

HVAC PIPING LEGEND

SYMBOL	ABBR.	DESCRIPTION
	CHWS	CHILLED WATER SUPPLY PIPING
	CHWR	CHILLED WATER RETURN PIPING
	CWS	CONDENSER WATER SUPPLY PIPING
	CWR	CONDENSER WATER RETURN PIPING
	HWS	HEATING WATER SUPPLY PIPING
	HWR	HEATING WATER RETURN PIPING
	C.W.	COLD WATER PIPING
	H.W.	HOT WATER PIPING
	H.W.R.	HOT WATER RETURN PIPING
	G.	NATURAL GAS PIPING
	FW.	FILTERED WATER PIPING
	D./C.D.	INDIRECT OR CONDENSATE DRAIN
	-	ISOMETRIC CONTINUATION
	-	PIPE RISE
	-	PIPE DROP
	-	PIPE DROP UNDER A HORIZONTAL PIPE
	-	PIPE CAP
	-	PIPE BREAK
	G.V.	GATE VALVE
	G.B.V.	GLOBE VALVE
	B.V.	BALL VALVE
	C.V.	CHECK VALVE
	P.V.	PLUG VALVE
	S.V.	SOLENOID VALVE
	S.O.V.	SHUTOFF VALVE
	C.N.V.	CONTROL VALVE
	B.V.	BUTTERFLY VALVE
	-	UNION
	-	REDUCER
	C.P.	CENTRIFUGAL PUMP
	P.O.C.	POINT OF CONNECTION BETWEEN NEW AND EXISTING

NOTE: ALL SYMBOLS MAY NOT APPLY

REFERENCE SYMBOLS

	GENERAL REFERENCE DESIGNATES SHEET NUMBER		EQUIPMENT NAME AND NUMBER
	DETAIL REFERENCE DESIGNATES DETAIL NUMBER BOTTOM DESIGNATES SHEET NUMBER		SHEET KEYNOTE NUMBER
	SECTION REFERENCE TOP DESIGNATES SECTION NUMBER BOTTOM DESIGNATES SHEET NUMBER		REVISION NUMBER
	ELEVATION SYMBOL		NEW CONNECTION TO EXISTING

2015 IECC COMPLIANCE NOTES

- ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHEN LOCATED IN UNCONDITIONED SPACES AND A MINIMUM OF R-8 INSULATION WHEN LOCATED OUTSIDE THE BUILDING. WHEN LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-8 INSULATION. EXCEPTIONS:
 - WHEN LOCATED WITHIN EQUIPMENT.
 - WHEN THE DESIGN TEMPERATURE DIFFERENCE BETWEEN THE INTERIOR AND THE EXTERIOR OF THE DUCT OR PLENUM DOES NOT EXCEED 15 DEG. F.
- PROVIDE AUTOMATIC CHANGEOVER 7-DAY PROGRAMMABLE THERMOSTATS FOR EACH ZONE WITH A 2-HOUR OCCUPANT OVERRIDE, INTELLIGENT RECOVERY, AND 10-HOUR MINIMUM BATTERY BACKUP. PROGRAM SETBACK TEMPERATURES TO 85°F(COOL) AND 55°F(HEAT). THERMOSTATS USED TO CONTROL BOTH HEATING AND COOLING, SHALL PROVIDE A SETPOINT OVERLAP RESTRICTION SUCH AS A DEADBAND OF AT LEAST 5°F. ALL TEMPERATURE CONTROLS ARE TO BE TESTED, ADJUSTED, AND CALIBRATED FOR PROPER OPERATION. MOUNT ALL THERMOSTATS AND TEMPERATURE SENSORS AS INDICATED ON THE DRAWINGS. COORDINATE EXACT LOCATION WITH THE ARCHITECT. PROVIDE LOCKING COVER AS REQUIRED BY THE ARCHITECT OR THE OWNER, MOUNT BETWEEN 48"-54" AFF.
- WHERE MECHANICAL VENTILATION IS PROVIDED, THE SYSTEM SHALL PROVIDE THE CAPABILITY TO REDUCE THE OUTDOOR AIR SUPPLY TO THE MINIMUM REQUIRED BY CHAPTER 4 OF THE INTERNATIONAL MECHANICAL CODE. OUTDOOR AIR SUPPLY AND EXHAUST DUCTS SHALL BE PROVIDED WITH AUTOMATIC MEANS TO REDUCE AND SHUT OFF AIRFLOW.
- SEALING DUCTWORK: ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS AND CONNECTIONS IN DUCTWORK MUST BE SECURELY SEALED USING MEMBRANES, MECHANICAL FASTENERS WITH SEALS, GASKETS OR MASTICS; MESH AND MASTIC SEALING SYSTEMS; OR TAPES. TAPES AND MASTICS MUST BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A OR 181B.
- OUTDOOR AIR SUPPLY AND EXHAUST DUCTS SHALL BE EQUIPPED WITH MOTORIZED DAMPERS THAT WILL AUTOMATICALLY SHUT WHEN THE SYSTEMS OR SPACES SERVED ARE NOT IN USE. EXCEPTION - GRAVITY DAMPERS SHALL BE PERMITTED IN BUILDINGS LESS THAN 3 STORIES IN HEIGHT.
- PROVIDE OWNER WITH COMPLETE OPERATION AND MAINTENANCE MANUALS FOR ALL EQUIPMENT AND CONTROLS INSTALLED. DOCUMENTATION MUST INCLUDE EQUIPMENT CAPACITY (INPUT & OUTPUT), REQUIRED MAINTENANCE ACTIONS, CONTROLS AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, CONTROL SEQUENCE DESCRIPTIONS, DESIRED OR FIELD-DETERMINED SETPOINTS, AND A COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE.

DUCTWORK SYMBOLS

SINGLE	DOUBLE	ABBR.	DESCRIPTION
		-	RECTANGULAR DUCT (NEW)
		-	ROUND DUCT (NEW)
		-	RECTANGULAR DUCT (EXISTING)
		-	ROUND DUCT (EXISTING)
		-	45 DEG. TAP: USE AT BRANCH DUCTS ONLY
		-	DUCT SPLIT WITH DAMPER: USE AT ELBOWS AND TEES: PROPORTION DUCT AREAS BY CFM'S
		-	CURVED ELBOW - MIN. RADIUS R: 1.5 WIDTH
		-	90 DEG. ELBOW WITH SINGLE RADIUS TURNING VANES
		-	FLEXIBLE DUCT CONNECTION
		SD	SMOKE DETECTOR
		VD	VOLUME DAMPER
		-	SPIN-IN FLEX DUCT TAKEOFF WITH DAMPER
		SA	SUPPLY AIR
		EXH / EA	EXHAUST AIR
		RA	RETURN AIR
		REL	RELIEF AIR
		OSA / OA	OUTSIDE AIR
		POC	POINT OF CONNECTION
		TA	TRANSFER AIR
		FF	FINISHED FLOOR
		AFB	ABOVE FINISHED FLOOR
		BBF	BELOW FINISHED FLOOR
		NTS	NOT TO SCALE
		FSD	FIRE/SMOKE DAMPER
		S	SENSOR
		-	FIRE STAT SET AT 165°
		-	OUTSIDE AIR STAT
		T	THERMOSTAT MOUNTED AT A 48" MAX. OR PER ADA REQUIREMENTS
		-	CO2 SENSOR
		H	HUMIDISTAT
		U.C.	UNDERCUT DOOR 1". COORDINATE WITH GENERAL CONTRACTOR

NOTE: ALL SYMBOLS MAY NOT APPLY

CODE INFORMATION

- 2012 IECC, 2012 IMC, 2015 IECC. ALL SYSTEMS SHALL BE IN COMPLIANCE WITH THE ABOVE CODES AS ADOPTED BY RICHMOND, TEXAS.
- OUTDOOR AIR VENTILATION PROVIDED AND BASED ON CHAPTER 4, SECTION 403.2 AND TABLE 403.3.1.1.
- DUCT SMOKE DETECTORS REQUIRED BY SECTION 606 SHALL BE INSTALLED IN THE RETURN AIR SYSTEM. DETECTORS SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 606.3 AND NFPA 72. DUCT SMOKE DETECTORS REQUIRE A REMOTE TEST VISUAL/TEST STATION PER NFPA 72. DETECTORS SHALL BE CONTROLLED PER SECTION 606.4.
- EQUIPMENT AND APPLIANCES SHALL BE INSTALLED AS REQUIRED BY THE TERMS OF THEIR APPROVAL, IN ACCORDANCE WITH THE CONDITIONS OF THE LISTING, THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THIS CODE. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE AVAILABLE ON THE JOB SITE AT THE TIME OF INSPECTION PER SECTION 304.1.
- MATERIALS EXPOSED WITHIN PLENUMS SHALL HAVE A FLAME SPREAD RATING INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE TO ASTM E84.
- ALL MATERIAL INSTALLED WITHIN PLENUMS SHALL CONFORM TO SECTION 602 PLUMBS.
- MECHANICAL DESIGN IS INTENDED THAT THE AIR CONDITIONING SYSTEM WILL OPERATE CONTINUOUSLY TO MAINTAIN CURRENT VENTILATION REQUIREMENTS, IMC 403.2 & 403.3.
- CALL FOR INSPECTION OF ALL MECHANICAL SYSTEMS PRIOR TO BACKFILL AND CONCEALMENT, IMC 107.2

MECHANICAL SHEET INDEX

MO.1	MECHANICAL SPECS, SYMBOLS AND SHEET INDEX
MO.2	COMCHECK
MO.3	COMCHECK
M1.1	MECHANICAL PLAN
M1.2	MECHANICAL ROOF PLAN
M2.1	MECHANICAL SCHEDULES
M3.1	MECHANICAL DETAILS
M4.1	MECHANICAL CALCULATIONS
M5.1	KITCHEN HOOD AND FANS
M5.2	KITCHEN HOOD AND FANS

MECHANICAL SPECIFICATIONS

- NOTE: NOT ALL SPECIFICATIONS MAY APPLY.
- DUCTWORK**
- ALL DUCTWORK AND PLENUMS SHALL BE GALVANIZED SHEET METAL, FABRICATE AND INSTALL ALL DUCTWORK IN STRICT COMPLIANCE WITH THE LATEST SMACNA MANUAL, AND APPLICABLE MECHANICAL CODES FOR LOW VELOCITY DUCT CONSTRUCTION STANDARDS.
 - ALL HEATING WATER AND CHILLED WATER SYSTEMS SHALL BE INSTALLED WITH INSULATED TURNING VANES, SPLITTER DAMPERS AND SUPPORTS, AND EXTRACTORS AT ALL RIGHT ANGLE TAKEOFFS AND TEES.
 - DUCTWORK SHALL BE GALVANIZED, PRIME-GRADE, LOCK-FORMING QUALITY STEEL (LFG) HAVING A GALVANIZED COATING OF 1-3/4 OUNCES TON FOR BOTH SIDES OF ONE SQUARE FOOT OF A SHEET.
 - CROSSBREAK ALL SIDES OF ALL DUCTS IN ACCORDANCE WITH SMACNA GUIDELINES. DUCTWORK INSTALLATIONS SHALL HAVE NO OBSTRUCTIONABLE NOISE, AND CONTRACTOR SHALL PROVIDE ANY ADDITIONAL STIFFENERS REQUIRED.
 - ALL LONGITUDINAL SEAMS SHALL BE PITTSBURGH LOCK SEAM, HAMMERED FLAT, WITH ALL TRANSVERSE JOINTS TAPED WITH 8 OZ. CANVAS AND SEALED WITH ARABOL, AIR TIGHT. DUCT TAPE IS NOT ALLOWED.
 - PROVIDE DOUBLE THICKNESS, FACTORY FABRICATED GALVANIZED STEEL TURNING VANES WITH ARBOL CONTOUR IN ALL RIGHT ANGLE ELBOWS, TEES, AND ELBOWS WITH RADIUS LESS THAN 1-1/2 TIMES THE WIDTH OF THE DUCT.
 - ALL ROUND DUCT BRANCH TAKEOFFS SHALL BE PROVIDED WITH SPIN-IN COLLAR AND BALANCING DAMPER.
 - DUCT SIZES SHOWN ON THE DRAWINGS ARE TO THE INSIDE OF ACoustICAL LININGS. INCREASE SIZES OF DUCTS AS REQUIRED TO ACCOMMODATE ACoustICAL INSULATION. DUCTWORK SHALL CONFORM TO DIMENSIONS ON THE DRAWINGS, UNLESS LOCATION OF STRUCTURAL MEMBERS IS PROHIBITIVE. IN CASE OF CHANGE IN DIMENSIONS, CROSS SECTIONAL AREAS SHALL BE MAINTAINED.
 - ALL DUCTS SHALL BE SUBSTANTIALLY SUPPORTED WITH HANGERS TO THE STRUCTURE OR OTHERWISE, DEPENDING ON LOCATION CONDITIONS, PLACING SUPPORTS NOT OVER 8 FEET APART AND USING THE LENGTHS OF THE HANGERS SHALL CONFORM TO ALL APPLICABLE MECHANICAL CODES AND SMACNA REQUIREMENTS.
 - FLEXIBLE ROUND DUCTS TO OUTLETS SHALL BE THERMAFLEX TYPE MKE, A MAXIMUM LENGTH OF 25' LONG (AND ALLOWED ONLY WHERE INDICATED ON THE DRAWINGS).
 - ALL FACTORY-MADE DUCTS MUST BE CLASS 0 OR 1 AS APPROVED BY THE LOCAL APPLICABLE MECHANICAL CODE.
 - ALL MATERIALS EXPOSED WITHIN DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25, AND A SMOKE-DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH THE TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
- ACoustICAL LINER**
- SUPPLY, RETURN AND PLENUM DUCTS SHALL BE ACoustICALLY LINED FOR THE FIRST 15'-0" MINIMUM FROM UNION CONNECTION POINTS.
 - ALL SHEET METAL SUPPLY, RETURN AND PLENUM DUCTWORK REQUIRING ACoustICAL LINER SHALL BE LINED WITH 1" THICK LINER.
- THERMAL DUCT AND PLENUM INSULATION**
- SUPPLY AND RETURN DUCTS SHALL BE INSULATED IN ACCORDANCE WITH THE PREVAILING ENERGY CODE (IECC OR TITLE 24). PROVIDE WATERPROOF ALUMINUM JACKING FOR DUCTS EXPOSED UNINSULATED SUPPLY AND RETURN DUCTS IN CONDITIONED SPACES WILL NOT BE ALLOWED WITHOUT PRIOR WRITTEN REQUEST AND APPROVAL BY THE OWNER AND MECHANICAL ENGINEER.
 - ALL RESIDENTIAL SUPPLY AND RETURN DUCTS SHALL BE INSULATED WITH R-8 INSULATION.
 - ALL PENETRATIONS OR PLUNGERS IN FACING SHALL ALSO BE TAPED. VERTICAL DUCTS SHALL HAVE INSULATION ADEQUATELY SECURED TO PREVENT SLIPPING.
 - EXTERNALLY INSULATED DUCTS
 - ALL EXTERNALLY INSULATED DUCTS SHALL BE INSULATED WITH MINIMUM 2" THICK .75 LB. DENSITY FIBERGLASS BLANKET WITH FRK (FRK REINFORCED KRAFT) PAPER BARBER FACED INSULATION. INSULATION SHALL HAVE A CONDUCTIVITY NOT TO EXCEED 0.27 BTU PER INCH PER SQUARE FOOT PER DEGREE FAHRENHEIT PER HOUR AT 75 DEGREE FAHRENHEIT MEAN TEMPERATURE.
 - INSULATION SHALL BE WRAPPED TIGHTLY ON THE DUCTWORK WITH ALL CIRCUMFERENTIAL JOINTS BUTTED AND LONGITUDINAL JOINTS OVERLAPPED A MINIMUM OF 2". ADHERE INSULATION TO METAL ON THE BOTTOM OF RECTANGULAR DUCTWORK OVER 24" WIDE WITH 4" STRIP OF INSULATION BONDING ADHESIVE, BENJAMIN FOSTER OR 3M. INSULATION SHALL BE WRAPPED TIGHTLY ON THE DUCTWORK WITH ALL CIRCUMFERENTIAL JOINTS BUTTED AND LONGITUDINAL JOINTS OVERLAPPED A MINIMUM OF 2". ADHERE INSULATION TO METAL ON THE BOTTOM OF RECTANGULAR DUCTWORK OVER 24" WIDE WITH 4" STRIP OF INSULATION BONDING ADHESIVE, BENJAMIN FOSTER OR 3M. INSULATION SHALL BE WRAPPED TIGHTLY ON THE DUCTWORK WITH ALL CIRCUMFERENTIAL JOINTS BUTTED AND LONGITUDINAL JOINTS OVERLAPPED A MINIMUM OF 2". ADHERE INSULATION TO METAL ON THE BOTTOM OF RECTANGULAR DUCTWORK OVER 24" WIDE WITH 4" STRIP OF INSULATION BONDING ADHESIVE, BENJAMIN FOSTER OR 3M. 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