

HVAC LEGEND

SYMBOL	DESCRIPTION
	SUPPLY DUCT
	RETURN OR EXHAUST DUCT
	RECTANGULAR DUCT UP (SUPPLY SHOWN)
	RECTANGULAR DUCT DOWN (SUPPLY SHOWN)
	RECTANGULAR DUCTWORK - 20" SIDE SHOWN x 12" SIDE NOT SHOWN
	DUCTWORK LINED WITH FIBERGLASS DUCT LINER - INSIDE DIMENSION SHOWN
	EXISTING DUCTWORK OR DEVICE TO REMAIN - SIZE REFERENCED FROM ORIGINAL DWG'S
	EXISTING DUCTWORK OR DEVICE TO BE REMOVED
	MITERED ELBOW WITH DOUBLE THICKNESS TURNING VANES
	FULL RADIUS ELBOW
	FLEXIBLE CONNECTION
	FLEXIBLE DUCTWORK
	SPIN-IN FITTING WITH SCOOP AND MANUAL DAMPER
	SPIN-IN FITTING WITH MANUAL DAMPER
	SPIN-IN FITTING WITH SCOOP
	FLAT OVAL DUCTWORK - 20" SIDE SHOWN x 12" SIDE NOT SHOWN
	ROUND DUCT UP
	ROUND DUCT DOWN
	ACCESS PANEL (AP) OR ACCESS DOOR (AD) - ACCESS PANEL SHOWN
	1-1/2 HOUR FIRE DAMPER (UL 555) WITH ACCESS DOOR OR PANEL
	FD-3
	SPLITTER DAMPER
	SMOKE DAMPER (UL 555B) WITH ACCESS DOOR OR PANEL
	COMBINATION FIRE & SMOKE DAMPER (UL 555B) WITH ACCESS DOOR OR PANEL
	BACK-DRAFT DAMPER WITH ACCESS DOOR OR PANEL
	MANUAL VOLUME DAMPER WITH ACCESS DOOR OR PANEL
	MOTOR OPERATED DAMPER WITH ACCESS DOOR OR PANEL
	DUCT MOUNTED SMOKE DETECTOR, FURNISHED BY ELECTRICAL, INSTALLED BY HVAC
	REFRIGERANT SUCTION PIPING
	REFRIGERANT LIQUID PIPING
	HOT WATER SUPPLY PIPING
	HOT WATER RETURN PIPING
	CONDENSATE DRAIN PIPING
	CIRCULATING WATER SUPPLY PIPING
	CIRCULATING WATER RETURN PIPING
	COOLING TOWER WATER SUPPLY PIPING
	COOLING TOWER WATER RETURN PIPING
	COLD WATER PIPING
	PIPE TURNING UP
	PIPE TURNING DOWN
	TEE CONNECTION IN SIDE OF PIPE
	TEE CONNECTION IN BOTTOM OF PIPE
	TEE CONNECTION IN TOP OF PIPE
	UNION
	END CAP
	CONCENTRIC INCREASER/REDUCER
	BALL VALVE
	BUTTERFLY VALVE
	GATE VALVE
	CHECK VALVE
	THREE WAY CONTROL VALVE
	MOTOR OPERATED BUTTERFLY VALVE
	MOTOR OPERATED CONTROL VALVE
	BALANCING VALVE
	FLOW CONTROL VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	BACKFLOW PREVENTER
	STRAINER
	STRAINER WITH BLOW-OFF VALVE
	MANUAL AIR VENT
	AUTOMATIC AIR VENT
	PRESSURE GAUGE
	NEEDLE VALVE IN 1/4" GAUGE LINE
	PRESSURE TAP
	THERMOMETER
	THERMOMETER WELL IN PIPING
	FLOOR DRAIN LOCATION FOR REFERENCE
	CONDENSATE P-TRAP LOCATION FOR REFERENCE
	FLOW SWITCH
	PRESSURE DIFFERENTIAL SWITCH
	DUCTLESS SPLIT SYSTEM UNIT CONTROLLER
	EMS TEMPERATURE SENSOR
	EMS SPACE HUMIDITY SENSOR
	ABOVE FINISHED FLOOR
	ABOVE FINISHED GRADE
	ABOVE CEILING
	OUTSIDE AIR
	RETURN AIR
	SUPPLY AIR
	NOT IN CONTRACT
	EXISTING
	WALL OPENING
	THERMOSTAT
	RISE IN DIRECTION OF ARROW
	DROP IN DIRECTION OF ARROW
	DENOTES 1 HR FIRE RATED WALL, VERIFY ON ARCHITECTURAL DRAWINGS
	DENOTES 2 HR FIRE RATED WALL, VERIFY ON ARCHITECTURAL DRAWINGS
	OCCUPANCY SENSOR, SEE ELECTRICAL
	FABRIC (NON-METALLIC) BACK-DRAFT DAMPER (RUSKIN NMS2)

ROOF-TOP AIR CONDITIONING UNITS

UNIT DESIGNATION	R60	R12	R101	R120
MANUFACTURER	CARRIER	CARRIER	CARRIER	CARRIER
MODEL NUMBER	48HC06	48HC07	48HC04	48HC12
EVAPORATOR FAN PERFORMANCE				
TOTAL SUPPLY AIR (CFM)	1,750	2,100	3,000	4,000
MINIMUM OUTSIDE AIR (CFM)	260	315	450	600
EXTERNAL STATIC PRESSURE (" H ₂ O)	.35	.35	.60	.40
FAN MOTOR HORSEPOWER	1.0	2.0	2.0	3.0
COOLING PERFORMANCE				
TOTAL CAPACITY (BTUH)	54,300	73,600	101,600	119,500
SENSIBLE CAPACITY (BTUH)	44,700	59,300	75,600	84,600
ENTERING AIR TEMPERATURE DBWB (°F)	80/67	80/67	80/67	80/67
OUTSIDE AMBIENT TEMP (°F)	45	45	45	45
MINIMUM (SEER) EER AT ARI CONDITIONS	(5.2) 12.4	12.0	12.0	11.5
HEATING PERFORMANCE				
HEATING INPUT (BTUH)	115,000	125,000	180,000	180,000
HEATING OUTPUT (BTUH)	49,000	109,000	148,000	148,000
A/RUE (% EFFICIENCY)	82	82	82	82
TEMPERATURE RISE (°F)	44	45	45	34
FUEL TYPE	NATURAL GAS	NATURAL GAS	NATURAL GAS	NATURAL GAS
ACCESSORIES				
DEHUMIDIFICATION CYCLE	YES	YES	YES	YES
SLOPED ACCESSORY ROOF CURB	YES	YES	YES	YES

DESIGN CONDITIONS

SUMMER	- OUTSIDE	43.9°F DB, 14.2°F MCDB
	- INSIDE	71.9°F DB, 66.5°F MCDB
	- INSIDE	78°F DB, 50% RH
WINTER	- OUTSIDE	21.5°F
	- INSIDE	72°F
	- INSIDE	70°F - GYMNASIUMS

OUTSIDE DESIGN CONDITIONS ARE BASED ON ASHRAE GUIDE HANDBOOK OF FUNDAMENTALS, 2018 EDITION. SUMMER CONDITIONS ARE FROM 4th COLUMN. WINTER CONDITIONS ARE FROM 9th COLUMN.

OUTSIDE AIR REQUIREMENTS

SYSTEMS ARE DESIGNED TO COMPLY WITH THE 2012 INTERNATIONAL MECHANICAL CODE WITH ALL SUBSEQUENT GEORGIA AMENDMENTS, THE 2009 INTERNATIONAL ENERGY CONSERVATION CODE WITH ALL SUBSEQUENT GEORGIA SUPPLEMENTS AND AMENDMENTS, AND ASHRAE STANDARD 62.1-2010 (AQ PROCEDURE). IONIZATION UNITS ARE USED TO REDUCE THE CONTAMINANTS LISTED IN APPENDIX B TO LESS THAN THE MAXIMUM ACCEPTABLE LEVEL. OUTSIDE AIR IS PROVIDED AT A MINIMUM OF 5 CFM PER PERSON IN EACH SPACE (15 CFM PER PERSON IN CLASSROOMS) OR MORE IF REQUIRED TO OFFSET BUILDING EXHAUST & MAINTAIN A POSITIVE PRESSURE IN THE BUILDING.

PUMPS

PUMP DESIG.	SERVICE	GPM	HEAD FT H ₂ O	PUMP EFF.	HP	RPM	MIN. GPM	TYPE	MANUFACTURER # MODEL NUMBER
P-1 & 2	CIRCULATING WATER	800	100	76%	30 (1D)	1750	154	FRAME MOUNTED	ABB ACH550
P-3 & 4	COOLING TOWER WATER	800	60	69%	15 (1D)	1750	141	FRAME MOUNTED	ABB ACH550
P-B1	BOILER WATER	45	3	-	1/2	SPR	-	IN-LINE	INFORMOS 1/2 50-60

NOTE: (1D) INDICATES INVERTER DUTY MOTOR

VARIABLE FREQUENCY DRIVES

DRIVE DESIG.	DRIVE SERVES	VOLTS	PHASE	MOTOR HP	FRAME SIZE	ENCLOSURE	MANUFACTURER # MODEL NUMBER
V-P1	PUMPS P-1 & P-2	480V-3P	3	30	R3	UL TYPE I VERTICAL	ABB ACH550
V-P3	PUMPS P-3 & P-4	480V-3P	3	15	R2	UL TYPE I VERTICAL	ABB ACH550
V-CT1	COOLING TOWER FAN CT-1	480V-3P	3	15	R2	UL TYPE I VERTICAL	ABB ACH550

NOTES:
 1. FURNISH ENHANCED BYPASS SYSTEM WITH DISCONNECT & FUSES.
 2. FURNISH CONNECTION FOR COMMUNICATION WITH BUILDING CONTROLS.
 3. MOUNT DRIVE WITH TOP 5'-6" AFF.

COOLING TOWER

COOLING TOWER DESIGNATION	CT-1
MANUFACTURER	EVAPCO
MODEL NUMBER	UT-1R-4.31
TYPE	UPFLOW
ENTERING AIR W.B. TEMPERATURE (°F)	78
ENTERING WATER TEMPERATURE (°F)	45
LEAVING WATER TEMPERATURE (°F)	85
WATER FLOW (GPM)	800
MAX. STATIC LIFT + PRESS. DROP (PSI)	9
MAX. FAN MOTOR HORSEPOWER (HP)	15
TOTAL HEAT REJECTED (BTU/HR)	4,000,000
BASE HEATER (KW)	6 KW @ 480V
SOUND PRESSURE LEVEL (dBA)	
TOP OF TOWER GBA @ (5' / 50')	71 / 63
MOTOR SIDE OF TOWER GBA @ (5' / 50')	71 / 67

NOTES:
 1. (1D) INDICATES INVERTER DUTY MOTOR
 2. FURNISH SUPER LOW SOUND FAN (WHISPER QUIET, ULTRA QUIET)

WATER SOURCE HEAT PUMP UNITS

UNIT DESIGNATION	W06	W12	W18	W24	W30	W36	W42	W48	W60	
MANUFACTURER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	
MODEL NUMBER	PCH007	PCH012	PCH018	PCH024	PCH030	PCH036	PCH042	PCH048	PCH060	
TYPE	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	
MAX. UNIT DIMENSIONS L x M x H (")	40 x 20 x 15	40 x 20 x 15	46 x 23 x 18	46 x 23 x 18	46 x 23 x 18	54.5 x 25 x 14	54.5 x 25 x 14	58 x 33 x 21	58 x 33 x 21	
SUPPLY FAN PERFORMANCE										
SUPPLY AIR (CFM)	300	400	600	800	1000	1200	1400	1600	2000	
EXTERNAL STATIC PRESSURE (" H ₂ O)	.20	.20	.30	.30	.35	.35	.35	.35	.35	
MAX. FAN MOTOR HORSEPOWER	1/10	1/10	1/4	1/4	3/4	1/2	1/2	3/4	3/4	
COOLING PERFORMANCE										
TOTAL COOLING CAPACITY (BTUH)	6,000	11,700	14,400	24,000	30,500	34,200	42,300	44,500	60,900	
SENSIBLE COOLING CAPACITY (BTUH)	4,500	9,000	14,400	17,300	22,500	26,300	31,700	35,300	44,500	
ENTERING AIR TEMPERATURE DBWB (°F)	80/67	80/67	80/67	80/67	80/67	80/67	80/67	80/67	80/67	
ENTERING WATER TEMPERATURE (°F)	40	40	40	40	40	40	40	40	40	
MINIMUM EER AT ARI CONDITIONS	12.5	11.8	13.4	13.4	14.1	14.1	14.1	12.9	13.2	
HEAT REJECTED	7,500	14,400	24,000	24,000	31,000	47,000	51,200	54,000	76,000	
HEATING PERFORMANCE										
TOTAL HEATING CAPACITY (BTUH)	7,000	13,900	23,800	29,000	36,800	44,900	51,900	51,000	67,800	
ENTERING AIR TEMPERATURE (°F)	70	70	70	70	70	70	70	70	70	
ENTERING WATER TEMPERATURE (°F)	60	60	60	60	60	60	60	60	60	
MINIMUM COP AT ARI CONDITIONS	4.5	4.3	4.6	4.4	4.3	4.2	4.3	4.3	4.2	
HEAT ABSORBED (BTUH)	5,300	10,600	18,600	22,600	28,500	35,300	39,000	39,200	53,800	
WATER FLOW										
WATER COIL FLOW (GPM)	15	30	40	50	60	70	80	100	150	
MAXIMUM COIL PRESSURE DROP (FT)	3.5	8.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
MIN. CONTROL VALVE Cv / MAX. P.D. (FT.)	NO VALVE	2.1 / 4.6	2.8 / 4.6	4.2 / 4.6	5.0 / 4.6	6.4 / 4.6	7.0 / 4.6	8.5 / 4.6	10.7 / 4.6	
FLEXIBLE HOSE & PIPE DIAMETER	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1-1/4"	

NOTES:
 1. E.S.P. INCLUDES 0.25 FOR 2" MERV 6 FILTER (GT CLEAN).
 2. OMIT LINE SIZE WATER CONTROL VALVES ON PUMP UNITS TO PROVIDE MINIMUM FLOW THROUGH THE PUMP IN THE FOLLOWING MANNER: FIRST OMIT VALVES ON UNITS AT THE END OF ALL MAINS AND ON UNITS IDENTIFIED AS HAVING "NO VALVE" IN THE SCHEDULE.

ENERGY RECOVERY UNITS

UNIT DESIGNATION	ERU-1	ERU-2 - 4
SERVES	ADMIN	CRS
MANUFACTURER	PROA	PROA
MODEL NUMBER	PROA 40	PROA 300
MAX HEIGHT IV ACCESSORIES & GUNS (LBS)	4.5	6,500
OUTSIDE AIR SUPPLY SIDE		
AIR QUANTITY (CFM)	12	5,850
EXTERNAL STATIC PRESSURE (" H ₂ O)	0.5	1.0
FAN MOTOR HORSEPOWER	1	5
EXHAUST AIR SIDE		
AIR QUANTITY (CFM)	1,000	4,700
EXTERNAL STATIC PRESSURE (" H ₂ O)	0.5	1.0
FAN MOTOR HORSEPOWER	1	5
DESICCANT WHEEL PERFORMANCE - SUMMER		
EXHAUST ENTERING AIR TEMP. (°F/DB)	78 / 50%	78 / 50%
OUTSIDE ENTERING AIR TEMP. DB / WB (°F)	94 / 74	94 / 74
OUTSIDE LEAVING AIR TEMP. DB / WB (°F)	81.7 / 67.4	82.6 / 68.0
SENSIBLE EFFECTIVENESS(ASHRAE 54-1941)	81	76
LATENT EFFECTIVENESS (%)	77	71
DX COOLING COIL PERFORMANCE		
ENTERING AIR TEMP. (DB / WB)	81.7 / 67.4	82.6 / 68.0
LEAVING AIR TEMP. (DB / WB)	54.3 / 54.1	50.3 / 50.3
TOTAL CAPACITY (BTUH)	24,522	132,800
EER	15.8	14.2
HOT GAS REHEAT PERFORMANCE		
ENTERING AIR TEMP. (DB / WB)	54.0 / 53.1	50.3 / 50.3
LEAVING AIR TEMP. (DB / WB)	76.2 / 63.1	78 / 61
DESICCANT WHEEL PERFORMANCE - WINTER		
EXHAUST ENTERING AIR TEMP. (DB / WB)	72 / 30%	72 / 30%
OUTSIDE ENTERING AIR TEMP. (DB / WB)	17 / 14	17 / 14
OUTSIDE LEAVING AIR TEMP. DB / WB (°F)	58.5 / 44.1	52.8 / 42.2
GAS HEAT PERFORMANCE - WINTER		
ENTERING AIR TEMP. (DB °F)	55	55
LEAVING AIR TEMP. (DB °F)	78	78
INPUT (BTUH)	75,000	200,000
OUTPUT (BTUH)	60,000	160,000
ACCESSORIES		
SLOPED ROOF CURB / EQUIPMENT SUPPORTS	YES	YES
VIBRATION ISOLATION CURBS	YES	YES

Ⓢ DENOTES STATEPOINT FOR OUTSIDE AIR CONDITIONS - SEE EMS SCHEMATIC ON N4.1

AIRFLOW MEASUREMENT DEVICES

SERVES	DUCT SIZE	AIRFLOW (CFM)	MANUFACTURER # MODEL NUMBER
ERU-1 SUPPLY	28 x 10	1,200	EBTRON 6TC116-P4
ERU-1 EXHAUST	28 x 12	1,000	EBTRON 6TC116-P4
ERU-2 SUPPLY	36 x 22	5,850	EBTRON 6TC116-P4
ERU-2 EXHAUST	36 x 22	4,700	EBTRON 6TC116-P4
ERU-3 SUPPLY	36 x 22	5,850	EBTRON 6TC116-P4
ERU-3 EXHAUST	36 x 22	4,700	EBTRON 6TC116-P4
ERU-4 SUPPLY	36 x 22	5,850	EBTRON 6TC116-P4
ERU-4 EXHAUST	36 x 22	4,700	EBTRON 6TC116-P4

IONIZATION UNITS

1. IONIZATION UNITS SHALL BE SIZED TO COMPLY WITH ASHRAE 62.1-2004 AND SHALL MAINTAIN A CONCENTRATION OF NEGATIVE IONS AT A LEVEL OF 500 TO 1500 IONS PER CUBIC CENTIMETER IN THE PRIMARY SPACE SERVED BY THE DEVICE.
2. IONIZATION UNIT SHALL BE UL LISTED OR ETL LISTED FOR INSTALLATION IN A RETURN AIR PLenum.
3. INSTALL IONIZATION UNITS IN SUPPLY FAN INLET OR IN SUPPLY AIR DUCTWORK IN ACCESSIBLE LOCATION.
4. CALCULATIONS FOR SIZING THE IONIZATION UNITS SHALL BE BASED ON THE USE OF THE SPACE AND ANY UNUSUAL ODOR PROBLEMS SUCH AS IN SCIENCE LABS, & GRAPHIC ARTS.
5. PROVIDE IONIZATION UNITS FOR ALL PHPS AND RIUS.
6. PROVIDE IONIZATION UNITS AS FOLLOWS: 6.1. 6PS-1N / 6PS-24G, UP TO 2400 CFM, BAS CONTACT, DUCT MOUNTED, 24V. (PROVIDE TRIPLE CAPACITY ON ART ROOMS, CHEMISTRY & BIOLOGY LABS). 6.2. 6PS-FC-9-BAS, UP TO 3200 CFM, BAS CONTACT, FAN INLET MOUNTED, 24V. 6.3. TWO 6PS-FC-3-BAS, UP TO 6400 CFM, BAS CONTACT, FAN INLET MOUNTED, 24V. 6.4. 6PS-1BAR, ABOVE 6400 CFM, BAS CONTACT, MOUNTED AFTER THE FILTERS AT THE TOP OF THE COOLING COIL. BAR IS FULL WIDTH OF THE COOLING COIL, 120V OR 208V/1.

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