

LEGEND

	POSITIVE PRESSURE SUPPLY DUCT TURNING UP		PIPING
	NEGATIVE PRESSURE RETURN OR EXHAUST DUCT TURNING UP		ELBOW TURN UP
	POSITIVE PRESSURE SUPPLY DUCT TURNING DOWN		ELBOW TURN DOWN
	NEGATIVE PRESSURE RETURN OR EXHAUST DUCT TURNING DOWN		CONNECTION, BOTTOM
	FLAT OVAL DUCT SIZE. FIRST SIZE LISTED IS SIDE SHOWN IN PLANS.		CONNECTION, TOP
	RECTANGULAR DUCT SIZE. FIRST SIZE LISTED IS SIDE SHOWN IN PLANS.		CHWS CHILLED WATER SUPPLY PIPING
	EXTERNALLY INSULATED DUCTWORK		CHWR CHILLED WATER RETURN PIPING
	EXTERNALLY INSULATED ROUND FLEXIBLE DUCTWORK		HWS HEATING WATER SUPPLY PIPING
	DUCT ELBOW WITH TURNING VANES		HWR HEATING WATER RETURN PIPING
	RADIUSED DUCT ELBOW		NEW UNDERGROUND PIPING
	FLEXIBLE DUCT CONNECTION		CONDENSATE DRAIN PIPING
	MANUAL VOLUME BALANCING DAMPER		GATE VALVE
	TRANSITION		BALL VALVE
	FLEX DUCT TAKE OFF WITH MVD		BUTTERFLY VALVE
	BRANCH DUCT TAKEOFF WITH MVD		SWING CHECK VALVE
	RETURN OR SUPPLY DEVICE WITH MVD DIRECTLY BELOW MAIN TRUNK DUCT		SPRING CHECK VALVE
	TEE WITH TURNING VANES		PRV PRESSURE REDUCING VALVE
	MOTORIZED DAMPER		PRESSURE RELIEF VALVE, PIPE FULL SIZE DISCHARGE TO FLOOR DRAIN
	FIRE DAMPER		CIRCUIT SETTER
	1 DETAIL X-000 SHEET REFERENCED		TRIPLE DUTY VALVE
	EQUIPMENT TAG		AUTOMATIC FLOW CONTROL VALVE
	SHEET NOTE		2-WAY CONTROL VALVE
	COMBINATION THERMOSTAT/HUMIDISTAT MOUNTED AT 54" AFF. (1" INDICATES AHU CONTROLLED)		3-WAY CONTROL VALVE
	CO2 "CARBON DIOXIDE"		COMBINATION VENTURI AND BALL VALVE WITH MEMORY STOP FOR FLOW BALANCING AND SHUT OFF SERVICE
	SMOKE DETECTOR (PROVIDED BY DIVISION 26, INSTALLED BY DIVISION 23 AND WIRED BY DIVISION 26)		MULTI-TURN BALANCING VALVE
	UNDER CUT DOOR 3/4"		UNION
			GLOBE VALVE
			THERMAL EXPANSION VALVE
			TRIPLE DUTY VALVE
			ANGLE VALVE
			SOLENOID VALVE
			BACKPRESSURE RELIEF OR SAFETY VALVE
			BACKPRESSURE REGULATOR (SELF-CONTAINED)
			BACKPRESSURE REGULATOR (EXTERNAL PRESSURE)
			FLEXIBLE PIPE CONNECTOR
			COMBINATION PRESSURE AND TEMPERATURE TEST PLUG WITH EXTENDED NECK AND CAP
			STRAINER WITH BLOW DOWN GATE VALVE FULL SIZE OF STRAINER AND 3/4" PIPE END CONNECTION AND CAP
			MANUAL AIR VENT WITH 1/2" BALL VALVE ROUTE 1/2" SOFT PIPING FROM DISCHARGE TO FLOOR DRAIN UNLESS OTHERWISE NOTED.

DIFFUSER REGISTER & GRILLE LEGEND

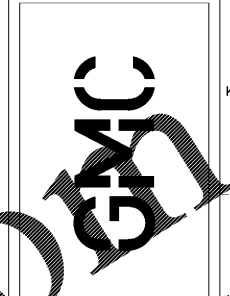
	CEILING DIFFUSER EQUAL TO TITUS 300FS CEILING DIFFUSER SUITABLE FOR INSTALLATION IN GYPSUM BOARD CEILING OR LAY-IN INSTALLATION IN TILE CEILING. SIZE AND AIRFLOW AS INDICATED. PROVIDE WITH SQUARE-TOP AND NECK TRANSITION AS REQUIRED.
	RETURN REGISTER (RAR) OR RETURN GRILLE (RAG) OR TRANSFER GRILLE (TAG) OR TRANSFER REGISTER (TRR) OR EXHAUST GRILLE (EAG) OR EXHAUST REGISTER (EAR) EQUAL TO TITUS 300FS 2F WITH 0" DEFLECTION AND 3/4" SPACING SUITABLE FOR SURFACE MOUNTING TO SIDEWALL GYPSUM BOARD CEILING OR LAY-IN INSTALLATION IN TILE CEILING. REGISTER DESIGNATION INDICATES GRILLE TO BE PROVIDED WITH OPPOSED BLADE DAMPER SIZE AS INDICATED. FOR LAY-IN INSTALLATION, PROVIDE LAY-IN BORDER FRAME AND PROVIDE FILLER PANEL FOR CEILING TILE LOCATION.
	SUPPLY REGISTER (SAR) OR SIDEWALL SUPPLY REGISTER (SWR) EQUAL TO TITUS 300FS SUPPLY GRILLE. PROVIDE WITH OPPOSED BLADE DAMPER. SIZE AND AIRFLOW AS INDICATED. FOR LAY-IN INSTALLATION, PROVIDE LAY-IN BORDER FRAME AND PROVIDE FILLER PANEL FOR CEILING TILE LOCATION.
	OUTSIDE AIR LOUVER (OAL) OR EXHAUST DAC LOUVER (EAL) OUTSIDE AIR LOUVER EQUAL TO POTTORF MODEL ECD-545-MD, AMCA540 AND AMCA 550 LISTED. DRAINABLE BLADE LOUVER, ALUMINUM CONSTRUCTION WITH CLEAR ANODIZED FINISH (COORDINATE COLOR WITH OWNER); DRAINABLE AND WIND BLOWN RAIN RESISTANT, 30% FREE AREA. PROVIDED WITH BIRD SCREEN. LOUVER SIZE AS INDICATED (FACE AREA).

GENERAL NOTES

- CONTRACTOR SHALL COORDINATE WITH ALL TRADES THE REQUIRED OPENINGS IN WALLS, FOUNDATIONS, FLOORS, AND ROOFS.
- FIELD VERIFY ALL DIMENSIONS, SIZES, AND CONNECTION LOCATIONS BEFORE ANY DUCTWORK FABRICATION OR PIPE CUTTING IS COMMENCED.
- PROVIDE ANY OFFSETS, TRANSITIONS, AND OTHER MINOR ADJUSTMENTS AS REQUIRED FOR A COMPLETE AND WORKING SYSTEM INSTALLATION.
- COORDINATE FLOOR DRAIN LOCATIONS IN MECHANICAL ROOMS WITH ANY EQUIPMENT LOCATED IN THE MECHANICAL ROOM. ROUTE CONDENSATE DRAIN PIPING OUT OF WALKWAY PATHS. CONDENSATE DRAIN PIPING SHALL BE COPPER TYPE L WITH A MIN. OF 1" FLEXIBLE ELASTOMERIC CELLULAR INSULATION AND VAPOR BARRIER.
- VERIFY MECHANICAL EQUIPMENT LOCATIONS AND PROVIDE ADEQUATE MAINTENANCE CLEARANCE AROUND EACH PIECE OF EQUIPMENT PER THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE CLEARANCE IN FRONT OF ELECTRICAL PANELS AND OTHER ELECTRICAL EQUIPMENT PER THE NATIONAL ELECTRICAL CODE REQUIREMENTS. COORDINATE WITH OTHER TRADES.
- HVAC REGISTERS, GRILLES, DIFFUSERS, PIPING, ETC. ARE SHOWN IN APPROXIMATE LOCATIONS. ACTUAL LOCATIONS SHALL BE DETERMINED IN THE FIELD. FULLY COORDINATED AND IN COMPLIANCE WITH CONTRACT DOCUMENTS. IN NO INSTANCE SHALL THE LOCATION VIOLATE STANDARDS, CODES, GOOD HVAC PRACTICES, AND THE INTENT OF THE HVAC DESIGN. CONSULT ENGINEER PRIOR TO RELOCATION. MECHANICAL DRAWINGS, IN SOME RESPECTS, ARE DIAGRAMMATIC. COORDINATION, LAYOUT OF SECTIONS, OR FIELD MEASUREMENTS MAY BE REQUIRED PRIOR TO FABRICATION OF DUCTWORK OR PIPING. MODIFY SIZES, AS DIRECTED BY ENGINEER, FOR FIT. ARRANGE ALL DUCTWORK AND PIPING IN A NEAT AND ORDERLY MANNER. COORDINATE WITH OTHER TRADES.
- MECHANICAL CONTRACTOR SHALL NOT CUT ANY STRUCTURAL MEMBERS OF BUILDING WITHOUT PRIOR CONSENT OF ARCHITECT AND STRUCTURAL ENGINEER.
- OUTSIDE AIR INLETS TO BE LOCATED A MINIMUM OF 10 FT FROM ANY EXHAUST AIR OUTLET OR PLUMBING VENT STACK. COORDINATE WITH THE PLUMBING AND THE GENERAL CONTRACTORS IN THE FIELD. OUTSIDE AIR INTAKES FOR BUILDING VENTILATION SHALL BE LOCATED A MINIMUM OF 10 FT ABOVE GRADE.
- PROVIDE WATER PROOF SEALING OF PIPE AND DUCT PENETRATIONS OF EXTERIOR WALLS, FLOORS, AND/OR ROOF.
- ALL PIPING SYSTEM SHALL BE FLUSHED UNTIL CLEAN BEFORE EQUIPMENT CONNECTION.
- PENETRATIONS THROUGH FIRE RATED FLOORS AND WALLS ARE TO BE FIRE SEALED SO AS TO MAINTAIN FLOOR OR WALL INTEGRITY IN THE EVENT OF A FIRE. ALL PENETRATIONS OF FIREWALLS, CEILING, FLOORS, ETC. FOR PIPING SHALL BE UL LISTED FIRESTOPS AND SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL OBTAIN MANUFACTURER'S SHOP DRAWINGS FOR ALL JOBSITE PENETRATIONS.
- SUPPLY AIR DUCTWORK UPSTREAM OF AIR TERMINAL TO BE DOUBLE-WALLED MEDIUM PRESSURE ROUND OR FLAT OVAL. PROVIDE SMACNA STATIC PRESSURE CLASS AS REQUIRED FOR SCHEDULE EXTERNAL STATIC PRESSURE. SEAL CLASS A, INTERNALLY INSULATED. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS. PROVIDE FIRST 25 FEET OF SUPPLY DUCTWORK IMMEDIATELY DOWNSTREAM OF AIR HANDLING UNIT WITH PERFORATED INNER LINER FOR SOUND CONTROL.
- SUPPLY AIR DUCTWORK DOWNSTREAM OF AIR TERMINAL UNITS (EXCEPT TAKEOFFS TO SUPPLY AIR DIFFUSERS) TO BE SINGLE WALL LOW PRESSURE RECTANGULAR, SMACNA STATIC PRESSURE CLASS 2" W.G., SEAL CLASS A, EXTERNALLY INSULATED WITH 2" THICK FIBERGLASS DUCT WRAP. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS.
- RETURN AIR DUCTWORK TO BE SINGLE WALL LOW PRESSURE RECTANGULAR, SMACNA STATIC PRESSURE CLASS 2" W.G., SEAL CLASS A. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS. PROVIDE 2" THICK EXTERNAL FIBERGLASS WRAP.
- OUTSIDE AIR INTAKE DUCTWORK TO BE SINGLE WALL LOW PRESSURE RECTANGULAR, SMACNA STATIC PRESSURE CLASS 2" W.G., SEAL CLASS A, EXTERNALLY INSULATED WITH 2" THICK FIBERGLASS WRAP. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS.
- EXHAUST AIR DUCTWORK TO BE LOW PRESSURE SINGLE WALL RECTANGULAR, SMACNA STATIC PRESSURE CLASS 2" W.G., SEAL CLASS A. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS.
- ALL ROUND FLEXIBLE DUCT SHALL BE FACTORY PRE-INSULATED WITH CORRUGATED ALUMINUM LINER. MAXIMUM LENGTH OF ANY FLEXIBLE DUCT RUNOUT SHALL BE 6' WHERE LENGTH REQUIRED EXCEEDS 6', INSTALL EXTERNALLY INSULATED ROUND SNAP LOCK DUCT FOR BALANCE OF DISTANCE TO SPIN-IN TAP AT MAIN DUCT TRUNK.
- PROVIDE SPIN-IN WITH EXTENDED SPIN-IN DAMPER OPERATOR HANDLE FOR ALL DIFFUSER RUNOUTS.
- ALL DUCTWORK CONSTRUCTION, DUCT HANGERS AND SUPPORTS SHALL COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE" FOR METAL THICKNESS, REINFORCING TYPES AND INTERVALS, TIE-ROD APPLICATIONS, AND JOIST TYPES AND INTERVALS. SUPPORT HORIZONTAL DUCTS WITHIN 24" OF EACH ELBOW AND WITHIN 48" OF EACH BRANCH. SEE DUCT HANGER DETAILS.
- ALL DUCT ELBOWS SHALL BE LONG RADIUS TYPE OR, WHERE INDICATED, SQUARE ELBOW WITH TURNING VANES. PROVIDE TURNING VANES ON ALL SQUARE ELBOWS IN TRUNK DUCTWORK AND DIFFUSER CONNECTIONS.
- TRANSFER DUCTS TO BE INTERNALLY INSULATED WITH 1" THICK ACOUSTICAL DUCT LINER. DUCT SIZES INDICATED ARE INSIDE CLEAR DIMENSIONS.
- VERIFY COLLAR SIZES ON ALL AIR TERMINALS, EQUIPMENT INLETS AND OUTLETS. INSULATE DUCTWORK AS NECESSARY. EXTERNALLY INSULATE ALL TRANSITIONS AT EQUIPMENT CONNECTIONS.
- PROVIDE FLEXIBLE DUCT, PIPE CONNECTIONS, AND VIBRATION ISOLATION FOR INTERNAL AND EXTERNAL UNITS. PROVIDE FLEXIBLE DUCT CONNECTORS AT ALL HVAC EQUIPMENT CONNECTIONS COMPLYING WITH MSS SP-91, NFPA 99A, AND MSS 90B.
- DO NOT MOUNT DISCONNECT SWITCHES ON HVAC EQUIPMENT EXCEPT AS SPECIFIED BY MANUFACTURER.
- MOUNT ALL DUCTWORK AS HIGH AS POSSIBLE, BETWEEN FRAMING IF NECESSARY. ROUTING DUCTWORK OVER LIGHTS WHEREVER POSSIBLE. WHERE DUCTWORK MUST RUN OVER LIGHTS MAINTAIN MINIMUM 4" CLEARANCE BETWEEN DUCT INSULATION AND TOP OF LIGHTS. COORDINATE WITH STRUCTURAL.
- ABOVE CEILING MECHANICAL EQUIPMENT TO BE INSTALLED NOT MORE THAN 2" ABOVE SUSPENDED CEILING. AVOID INSTALLATION ABOVE LIGHTS AND MAINTAIN ACCESS AND CLEARANCE AROUND MECHANICAL EQUIPMENT AS REQUIRED FOR MAINTENANCE OF UNIT AND CONTROLS. IF A MECHANICAL EQUIPMENT IS INSTALLED ABOVE A LIGHT, MAINTAIN MINIMUM 6" CLEARANCE BETWEEN BOTTOM OF UNIT AND TOP OF LIGHT.
- EQUIPMENT OF DIFFERING ELECTRICAL CHARACTERISTICS, METAL DIMENSIONS, CAPACITIES, AND RATINGS MAY BE FURNISHED PROVIDED SUCH PROPOSED EQUIPMENT IS APPROVED BY THE ENGINEER. WIRING AND CONNECTING MECHANICAL SERVICES, CIRCUIT BREAKERS, CONDUIT, MOTORS, BASES, AND EQUIPMENT SHALL BE INCREASED. ADDITIONAL COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR FOR THE DIFFERING EQUIPMENT.
- PROVIDE ALL EQUIPMENT, VALVES, ETC. WITH MARKINGS AS SPECIFIED FOR IDENTIFICATION PURPOSES. SEE SPECIFICATION COMPLY WITH MSS SP-58 (PIPE HANGERS AND SUPPORTS-MATERIALS, DESIGN, AND MANUFACTURE), MSS SP-69 (PIPE HANGERS AND SUPPORTS-SELECTION AND APPLICATION), MSS SP-89 (PIPE HANGERS AND SUPPORTS-FABRICATION AND INSTALLATION) FOR PIPE HANGER CONNECTIONS AND APPLICATIONS.
- ENGINEER'S FACTORY AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM START-UP SERVICES AND TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE AND MAINTAIN EQUIPMENT. SEE SPECIFICATION.
- THERMOSTATS SHALL BE GENERALLY LOCATED AS SHOWN. THE EXACT LOCATION SHALL BE FIELD COORDINATED TO AVOID INTERFERENCE WITH WALL MOUNTED WORK.
- FOR PIPE DIAMETER 4" AND LARGER, WHERE PIPES RUN PERPENDICULAR TO JOISTS, ARRANGE PIPE SUPPORTS IN A MANNER THAT GENERALLY DISTRIBUTES THE PIPE LOAD TO ALL JOISTS DIRECTLY ABOVE THE PIPES. THIS CAN BE ACHIEVED BY SUPPORTING ALL PIPES AT EACH JOIST OR BY STAGGERING THE SUPPORTS FOR INDIVIDUAL PIPES SUCH THAT THE TOTAL LOAD IS EQUALLY DISTRIBUTED TO ALL JOISTS. THE SUSPENSION POINT SHALL OCCUR AT THE BOTTOM CHORD PANEL POINT OF THE JOISTS OR REINFORCED JOIST AS INDICATED IN THE STRUCTURAL DRAWINGS. WHERE JOISTS ARE PARALLEL TO PIPE RUNS, USE 1/3x3/4 (OR APPROPRIATELY RATED UNISTRUT) SPANNING ACROSS THE BOTTOM OF THREE JOISTS AT A MINIMUM TO SUSPEND PIPES. THE SUSPENSION POINT SHALL OCCUR AT THE BOTTOM CHORD PANEL POINT OF THE JOISTS OR REINFORCED JOIST AS INDICATED IN THE STRUCTURAL DRAWINGS.
- WORK SHALL COMPLY WITH THE FOLLOWING AGENCIES:
 - 2009 INTERNATIONAL BUILDING CODE
 - 2009 INTERNATIONAL MECHANICAL CODE
 - 2009 INTERNATIONAL PLUMBING CODE
 - 2009 INTERNATIONAL FIRE GAS CODE
 - NATIONAL FIRE PROTECTION AGENCY (NFPA)
 - AMERICAN SOCIETY OF HEATING AND REFRIGERATION ENGINEERS (ASHRAE)
 - ALL APPLICABLE CODES, ORDINANCES, AND THE AUTHORITIES HAVING JURISDICTION

ABBREVIATIONS

@	AT
AAV	AUTOMATIC AIR VENT
ADC	AUTOMATIC CONTROL DAMPER
AD	ACCESS DOOR
AF	ABOVE FINISHED FLOOR
AFMS	AIRFLOW MEASURING STATION
AHRI	AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE
AHU	AIR HANDLING UNIT
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
BD	BELT DRIVE
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CONT.	CONTINUOUS
COP	COEFFICIENT OF PERFORMANCE
DAC	DUCTLESS AIR CONDITIONER
DCU	DUCTLESS CONDENSING UNIT
DD	DIRECT DRIVE
DDC	DIRECT DIGITAL CONTROL
DPS	DIFFERENTIAL PRESSURE SENSOR
DWGS	DRAWINGS
EA	EXHAUST AIR
EAL	EXHAUST AIR LOUVER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EH	ELECTRICAL HANGER
EL	ELEVATION
EMCS	ENERGY MANAGEMENT AND CONTROL SYSTEM
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
FF	FIRE FIGHTER
FFM	FEET PER MINUTE
GPM	GALLONS PER MINUTE
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
MAX	MAXIMUM
MIN	MINIMUM
MVD	MANUAL VOLUME DAMPER
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NFO	NORMALLY OPEN
NC	NORMALLY CLOSED
NFLV	NON-STANDARD PART LOAD VALUE
OA	OUTSIDE AIR
OAL	OUTSIDE AIR LOUVER
O.C.	ON CENTER
PRV	PRESSURE REDUCING VALVE
PIT	PRESSURE/TEMPERATURE
RA	RETURN AIR
RAG	RETURN AIR GRILLE
SA	SUPPLY AIR
SD	SMOKE DETECTOR
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SF	SUPPLY FAN
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
SPT	STATIC PRESSURE TRANSMITTER
SWR	SIDEWALL REGISTER
TAG	TRANSFER AIR GRILLE
TSTAT	THERMOSTAT
TT	TEMPERATURE TRANSMITTER
TSP	TOTAL STATIC PRESSURE
TYP.	TYPICAL
W/	WITH
W.G.	WATER GAUGE



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MECHANICAL LEGEND
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