0510-VS1, 80 CFM @ 0.25" S.P., 7.2 WATTS, 0.39 AMPS, 0.4 SONES, TOTAL WEIGHT-7.0 LBS, 120V/1PH/60HZ. INTERLOCK FAN WITH WALL LIGHT SWITCH. PROVIDE DISCONNECT SWITCH. COLOR AS PER ARCHITECT.
- (8) PROVIDE PANASONIC/WHISPER ENERGY RECOVERY VENTILATOR (ERV) ABOVE CEILING, MODEL FV-04VE1, 40 CFM MAX. EXHAUST AIR @ 0.1" S.P., 0.8 SONES, 23 WATTS, 0.15 AMPS, 120V/1PH/60HZ. FAN SHALL BE PROVIDED WITH EXTERIOR POLYPROPYLENE WALL CAP WITH Y-SHAPE ADAPTOR MODEL FV-WC04VE1. INSTALL ONLY IN COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL REQUIRED HANGING RODS, INLINE VIBRATION ISOLATORS, MOUNTING BRACKETS.
- THE MECHANICAL SPACE OR TO SINK TRAP INSIDE ADA RESTROOM. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR.
- (10) REFRIGERANT PIPING TO BE INSULATED, SIZED AND RUN AS PER MANUFACTURER'S RECOMMENDATION.
- (12) PROVIDE SIDEWALL GRILLE, CARNES-MODEL RADMH

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		VENTI	LATIC	N CALCULA	FIONS (BASED	ON 2020	MECHANI	CAL CC	DE OF	NEW	
		ZONE				CODE N	INIMUM CRITERIIA					6
PTION	SPACE NUMBER	AREA (Az) (SQ.FT.)	ZONE POPU- LATION	OCCUPANCY CLASSIFICATION	O.A. BREATHING ZONE (Rp) (CFM/PERS.)	O.A. RATE BREATHING ZONE (Ra) (CFM/SQ.FT.)	DEFAULT OCCUPANT DENSITY (#/1000 SQ.FT.)	ZONE DISTRIBUTION EFFECTIVENESS (Ez)	KITCHEN EXHAUST RATE (CFM)	TOILET EXHAUST RATE (CFM/FIXT.)	TOILET FIXTURE COUNT	C
	-	120	1	OFFICE	5.00	0.06	5	1.00	_	_	_	
SPACE	-	1,640	0	STORAGE	0.00	0.12	0.00	1.00	_	-	_	
SPACE	-	180	0	STORAGE	0.00	0.12	0.00	1.00	-	-	_	
моо	_	75	0	PUBLIC SPACE/TOILET	0.00	0.00	0.00	1.00	_	50	1	



<u> </u>	THE BIDDING REQUIREMENTS ARE PART OF THIS SECTION AND CONTRACT. ALL WORK PERFORMED HEREUNDER SHALL BE		C F	OPPER TUBING
В.	ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE PART OF THESE SPECIFICATIONS. THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING THE PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. THE CONTRACTOR, AT NO ADDITIONAL COST TO THE OWNER, SHALL		1 1 E. T C	/2" TO 1—1/4 —1/2" TO 2" HE ABOVE HA
C.	CORRECT ANY WORK DONE BY HIM CAUSING SUCH VIOLATION. THE CONTRACT DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS FOR DUCTS & PIPING. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF DUCTS AND PIPING AVOIDING OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF THE ARCHITECT/ENGINEER. THIS CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL HIS WORK WITH THE WORK OF ALL OTHER TRADES INVOLVED.	6.	F. H C <u>VIBR/</u>	ANGERS AND CO. INC., OR A ATION ISOLATIO
D.	WHEN CONFLICTS OCCUR IN THE SPECIFICATIONS OR ON THE DRAWINGS, OR BETWEEN EITHER, THE ITEMS GREATER QUANTITY OR HIGHER COST SHALL BE PROVIDED.			ITH MANUFAC
E.	IT IS THE INTENTION OF THESE DRAWINGS AND SPECIFICATION TO CALL FOR FINISHED WORK, TESTED AND READY FOR OPERATION. ALL MATERIALS, WORK, INCIDENTAL ACCESSORIES OR OTHER DETAILS NOT SHOWN BUT NECESSARY TO MAKE THE WORK COMPLETE AND PERFECT IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE PROVIDED BY THE CONTRACTOR WITHOUT ADDITIONAL COST TO THE AUTHORITY.		D. F L C. V D. S	ATERAL MOTIC IBRATION ISOL
F.	INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL		F N	ETAINER BOX
G.	ALL MATERIALS AND EQUIPMENT ARE TO BE NEW AND FIRST CLASS QUALITY, UNLESS OTHERWISE NOTED, AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.		E.F	ROVIDE SUPPL
н.	ALL MECHANICAL WORK SHALL BE FREE FROM DEFECTS IN BOTH WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM DATE OF FINAL ACCEPTANCE AND SHALL MEET ALL LOCAL AND STATE CODES. ALL DEFECTS, WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COSTS.	7.	A <u>NOISI</u> A. F	PPLIED CORRO <u>E CONTROL</u> PROVIDE ACOUS
١.	ALL PRESENT MATERIALS, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR.		a) ALL DUCTS THAN 15 F
J.	THE CONTRACTOR'S PROPOSAL FOR ALL WORK PERFORMANCE IS REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.		B. M) ALL AIR IR) WHERE NOT IATERIAL SHAL EMPERATURE
к.	SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.		C. A	NALL BE 25, N APPROVED
L.	BETWEEN EXISTING FRAMING AND UTILITIES AS REQUIRED. CHANGES IN THE CROSS-SECTIONAL DIMENSIONS OF A DUCT ARE PERMISSIBLE WHEN REQUIRED TO MEET JOB CONDITIONS AND SHALL MAINTAIN AT LEAST THE SAME EQUIVALENT CROSS- SECTIONAL DUCT AREA IN ACCORDANCE WITH THE LATEST EDITION OF THE ASHRAE GUIDE.	8.	MECH	IANICAL IDENTI
М.	DESIGN AND PERFORMANCE OF COMPONENTS AND METHODS SPECIFIED HEREIN SHALL COMPLY WITH THE APPLICABLE PROVISIONS OF THE CODES, STANDARDS, AND MANUFACTURER'S RECOMMENDATIONS OF THE ENTITIES LISTED BELOW.		B. A	IPE MARKERS, LL IDENTIFICA
	MECHANICAL CODE OF NEW YORK STATE, 2020 EDITION ASHRAE AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS ASTM AMERICAN SOCIETY FOR TESTING MATERIALS		C. A	LL COLORS A
	UL UNDERWRITER'S LABORATORIES, INC FM FACTORY MUTUAL.		D. E S	QUIPMENT TAG ELF-TAPPING,
	SMACNASHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION.ASMEAMERICAN SOCIETY OF MECHANICAL ENGINEERSAMCAAIR MOVING AND CONTROL ASSOCIATION.ARIAMERICAN REFRIGERATION INSTITUTE.		E. D S	UCT IDENTIFIC ERVICE (SUPP COLD-AIR SUPP
N.	THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS AND SHALL COMPLY WITH THE REQUIREMENTS OF LOCAL AUTHORITIES HAVING JURISDICTION.		E R M	XHAUST-, OU ELIEF-, RETUI IIXED-AIR DUC
<u>SC</u> TH RI(<u>OFE OF WORK</u> IS CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, EQUIPMENT, TOOLS, APPLIANCES, SERVICES, HOISTING, SCAFFOLDING, GGING, SUPERVISION AND OVERHEAD FOR THE FURNISHING AND INSTALLING OF ALL THE HEATING, VENTILATING AND AIR		F.V	ALVE TAGS SH IUMBERS, WITH
CC AN RE CC SH	NDITIONING, EXHAUST AND RELATED WORK COMPLETE, IN ACCORDANCE WITH THE DRAWINGS, SCHEDULES AND SPECIFICATIONS. Y LISTING OR INDICATION OF THE ITEMS FURNISHED OR WORK TO BE PERFORMED SHALL NOT LIMIT THE GENERAL QUIREMENTS TO FURNISH, INSTALL TEST AND PLACE IN OPERATION ALL WORK, ACCESSORIES REQUIRED TO COMPLETE THE NTRACT IN A SUBSTANTIAL MANNER. THE EXTEND OF WORK SHALL BE AS SHOWN ON DRAWINGS AND THE SCOPE OF WORK ALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:		G. F C V S	OR PIPING SYS THER INDICATI ITH THEIR LOP SYSTEM. BANE
A.	INSTALLATION OF MITSUBISHI HORIZONTAL HEAT PUMP UNITS INCLUDING ALL RELATED HANGERS, CONTROLS AND SUPPORTS.		S R C	EFRIGERANT CONDENSATE
в. С.	INSTALLATION OF MITSUBISHI WALL MOUNTED INDOOR UNIT INCLUDING ALL RELATED HANGERS, CONTROLS AND SUPPORTS.	9.	A HVAC	DHESIVE BANE
D.	INSTALLATION OF CEILING MOUNTED TOILET EXHAUST FANS INCLUDING ALL RELATED HANGERS, CONTROLS AND SUPPORTS.		A. G	ENERAL
E. F.	INSTALLATION OF ELECTRIC BASEBOARD HEATERS INCLUDING ALL RELATED HANGERS, CONTROLS AND SUPPORTS. INSTALLATION OF PANASONIC ENERGY RECOVERY VENTILATOR INCLUDING ALL RELATED HANGERS, CONTROLS AND SUPPORTS.		a) DESIGN AND PROVISIONS
G.	INSTALLATION OF LOW VELOCITY SHEET-METAL DUCTWORK, DIFFUSERS, GRILLES, HANGERS, SUPPORTS, VOLUME DAMPERS, ACCESS DOORS, ETC.			ASHRAE 90 2015 INTER AMERICAN
⊣.	INSULATION FOR ALL DUCTWORK AND PIPING WITHIN THE AREA OF SCOPE.			NATIONAL F UNDERWRITE
J.	TESTING, ADJUSTING AND AIR BALANCING OF AIR CONDITIONING UNITS, FANS, AIR OUTLETS AND INLETS WITHIN THE AREA OF		b) INSULATION APPLICABLE
K.	WORK NOT INCLUDED: FINAL PATCHING AND PAINTING SHALL BE PERFORMED BY THE GENERAL CONTRACTOR. CUTTING, CORE DRILLING, ROUGH PATCHING AND SHALL BE BY THIS CONTRACTOR.		С) ALL INSULA FITTINGS SH PROCEDURE
<u>CU</u>	TTING AND PATCHING		d) NOTE THAT EXTERIOR S
A.	REFER TO THE ARCHITECTURAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION BEYOND THAT COVERED BELOW.		е) WHERE INTE EQUIVALENT
в.	a) CUTTING - REMOVAL OF PORTIONS OR SECTIONS OF STRUCTURAL MEMBERS, WALLS, FLOORS, CEILINGS, AND THE LIKE, AS		f	REQUIREMEN
	b) PATCHING - REPAIR OF SUCH CUT MATERIALS AS DIRECTED BY THE ENGINEER UNLESS NOTED OTHERWISE ON DRAWINGS.		g	INSULATED.
<u>SU</u> A.	BMITTALS SUBMIT ELECTRONIC SHOP DRAWINGS FOR ENGINEER'S REVIEW AND COMMENT OF DUCTS LAYOUTS, SHEET METAL DESIGNS, AC		h) ALL INSULA THE SATISF
в.	UNIT'S LAYOUTS, PIPING LAYOUTS. SUBMIT ELECTRONIC SHOP DRAWINGS FOR ENGINEER'S REVIEW AND COMMENT OF ALL EQUIPMENT CUTS, DAMPERS, AIR		i)) INSULATION
C	UNITERS, AUGESSURIES, THERMUSTATS, CONTROLS, VIBRATION ISOLATORS, SUPPORTS AND HANGERS, AND INSULATION MATERIALS. SUBMIT ELECTRONIC FILES OF AIR BALANCING REPORTS FIELD DIDE TEST DEDODTS AND OTHER FIELD TEST DEDODTS			MANVILLE C CERTAIN TE OWENS - C
D.	<u>AS-BUILT DRAWINGS:</u> SUBMIT FOR ENGINEER'S REVIEW AND COMMENT ONE (1) DIGITAL COPY IN AUTOCAD FORMAT OF THE AS-BUILT DRAWINGS FOR DUCTWORK LAYOUTS, SHEET METAL DESIGNS, ETC. ALL COPIES MUST BE STAMPED "AS BUILT" AND BEAR THE DATE AND CONTRACTOR'S SIGNATURE. THE DIGITAL COPY SHALL BE DELIVERED ON A COMPACT DISK AND SHALL INCLUDE IN ADDITION TO THE ACTUAL DRAWINGS. ALL RELATED FILES NECESSARY FOR AN ACCURATE PRINTING OF THF		B. D	KNAUF FIBE DUCT INSULATIO HVAC SUPF FURRED SP
PIF	DRAWINGS (PLOT STYLES, FONTS ETC.).			MAXIMUM O TO MANVILL JOINTS OVE
۹.	ALL SUPPORTS AND PARTS SHALL CONFORM TO THE REQUIREMENTS OF ANSI B 31.9 AS APPLICABLE FOR PRESSURE PIPING AND MSS STANDARD PRACTICE SP-58 SP-69.		b) HVAC SUPP ROOMS CP
В.	INSTALL HANGERS AND SUPPORTS TO ALLOW CONTROLLED THERMAL AND SEISMIC MOVEMENT OF PIPING SYSTEMS, TO PERMIT FREEDOM OF MOVEMENT BETWEEN PIPE ANCHORS, AND TO FACILITATE ACTION OF EXPANSION JOINTS, EXPANSION LOOPS, EXPANSION BENDS, AND SIMILAR UNITS.			FIBERGLASS TEMPERATU THICK FOR AN APPRON
).).	SUPPORT HANGERS FROM BUILDING FRAMING. PROVIDE ANY ADDITIONAL SUPPORTS BETWEEN EXISTING FRAMING MEMBERS AS MAY BE REQUIRED. UNLESS OTHERWISE SPECIFICALLY APPROVED, HANGER SIZE AND SPACING SHALL BE AS FOLLOWS:		С) IMPALE INS AFTER THE MINIMUM OF MATERIAL,

PIPE SIZE

MAX. HANGER SPACING

MIN. ROD SIZE

EED CORP./INSULATION GROUP CORNING FIBERGLASS CORP. ER GLASS

PLY, RETURN, TRANSFER, AND AUXILIARY VENTILATION AIR DUCTS CONCEALED IN HUNG CEILING, SHAFTS AND PACES SHALL BE INSULATED WITH ONE INCH THICK, MINIMUM ONE LB. DENSITY, FLEXIBLE BLANKET FIBERGLASS, 0.28 K—FACTOR AT 75°F MEAN TEMPERATURE WITH FACTORY APPLIED FOIL—SKRIM—KRAFT (FSK) FACING SIMILAR LE MICROLITE. WRAP INSULATION TIGHTLY ON DUCT WITH ALL TRANSVERSE JOINTS BUTTED AND LONGITUDINAL ERLAPPED A MINIMUM OF TWO INCHES.

PLY, RETURN, TRANSFER, OUTDOOR AIR SUPPLY DUCTS AND PLENUMS EXPOSED IN MECHANICAL EQUIPMENT RAWL SPACES, ALL UNCONDITIONED AREAS, AND OUTDOORS SHALL BE INSULATED WITH 1-1/2 IN. THICK RIGID BOARD, NOT BE LESS THAN SIX LBS. PER CUBIC FOOT DENSITY, MAXIMUM 0.22 K FACTOR AT 75°F MEAN JRE WITH FACTORY APPLIED ALL PURPOSE WHITE FACING FOR INDOORS. THE INSULATION BOARD SHALL BE 2 IN. OUTDOOR APPLICATION. THE INSULATION SHALL BE MANVILLE "817 SPIN-GLASS" WITH AP WHITE FACING, OR VED EQUAL.

SULATION OVER STICK CLIPS OR PINS WELDED TO DUCT WITH PROTRUDING ENDS OF PINS CUT OFF FLUSH. STICK CLIPS HAVE BEEN APPLIED. SPACING OF PINS, TO HOLD INSULATION FIRMLY IN PLACE, SHALL BE A ONE PIN PER SQ. FT. SEAL ALL JOINTS AND PENETRATIONS WITH A 3 IN. WIDE STRIP OF THE SAME APPLIED WITH APPROVED ADHESIVE TO BOTH SIDE. FOR FINISHING, APPLY A TACK COAT OF APPROVED ADHESIVE ON ALL CORNERS. EMBED REINFORCING MESH INTO WET ADHESIVE AND SMOOTH OUT TO ELIMINATE WRINKLES. OVERLAP ALL REINFORCING MESH SEAMS A MINIMUM OF 2 IN. APPLY FINISH COAT OF APPROVED MASTIC TO ENTIRE

7	FT.	0.C.
9	FT.	0.C.

3/8" 1/2"

MAX. HANGER SPACING 6 FT. O.C. 8 FT. O.C.

MIN. ROD SIZE 3/8" 3/8"

ANGER SPACING APPLY TO STRAIGHT RUN OF PIPE ONLY. AT POINTS WHERE VALVES, SPECIALTIES OR BRANCH ARE LOCATED, ADDITIONAL HANGERS OR SUPPORTS SHALL BE USED TO PROPERLY SUPPORT THE LOAD. SUPPORTS SHALL BE MANUFACTURED BY GRINNELL CORP, CARPENTER & PATTERSON INC., MICHIGAN HANGER

AN APPROVED EQUAL. ON AND SEISMIC RESTRAINTS

ATION ISOLATION AND SEISMIC RESTRAINTS FOR EQUIPMENT, PIPING AND DUCTS AND INSTALL IN ACCORDANCE CTURER'S INSTRUCTIONS.

LING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING ON IN EXCESS OF 1/4 IN.

LATORS SHALL BE AVNEC (MASON INDUSTRIES) INC., OR AN APPROVED EQUAL.

R ROD ISOLATORS SHALL BE STEEL COMPRESSION SPRING AND NEOPRENE SOUND PAD WITHIN A STEEL SIMILAR TO MASON INDUSTRIES, INC. TYPE SLE, SLR, OR PCHS. THE SPRING SHALL PROVIDE ONE (1) IN. IC DEFLECTION, 1/2 IN. MINIMUM RESERVE DEFLECTION, FACTORY PRE-LOADED TO 75% OF A RATED LOAD. LEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS.

SYSTEMS EXPOSED TO WEATHER AND OTHER CORROSIVE ENVIRONMENTS SHALL BE PROTECTED WITH FACTORY OSION RESISTIVE MATERIALS.

ISTIC DUCT LINER FOR THE FOLLOWING DUCTS:

UPSTREAM AND DOWNSTREAM FROM ALL FANS AND AIR CONDITIONING UNITS FOR A LENGTH OF NOT LESS

RANSFER DUCTS. TED ON THE CONTRACT DRAWINGS.

LL BE FIBERGLASS, MINIMUM 3 LB. DENSITY, 1 IN. THICKNESS, MAXIMUM 0.26 K FACTOR AT 75° F MEAN WITH NEOPRENE COATED FINISH AND STENCILED IN ACCORDANCE WITH NEPA 90. MAXIMUM FLAME SPREAD AND MAXIMUM SMOKE DEVELOPED SHALL BE 50. IT SHALL BE SIMILAR TO JOHNS-MANVILLE LINACOUSTIC, OR EQUAL

NING, ADHESIVES, FACES AND ACCESSORIES TO BE APPLIED IN ACCORDANCE WITH MANUFACTURERS IONS, EXCEPT AS OTHERWISE NOTED. TIFICATION

FOLLOWING MECHANICAL IDENTIFICATION MATERIALS: EQUIPMENT TAGS, ACCESS PANELS AND DOOR MARKERS, DUCT MARKERS, STENCILS, VALVE TAGS.

ATION MATERIALS SHALL BE FIRMLY ATTACHED WITH STAINLESS STEEL SCREWS, BRASS S-HOOK OR CONTACT ENT ADHESIVE AS REQUIRED BY FIELD CONDITIONS.

AND DESIGNS SHALL CONFORM TO ANSI A 13.1. AND AS REQUIRED HEREIN AFTER.

GS SHALL BE COLOR-CODED LAMINATED PLASTIC, ENGRAVED WITH EQUIPMENT DESIGNATION. INCLUDE , STAINLESS STEEL SCREWS OR CONTACT TYPE, PERMANENT ADHESIVE.

CATION DEVICES SHALL BE ENGRAVED, COLOR-CODED LAMINATED PLASTIC. INCLUDE DIRECTION AND DUCT PLY, RETURN, EXHAUST, ETC.). USE THE FOLLOWING COLOR CODES FOR SYSTEM IDENTIFICATION:

PLY GREEN PI_Y YELLOW

JTSIDE-, JRN-, AND CTS BLUE

SHALL BE STAMPED OR ENGRAVED WITH 1/4-INCH LETTERS FOR PIPING SYSTEM ABBREVIATION AND 1/2-INCH NUMBERING SCHEME APPROVED BY OWNER. PROVIDE 5/32-INCH HOLE FOR FASTENER

STEMS IDENTIFICATION PROVIDE TWO ADHESIVE BANDS, ONE IDENTIFYING THE PIPING SYSTEM TYPE AND THE TING THE DIRECTION OF FLOW. THE ADHESIVE BANDS SHALL BE INSTALLED WHERE THEY CAN BE EASILY READ, ING DIMENSION PARALLEL TO THE AXIS OF THE PIPE AND NO MORE THAN 40 FEET APART ON A PIPING DS SHALL BE IN COLORS AS INDICATED BELOW AND SHALL CONFORM TO

<u>BACKGROUND</u> WHITE YELLOW	<u>LETTERS</u> BLACK BLACK	8	ARROW
YELLOW	BLACK		

IDS SHALL BE MANUFACTURED BY W.H. BRANDY CO."QUICKLABEL", OR AN APPROVED EQUAL.

ID PERFORMANCE OF COMPONENTS AND METHODS SPECIFIED HEREIN SHALL COMPLY WITH THE APPLICABLE OF THE CODES, STANDARDS, AND RECOMMENDATIONS OF THE ENTITIES LISTED BELOW:

D.1 (COMMERCIAL) - ENERGY CONSERVATION RNATIONAL BUILDING CODE (NEW JERSEY EDITION) SOCIETY FOR TESTING AND MATERIALS (ASTM) FIRE PROTECTION ASSOCIATION (NFPA) TERS LABORATORIES INC. (UL)

SHALL BE APPLIED TO PIPING, DUCT AND EQUIPMENT OF MATERIALS AS SPECIFIED HEREIN AND FOR SYSTEMS OF THIS PROJECT.

ATION, INCLUDING JACKETS OR FACINGS, ADHESIVES, MASTICS, CEMENTS, TAPES AND GLASS CLOTH FOR HALL HAVE COMPOSITE FIRE AND SMOKE HAZARD RATINGS AS TESTED BY ASTM E 84, NFPA 225, AND UL 723 ES, NOT EXCEEDING A "FLAME SPREAD" OF 25 AND "SMOKE DEVELOPED" OF 50.

EQUIPMENT CASINGS WHICH ARE INTERNALLY AND ACOUSTICALLY INSULATED NEED NOT BE INSULATED AT THE SURFACE.

ERNAL DUCT INSULATION IS REQUIRED, THE EXTERIOR DUCT INSULATION MAY BE OMITTED, PROVIDED THAT THE "R" FACTOR FOR THE INTERNAL DUCT INSULATION IS THE SAME AS THE EXTERNAL DUCT INSULATION ENTS.

WATER PIPING, EXCEPT GLYCOL COOLING, DOES NOT REQUIRE THE INSULATION. GLYCOL PIPING NEEDS TO BE

TTINGS, STRAINERS, AND OTHER PIPING APPURTENANCES SHALL BE INSULATED TO MATCH THOSE OF THE TO WHICH THEY ARE CONNECTED.

ATION AND EXTERIOR JACKETS THAT ARE DAMAGED SHALL BE REPLACED WITH NEW MATERIAL AS SPECIFIED, TO FACTION OF THE ENGINEER.

MATERIALS SHALL BE PRODUCTS OF ONE OF THE FOLLOWING MANUFACTURERS:

REINFORCING MESH FABRIC WEATHERPROOFING OF ALL OUTDOOR DUCTS BY USING ONE COAT OF MANVILLE "INSULKOTE PRIMER", ONE IN. GALVANIZED STEEL WIRE MESH, AND TWO SUCCESSIVE 1/8 IN. THICK COATS OF MANVILLE "INSULKOTE EL" IS REQUIRED.

C. PIPE INSULATION

a) INSULATE ALL PIPING, FITTINGS AND VALVES IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED. PIPING INSULATION MINIMUM THICKNESS (IN.)

PIPING FLUID SYSTEM RANGE,	TEMP. °F	PIPE SIZ UP TO
WATER CHILLED, MAKE-UP, DOMESTIC, CONDENSATE DRAIN	40 TO 60°F	1.0"
REFRIGERANT	BELOW 40°F	1.0"

b) INSULATION SHALL BE MINIMUM 6 LB DENSITY MOLDED FI TEMPERATURE WITH FACTORY-APPLIED ALL PURPOSE (AP)

c) FITTINGS, VALVES AND FLANGES SHALL ALSO BE INSULATE GAUGE GALVANIZED STEEL WIRE. PRE-MOLDED PVC INSUL

d) BEFORE APPLYING INSULATION, ALL PRESSURE AND LEAK

e) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PRO

f) ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTIN OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTIC

10. PIPING AND ACCESSORIES

A. PROVIDE PIPING SYSTEMS SHOWN ON DRAWINGS COMPLETE IN SUPPORTS, SLEEVES, AND ACCESSORIES.

- B. CONDENSATE DRAIN PIPING SHALL BE COPPER HARD TEMPER SOLDER JOINT, AND FITTINGS SHALL BE STANDARD WEIGHT, 16.18. ALL SOLDERED JOINTS SHALL BE MADE WITH 95-5 TIM 450°F.
- C. REFRIGERANT PIPING SHALL BE SEAMLESS COPPER REFRIGERA CLEANED, DEHYDRATED AND SEALED, MARKED "ACR" ON HAP
- D. PROVIDE DIELECTRIC COUPLINGS AT JUNCTIONS OF COPPER
- E. PROVIDE FOR EXPANSION AND CONTRACTION OF PIPING SYSTI F. PITCH WATER PIPING EXCEPT AS NOTED.

a) UP TO 1 IN. DIA.: — 1 IN. PER 40 FT. b) 1-1/2 IN. DIA. AND LARGER: - 1 IN. PER 100 FT.

G. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPI AND DEFECTS AT NO ADDITIONAL COST TO THE OWNER.

11. METAL DUCTS AND ACCESSORIES

A. EXCEPT AS OTHERWISE SHOWN OR NOTED, ALL DUCTS AND GALVANIZED STEEL AND SHALL COMPLY WITH NFPA 90A AND

B. OUTSIDE AIR INTAKE DUCTWORK SHALL BE ALUMINUM CONSTR

C. DUCTS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDAN DUCTWORK DOWNSTREAM OF VAV BOXES AND AIR CONDITIONIN PRESSURE MAY BE USED.

D. FOR DUCTWORK UPSTREAM OF VAV BOXES A PRESSURE CLAS

E. U.S. STANDARD GAUGES FOR DUCTWORK ARE TO CONFORM a) UP TO 30" WIDE – 24 GAUGE b) 31" TO 48" WIDE - 22 GAUGE c) 49" TO 60" WIDE - 20 GAUGE

d) 61" AND OVER – 18 GAUGE

PRESSURE CLASSIFICATION REQUIREMENT WILL VARY FOR OTHI MATERIALS FOR HANGERS AND SUPPORTS, INCLUDING FASTEN

THE DUCT FURNISHED. G. ALL DUCTWORK INSTALLED EXPOSED TO VIEW SHALL BE FABR

- CONSTRUCTED USING MANUFACTURER'S GUIDELINES FOR MATE REINFORCEMENT. PROVIDE INTERNAL INSULATION CONFORMING H. ALL DUCT SIZES SHOWN ON THE CONTRACT DRAWINGS ARE
- IS REQUIRED, DUCT SIZES SHALL BE CORRESPONDINGLY INCRE CROSS-SECTIONAL AREAS WILL NOT BE REDUCED. I. RADIUS ELBOWS SHALL HAVE A CENTERLINE RADIUS EQUAL
- RADIUS ELBOWS WHERE INDICATED ON DRAWINGS SQUARE EL 4 IN. ON CENTER UNLESS SINGLE THICKNESS VANES ARE CLE
- J. TRANSITIONS IN DUCTWORK SHALL BE MADE WITH A SLOPE N PREFERRED.
- K. PROVIDE FLEXIBLE DUCT AS A FACTORY GLASS FIBER INSULA THERMAL CONDUCTANCE (C- FACTOR) OF 0.23 BTU/HR/SF/I REINFORCED METALIZED TYPE. POLYETHYLENE JACKET IS NOT SPRING STEEL WITH FLAMEPROOF VINYL SHEATHING, OR CORR FLAME SPREAD RATE OF 25, MAXIMUM SMOKE DEVELOPED RA CONNECTION TO DIFFUSERS.
- L. FLEXIBLE CONNECTIONS TO THE SUPPLY DUCTS AND DIFFUSER CLAMPED WITH STAINLESS STEEL IDEAL TYPE 52 CLAMPS.
- M. HORIZONTAL DUCTS CAN BE SUPPORTED WITH HANGERS SECU TABS THAT ARE EMBEDDED IN THE CONCRETE ARE TO BE INS WHEREVER POSSIBLE. REFER TO DETAILS SHOWN ON CONTRAC
- N. FOR DUCTS WITH A CROSS-SECTIONAL AREA 4 SQUARE FEET FOR DUCTS WITH A CROSS- SECTIONAL AREA OF MORE THAN SHALL BE NO MORE THAN 6 FEET APART; AND FOR DUCTS HANGERS SHALL BE NO MORE THAN 4 FEET APART. THE DIS THE DUCT
- O. ALL BRANCHES, TAKE-OFFS AND TIE-INS TO DUCTS SHALL BE OPPOSED BLADE DAMPERS. SPLITTER DAMPERS SHALL NO WHERE SHOWN ON DRAWINGS OR WHERE REQUIRED BY SHEET
- P. VOLUME DAMPERS CONSTRUCTION SHALL BE QUADRANT TYPE THE APPLICABLE REQUIREMENTS OF THE SMACNA MANUAL, E QUADRANT. INCLUDE APPROVED LEVER OPERATING AND LOCK-INSTALLED IN ACCESSIBLE LOCATIONS. FOR INSULATED DUCTS INSULATION.
- Q. UNLESS OTHERWISE NOTED, ALL NEW AND EXISTING LOW VELC REQUIREMENT OF SEAL CLASS C, 2 IN. W.G. OF SMACNA. THE CLASS 1 (MAXIMUM FLAME SPREAD RATE OF 25, MAXIMUM SI
- R. ALL ACCESS DOORS SHALL BE AS PER SMACNA STANDARDS. DOUBLE PANEL CONSTRUCTION, NOT LESS THAN 20 GAUGE, DUCTS OF SINGLE PANEL CONSTRUCTION NOT LESS THAN 18 SPONGE RUBBER GASKETS AROUND THEIR ENTIRE PERIMETER.
- S. HARD DUCT CONNECTIONS TO SUPPLY AIR DIFFUSER COLLARS CLAMPED WITH STAINLESS STEEL "IDEAL" TYPE 52 CLAMP.
- T. AUTOMATIC DAMPERS SHALL BE PROVIDED COMPLETE WITH D. ELECTRIC OPERATOR. OPPOSED BLADE DAMPER, GALVANIZED FACTORY-ASSEMBLED STEEL LINKAGE AND SHAFT SHALL HAV SUFFICIENT POWER TO LIMIT LEAKAGE TO A MAXIMUM 10 CFM EQUAL TO TWICE MAXIMUM OPERATING FORCE WITHOUT DEFLE FRAME.

U. THE WIRE MESH SCREEN WHERE SHOWN ON DRAWINGS AND

	M THICKNESS (IN.)									
PIPING FLUID SYSTEM RANGE,	TEMP. °F	PIPE SIZES UP TO 2"	(NPS) 2-1/2"	OVER 4"				K -	A/I	
WATER CHILLED, MAKE-UP, DOMESTIC, CONDENSATE DRAIN	40 TO 60°F	1.0"	to 4 1.0"	1.0"						
REFRIGERANT	BELOW 40°F	1.0"	1.5"	1.5"				12 HEIDT AVE, N	11DDLETOWN, NY 1	L0940
INSULATION SHALL BE MINI TEMPERATURE WITH FACTO	IMUM 6 LB DENSITY RY—APPLIED ALL PI	′ MOLDED FIBERGLAS URPOSE (AP) FACINO	S INSULATION, M G OR ALUMINUM	AXIMUM 0.23 K-FACTO JACKET.	DR AT 75°F MEAN			(845)342-408	30 - mail@kad.grou	qr
FITTINGS, VALVES AND FLA GAUGE GALVANIZED STEEL BEFORE APPLYING INSULAT	NGES SHALL ALSO WIRE. PRE-MOLDEE FION. ALL PRESSURE	BE INSULATED WITH PVC INSULATION C AND LEAK TESTS S	COMPRESSED FI OVERS FOR FITTI SHALL BE COMPL	BERGLASS AND WIRED NGS ARE NOT ALLOWE ETED AND APPROVED.	IN PLACE WITH 18 D.				NOT FOR	~
ALL INSULATION SHALL BE	BUTTED FIRMLY TO	OGETHER. PROVIDE 2	IN. LAMP STRIPS	S AT ALL SEAMS SECU					24/10/2	
ALL INSULATION AND VAPOR OPENINGS. PROVIDE SADDL	DR BARRIERS SHALL LES OR SHIELDS FOR	BE CONTINUOUS PARTICULAR PARTICUL	ASSING THROUGH	SLEEVES, HANGERS, I	ETC., OR OTHER			I IMIN	5TRU 125123	
AND ACCESSORIES OVIDE PIPING SYSTEMS SHO PPORTS, SLEEVES, AND ACC	WN ON DRAWINGS (CESSORIES.	COMPLETE INCLUDING	PIPE, FITTINGS,	VALVES, STRAINERS, I	HANGERS,			PRELCON	DATE	
NDENSATE DRAIN PIPING SH .DER JOINT, AND FITTINGS S 18. ALL SOLDERED JOINTS S 1°F.	IALL BE COPPER HA SHALL BE STANDAR SHALL BE MADE WI	ARD TEMPER TYPE "L D WEIGHT, WROUGHT TH 95—5 TIN ANTIMC	, CONFORMING COPPER AND SO NY SOLDER HAV	TO ASTM B-88 WITH DLDER TYPE CONFORM ING A MELTING POINT	WROUGHT COPPER ING TO ANSI B GREATER THAN	,		CONSULTANTS		
RIGERANT PIPING SHALL BE ANED, DEHYDRATED AND S	E SEAMLESS COPPEI EALED, MARKED "A	R REFRIGERANT TUB CR " ON HARD TEMP	E CONFORMING T ER STRAIGHT LEI	O ASTM B280 AND AN NGTHS.	NSI B31.5,			BROOK	FR ENGINEERIN(G DUC
OVIDE FOR EXPANSION AND	CONTRACTION OF F	PIPING SYSTEMS.	L OR GALVANIZE	D FIFING.				74 LAFAYETTE A	VE #501,SUFFERN,N	Y 10901
CH WATER PIPING EXCEPT /	AS NOTED.							T: 845- WWW. BROOK	357-4411 - F: 845-357 ERENGINEERING .CC	'-1896 JM
UP TO 1 IN. DIA.: -1 IN. $1-1/2$ IN. DIA. AND LARGE	PER 40 FT. ER: — 1 IN. PER 10	0 FT.							RERTIN	
PRESSURIZED PIPING TO E IOURS WITH NO PRESSURE D DEFECTS AT NO ADDITION	BE TESTED HYDROS CHANGE CORRECTEI IAL COST TO THE C	TATICALLY TO 150% D FOR TEMPERATURE DWNER.	OF RATED OPERA CHANGE. THIS	ATING PRESSURE. TEST CONTRACTOR SHALL R	DURATION TO BE EPAIR ALL LEAKS			R	ENGINEEF 66 GLEN AVENUE GLEN ROCK, NJ 07-	RING 452
CEPT AS OTHERWISE SHOWN	I OR NOTED, ALL DI	UCTS AND OTHER SH	IEET METAL WOR	K SHALL BE PRIME SH	IEETS OF				P 201.670.6688 F 201.670.9788 www.bertinengineerir	ng.com
ISIDE AIR INTAKE DUCTWOR	K SHALL BE ALUMI	NUM CONSTRUCTION.	TANDARDS A525	AND ASZ7.					IG•TRAFFIC•STRUCTI	
CTS SHALL BE CONSTRUCTE CTWORK DOWNSTREAM OF V CSSURE MAY BE USED.	D AND INSTALLED I AV BOXES AND AIR	IN ACCORDANCE WITH CONDITIONING UNITS	H THE LATEST EI S A PRESSURE (DITIONS OF SMACNA A CLASSIFICATION OF 2 I	ND ASHRAE. FOR N. W.G. STATIC	,				
R DUCTWORK UPSTREAM OF	VAV BOXES A PRE DUCTWORK ARE TO	CONFORM TO THE F	ON OF 4 IN. W.G OLLOWING REQUIF	. STATIC PRESSURE M REMENTS:	AY BE USED.					
UP TO 30" WIDE - 24 G 31" TO 48" WIDE - 22 G 49" TO 60" WIDE - 20 G 61" AND OVER - 18 G	GAUGE GAUGE GAUGE GAUGE									+
SSURE CLASSIFICATION REC	QUIREMENT WILL VAI	RY FOR OTHER TYPE	SYSTEMS DEPEN	NDING ON THE APPLIC	ATION.	NO	IS IS			
TERIALS FOR HANGERS AND DUCT FURNISHED.	SUPPORTS, INCLU	DING FASTENERS, AN	CHORS, RODS, S	TRAPS TRIM AND ANG	LES SHALL MATCH	/ISI	ESSIC EYOR BY"			
DUCTWORK INSTALLED EXF NSTRUCTED USING MANUFAC NFORCEMENT. PROVIDE INTE	POSED TO VIEW SHA CTURER'S GUIDELINE RNAL INSULATION (ALL BE FABRICATED S FOR MATERIAL THI CONFORMING TO SEC	WITH SLIP-ON TH ICKNESS, REINFO TION "NOISE CON	RANSVERSE JOINTS AN RCEMENT SIZE AND SF TROL" OF THIS SPECIF	D COMPONENTS PACING, AND JOINT FICATION.	ROV	SED PROF ND SURVI "ALTERED ATION.	A XX/XX/XXXX NO. DATE	ISSUED FOR XX	XX BY
DUCT SIZES SHOWN ON TI REQUIRED, DUCT SIZES SHA DSS-SECTIONAL AREAS WILI	HE CONTRACT DRAV	WINGS ARE CLEAR IN DINGLY INCREASED TO	SIDE DIMENSIONS D ACCOMMODATE	. WHERE INTERNAL AC THE LINER THICKNES	OUSTICAL LINING S SO THAT NET	ALF	A LICENS R OR LAN TATION E ALTER	CLIENT		
DIUS ELBOWS SHALL HAVE DIUS ELBOWS WHERE INDICAN. ON CENTER UNLESS SINC	A CENTERLINE RADI NTED ON DRAWINGS GLE THICKNESS VAN	US EQUAL TO 1-1/2 SQUARE ELBOWS SH IES ARE CLEARLY IN	2 TIMES DUCT WI ALL HAVE DOUBI DICATED ON THE	DTH. PROVIDE SPLITTE LE THICKNESS TURNING DRAWINGS.	R VANES IN G VANES MAXIMUM	PECI	ION OF , ENGINEEF THE NC N OF TH	Bl	ueScope	
FERRED.	TALL DE MADE WITH	A SLOPE NOT TO E			SLOPE RATIO IS	S S	IRECT AN AN AND	1540 GEN	IESSEE STREI	ET
DVIDE FLEXIBLE DUCT AS A RMAL CONDUCTANCE (C- 1 NFORCED METALIZED TYPE. RING STEEL WITH FLAMEPRO ME SPREAD RATE OF 25, N	FACTORY GLASS F FACTOR) OF 0.23 B POLYETHYLENE JAC OF VINYL SHEATHIN MAXIMUM SMOKE DE	IBER INSULATED ASS BTU/HR/SF/DEG. F A CKET IS NOT PERMITT IG, OR CORRUGATED EVELOPED RATE OF 5	EMBLY WITH A V T 75°F. THE VAR TED. CONSTRUCT ALUMINUM, COM 50.) MAXIMUM OF	POR BARRIER JACKE POR BARRIER JACKET FLEXIBLE DUCT OF SF PLYING WITH UL 181, 0 3 FT. IS PERMITTED	I AND A MAXIMUM MUST BE PIRAL-WOUND CLASS I (MAXIMUM ONLY FOR	7209	der The D E Seal of Her Seal Sific descr	KANSAS C 816.245.6000 BLL PROJECT	ESCOPECONSTRUCTION	02 DN.COM
NECTION TO DIFFUSERS. XIBLE CONNECTIONS TO THI MPED WITH STAINLESS STE	E SUPPLY DUCTS A EL IDEAL TYPE 52	ND DIFFUSERS SHAL CLAMPS.	L BE SEALED WI	TH 3M COMPANY 800	SEALANT AND	15 15 8	TING UNI RING TH HIS OR A SPEC	STATES IN CONC.	OWN OF HAVERSTRA	
RIZONTAL DUCTS CAN BE S 3S THAT ARE EMBEDDED IN EREVER POSSIBLE. REFER T	UPPORTED WITH HA THE CONCRETE AR O DETAILS SHOWN	NGERS SECURED TO E TO BE INSPECTED ON CONTRACT DRAW	THE EXISTING C AND USED IN LI INGS.	ONCRETE SLAB ABOVE EU OF NEW EXPANSIO	. THE EXISTING N BOLTS	E 1	IE IS AC TEM BEA THE ITEM ON, AND	FOULKIE	Long Long	
R DUCTS WITH A CROSS-SE R DUCTS WITH A CROSS- S ALL BE NO MORE THAN 6 F NGERS SHALL BE NO MORE I DUCT.	ECTIONAL AREA 4 S ECTIONAL AREA OF FEET APART; AND F THAN 4 FEET APA	QUARE FEET OR LES MORE THAN 4 SQU FOR DUCTS WITH A C RT. THE DISTANCES	S, HANGERS SHA ARE FEET BUT N CROSS-SECTIONA BETWEEN HANGE	ALL BE NO MORE THAI OT OVER 10 SQUARE L AREA OF MORE THA RS SHALL BE MEASUR	N 8 FEET APART; FEET; HANGERS N 10 FEET, ED LINEAL ALONG	STATE	HE OR SH 1. IF AN I AFFIX TO 1. ALTERATI			۲AW
. BRANCHES, TAKE-OFFS A OPPOSED BLADE DAMPERS. ERE SHOWN ON DRAWINGS	ND TIE-INS TO DUC . SPLITTER DAMPER OR WHERE REQUIRE	CTS SHALL BE EQUIP S SHALL NOT BE AC D BY SHEET METAL	PED WITH VOLUM CEPTED. PROVIDE CONTRACTOR'S L	IE CONTROLLING DEVIC E ADJUSTABLE VOLUMI AYOUT.	ES. THESE SHALL E EXTRACTORS	– Þ	UNLESS ANY WA' ? SHALL OF SUCH	TO CHA	PEL STREET	.EX
UME DAMPERS CONSTRUCT APPLICABLE REQUIREMENT ADRANT. INCLUDE APPROVE TALLED IN ACCESSIBLE LOC	ION SHALL BE QUAI IS OF THE SMACNA D LEVER OPERATING CATIONS. FOR INSUL	DRANT TYPE, MINIMU MANUAL, EXCEPT P G AND LOCK-SCREW ATED DUCTS, QUADR	M 16 GAUGE, GA ROVIDE BEARING LOCKING DEVICE ANTS SHALL BE	LVANIZED STEEL, IN A AT ONE END OF DAM S, MOUNTED AT OTHEI MOUNTED ON A COLL	ACCORDANCE WITH PER ROD AND R END, AND AR TO CLEAR	<u>MARN</u> LAW	Y PERSON, N ITEM IN SURVEYOR THE DATE		$\frac{109}{100}$	23
LESS OTHERWISE NOTED, AL QUIREMENT OF SEAL CLASS NSS 1 (MAXIMUM FLAME SPI	L NEW AND EXISTIN C, 2 IN. W.G. OF S READ RATE OF 25,	IG LOW VELOCITY DU SMACNA. THE FIRE H MAXIMUM SMOKE DE	CTS SHALL BE S AZARD CLASSIFIC VELOPED RATE (SEALED TO MEET THE CATION OF THE SEALA OF 50).	DUCT SEALING NT SHALL BE	JRK V	E FOR ANY ALTER AN OR LAND JRE AND	SPECI	FICATION	S
ACCESS DOORS SHALL BE JBLE PANEL CONSTRUCTION CTS OF SINGLE PANEL CONS ONGE RUBBER GASKETS AR	AS PER SMACNA NOT LESS THAN STRUCTION NOT LES OUND THEIR ENTIRE	STANDARDS. PROVIDE 20 GAUGE, GALVANIZ 35 THAN 18 GAUGE, PERIMETER.	E ACCESS DOORS ED STEEL. PROV GALVANIZED STE	S IN INSULATED DUCTS IDE ACCESS DOORS IN EL. PROVIDE ALL ACC	6 OF INSULATED UN-INSULATED ESS DOORS WITH	W X(S ARTICLÉ EYOR, TO :NGINEER ? SIGNATL	SHE	ETTOF3	
RD DUCT CONNECTIONS TO	SUPPLY AIR DIFFUS EL "IDEAL" TYPE 52	SER COLLARS AND DI 2 CLAMP.	UCTS SHALL BE	SEALED WITH 3M CO.	800 SEALANT AND		OF THI D SURVI IERING E OR HER	GREGORY GIORDA	NO PROJECT #:	-
OMATIC DAMPERS SHALL B CTRIC OPERATOR. OPPOSED TORY-ASSEMBLED STEEL L FICIENT POWER TO LIMIT LE JAL TO TWICE MAXIMUM OP	BE PROVIDED COMPL D BLADE DAMPER, G INKAGE AND SHAFT EAKAGE TO A MAXIN ERATING FORCE WIT	ETE WITH DAMPER L GALVANIZED STEEL, V SHALL HAVE NYLON MUM 10 CFM PER SG HOUT DEFLECTION. D	INKAGE, OUTSIDE VITH COMPRESSIE VOR OIL-IMPREC V. FT. AT 1 IN. V VAMPER SHALL B	AIR STREAM MOUNTE LE EDGE SEALS TO PI NATED BRONZE BEAR V.G. LINKAGE TO WITHS E MOUNTED IN WELDE	D, AND AN REVENT LEAKAGE. NGS. MOTOR WITH STAND LOAD D STEEL CHANNEL	TE OF	VIOLATION ER OR LAN D, THE ALT FED BY HIS			<u> </u>
WIRE MESH SCREEN WHER	RE SHOWN ON DRAW	/INGS AND WHERE RE	EQUIRED SHALL E	3E NO. 16 USSG, 3/4'	' SQUARE MESH, IN	STA NEW	IT IS A ENGINE ALTERE FOLLOW		M-301	

ONE IN. WIDE GALVANIZED STEEL ENCLOSING FRAME.

12. MOTORIZED DAMPERS

A.	FURNISH AND INSTALL, AT LOCATIONS SHOWN ON PLANS, CONTROL DAMPERS MANUFACTURED BY AN ISO 9001 ACCREDITED
	MANUFACTURER AND THAT MEET THE FOLLOWING MINIMUM CONSTRUCTION REQUIREMENTS. UNLESS OTHERWISE INDICATED ON
	PLANS THE DAMPERS SHALL HAVE THE NOMINAL SIZE EQUAL THE DUCT SIZE AT LOCATION WHERE THE DAMPER IS INSTALLED.

- B. MOTORIZED DAMPERS SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS AND THE SPECIFICATION IS BASED ON RUSKIN.
- C. DAMPER FRAMES SHALL BE CONSTRUCTED USING THE UNIFRAME DESIGN CONCEPT AND SHALL BE ROLL-FORMED STRUCTURAL HAT CHANNELS, REINFORCED AT THE CORNERS, FORMED FROM A SINGLE PIECE OF MINIMUM 16 GAUGE GALVANIZED STEEL. THE ROLL-FORMED FRAMES SHALL BE STRUCTURALLY SUPERIOR TO 13 GAUGE U-CHANNEL FRAMES.
- D. THE BLADES SHALL BE SINGLE SKIN, 16 GAGE GALVANIZED STEEL WITH THREE LONGITUDINAL GROOVES FOR REINFORCEMENT. BLADE EDGE SEALS SHALL BE PVC COATED POLYESTER FABRIC MECHANICALLY LOCKED INTO THE BLADE EDGE, SUITABLE FOR OPERATING AT TEMPERATURES FROM -25°F TO +180°F
- E. JAMB SEALS SHALL BE FLEXIBLE STAINLESS STEEL METAL, COMPRESSION TYPE TO PREVENT LEAKAGE BETWEEN END OF THE BLADE AND THE DAMPER FRAME USE OF THE BLADE END TO OVERLAPPING FRAME FOR JAMB SEAL IS NOT ACCEPTABLE. ADHESIVE OR CLIP-ON TYPE SEALS FOR BLADE AND SEALS ARE NOT ACCEPTABLE.
- F. BEARINGS SHALL BE CORROSION RESISTANT, MOLDED SYNTHETIC SLEEVE TYPE TURNING IN AN EXTRUDED HOLE IN THE DAMPER FRAME. AXLES SHALL BE 1/2" PLATED STEEL, HEXAGONAL SHAPED AND POSITIVELY LOCKED INTO THE DAMPER BLADE (ROUND AXLES ARE NOT ACCEPTABLE). DAMPER LEAKAGE SHALL NOT EXCEED 10 CFM PER SQUARE FOOT AT 4" SP.
- G. LINKAGE SHALL BE CONCEALED OUT OF AIRSTREAM, WITHIN THE DAMPER FRAME TO REDUCE PRESSURE DROP AND NOISE AND LESSEN THE NEED FOR MAINTENANCE. MAXIMUM APPROACH VELOCITY RATING: 2000 FT/MIN.
- H. LINKAGE BRACKETS AND CONNECTING RODS TO BE 5/16 INCH DIAMETER ZINC PLATED STEEL. ALL THE UNION RODS SHALL BE BRASS. THE SET SCREWS AND MOUNTING BOLTS TO BE ZINC PLATED. THE BEARINGS SHALL BE EITHER NYLON OR OILITE. DRIVE BLADES ON ALL DAMPERS TO HAVE EXTRA LONG ADJUSTABLE AXLES THAT CAN BE EXTENDED 4 INCHES BEYOND THE FRAME
- I. THE OPERATORS SHALL BE ELECTRIC TYPE WITH SPRING RETURN SO THAT, IN THE EVENT OF POWER FAILURE, THEY WILL FAIL SAFE IN NORMALLY CLOSED POSITION.
- J. SUBMITTALS MUST INCLUDE LEAKAGE, MAXIMUM AIRFLOW AND MAXIMUM PRESSURE RATINGS BASED ON AMCA PUBLICATION
- 13. AIR OUTLETS AND INLETS
- A. FURNISH AND INSTALL ALL METAL DIFFUSERS, GRILLES AND REGISTERS AS INDICATED ON THE CONTRACT DRAWINGS. ALL SIZES, AIR DISTRIBUTION PATTERNS AND AIR VOLUME CAPACITIES SHALL BE AS SPECIFIED ON THE SCHEDULES AND PLANS.
- B. DIFFUSERS, GRILLES AND REGISTERS SHALL BE PRIME COATED STEEL FINISHED, UNLESS OTHERWISE NOTED, IN BAKED WHITE ENAMEL.
- C. CEILING TYPE AIR DIFFUSERS SHALL BE PROVIDED WITH AIR EQUALIZING DEFLECTORS, FULLY ADJUSTABLE FOR HORIZONTAL TO VERTICAL AIR FLOW.
- D. RETURN REGISTERS SHALL HAVE VOLUME DAMPERS. DAMPER OPERATING LEVERS SHALL BE ACCESSIBLE AT THE FACE OF AIR OUTLET.
- E. MARGIN TYPES AND METHODS OF ATTACHMENT FOR ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE COORDINATED WITH ARCHITECTURAL CEILING DETAILS AND SPECIFICATIONS.
- F. UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS, NOISE CRITERIA FOR ALL AIR TERMINAL DEVICES SHALL NOT EXCEED NOISE CRITERIA (NC) 35, OR SOUND METER READING 40 DBA, MEASURED AT A LOCATION 42 IN. BELOW THE CENTER OF THE DEVICES. MANUFACTURER IS RESPONSIBLE FOR EXAMINING APPLICATION OF EACH OUTLET AND GUARANTEE THAT EACH WILL PROVIDE REQUIRED NC LEVELS AND COMFORT SPACE CONDITIONS WITHOUT DRAFTS THROUGHOUT OPERATING RANGE.
- G. AIR TERMINAL DEVICES SHALL BE CARNES, TITUS, ACUTHERM, KRUGER OR AN APPROVED EQUAL.
- H. EXACT LOCATION FOR ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE COORDINATED WITH THE ARCHITECT. ARCHITECT'S DECISION SHALL PREVAIL.
- 14. MOTORS AND MOTOR CONTROLLERS

TYPE.

DESIGN AND PERFORMANCE OF COMPONENTS AND METHODS SPECIFIED HEREIN SHALL COMPLY WITH THE APPLICABLE PROVISIONS OF THE CODES, STANDARDS, AND RECOMMENDATIONS OF THE ELECTRIC CODE, ANSI, IEEE, NEMA, AND NFPA. A. MOTORS

- a) ALL MOTORS WITH THE EXCEPTION OF SEVERE DUTY MOTORS AS DEFINED BELOW, SHALL BE DESIGNED TO OPERATE CONTINUOUSLY AT 40°C AMBIENT TEMPERATURE WITH A SERVICE FACTOR OF 1.15. UNLESS OTHERWISE SPECIFIED IN OTHER SECTION. SEVERE DUTY MOTORS SHALL HAVE A SERVICE FACTOR OF 1.0 AT 65°C AMBIENT.
- b) FRACTIONAL HORSEPOWER MOTORS BELOW 3/4 HP SHALL MEET NEMA REQUIREMENTS FOR MINIMUM TORQUE AND MAXIMUM CURRENT.
- c) MOTORS BELOW 1 HP MAY BE 120 VOLT, SINGLE PHASE, 60 HZ, CAPACITOR START, INDUCTION RUN OR SPLIT PHASE
- d) USE OPEN DRIP PROOF TYPE MOTORS FOR GENERAL INDOOR APPLICATIONS. THE MOTORS SHALL HAVE MINIMUM CLASS "B" INSULATION.
- e) USE TOTALLY ENCLOSED, FAN-COOLED TYPE MOTORS FOR SPECIAL INDOOR APPLICATIONS SUCH AS INSIDE RETURN AIR PLENUMS, FOR INLINE DIRECT-DRIVEN FANS AND WHEN FLOOR-MOUNTED NEAR HOSE DOWN AREAS OR FOR OTHER APPLICATIONS AS SHOWN ON THE CONTRACT DRAWINGS. THE MOTOR SHALL HAVE MINIMUM CLASS "B" INSULATION.
- f) BEARINGS FOR INTEGRAL HORSEPOWER MOTORS SHALL BE ANTIFRICTION, OPEN TYPE WITH GREASE FITTINGS AND SHALL HAVE A MINIMUM RATED LIFE OF 125,000 HOURS FOR DIRECT COUPLED MOTORS AND 25,000 HOURS FOR BELT OR CHAIN DRIVEN LOADS. BEARINGS FOR FRACTIONAL HORSEPOWER MOTORS SHALL BE PERMANENTLY SEALED BALL TYPE, SUITABLE FOR CONTINUOUS DUTY.
- q) PROVIDE SOLDER LESS LUGS OF PROPER SIZES AT THE ENDS OF MOTOR LEADS.
- h) ALL MOTORS SHALL BE LABELED BY THE MANUFACTURER WITH AN NEMA MINIMUM EFFICIENCY MARKING STANDARD IN ACCORDANCE WITH NEMA STANDARD MG-1-12.536 WHEN TESTED IN ACCORDANCE WITH IEEE STANDARD 112.
- i) UNLESS OTHERWISE SPECIFIED, MOTOR SHALL BE ONE OF THE FOLLOWING MANUFACTURERS OR AN APPROVED EQUAL: GENERAL ELECTRIC CO.
- WESTINGHOUSE ELECTRIC CORP. SIEMENS-ALLIS INC. RELIANCE ELECTRIC CO.
- B. MOTOR CONTROLLERS
- a) ALL MOTOR CONTROLLERS SHALL BE COMBINATION CONTROLLERS SUITABLE FOR WALL MOUNTING.
- b) CONTROLLERS FOR MOTORS LESS THAN 1/2 HP SHALL BE OF THE TOGGLE, SWITCH, MANUAL TYPE WITH INTEGRAL OVERLOAD PROTECTION AND PILOT LIGHT IN THE COVER, AND SHALL BE DESIGNED FOR 120 VOLT, SINGLE PHASE, 60 HZ SERVICE. WHERE INTERLOCKS OR AUTOMATIC CONTROLS ARE REQUIRED, PROVIDE MAGNETIC ACROSS-THE-LINE COMBINATION STARTERS.
- c) WHERE REQUIRED TO PREVENT SIMULTANEOUS STARTING OF MOTORS, PROVIDE INTERLOCKED CONTROLLERS WITH TIME DELAY DEVICES.
- d) ALL INDIVIDUALLY MOUNTED MOTOR CONTROLLERS, INSTALLED INDOORS, SHALL BE FURNISHED IN AN NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE.
- e) THE MINIMUM CONTROLLER SIZE FOR THREE-PHASE MOTORS SHALL BE NEMA ICS 2, SIZE 1.
- f) IN ADDITION TO NFPA 70 REQUIREMENTS FOR SAFETY DISCONNECT SWITCHES, WHERE CONTROLLERS ARE NOT DIRECTLY ADJACENT TO THE MOTORS THEY CONTROL, OR WHERE A SAFETY DISCONNECT SWITCH IS NOT SPECIFIED TO BE FURNISHED WITH MOTOR-DRIVEN EQUIPMENT, A HEAVY-DUTY, UN-FUSED DISCONNECT SWITCH, ARRANGED FOR BEING PADLOCKED IN THE OPEN POSITION, AND ALSO CAPABLE OF INTERRUPTING THE MOTOR LOCKED ROTOR CURRENT, SHALL BE FURNISHED FOR INSTALLATION WITHIN SIGHT OF THE MOTOR.
- g) ALL CONTROLLERS FOR 460 VOLT OR 208 VOLT SERVICE SHALL HAVE 460/120 VOLT OR 208/120 VOLT, RESPECTIVELY FUSED TRANSFORMERS BUILT-IN IN EACH CONTROLLER HOUSING TO SERVE ALL CONTROL CIRCUITS WITHIN THE CONTROLLER. EACH CONTROLLER SUBJECT TO ELECTRICAL INTERLOCK AND/OR AUTOMATIC CONTROL SHALL HAVE THE NECESSARY AUXILIARY CONTACTS TO PERFORM THE REQUIRED OPERATIONS. ONE SET OF TERMINALS SHALL BE PROVIDED FOR EACH CONTROL CIRCUIT.
- h) WHERE INTERPOSING RELAYS ARE REQUIRED, THEY SHALL BE FURNISHED IN SEPARATE ENCLOSURES ADJACENT TO THE CONTROLLERS.
- i) WHERE CONTROLLERS ARE INTERLOCKED, A SEPARATE DISCONNECT SWITCH SHALL BE MOUNTED ADJACENT TO THE LEAD CONTROLLER IN ORDER TO DISCONNECT ALL CONTROL VOLTAGES TO THE CONTROLLERS.
- j) ALL PARTS SUBJECT TO WEAR OR ARCING SHALL BE RENEWABLE.
- k) ALL MOTOR CONTROLLERS, DISCONNECT DEVICES AND OTHER CONTROL DEVICES SHALL BE LABELED AS TO USE AND FUNCTION, UTILIZING ENGRAVED PLASTIC NAMEPLATES WITH WHITE LETTERS ON BLACK BACKGROUND. INSCRIPTIONS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS.

ALLEN-BRADLEY CO. CUTLER-HAMMER INC. GENERAL ELECTRIC CO. SQUARE D COMPANY

- COMMAND TO PREVENT NUISANCE SAFETY TRIPS.
- y) HIGH DISCHARGE GAS TEMPERATURE SENSING.
- SOURCE LOOP DURING COOLING MODE.

- LEAVING WATER TEMPERATURE COOLING STATUS - HEATING STATUS - HIGH PRESSURE SWITCH ALARM CONDENSATE OVERFLOW ALARM COOLING COMMAND HEATING COMMAND
- H. WARRANTY:
- I. FIELD INSTALLED OPTIONS: a) HOSE KITS:
- b) HOSE KIT ASSEMBLIES:
- c) THERMOSTATS:
- 15. CEILING MOUNTED TOILET EXHAUST FANS

- BALANCED

- THE ETL LABEL.

UNLESS OTHERWISE SPECIFIED, MOTOR SHALL BE ONE OF THE FOLLOWING MANUFACTURERS:

WESTINGHOUSE ELECTRIC CORP.

o) HIGH VOLTAGE PROTECTION.

p) UNIT SHUTDOWN ON HIGH OR LOW REFRIGERANT PRESSURES.

a) UNIT SHUTDOWN ON LOW TEMPERATURE (LOW SOURCE COIL TEMP OR LOW AIR COIL TEMP).

r) CONDENSATE OVERFLOW ELECTRONIC PROTECTION.

s) OPTION TO RESET UNIT AT THERMOSTAT OR DISCONNECT (SOFT OR HARD RESET FUNCTIONS)

t) FAULT RETRY LOGIC. THE SAME FAULT TRIP HAS TO OCCUR 3 TIMES BEFORE A HARD LOCKOUT. IF A FAULT OCCURS 3 TIMES SEQUENTIALLY WITHOUT THERMOSTAT MEETING TEMPERATURE, THEN LOCKOUT REQUIRING MANUAL RESET WILL OCCUR. A SOFT OR HARD RESET WILL RESTART THE UNIT.

u) ABILITY TO DEFEAT TIME DELAYS FOR SERVICING (TEST MODE).

v) LIGHT EMITTING DIODE (LED) ON CIRCUIT BOARD TO INDICATE HIGH PRESSURE, LOW PRESSURE, LOW/ HIGH VOLTAGE, LOW WATER/AIR TEMPERATURE, CONDENSATE OVERFLOW, HIGH DISCHARGE GAS TEMPERATURE, FAULTY TEMPERATURE SENSOR(S), AND CONTROL VOLTAGE STATUS.

w) THE LOW-PRESSURE SWITCH SHALL NOT BE MONITORED FOR THE FIRST 90 SECONDS AFTER A COMPRESSOR START

x) 24V OUTPUT TO CYCLE A MOTORIZED WATER VALVE OR OTHER DEVICE WITH COMPRESSOR CONTACTOR. N. WATER COLL LOW TEMPERATURE SENSING SELECTABLE FOR WATER OR ANTI- FREEZE. O. AIR COIL LOW TEMPERATURE SENSING.

z) SMART DESUPERHEATER OPERATION AND LOGIC TO ELIMINATE ANY HEAT TRANSFER FROM THE WATER TANK TO THE

aa) LOSS OF CHARGE COMPRESSOR PROTECTION LOGIC, WHICH WILL NOT ALLOW THE UNIT TO TRY AND START WHEN THE LOW PRESSURE SWITCH IS OPEN ON STARTUP, INDICATING A LOSS OF CHARGE.

ab) OPTIONAL FLUID FLOW PROVING SWITCH. THIS IS LOCATED IN THE SOURCE INLET WATER PIPING.

 DISCHARGE AIR TEMPERATURE - COMMAND OF SPACE TEMPERATURE SETPOINT - LOW TEMPERATURE SENSOR ALARM LOW PRESSURE SENSOR ALARM

– HI/LOW VOLTAGE ALARM

- FAN "ON/AUTO" POSITION OF SPACE THERMOSTAT AS SPECIFIED ABOVE - UNOCCUPIED/OCCUPIED COMMAND

– FAN "ON/AUTO" COMMAND FAULT RÉSET COMMAND - ITEMIZED FAULT CODE REVEALING REASON FOR SPECIFIC

SHUTDOWN FAULT (ANY ONE OF 7)

ENERTECH SHALL WARRANTY EQUIPMENT FOR A PERIOD OF 12 MONTHS FROM START UP OR 18 MONTHS FROM SHIPPING (WHICH EVER OCCURS FIRST). ALL WARRANTY COVERAGE IS PARTS ONLY, NO LABOR. OPTION: EXTENDED 4-YEAR COMPRESSOR WARRANTYCOVERS COMPRESSOR FOR A TOTAL OF 5 YEARS.

ALL UNITS SHALL BE CONNECTED WITH HOSES. THE HOSES SHALL BE 2 FEET (61CM) LONG, BRAIDED STAINLESS STEEL; FIRE RATED HOSES COMPLETE WITH ADAPTERS. ONLY FIRE RATED HOSES WILL BE ACCEPTED.

THE FOLLOWING ASSEMBLIES SHIP WITH THE VALVES ALREADY ASSEMBLED TO THE HOSE DESCRIBED: SUPPLY HOSE HAVING "Y" STRAINER WITH BLOWDOWN VALVE, AND BALL VALVE WITH PT PORT; RETURN HOSE HAVING AUTOMATIC FLOW REGULATOR WITH PT PORTS, AND BALL VALVE.

THE THERMOSTAT SHALL BE AN ELECTRONIC TYPE THERMOSTAT, SINGLE STAGE AND PROGRAMMABLE

A. PROVIDE EXHAUST FANS OF THE SIZE AND CAPACITY AS SHOWN IN THE FAN SCHEDULE ON CONTRACT DRAWINGS.

B. EXHAUST FANS SHALL BE OF THE CENTRIFUGAL, DIRECT DRIVE TYPE. THE FAN HOUSING SHALL BE CONSTRUCTED OF HEAVY GAUGE GALVANIZED STEEL AND SHALL INCLUDE PRE-PUNCHED MOUNTING BRACKETS. THE HOUSING INTERIOR SHALL BE LINED WITH 0.5 IN. ACOUSTICAL INSULATION. THE OUTLET DUCT COLLAR SHALL INCLUDE AN ALUMINUM BACKDRAFT DAMPER AND SHALL BE ADAPTABLE FOR HORIZONTAL OR VERTICAL DISCHARGE.

C. SUPPORT FANS IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF INSTALLATION DETAIL AS SHOWN ON DRAWINGS, AND MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NOISE AND VIBRATIONS.

D. THE ACCESS FOR WIRING SHALL BE EXTERNAL. THE MOTOR DISCONNECT SHALL BE INTERNAL AND OF THE PLUG IN TYPE. THE FAN WHEEL SHALL BE OF THE FORWARD CURVED CENTRIFUGAL TYPE, CONSTRUCTED OF GALVANIZED STEEL AND DYNAMICALLY

E. FANS SHALL BE LICENSED TO BEAR THE AMCA CERTIFIED RATINGS SEALS FOR SOUND AND AIR PERFORMANCE AND SHALL BE U.L. LISTED AND C.S.A. APPROVED.

F. PROVIDE A VARIABLE SPEED CONTROLLER TO BE MOUNTED ON THE FAN HOUSING. THIS CONTROLLER SHALL ONLY BE USED FOR BALANCING PURPOSES.

G. FAN SHALL BE SIMILAR OR EQUAL TO THOSE MANUFACTURED BY PANASONIC, BROAN, GREENHECK, MODEL CSP; PENN VENTILATOR COMPANY/ULTRA QUIET ZEPHYR, OR AN APPROVED EQUAL.

16. MULTI-SPLIT HEAT PUMP AIR CONDITIONING SYSTEM

A. FURNISH AND INSTALL VARIABLE CAPACITY MULTI-ZONE SERIES HEAT PUMP AIR CONDITIONING SYSTEM AS DESCRIBED IN THE SCHEDULE ON DRAWINGS, MANUFACTURED BY MITSUBISHI, DAIKIN, CARRIER OR AN APPROVED EQUAL MANUFACTURER. THE SYSTEM SHALL CONSIST OF TWO (2) WALL MOUNTED INDOOR UNITS WITH WALL MOUNTED REMOTE CONTROLLER, AND ONE (1) DUCTED INDOOR UNITS WITH A WIRED, WALL MOUNTED REMOTE CONTROLLER CONNECTED TO A COMPACT HORIZONTAL DISCHARGE OUTDOOR UNIT WHICH SHALL BE OF AN INVERTER DRIVEN HEAT PUMP DESIGN. THE UNITS MUST COMPLY WITH THE FOLLOWING SPECIFICATIONS AND HAVE THE CAPACITIES DESCRIBED IN THE SCHEDULE ON PLANS.

B. THE SYSTEM COMPONENTS SHALL BE TESTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND SHALL BEAR

C. ALL WIRING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (N.E.C.).

D. THE UNITS SHALL BE RATED IN ACCORDANCE WITH AIR-CONDITIONING REFRIGERATION INSTITUTE'S (ARI) STANDARD 240 AND BEAR THE ARI CERTIFICATION LABEL.

E. THE UNITS SHALL BE MANUFACTURED IN A FACILITY REGISTERED TO ISO 9001 AND ISO 14001, WHICH IS A SET OF STANDARDS APPLYING TO PRODUCT AND MANUFACTURING QUALITY AND ENVIRONMENTAL MANAGEMENT AND PROTECTION SET BY THE INTERNATIONAL STANDARD ORGANIZATION (ISO).

F. A DRY AIR HOLDING CHARGE SHALL BE PROVIDED IN THE INDOOR SECTION.

G. SYSTEM EFFICIENCY SHALL MEET OR EXCEED 15.5 SEER WHEN PART OF A MULTI SYSTEM (2:1 / 3:1).

H. UNIT SHALL BE STORED AND CAREFULLY HANDLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

I. THE WIRELESS REMOTE CONTROLLERS FOR THE WALL MOUNTED INDOOR UNITS SHALL BE SHIPPED INSIDE THE CARTON AND PACKAGED WITH THE INDOOR UNIT AND SHALL BE ABLE TO WITHSTAND 105° STORAGE TEMPERATURE AND 95% RELATIVE HUMIDITY WITHOUT ADVERSE EFFECT. THE WIRELESS OR WIRED REMOTE CONTROLLER FOR THE CEILING SUSPENDED, DUCTED INDOOR UNIT SHALL BE SHIPPED SEPARATELY.

J. THE UNITS SHALL HAVE A MANUFACTURER'S PARTS AND DEFECTS WARRANTY FOR A PERIOD OF FIVE (5) YEARS FROM DATE OF INSTALLATION. THE COMPRESSOR SHALL HAVE AN EXTENDED WARRANTY OF SEVEN (7) YEARS FROM DATE OF INCLUDE LABOR.

K. MANUFACTURER SHALL HAVE OVER 30 YEARS OF CONTINUOUS EXPERIENCE IN THE U.S. MARKET.

- L. WALL MOUNTED INDOOR UNITS SHALL BE FACTORY ASSEMBLED, WIRED AND RUN TESTED. CONTAINED WITHIN THE UNIT SHALL SHALL BE PURGED WITH DRY AIR BEFORE SHIPMENT FROM FACTORY.
- M. THE CASING SHALL HAVE A SMOOTH FRONT, WHITE FINISH. MULTI DIRECTIONAL DRAIN CONNECTION AND REFRIGERANT PIPING, OFFERING THREE (3) DIRECTION PIPE ALIGNMENTS FOR ALL REFRIGERANT PIPING AND TWO (2) DIRECTION PIPE ALIGNMENTS FOR CONDENSATE DRAINING SHALL BE STANDARD. THERE SHALL BE SEPARATE. METAL INSTALLATION-PLATE THAT SECURES THE INDOOR UNIT FIRMLY TO THE WALL. THE INSTALLATION-PLATE SHALL BE SECURELY ATTACHED TO THE WALL USING APPROPRIATE ANCHOR METHOD. INSTALLING CONTRACTOR SHALL DETERMINE THE BEST METHOD AND BE RESPONSIBLE FOR PROPER MOUNTING OF THE INSTALLATION-PLATE TO THE WALL.
- N. THE INDOOR UNIT FAN SHALL BE ASSEMBLED WITH A LINE-FLOW FAN DIRECT DRIVEN BY A SINGLE MOTOR. THE FAN SHALL BE STATICALLY AND DYNAMICALLY BALANCED AND BE POWERED BY A MOTOR WITH PERMANENTLY LUBRICATED BEARING. MANUAL ADJUSTABLE GUIDE VANES SHALL BE PROVIDED WITH THE ABILITY TO CHANGE THE AIRFLOW FROM SIDE TO SIDE AIR DISTRIBUTION, UP AND DOWN. FIVE (5) POSITIONS PLUS AUTO AND SWING SHALL BE PROVIDED, CONTROLLED FROM THE QUIET PLUS AUTO FAN MODE FOR MODELS UP TO 18,000 BTU/W, AND FOUR (4) SPEEDS: POWERFUL, HIGH, MEDIUM, AND LOW PLUS AUTO FAN MODE FOR THE 24,000 BTU/H MODEL. ALL SPEEDS SHALL BE SELECTED FROM THE REMOTE CONTROLLER.
- O. RETURN AIR SHALL BE FILTERED B MEANS OF EASILY REMOVABLE, WASHABLE, NANO PLATINUM FILTER, DEODORIZING FILTER AND AN ANTI-ALLERGY ENZYME FILTER - BLUE PLEATED TYPE.
- P. THE INDOOR UNIT COIL SHALL BE OF NONFERROUS CONSTRUCTION WITH SMOOTH PLATE FINS ON COPPER TUBING. THE TUBING OR SILVER ALLOY. THE COILS SHALL BE PRESSURE TESTED AT THE FACTORY. A SLOPED, CORROSION RESISTANT PAN WITH DRAIN SHALL BE PROVIDED UNDER THE COIL. AN OPTIONAL DRAIN PAN LEVEL SWITCH (DPLS2), DESIGNED TO CONNECT TO THE CONTROL BOARD, SHALL BE PROVIDED IF REQUIRED, AND INSTALLED ON THE CONDENSATE PAN TO PREVENT CONDENSATE FROM OVERFLOWING.
- Q. THE UNIT ELECTRICAL POWER SHALL BE 208-230 VOLTS, 1-PHASE, 60 HERTZ. THE SYSTEM SHALL BE EQUIPPED WITH A-CONTROL - A SYSTEM DIRECTING THAT THE INDOOR UNIT BE POWERED DIRECTLY FROM THE OUTDOOR UNIT USING A 3-WIRE, 14 GA, AWG CONNECTIONS PLUS GROUND.
- R. THE DUCTED TYPE INDOOR UNIT SHALL BE FACTORY ASSEMBLED, WIRED AND TESTED PRIOR TO SHIPMENT. CONTAINED WITHIN THE INDOOR UNIT SHALL BE ALL FACTORY WIRING, PIPING, CONTROL CIRCUIT BOARD, FAN, AND FAN MOTOR. THE UNIT, IN TIME DELAY MECHANISM, AN AUTO RESTART FUNCTION, AN EMERGENCY / TEST OPERATION. INDOOR UNITS SHALL BE CHARGED WITH DRY AIR BEFORE SHIPMENT FROM FACTORY.
- S. THE CABINET SHALL BE SPACE SAVING, LOW PROFILE, HORIZONTAL, DUCTED TYPE. FORMED CABINET SHALL BE CONSTRUCTED OF G-60 GALVANIZED STEEL WITH FACTORY APPLIED FOAM SURFACE INSULATION TO PREVENT CONDENSATION ON OUTER SURFACES. THE CABINET SHALL BE PROVIDED WITH FOUR MOUNTING BRACKETS TO ACCOMMODATE SUSPENSION FROM THREADED ROD OR STRUCTURAL SUPPORT LOCATED ON THE SIDE PANELS IN ALL FOUR CORNERS. BRACKETS SHALL BE SUITABLE FOR SUPPORTING THE WEIGHT OF THE INDOOR UNIT. THE INDOOR UNIT CABINET SHALL BE EQUIPPED WITH A AS A STANDARD FEATURE.
- T. THE INDOOR UNIT FAN SHALL BE AN ASSEMBLY WITH TWO (2) SIROCCO FANS DIRECT DRIVEN BY A SINGLE MOTOR. FAN SETTING THAT WILL ADJUST THE FAN SPEED BASED ON THE DIFFERENCE BETWEEN CONTROLLER SET-POINT AND SPACE TEMPERATURE.
- ASSEMBLY WITH REPLACEABLE 2" PLEATED FILTERS, FILTER ACCESS PANEL, AND MOUNTING CONNECTIONS FOR CONNECTION TO DUCTED INDOOR UNIT.
- V. THE INDOOR UNIT COIL SHALL BE OF NONFERROUS WITH PRE-COATED ALUMINUM STRAKE FINS ON COPPER TUBING. THE TUBING SHALL HAVE INNER GROOVES FOR HIGH FEFICIENCY HEAT EXCHANGE ALL TUBE JOINTS SHALL BE BRAZED WITH PHOSCOPPER OR SILVER ALLOY. THE COILS SHALL BE PRESSURE TESTED AT THE FACTORY. A CONDENSATE PAN WITH TWO (2) 1-9/32" (32 MM) DRAINS SHALL BE PROVIDED UNDER THE COIL. IN ADDITION TO THE TWO (2) GRAVITY DRAINS, THE INDOOR UNIT SHALL BE PROVIDED WITH AN INTEGRAL CONDENSATE LIFT MECHANISM ABLE TO RAISE DRAIN WATER 7-9/16" (700 MM) ABOVE THE CONDENSATE PAN. LIFT MECHANISM SHALL INCORPORATE A SAFETY SENSOR TO SHUT DOWN THE INDOOR FAN IN THE EVENT OF HIGH LEVEL OF CONDENSATE IN THE DRAIN PAN. A SECONDARY OPTIONAL DRAIN PAN LEVEL SWITCH (DPLS1), DESIGNED TO CONNECT TO THE CONTROL BOARD, SHALL BE PROVIDED IF REQUIRED, AND INSTALLED ON THE CONDENSATE PAN TO PREVENT CONDENSATE FROM OVERFLOWING.
- W. THE INDOOR UNIT ELECTRICAL POWER SHALL BE 208/230 VOLTS, 1-PHASE, 60 HERTZ. THE SYSTEM SHALL BE CAPABLE OF SUPPLIED FROM THE OUTDOOR UNIT, USING MITSUBISHI ELECTRIC A-CONTROL SYSTEM.
- THE FACTORY PRIOR TO SHIPMENT.
- Y. THE CASING SHALL BE FABRICATED OF GALVANIZED STEEL, BONDERIZED, FINISHED WITH AN ELECTROSTATICALLY APPLIED. CADMIUM PLATED FOR WEATHER RESISTANCE. TWO (2) MILD STEEL MOUNTING FEET, TRAVERSE MOUNTED ACROSS THE WITHSTAND LATERAL WIND GUST OF UP TO 155 MPH TO MEET APPLICABLE WEATHER CODES.
- Z. THE UNIT SHALL BE FURNISHED WITH A DIRECT DRIVE, HIGH PERFORMANCE PROPELLER TYPE FAN. THE CONDENSER FAN MOTOR SHALL BE A VARIABLE SPEED, DIRECT CURRENT (DC) MOTOR AND SHALL HAVE PERMANENTLY LUBRICATED BEARINGS. FAN SPEED SHALL BE SWITCHED AUTOMATICALLY ACCORDING TO THE NUMBER OF OPERATING INDOOR UNITS AND HAVE A HORIZONTAL DISCHARGE AIRFLOW.
- AA. THE OUTDOOR UNIT COIL SHALL BE OF NONFERROUS CONSTRUCTION WITH LANCED OR CORRUGATED PLATE FINS ON COPPER TUBING. THE COIL SHALL BE PROTECTED WITH AN INTERNAL GUARD. REFRIGERANT FLOW FROM THE OUTDOOR UNIT TO THE EACH INDOOR UNIT. OUTDOOR UNIT SHALL BE PRE-CHARGED WITH SUFFICIENT R-410A REFRIGERANT FOR UP TO ONE HUNDRED AND THIRTY-ONE (98) FEET OF REFRIGERANT PIPING.
- TUBING, ARC TYPE, MEETING ASTM B280 REQUIREMENTS, INDIVIDUALLY INSULATED IN TWIN-TUBE, FLEXIBLE, CLOSED-CELL, CFC-FREE (OZONE DEPLETION POTENTIAL OF ZERO), ELASTOMERIC MATERIAL FOR THE INSULATION OF REFRIGERANT PIPES AND TUBES WITH THERMAL CONDUCTIVITY EQUAL TO OR BETTER THAN 0.27 BTU-INCH/HOUR PER SQ. FT./F, A WATER VAPOR TRANSMISSION EQUAL TO OR BETTER THAN 0.08 PERM-INCH AND SUPERIOR FIRE RATINGS SUCH THAT INSULATION WILL NOT CONTRIBUTE SIGNIFICANTLY TO FIRE AND UP TO 1" THICK INSULATION SHALL HAVE A FLAME-SPREAD INDEX OF LESS THAN 25 AND A SMOKE-DEVELOPMENT INDEX OF LESS THAN 50 AS TESTED BY ASTM E 84 AND CAN/ULC S-102. ALL REFRIGERANT CONNECTIONS BETWEEN OUTDOOR AND INDOOR UNITS SHALL BE FLARE TYPE.
- CC. THE COMPRESSOR SHALL BE A HIGH PERFORMANCE, HERMETIC, INVERTER DRIVEN, VARIABLE SPEED, DUAL ROTARY TYPE. THE COMPRESSOR MOTOR SHALL BE DIRECT CURRENT (DC) TYPE WITH FACTORY SUPPLIED AND INSTALLED INVERTER DRIVE PACKAGE. THE OUTDOOR UNIT SHALL BE EQUIPPED WITH AN INTERNAL THERMAL OVERLOAD. THE COMPRESSOR SHALL BE MOUNTED TO AVOID THE TRANSMISSION OF VIBRATION.
- DD. THE UNIT ELECTRICAL POWER SHALL BE 208/230 COLTS, 1-PHASE, 60 HERTZ. THE UNIT SHALL BE CAPABLE OF BY THE MICROPROCESSORS LOCATED IN THE INDOOR UNIT AND IN THE INDOOR UNIT COMMUNICATION SYSTEM STATUS, OPERATION, AND INSTRUCTIONS DIGITALLY OVER A-CONTROL - A SYSTEM DIRECTING THAT THE INDOOR UNIT BE POWERED DIRECTLY FROM THE OUTDOOR UNIT USING 3-WITE, 14 GA. AWG CONNECTION PLUS GROUND. THE OUTDOOR UNIT SHALL BE MINIMUM POWER CONSUMPTION.
- 17. RAYWALL WALL MOUNTED ELECTRIC HEATERS
- A. FURNISH AND INSTALL U.L. LISTED ELECTRIC ARCHITECTURAL HEATERS OF SIZES. STYLES AND CAPACITIES INDICATED ON DRAWINGS. SUBSTITUTION OF SHORTER HEATERS WITH HIGHER WATT DENSITY WILL NOT BE PERMITTED.
- B. HEATERS SHALL OPERATE ON 120V, 208V, 240V, OR 277V SINGLE PHASE. CONTROLS SHALL BE WIRED FOR (SINGLE UNIT) (MASTER-SLAVE) (TWO STAGE) OPERATION.

INSTALLATION. IF, DURING THIS PERIOD, ANY PART SHOULD FAIL TO FUNCTION PROPERLY DUE TO DEFECTS IN WORKMANSHIP OR MATERIAL, IT SHALL BE REPLACED OR REPAIRED AT THE DISCRETION OF THE MANUFACTURER. THIS WARRANTY WILL NOT

BE ALL FACTORY WIRING, PIPING, CONTROL CIRCUIT BOARD, FAN AND FAN MOTOR. THE UNIT SHALL HAVE A SELF-DIAGNOSTIC FUNCTION, 3-MINUTE TIME DELAY MECHANISM, AND AN AUTO RESTART FUNCTION AFTER POWER INTERRUPTION. INDOOR UNIT

(LEFT TO RIGHT). AN INTEGRAL, MOTORIZED, MULTI-POSITION, HORIZONTAL AIR SWEEP FLOW LOUVER SHALL PROVIDE UNIFORM REMOTE CONTROLLER. THE INDOOR FAN SHALL OPERATE AT ONE OF FIVE (5) SPEEDS: SUPER HIGH, HIGH, MEDIUM, LOW, AND

SHALL HAVE INNER GROVES FOR HIGH EFFICIENCY HEAT EXCHANGE. ALL TUBE JOINTS SHALL BE BRAZED WITH PHOSCOPPER

CONJUNCTION WITH THE WIRED, WALL MOUNTED CONTROLLER SHALL HAVE A SELF-DIAGNOSTIC FUNCTION, 3-MINUTE RESTART

DUCTED AIR OUTLET AND DUCTED REAR RETURN AIR CONNECTION. UNIT SHALL HAVE SELECTABLE REAR OR BOTTOM RETURN

SHALL DEVELOP AIRFLOW TO DELIVER UP TO 0.60 INCHES W.G. OF EXTERNAL STATIC PRESSURE. THE INDOOR FANS SHALL BE STATICALLY AND DYNAMICALLY BALANCED TO RUN ON A MOTOR WITH PERMANENTLY LUBRICATED BEARINGS. THE INDOOR FAN SHA;; OPERATE ON ANY OF THREE (3) SPEEDS, HIGH, MID, LOW AND AUTO. THE FAN SHALL HAVE A SELECTABLE AUTO FAN

RETURN AIR SHALL BE FILTERED BY MEANS OF A STANDARD FACTORY INSTALLED RETURN AIR FILTER. INSTALL FILTER RACK

SATISFACTORY OPERATION WITHIN VOLTAGE LIMITS OF 198 VOLTS TO 253 VOLTS. THE POWER TO THE INDOOR UNIT SHALL BE

X. THE OUTDOOR UNIT SHALL BE COMPLETELY FACTORY ASSEMBLED, PIPED AND WIRED. EACH UNIT SHALL BE RUN TESTED AT

THERMALLY FUSED ACRYLIC OR POLYESTER POWDER COATING FOR CORROSION PROTECTION. ASSEMBLY HARDWARE SHALL BE CABINET BASE PAN, WELDED MOUNT, PROVIDING FOUR (4) SLOTTED MOUNTING HOLES SHALL BE FURNISHED. ASSEMBLY SHALL

COMPRESSOR OPERATING FREQUENCY. THE FAN MOTOR SHALL BE MOUNTED WITH VIBRATION ISOLATION FOR QUIET OPERATION. THE FAN SHALL BE PROVIDED WITH A RAISED GUARD TO PREVENT CONTACT WITH MOVING PARTS. THE OUTDOOR UNIT SHALL

INDOOR UNITS SHALL BE INDEPENDENTLY CONTROLLED BY MEANS OF INDIVIDUAL ELECTRONIC LINEAR EXPANSION VALVES FOR

BB. ALL REFRIGERANT LINES BETWEEN OUTDOOR AND INDOOR UNITS SHALL BE OF ANNEALED, REFRIGERATION GRADE COPPER

SATISFACTORY OPERATION WITHIN VOLTAGE LIMITS OF 198 VOLTS AND 253 VOLTS. THE OUTDOOR UNIT SHALL BE CONTROLLED EQUIPPED WITH PULSE AMPLITUDE MODULATION (PAM) COMPRESSOR INVERTED DRIVE CONTROL FOR MAXIMUM EFFICIENCY WITH

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COVER SUPPORT BRACKETS OF 3/16" X 1-1/2" STEEL SHALL BE SECURELY WELDED TO FULL HEIGHT BACK CONSTRUCTED OF 18 GAUGE ZINC COATED STEEL.	
(FOR FLOOR MOUNTED STYLES — BACKS SHALL INCLUDE A FULL 18 GAUGE BOTTOM WITH FRONT FLANGED UP TO PERMIT SECURING OF ENCLOSURE FRONT.)	

(FOR WALL MOUNTED STYLES – BOTTOM OF BACK SHALL FLANGE FORWARD A HALF INCH TO PROVIDE A CONTINUOUS STIFFENER AND POSITION COVER SUPPORT BRACKETS.)

(FOR PEDESTAL MOUNTED STYLES - BOTTOM OF BACK SHALL FLANGE FORWARD A HALF INCH TO PROVIDE A CONTINUOUS STIFFENER AND TO POSITION COVER SUPPORT BRACKETS. PEDESTAL SHALL CONSIST OF 111 STEEL PIPE WELDED TO THE BOTTOM OF THE COVER SUPPORT BRACKET AND ENCLOSED BY A CAST ALUMINUM BASE WITH FLOOR FASTENER CONCEALED WITHIN THE BASE. TOP OF THE BACK SHALL BE PROVIDED WITH A CONTINUOUS CHANNEL TO SECURELY POSITION THE ENCLOSURE. EXPOSED SURFACE OF BACK SHALL BE POWDER COATED ENAMEL THE SAME COLOR AS THE ENCLOSURE.)

EACH HEATER SHALL BE PROVIDED WITH AN AUTOMATIC RESET THERMAL CUTOUT, LINEAR CAPILLARY TYPE TO ASSURE CONSTANT PROTECTION AGAINST OVERHEATING THE ENTIRE LENGTH OF THE HEATER.

FOR STYLE 6 AF, ENCLOSURE SHALL CONSIST OF .090 INCH THICK (11 GAUGE) EXTRUDED ALUMINUM TOP AND FRONT CLEAR ANODIZED 204 RL. INLET AND DISCHARGE VANES AT LEAST 5/16" DEEP SHALL BE CONTINUOUS AND PUNCHED OPENINGS SHALL BE PENCIL PROOF. ENCLOSURE JOINTS SHALL BE FLUSH AND ALIGNMENT PROVIDED BY A 3/16" DIAMETER PIN IN TOP EXTRUSION.

FOR STYLE 7-36AF, ENCLOSURE SHALL CONSIST OF .090 THICK (1 1 GAUGE) EXTRUDED ALUMINUM INLET AND DISCHARGE GRILLES WITH 5/16" DEEP VANES, FACTORY ASSEMBLED TO 14 GAUGE ALUMINUM FRONT, ALL CLEAR ANODIZED 204 RL. GRILLE OPENINGS SHALL BE PENCIL PROOF. EXTRUDED ALUMINUM JOINT TRIMS 3/4" WIDE SHALL BE PROVIDED AT ENCLOSURE JOINTS.

FOR STYLE 6-36 VF, 6VW, OR 6VP ENCLOSURE, SHALL CONSIST OF .090' THICK (11 GAUGE) EXTRUDED ALUMINUM DISCHARGE GRILLE, CLEAR ANODIZED, 204 RL AND AN ENAMELED 16 GAUGE STEEL FRONT. THE GRILLE VANES SHALL BE AT LEAST 5/16" DEEP AND PUNCHED OPENINGS SHALL BE PENCIL PROOF. ENCLOSURE JOINTS SHALL BE FLUSH WITH CONCEALED FASTENERS IN FRONT AND 3/16 DIAMETER ALIGNMENT PIN IN TOP.

FOR STYLES 6-36 TF, 6 TW, AND 6TP, ENCLOSURE SHALL CONSIST OF AN ENAMELED 16 GAUGE STEEL TOP AND FRONT WITH PENCIL PROOF DISCHARGE LOUVERS. ENCLOSURE JOINTS SHALL BE FLUSH WITH CONCEALED FASTENERS IN FRONT AND TOP.

HEATERS SHALL BE FURNISHED WITH ALL ACCESSORIES NECESSARY FOR WALL TO WALL APPLICATION UNLESS NOTED OTHERWISE. (DESCRIBE BRIEFLY OPTIONS SUCH AS HIGH WALL MOUNTING, FEED THROUGH PEDESTALS, BUILT-IN CONTROLS, OPTIONAL FINISH, ETC.)

18. CADET ELECTRIC BASEBOARD HEATERS

THE FLOOR AND MOUNTED TO THE WALL

ELECTRIC BASEBOARD HEATERS ARE UL LISTED, FACTORY RATED AT 120V, 208V, AND DUAL RATED FROM 208V TO 240V. ELEMENT IS STEEL SHEATHED CALROD ELEMENT WITH CHANNEL SHAPED ALUMINUM FINS. A FULL LENGTH CAPILLARY SENSOR TUBE IS AN INTEGRAL PART OF EACH UNIT. CASE, COVER, AND DEFLECTOR ARE MADE OF 24 GAUGE STEEL WITH 20 GAUGE JUNCTION BOXES CONTAINING A GROUNDING SCREW. ALL METAL PIECES ARE FINISHED WITH A POWDER COAT PAINT SYSTEM. TECHNICAL INFORMATION BASEBOARD HEATERS WORK BEST WHEN PLACED UNDER A WINDOW AND AT LEAST 12 INCHES AWAY FROM FURNITURE OR OTHER OBJECTS. KEEP AT LEAST 12 INCHES MINIMUM FROM OBJECTS HANGING ABOVE (I.E., DRAPES). DO NOT INSTALL BELOW ELECTRICAL OUTLETS. THE ELECTRIC BASEBOARD HEATER MAY BE PLACED DIRECTLY ON

19. AUTOMATIC CONTROLS

- A. PROVIDE AN ELECTRIC/ELECTRONIC CONTROL SYSTEM COMPLETE WITH ALL NECESSARY CONTROL DEVICES, THERMOSTATS, RELAYS, SWITCHES, WIRING, AND TO PROVIDE THE FUNCTIONS AS SPECIFIED. ALL CONTROLS SHALL BE THE PRODUCT OF ONE MANUFACTURER.
- B. THE CONTROL SYSTEM SHALL BE INSTALLED COMPLETE IN ALL RESPECTS BY COMPETENT MECHANICS, REGULARLY EMPLOYED BY THE MANUFACTURER OF THE CONTROL SYSTEM. ALL ELECTRIC WIRING IN CONNECTION WITH THE CONTROL SYSTEM SHALL BE INSTALLED UNDER THIS SECTION.
- C. THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL, TERMINAL POINT TO TERMINAL POINT, COMPLETELY COORDINATED AND INTEGRATED WIRING DIAGRAMS FOR ALL WIRING REQUIRING FIELD INSTALLATION BY THE ELECTRICAL CONTRACTOR, OR THE MECHANICAL CONTRACTOR'S ELECTRICIAN.
- D. SPECIFIC WIRING DIAGRAMS OF FACTORY INSTALLED EQUIPMENT WIRING SHALL ALSO BE SUBMITTED FOR APPROVAL AND FURNISHED TO THE ELECTRICAL CONTRACTOR FOR HIS INSTALLATION REQUIREMENTS AND OTHER USES.
- E. SERVICE AFTER COMPLETION OF THE CONTROL SYSTEM INSTALLATION, THE CONTROL CONTRACTOR SHALL REGULATE AND ADJUST THERMOSTAT, CONTROL RELAYS, ETC., AND PLACE THEM IN COMPLETE OPERATING CONDITION SUBJECT TO THE APPROVAL OF THE ENGINEERS. COMPLETE INSTRUCTIONS SHALL BE GIVEN TO THE OWNER.
- F. ALL FIELD WIRING WORK INCLUDING INTERLOCKING WIRING IN CONNECTION WITH THE ELECTRICAL CONTROL SYSTEM FOR AUTOMATIC CONTROLS SHALL BE PROVIDED BY THE HVAC CONTRACTOR. THE CONTRACTOR SHALL HAVE THE CONTROL MANUFACTURER FURNISH APPROVED DETAIL TERMINAL TO TERMINAL WIRING DIAGRAMS TO FACILITATE THE FIELD WIRING. ALL WORK SHALL BE IN ACCORDANCE WITH THE NEW YORK CITY ELECTRICAL CODE.
- G. WORK SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:

1) ALL CONTROLS AND WIRING FOR NEW EQUIPMENT.

- H. CONTROL DEVICES SHALL BE FACTORY SET FOR THE SCHEDULED MINIMUM AND MAXIMUM VALUES.
- I. WHERE NOT OTHERWISE SPECIFIED, RECOMMENDATIONS OF THE CONTROL MANUFACTURER'S OF VARIOUS PRODUCTS SHALL APPLY.
- J. REMOTE ALARM PANEL SHALL BE ELECTRIC WALL MOUNTED AND SHALL INCORPORATE AN AUDIBLE ALARM AS WELL AS VISUAL ALARM INDICATORS. THE NUMBER AND SIZE OF THE VISUAL ALARM INDICATORS SHALL BE SUCH AS TO PERMIT THE DISPLAY OF THE MESSAGES INDICATED IN THE SEQUENCE OF OPERATION. THE PANEL SHALL BE SIMILAR TO MODEL RCM-4 MANUFACTURED BY LIEBERT OR AN APPROVED EQUAL.
- K. ROOM THERMOSTAT
- a) ROOM THERMOSTAT SHALL BE FULLY PROPORTIONING WITH FEEDBACK AND SHALL HAVE ADJUSTABLE SENSITIVITY OR THROTTLING RANGE, AND A SCALE RANGE OF 56°F TO 85°F. THE CONTROL POINT SHALL BE ADJUSTABLE 10°F ABOVE AND BELOW ITS INTENDED SETTING.
- b) ROOM THERMOSTAT SHALL BE CAPABLE OF CONTROLLING WITHIN 1-1/2°F BUT SHALL BE RESPONSIVE TO 1/4°F CHANGE.
- c) ROOM TYPE THERMOSTAT SHALL BE COOLING OR HEATING INDICATION. FINISH AND FINAL LOCATIONS SHALL BE APPROVED BY THE ENGINEER.
- d) UNLESS OTHERWISE NOTED, INSTALL WALL MOUNTED THERMOSTATS 4'-6" ABOVE THE FLOOR MEASURED TO THE CENTER LINE OF THE INSTRUMENT
- e) THE CONTROLS FOR INDUCTION UNITS ARE PNEUMATIC TYPE. NEW THERMOSTATS MUST BE COMPATIBLE WITH THE EXISTING EQUIPMENT AND APPROVED BY BUILDING MANAGER. AIR TUBING SHALL BE SEAMLESS COPPER TUBING WITH SOLDERED FITTINGS IN CONCEALED SPACES, AND COMPRESSION FITTING IN ACCESSIBLE SPACES. TUBING SHALL BE PROPERLY SUPPORTED USING STRAPS, CLEATS OR HANGERS. ALL TUBING SHALL BE TESTED AT 30 PSIG FOR A PERIOD OF 24 HOURS TO MAINTAIN A PRESSURE OF 25 PSIG. PLUGGED TEE FOR PRESSURE GAUGE SHALL BE INSTALLED AT VALVE CONNECTIONS.
- L. DUCT-MOUNTED SMOKE DETECTORS SHALL BE INSTALLED FOR AC UNITS AS SHOWN ON CONTRACT DRAWINGS. WHEN SMOKE CONDITIONS EXIST, ANY ONE OF THE DUCT-MOUNTED SMOKE DETECTORS SHALL SOUND AN ALARM AND STOP RESPECTIVE FANS SERVING AREA OF ALARM. DUCT SMOKE DETECTORS SHALL BE IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.
- M. PROVIDE PROGRAMMABLE ELECTRONIC THERMOSTAT CONSISTING OF A WALL MOUNTED UNIT WITH A REMOTE CEILING MOUNTED TEMPERATURE SENSOR. THE THERMOSTAT SHALL HAVE COOLING AND HEATING CONTROL CAPABILITY AND BE ABLE TO INTERFACE WITH AND OUTDOOR CONDENSING UNIT AND AN INDOOR FURNACE AS SPECIFIED HEREIN. THE THERMOSTAT PROGRAMMING SHALL ALLOW FOR SETTING THE OCCUPIED AND UN=OCCUPIED PERIODS FOR 24 HOURS A DAY AND SEVEN (7) DAYS A WEEK. THE THERMOSTAT SHALL FEATURE A MANUAL SWITCHOVER FROM COOLING TO HEATING.

20. <u>SEQUENCE OF OPERATION</u>

- 21. BALANCING ADJUSTING AND TESTING
- AWARDING OF THE HVAC CONTRACT

- PROGRAMS FOR AIR BALANCING; TECHNICIAN QUALIFICATIONS MUST BE SUBMITTED FOR REVIEW PRIOR TO COMMENCEMENT OF FIELD WORK
- REPORTS.
- SOURCES DIRECTED.
- a) REVIEW CONTRACT DOCUMENTS TO CONFIRM READINESS FOR BALANCING WORK.
- RELATED EQUIPMENT. c) BALANCE ALL AIR SYSTEMS.

- S. BALANCING REPORTS
- RESULTS ON APPROVED FORMS.

- T. PERIODIC INSPECTIONS OF THE PROJECT DURING CONSTRUCTION

 - o EQUIPMENT
 - o INSTALLATION o PLACEMENT

 - PORTS PLUGS

 - OTHER SUCH ITEMS.

- THE SYSTEM IN QUESTION.
- EXPIRED.

- SYSTEMS AND CONTROLS.
- Z. SYSTEM BALANCING

- REQUIREMENTS.
- OR

A. AIR HANDLING UNIT AHU-1,2,3 - THE FAN IN THE UNIT SHALL RUN CONTINUOUSLY DURING THE OCCUPIED MODE. THE WALL MOUNTED THERMOSTAT SHALL CYCLE THE COMPRESSOR OR SHALL CYCLE THE HEAT EXCHANGER TO MAINTAIN ROOM TEMPERATURE SET POINT OF 75°F (ADJUSTABLE) IN COOLING SEASON AND 70°F (ADJUSTABLE) IN HEATING SEASON.

B. CEILING MOUNTED TOILET EXHAUST FANS - THE FANS SHALL BE INTERLOCKED WITH WALL SWITCH.

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A TESTING AND BALANCING (T&B) CONTRACTOR TO PERFORM ALL AIR SYSTEMS BALANCING SPECIFIED HEREIN. T&B CONTRACTOR SHALL REVIEW CONTRACT DRAWING WITHIN FIRST MONTH OF

B. THE T&B CONTRACTOR SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB); MOREOVER, HE MUST HAVE ALL CREDENTIALS AND CAPABILITY REQUIRED FOR AABC OR NEBB MEMBERS AND MUST HAVE AT LEAST 4 YEARS EXPERIENCE IN AIR AND WATER BALANCING ON COMPARABLE PROJECTS IN SIZE AND SCOPE.

C. IF THE T&B CONTRACTOR FINDS THAT HE CANNOT BALANCE ANY AIR SYSTEM, OR IF HE FINDS ANY POTENTIALLY DETRIMENTAL OPERATING CONDITION, HE SHALL IMMEDIATELY ADVISE THE ARCHITECT IN WRITING AND SHALL STATE THE REASONS WHY BALANCING CANNOT BE ACHIEVED. HE SHALL ALSO MAKE CORRECTIVE RECOMMENDATIONS ON WHAT IS TO BE DONE BY THE INSTALLING CONTRACTOR. AFTER REVIEW OF THESE RECOMMENDATIONS, THE ARCHITECT WILL DIRECT THE CONTRACTOR TO PERFORM ALL NECESSARY WORK TO ALLOW THE BALANCING CONTRACTOR TO BALANCE THE VARIOUS SYSTEMS ACCORDING TO THE SPECIFICATIONS. CONTRACTOR IS EXPECTED TO DO WITHOUT EXTRA CHARGE, CHANGES TO THE SHEAVES AND FAN BELTS, AS SPECIFIED OR REQUIRED.

D. THE T&B CONTRACTOR SHALL COORDINATE HIS WORK WITH THE INSTALLING CONTRACTOR THROUGH THE CONSTRUCTION MANAGER. THE T&B CONTRACTOR SHALL HAVE NO BUSINESS AFFILIATION WITH THE INSTALLING CONTRACTOR. E. HIS TECHNICIANS MUST BE CERTIFIED THROUGH COMPLETION OF SMACNA OR OTHER SUCH APPROVED SPONSORED TRAINING

F. THE BALANCING EFFORT SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A REGISTERED PROFESSIONAL ENGINEER, RETAINED BY THE INSTALLING CONTRACTOR, WHO WILL CERTIFY THE ACCURACY OF THE FINAL BALANCING DATA AND

G. COMPRESSED AIR, FUEL OIL, REFRIGERANTS, GLYCOL AND CHEMICALS REQUIRED FOR TESTING AND START-UP OF SYSTEMS SHALL BE FURNISHED BY THE CONTRACTOR. ELECTRIC POWER AND WATER WILL BE MADE AVAILABLE TO THE CONTRACTOR AT

H. WORK SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

b) DEVELOP AN APPROVED PROCEDURE FOR, AND PERFORM PRE-STARTUP SYSTEM CHECKOUT FOR, ALL SYSTEMS AND

d) PERFORM FAN OPERATING TESTS. e) WITNESS EQUIPMENT CAPACITY AND EFFICIENCY TESTS TO BE CONDUCTED BY VENDORS OR OTHER DESIGNATED PARTIES.

 f) SUBMIT ALL APPARATUS TEST REPORTS WITNESSED. I. CONSTRUCTION MANAGER WILL SUPPLY T&B CONTRACTOR WITH A SCHEDULE OF PROJECTED COMPLETION TIME AND PHASING FOR EACH SYSTEM AND A LIST OF SYSTEMS WITH SPECIAL OR UNUSUAL REQUIREMENTS.

J. THE T&B CONTRACTOR SHALL THEN SUBMIT TO THE CONSTRUCTION MANAGER FOR APPROVAL A DETAILED TIME SCHEDULE FOR AIR BALANCE ON EACH SYSTEM.

K. IMMEDIATELY AFTER AWARD OF THE HVAC CONTRACT, THE T&B CONTRACTOR SHALL REVIEW THE DRAWINGS AND SPECIFICATIONS AND SHALL INDICATE ANY DEFICIENCIES (OR ADDITIONAL FEATURES) IN THE AIR SYSTEMS WHICH WOULD PRECLUDE (OR IMPROVE) PROPER ADJUSTING OR BALANCING. THESE INCLUDE:

a) ADDITIONAL AIR VOLUME DAMPERS.

b) INSTALLATION OF ADDITIONAL "PEET'S PLUGS" PORTS, ETC.

L. SUBMIT FOR APPROVAL SAMPLE FORMS THAT HE INTENDS TO USE FOR TABULATING BALANCING REPORTS WHICH SHALL INCLUDE FAN OR OTHER EQUIPMENT TAGS OR LABELS. THESE FORMS SHOULD BE SIMILAR TO THE AABC "TEST AND BALANCE" FORMS DESCRIBED IN "NATIONAL STANDARDS FOR FIELD MEASUREMENTS AND INSTRUMENTATION" VOL. II, NO. 12173, OF AABC OR NEBB EQUIVALENT AS STATED IN "HVAC SYSTEMS - TESTING ADJUSTING AND BALANCING".

M. DESCRIBE THE INSTRUMENTATION (INCLUDING ACCURACY LIMITATIONS) OF EACH DEVICE PROPOSED FOR USE ON THIS PROJECT FOR AIR AND WATER BALANCING. AS A MINIMUM, INSTRUMENTATION USAGE APPLICATION AND ACCURACY LIMITATIONS ACCEPTABLE ON THIS PROJECT SHALL BE THOSE DESCRIBED IN "HVAC SYSTEMS - TESTING, ADJUSTING AND BALANCING" PUBLISHED BY SHEET METAL AND AIR-CONDITIONING NATIONAL ASSOCIATION, INC. (SMACNA).

N. SPECIFY TYPE OR TYPES OF INSTRUMENTS TO BE USED FOR AIR BALANCING THAT HE PROPOSES TO USE FOR MEASURING AIR QUANTITIES AT AIR TERMINALS.

O. DESCRIBE THE PROCEDURE USED TO MAKE AIR FLOW MEASUREMENTS WITH EACH MEASURING DEVICE. P. INSTRUMENTATION USED IN AIR BALANCE SHALL BE FACTORY CALIBRATED AND CERTIFIED AS ACCURATE BEFORE AND AFTER TEST AND BALANCE. SUBMIT COPIES OF FACTORY CERTIFIED CALIBRATION RECORDS TO THE ARCHITECT/OWNER FOR REVIEW. Q. THE OWNER HAS RIGHT TO REQUEST INSTRUMENT RECALIBRATION, OR USE OF OTHER INSTRUMENTS AND BALANCING METHODOLOGY, WHERE ACCURACY OF READINGS IS QUESTIONABLE.

R. SUBMIT A START-UP CHECKOUT LIST FOR EACH SYSTEM AND FOR EACH MAJOR PIECE OF EQUIPMENT FOR APPROVAL.

a) AFTER BALANCING AND TESTING HAVE BEEN PERFORMED, THE BALANCING CONTRACTOR SHALL SUBMIT FOUR (4) BOUND COPIES OF RECORDED TEST DATA AND EQUIPMENT PERFORMANCE REPORTS ON THE BALANCING OF AIR SYSTEMS. b) THE REPORTS SHALL DEMONSTRATE THAT AIR SYSTEMS ARE PROPERLY BALANCED AS DESIGNED OR SPECIFIED; SUBMIT

c) THE REPORTS SHALL SHOW THAT FANS ARE DELIVERING AIR FLOWS WITHIN ALLOWABLE LIMITS AS SPECIFIED; SUBMIT RESULTS ON APPROVED FORMS.

d) THE APPROVED FORMS MUST BE COMPLETE WITH REGARD TO ALL DATA REQUIREMENTS.

a) PRIOR TO COMMENCEMENT OF BALANCING, THE T&B CONTRACTOR SHALL MAKE PERIODIC INSPECTIONS OF THE PROJECT DURING CONSTRUCTION (NOT LESS THAN ONE PER WEEK) AND SHALL REPORT IN WRITING TO THE ARCHITECT ANY DEVIATIONS FROM CONTRACT DOCUMENTS RELATING TO TESTING, BALANCING, AND ADJUSTMENT WORK CONCERNING:

INACCESSIBLE INSTALLATION OF THE FOLLOWING BALANCING HARDWARE:

BALANCE DAMPER HANDLES

U. FINAL APPROVAL: THIS CONTRACT SHALL INCLUDE AN EXTENDED PERIOD OF 120 DAYS AFTER SUBMITTAL OF THE FINAL CERTIFIED TEST REPORT (APPROVED BY THE ENGINEER) FOR A GIVEN SYSTEM, DURING WHICH TIME THE OWNER MAY REQUEST A SPOT CHECK. RETEST AND/OR RESETTING OF ANY OUTLET OR OTHER ITEM AS LISTED IN THE CERTIFIED TEST REPORT: HOWEVER, THIS REQUEST MAY NOT EXCEED 10% OF THE OUTLETS OR DEVICES ON EACH CENTRAL SYSTEM. V. IF MORE THAN 5% OF THE TOTAL DEVICES ON A GIVEN CENTRAL SYSTEM TEST OUTSIDE THE PRESCRIBED LIMITS SET FOR AIR

BALANCE, THE OWNER SHALL HAVE THE OPTION OF REVOKING THE TEST REPORT AND REQUIRING A COMPLETE REBALANCE OF

W. IF A RETEST OR SPOT CHECK IS REQUESTED, THE T&B CONTRACTOR SHALL PROVIDE TECHNICIANS AND INSTRUMENTS IN MAKING ANY TESTS REQUIRED DURING THIS PERIOD. X. FINAL ACCEPTANCE WILL NOT BE ACCORDED THE CERTIFIED TEST REPORT UNTIL THE EXTENDED PERIOD OF 120 DAYS HAS

Y. EQUIPMENT AND SYSTEM OPERATION AND PERFORMANCE TESTING a) NOTIFY THE OWNER IN ADVANCE OF BEGINNING THE TEST OPERATION, (MINIMUM NOTICE - 72 HOURS).

b) OPERATE EACH PIECE OF EQUIPMENT IN CONYUNCTION WITH ITS SYSTEM, AS LONG AS REQUIRED TO PROVIDE PROPER FUNCTION AND PERFORMANCE.

c) PERFORM AN OPERATING TEST OF EACH COMPLETE SYSTEM FOR TWENTY-FOUR HOURS CONTINUOUS OPERATION AS A MINIMUM, OR AS LONG AS REQUIRED TO DEMONSTRATE COORDINATION AND PROPER FUNCTIONING OF ALL RELATED

d) THE OPERATING CRITERIA FOR EACH TEST ARE TO BE DETERMINED IN ADVANCE AND SUBMITTED FOR APPROVAL. WHENEVER SEASONAL CONDITIONS WILL NOT PRODUCE A FULL DESIGN LOAD ON ANY EQUIPMENT OR SYSTEM, SUBMIT CRITERIA AT LEAST 4 MONTHS IN ADVANCE.

e) IF A SPECIFIED TIME DURATION IS INDICATED FOR A TEST THAT IS AT VARIANCE FROM THAT STATED ABOVE, THE SPECIFIED TIME PERIOD OR FRAME GOVERNS.

a) PRIOR TO ARRIVAL ON PROJECT, THE CONTRACTOR SHALL: ADJUST ALL BALANCING DAMPERS OPEN, PLACE ALL EQUIPMENT IN OPERATING CONDITION, REMOVE ALL TEMPORARY AIR FILTERS AND INSTALL DESIGN FILTERS.

b) FOR THE DURATION OF THE BALANCING WORK, THE CONTRACTOR SHALL: • MAINTAIN MECHANICS AT PROJECT AT ALL TIMES FOR SYSTEM OPERATION, TROUBLE SHOOTING, ASSISTANCE, ETC.

 ADJUST FAN DRIVES PITCH AS REQUIRED TO MEET SYSTEM PERFORMANCE REQUIREMENTS PROVIDE NECESSARY MECHANICAL ADJUSTMENTS IN CONYUNCTION WITH BALANCING PROCEDURE.

• REPLACE ALL BALANCING DAMPERS IN SYSTEMS THAT CANNOT BE MANIPULATED TO SATISFY BALANCING

c) BALANCE ALL SYSTEMS AND ALL SYSTEM ELEMENTS IN ACCORDANCE WITH EITHER:

- TOTAL SYSTEM BALANCE SPECIFICATIONS OF NATIONAL STANDARDS FOR FIELD MEASUREMENTS AND INSTRUMENTATION - TOTAL SYSTEM BALANCE, VOLUME II, NO. 12173, ASSOCIATED AIR BALANCE COUNCIL, LATEST EDITION,

- PROCEDURAL STANDARDS FOR TESTING-BALANCING-ADJUSTING OF ENVIRONMENTAL SYSTEMS, SECTIONS II, III, AND IV, PUBLISHED BY THE NATIONAL ENVIRONMENTAL BALANCING BUREAU, 1611 NORTH KENT STREET, ARLINGTON, VIRGINIA 22209, SUPPLEMENTED BY SMACNA'S "HVAC SYSTEMS - TESTING, ADJUSTING AND BALANCING" AA. IF THE T&B CONTRACTOR ELECTS TO USE BALANCING PROCEDURES FROM TWO OR MORE OF THE ABOVE PROCEDURES, AND IF THEY DIFFER, THIS CONTRACTOR WILL NOTE THE PROCEDURE HE HAS USED ON HIS REPORTING FORMS. BB. WHEN OUTSIDE AIR VELOCITIES ARE ABOVE 20 MPH AND WILL IMPACT OR ALTER AIR BALANCE READINGS, OR WHEN OTHER SUCH DETRIMENTAL CONDITIONS EXIST THAT WILL ADVERSELY IMPACT AIR BALANCE READINGS, THE T&B CONTRACTOR SHALL REFRAIN FROM TAKING SUCH DATA ON THE AFFECTED SYSTEM.

CC. THE T&B CONTRACTOR SHALL MARK FINAL POSITION OF ALL AIR DAMPERS, AIR BALANCING DEVICES. DD. IF REQUESTED, THE T&B CONTRACTOR SHALL CONDUCT BALANCING OR TESTING OPERATIONS IN THE PRESENCE OF THE OWNER OR HIS AUTHORIZED REPRESENTATIVE.

EE. IF REQUESTED, THE T&B CONTRACTOR SHALL RETAKE DATA IF THE ACCURACY OF READINGS, DUE TO METER MALFUNCTION OR DAMAGE, IS SUSPECTED OR IF THE DATA HAS BEEN IMPROPERLY TAKEN. FF. AFTER EACH SYSTEM HAS BEEN BALANCED AND TESTED, THE T&B CONTRACTOR WILL PERMANENTLY ATTACH TO EACH FAN A "CHECKOUT CARD" THAT INDICATES:

a) FOR FANS:

- STATIC PRESSURE READING ACROSS (CLEAN SERVICE)FILTERS, COILS, FANS - FLOWS CORRESPONDING TO THE ABOVE. FAN RPM.

- MOTOR CURRENT AND VOLTAGE READING FOR EACH LEG. - MEASURED AIR FLOW.

GG. ADJUSTMENTS

a) THE T&B CONTRACTOR SHALL PERFORM TESTS AND MAKE ADJUSTMENTS TO DAMPERS, FANS, AND RELATED ACCESSORIES, TO YIELD FLOW AND DISTRIBUTION OF AIR REQUIRED TO PRODUCE OPERATING CRITERIA AND FLOW RATES REQUIRED BY THE CONTRACT DOCUMENTS. ALLOWABLE TOLERANCES FOLLOW: AIR SIDE

q. AIR OUTLETS: $\pm 5\%$ OF DESIGN AIR FLOW. ii. FANS: ±5% OF DESIGN AIR FLOW.



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GENERAL ELECTRICAL NOTES

- 1. THESE GENERAL NOTES APPLY TO ALL DRAWINGS UNDER THIS CONTRACT. REFER TO INDIVIDUAL DRAWINGS FOR ADDITIONAL NOTES.
- 2. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. FOLLOW DRAWINGS IN LAYING OUT WORK AND CHECK DRAWINGS OF OTHER TRADES TO VERIFY SPACE CONDITIONS. MAINTAIN HEADROOM AND SPACE CONDITIONING CONSISTENT WITH PROJECT CRITERIA.
- 3. EXACT LOCATION OF ALL EQUIPMENT TO BE COORDINATED IN THE FIFI D.
- 4. JUNCTION AND PULL BOXES SHALL BE GENERALLY FLUSH MOUNTED IN FINISHED SPACES, WHERE NECESSARY, CONDUITS SHALL BE REPOUTED OR OTHER ARRANGEMENTS MADE FOR CONCEALMENT. PULL BOXES SHALL BE PROVIDED AS INDICATED AND WHEREVER NECESSARY TO FACILITATE PULLING OF WIRE. FOR EMPTY RACEWAY RUNS, PULL BOXES SHALL BE PROVIDED EVERY 100 FEET AND AS INDICATED. MAXIMUM OF 4-90° CONDUIT BENDS SHALL NOT BE EXCEEDED. COVERS OF JUNCTION AND PULL BOXES SHALL BE ACCESSIBLE.
- 5. BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. WALL AND SWITCH OUTLETS SHALL BE ERECTED IN ADVANCE OF FURRING AND FIREPROOFING. BOXES SHALL BE SECURED TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRONS.
- 6. ALL SUPPORTS TO BUILDING STRUCTURES SHALL BE SECURED BY MEANS OF TOGGLE BOLTS ON HOLLOW MASONRY WALLS, EXPANSION SHIELD OR INSERTS IN CONCRETE OR BRICK, MACHINE SCREWS ON METAL SURFACE, AND WOOD SCREWS ON WOOD CONSTRUCTION.
- 7. HORIZONTAL RUNS OF METALLIC CONDUIT SHALL BE SUPPORTED AT INTERVALS OF NOT MORE THAN 10 FEET APART. RACEWAY RISERS SHALL BE SUPPORTED AT EACH FLOOR LEVEL. EXPOSED RACEWAYS SHALL RUN PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
- 8. PANELS, JUNCTION BOXES AND PULL BOXES SHALL BE SUPPORTED INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON CONDUITS.
- 9. MOUNTING HEIGHTS OF DEVICES AND OUTLET BOXES SHALL BE SUBMITTED AND APPROVED AND SHALL BE DESCRIBED IN THE SPECIFICATIONS OR SHALL BE AS SPECIFIED BY THE ARCHITECT OR OWNFR.
- 10. ALL DISCONNECT SWITCHES AND CIRCUIT BREAKERS IN ALL AREAS SHALL BE SURFACE MOUNTED AS INDICATED ON DRAWINGS.
- 11. NO ELECTRICAL RACEWAY SHALL BE INSTALLED WITHIN 6" OF STEAM OR HOT WATER PIPES, OR APPLIANCES, EXCEPT FOR CROSSINGS WHERE RACEWAYS SHALL BE AT LEAST 1" FROM PIPE COVER. WHERE 6" MINIMUM SEPARATION CANNOT BE MAINTAINED, APPROVAL THERMAL INSULATION SHALL BE PROVIDED FOR RACEWAYS.
- 12. HORIZONTAL OR CROSS RUNS IN PARTITIONS OR WALLS ARE NOT PERMITTED.
- 13. CONDUIT ENDS SHALL BE CUT SQUARE AND REAMED SMOOTH. PAINT MALE THREADS OR FIELD THREADED CONDUIT WITH HOMOGENIZED BLEND OF COLORED COPPER AND RUST AND CORROSION INHIBITANT PIPE COMPOUND SIMILAR TO "T & B" COPPERSHIELD. BUTT CONDUIT ENDS
- 14. FINAL CONNECTIONS TO MOTOR TERMINAL BOXES, TRANSFORMERS AND OTHER VIBRATING EQUIPMENT SHALL BE MADE WITH "SEALITE" FLEXIBLE CONDUIT; MINIMUM 18" IN LENGTH WITH 50 PERCENT SLACK. DO NOT FASTEN RACEWAYS TO MOTOR FOUNDATION.
- 15. SUFFICIENTLY LONG WIRE SLACK SHALL BE LEFT IN RUNS TO MAKE FINAL CONNECTIONS. ALL EMPTY CONDUITS OVER 10 FEET LONG SHALL BE PROVIDED WITH NYLON DRAG LINE.
- 16. THE ELECTRICAL CONTRACTOR SHALL NOT INSTALL MORE THAN THE NUMBER OF CIRCUITS SHOWN IN ANY HOMERUN.
- 17. WIRE COLOR CODING SHALL CONFORM TO CODE REQUIREMENTS. MULTIPLE CONDUCTORS OF CONTROL AND SIGNAL CABLE SHALL BE COLOR CODED PER IPCEA. COLOR CODING, ONCE ESTABLISHED, MUST BE INSTALLED ACCORDINGLY.
- 18. WHERE APPLICABLE, INDIVIDUAL SINGLE-PHASE, TWO-WIRE RECEPTACLE HOMERUNS SHALL BE COMBINED INTO 3-PHASE, 4-WIRE HOMERUN TO REDUCE THE QUANTITY OF CONDUITS ENTERING THE RESPECTIVE PANELS TO A MINIMUM. HOMERUN SHALL NOT CONTAIN MORE THAN ONE SUCH 3-PHASE, 4-WIRE CIRCUIT, UNLESS SPECIFICALLY INDICATED ON DRAWINGS.
- 19. COMPLETE ELECTRICAL INSTALLATION SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED TO COLD WATER MAIN AHEAD OF METER FOR MAIN SERVICE EQUIPMENT OR BUILDING STEEL FOR DISTRIBUTION AND SEPARATELY DERIVED SYSTEM AND IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE 2017 REQUIREMENTS, WHETHER OR NOT SUCH CONNECTIONS ARE SPECIFICALLY IDENTIFIED. MEASURED RESISTANCE TO GROUND SHALL NOT EXCEED 10 OHMS.
- 20. ALL WIRING METHODS SHALL CONFORM TO ARTICLE 300-22 OF THE LATEST REQUIREMENTS 2017 NATIONAL ELECTRICAL CODE.
- 21. ALL LOW VOLTAGE WIRING IN CEILING SHALL BE "PLENUM RATED CABLES" AS PER REQUIREMENTS OF 2017 NATIONAL ELECTRICAL CODE.
- 22. ALL WORK SHALL CONFORM TO THE LATEST REQUIREMENT OF NATIONAL ELECTRICAL CODES, NFPA, UL, AND ALL OTHER GOVERNING AGENCIES HAVING JURISDICTION.
- 23. USE GROUND FAULT (GFCI) TYPE DEVICES IN WET AND DAMP LOCATIONS AND WHERE LÓCATED WITHIN 6 FEET OF SINK OR FAUCET OR AS REQUIRED.
- 24. USE ARC FAULT (AFCI) TYPE CIRCUIT BREAKERS FOR BRANCH CIRCUITS SERVING BEDROOMS AND LIVING SPACES AS REQUIRED.
- 25. POWER DISCONNECTING MEANS RELATED FIRE ALARM SYSTEMS SHALL BE ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL.
- 26. AC POWER FOR FIRE ALARM EQUIPMENT SHALL BE FED FROM DEDICATED CIRCUIT BREAKERS EQUIPPED WITH SET OF SCREW BREAKER LOCKS TO PREVENT INADVERTENT SHUT OFF.
- 27. INSTALLATION OF DEVICES AND OUTLET BOXES WHERE APPLICABLE SHALL BE ACCESSIBLE AND IN ACCORDANCE WITH BARRIER FREE REQUIREMENTS OF NJIBC CHAPTER 11(ACCESSIBILITY) AND ICC A117.1.

ELECTRICAL SPECIFICATIONS

1. SECURE AND PAY FOR PERMITS AND INSPECTIONS REQUIRED BY GOVERNMENT AGENCIES.

2. PRIOR TO SUBMITTING A BID, VISIT THE JOB SITE AND BECOME FAMILIAR WITH THE CONDITIONS EFFECTING THE ELECTRICAL INSTALLATION.

3. ELECTRICAL INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE 2017 EDITION AND SHALL BE PERFORMED BY INDIVIDUALS SKILLED IN THE TRADE. WORKMANSHIP SHALL BE FIRST CLASS. THE ELECTRICAL SYSTEMS SHALL BE COMPLETE IN ALL RESPECTS, TESTED, APPROVED AND READY TO OPERATE.

4. MATERIALS SHALL BE NEW, BEAR THE U.L. STAMP AND MANUFACTURERS IDENTIFICATION.

5. VERIFY THAT ALL EXISTING CONDITIONS ARE AS INDICATED OR NOTED ON THE DRAWINGS. ANY DISCREPANCIES OBSERVED IN THE FIELD BETWEEN ACTUAL FIELD CONDITIONS AND THAT INDICATED OR NOTED ON THE DRAWINGS, SHALL BE GIVEN TO THE OWNER IN WRITING.

6. SUBMIT ELECTRONIC COPIES (PDF) OF MANUFACTURER'S SHOP DRAWINGS FOR APPROVAL PRIOR TO ORDERING THE FOLLOWING:

PANELBOARDS DISTRIBUTION EQUIPMENT LIGHTING FIXTURES WIRING DEVICES

7. INSTALLATION SHALL BE INSTALLED NEAT, PLUMB, STRAIGHT AND LEVEL TO BUILDING AND TO OTHER SYSTEM COMPONENTS.

8. PROVIDE A ONE (1) YEAR GUARANTEE COVERING THE ELECTRICAL INSTALLATION FOR DEFECTIVE MATERIALS AND WORKMANSHIP.

9. REMOVE ALL DEBRIS FROM BUILDING ON A DAILY BASIS TO INSURE SAFETY OF PERSONNEL.

10. WORK PROVIDED UNDER OTHER SPECIFICATION SECTIONS: CONTROL WIRING FOR HVAC SYSTEM INCLUDING DAMPER

WIRING

11. RACEWAYS TO BE AS FOLLOWS:

UNDERGROUND: SCHEDULE 40 PVC EXPOSED EXTERIOR: RIGID GALVANIZED STEEL EXPOSED INTERIOR: ELECTRICAL METALLIC TUBING

12. WIRE SHALL BE COPPER, STRANDED, WITH TYPE THHN -THWN THERMOPLASTIC INSULATION. TYPE 'MC' CABLE MAY BE SUBSTITUTED FOR INDOOR CONCEALED LOCATIONS ONLY.

13. OUTLET BOXES SHALL BE STAMPED GALVANIZED STEEL OF THE TYPE AND SIZE FOR THE LOCATION AND USE INTENDED.

14. WIRING DEVICES SHALL BE AS FOLLOWS:

QUAD RECEPTACLE: HUBBELL 420

- TAMPER RESISTANT DUPLEX RECEPTACLES: HUBBELL BR20 TAMPER RESISTANT DUPLEX GFI RECEPTACLES: HUBBELL GFTR5362
- FLOOR POKE THRU: HUBBELL S1PT

BY GENERAL ELECTRIC OR WESTINGHOUSE.

FLOOR BOXES : LEGRAND EVOLUTION SERIES

PLATES SHALL BE SPECIFICATION GRADE CONSTRUCTION, COLOR, MATERIAL AND STYLE BY ARCHITECT.

15. LIGHTING FIXTURES SHALL BE AS SCHEDULED AND SHALL BE PROVIDED WITH PROPER TYPE MOUNTING HARDWARE. PROVIDE LAMPS AS MANUFACTURED BY SYLVANIA OR EQUAL

16. ELECTRICAL SERVICE EQUIPMENT SHALL BE MANUFACTURED BY SIEMENS/SQUARE D OR APPROVED EQUAL:

REFER TO PANEL SCHEDULES FOR PANEL AND LOAD CENTER SPECIFICATIONS.

Load Calculations	;				
Haverstraw Maintenar Reference NEC 220	nce Building				
Maintenance Building #3		1750	SF		
Non-Continuous Loads					
Receptacles	180VA each		3240	VA	General Rece
Hand Dryer			1500	VA	
Miscellaneous			2000	VA	
Demand Factor			0	VA	Recepts first
Non-Continuous Sub-Total			6740	VA	
Continuous Loads					
General Lighting	3VA / S.F.		5250	VA	
Electric Water Heater			4100	VA	Nameplate Ra
HVAC - Cooling			0	VA	Less than He
HVAC - Electric Heat			5980	VA	Electric Heate
Equipment			9600	VA	Welding Rece
Demand Factor		125%	1313	VA	Lighting Load
Continuous Sub-Total			26243	VA	
Net Calculated Load			32983	VA	
Total Amps	VA / Volts = A	mps	92	Amps	208 Volt Thre New 45Kva

Calculated by Bertin Engineering

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DRAWINGS.

NOTE:



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l0kVA @ 100%, remainder at 50%

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SHORT CIRCUIT CALCULATIONS

UTILITY TRANSFORMER TO SWITCHBOARD 'MSB' APPROXIMATE LENGTH OF RUN: 75' CONDUCTORS PER PHASE: 3 (#600MCM) SHORT CIRCUIT AT START OF RÜN: 38,230 AMPS LINE TO LINE VOLTAGE: 480 VOLTS

ALL ABBREVIATIONS AND SYMBOLS MAY NOT

APPEAR ON THE DRAWINGS FOR THIS PROJECT

FAULT CURRENT (L-L): 34,042 AMPS

'MSB' TO PANEL '100A D.S.', '45KVA XFMR', 'HA' APPROXIMATE LENGTH OF RUN: 75' CONDUCTORS PER PHASE: 1 (#4)

SHORT CIRCUIT AT START OF RUN: 34,042 AMPS LINE TO LINE VOLTAGE: 480 VOLTS

FAULT CURRENT (L-L): 9,950 AMPS

CALCULATION ASSUMES A STANDARD 1000KVA UTILITY TRANSFORMER WITH INFINITE PRIMARY AMPERES. CONTRACTOR SHALL COORDINATE EXACT SHORT CIRCUIT RATING AVAILABLE AT THE UTILITY TRANSFORMER AND FEEDER LENGTH WITH THE UTILITY COMPANY. ALL PANEL FEEDER CONDUCTOR LENGTHS SHALL MATCH SHORT CIRCUIT CALCULATIONS LENGTH AT A MINIMUM, LONGER CONDUCTORS ARE ACCEPTABLE.





- 1 PROVIDE NEMA 6-50R RECEPTACLES FOR WELDING PURPOSES. CONFIRM FINAL RECEPTACLE LOCATION WITH OWNER PRIOR TO INSTALLATION.
- 2 PROVIDE 15A/2P N.F. D.S.
- 3 PROVIDE 15A/2P N.F. D.S. (4) PROVIDE 30A/2P N.F. D.S.

DISTRIBUTION DIAGRAM 2 SCALE: NONE

			NE	EW PANEL	<u>'HA</u>	, 2	08/1	20V -	- 3ø	- 4W +	GND 15	OA MB 22K	SCA		
	WIRE	GND	CIR	DESIGNATION		BREAKER	PA	NEL LO	AD øC	BREAKER		DESIGNATION	CIR	GND	WIRE
	#12	#12	1		785	20	4045		ØC		4160		2		#8
	#12	#12	-7	OFFICE SPACE	765	20	4945	4500		50/2	4100	WELDER RFCFPTACLF #1		#10	#0
	#1Z	#1Z	3	GARAGE RECPT	360	20		4520			4160		4		#0
	<i>#</i> 12	#12	5	BATH CIRCUIT	265	20			265	20	0	SPARE	6		
1	# 12	#12	7	GARAGE RECPT	360	20	360			20	0	SPARE	8		
٩Þ	# 12	#12	9	GARAGE RECPT	540	20		540		20	0	SPARE	10		
(NEI	<i>#</i> 12	<i>#</i> 12	11	GARAGE RECPT	540	20			540	20	0	SPARE	12		
	<i>#</i> 12	<i>#</i> 12	13	GARAGE RECPT	360	20	360			20	0	SPARE	14		
AT5	<i>#</i> 12	<i>#</i> 12	15	WATER RM RECPT	360	20		360		20	0	SPARE	16		
15C	# 12	<i>#</i> 12	17	CO DETECTOR	50	20			50	20	0	SPARE	18		
2ME	# 12	<i>#</i> 12	19	OH DOOR#1	500	20	2550				2050		20	//10	#12
I C 4:	# 12	<i>#</i> 12	21	OH DOOR#2	500	20		2550		25/2+	2050	EHWH	22 #'	#\Z	#12
È	<i>#</i> 12	<i>#</i> 12	23	EXT. RECPT	180	20			930	20+	750	EBH-1	24	#12	#12
IEN	<i>#</i> 12	<i>#</i> 12	25	GARAGE LT	1040	20	1063			20+	23	ERV-1	26	#12	#12
SIEN	<i>#</i> 12	<i>#</i> 12	27	HAND DRYER	1500	20		1930		15 /2 .	430		28	<i>#</i> 1.2	#12
0,	<i>#</i> 12	<i>#</i> 12	29	EXTERIOR LTNG	500	20			930	13/2+	430	AHU-2	30	<i>#</i> '∠	#12
			31	SPARE	0	20	104			15 /2 1	104	ALILL Z	32		#12
			33	SPARE	0	20		104		13/2+	104	AHU-3	34] #' <i>~</i>	#12
			35	SPARE	0	20			104	15 /0 .	104		36		#12
			37	SPARE	1	20	105			15/2+	104	AHU-1	HU-1 38	<i>#</i> '∠	#12
			39	SPARE	2	20		4400		4398	4398		40	# 10	#8
			41	SPARE	3	20			4401	50/2+	4398	ACCU-1 42	42		#8
							9487	14404	7220	TOTAL	31111				

+ DENOTES HACR RATED BREAKER * DENOTES GROUND FAULT CIRCUIT INTERRUPTER (GFCI) RATED BREAKER

JNTING	LAMP DATA	REMARKS
RFACE	LED FURNISHED WITH UNIT (6431 LUMENS— 65WATTS)	ARCHITECTURAL SURFACE MODULE 1X4 LED VOLUME LUMINAIRE.
RFACE	LED FURNISHED WITH UNIT	THERMOPLASTIC EXIT/UNIT COMBO
RFACE	LED FURNISHED WITH UNIT	EXTERIOR EMERGENCY LIGHT WITH BATTERY
RFACE	LED FURNISHED WITH UNIT	THERMOPLASTIC EMERGENCY LIGHT
RFACE	LED FURNISHED WITH UNIT	LED WALL PACK FIXTURES WITH BUILT IN PHOTOCELL AND ADJUSTABLE WATTAGE, LUMEN, AND COLOR SETTINGS

