HVAC SPECIFICATIONS

1. GENERAL

A. A MECHANICAL CONTRACTOR SHALL BE THE PRIME CONTRACTOR AND SHALL BE RESPONSIBLE FOR ALL SUB-CONTRACTORS AND COORDINATION OF SAME.

B. ALL CONTRACTORS SHALL BE LICENSED IN THE STATE AND JURISDICTION WHERE WORK IS BEING PERFORMED.

C. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.

D. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.

E. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.

F. PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ENGINEER. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED.

G. SUPPORT ALL PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. WHEN SUPPORTING FROM BUILDING STRUCTURE USE BEAM CLAMPS WITH RETURNING CLIP IN APPROVED MANNER.

H. 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.

I. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.

J. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER

K. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ENGINEER.

L. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.

M. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.

N. SEAL OPENINGS AROUND PIPING THROUGH WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL.

O. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND MISCELLANEOUS STEEL AS REQUIRED, FOR SUPPORT OF NEW ROOF-MOUNTED EQUIPMENT.

P. ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE OWNER, ENGINEER OR AS NOTED TO BE RELOCATED ON THE DRAWINGS SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.

Q. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE FIRST CLASS IN ACCORDANCE WITH BUILDING STANDARDS AND TRADE PRACTICES.

R. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

S. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING 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.

T. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

U. WHEN UTILIZING EXISTING OPENINGS CONTRACTOR SHALL ENLARGE THEM AS REQUIRED TO ACCOMMODATE NEW PIPING AND CONDUIT.

V. CONTRACTOR SHALL UTILIZE OWNERS ROOFING CONTRACTOR TO FLASH/WATER PROOF ALL EQUIPMENT PENETRATIONS AND STRUCTURAL SUPPORTS.

W. BEFORE CUTTING ROOF, CONTRACTOR SHALL COORDINATE WITH OWNER TO VERIFY LOCATION OF EQUIPMENT SUPPORTS ARE ACCEPTABLE.

X. REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL MECHANICAL EQUIPMENT AND DEVICES. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS, AND MARKERS TO IDENTIFY LOCATION OF CONCEALED EQUIPMENT.

Y. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED.

Z. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC) AND CONDITIONS.

AA. INSURANCE: IN ACCORDANCE WITH OWNER REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

AB. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

AC. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

AD. DEFINITIONS:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

6) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

7) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

2. SCOPE OF WORK

A. THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR THE REMOVAL OF EXISTING A/C EQUIPMENT/SYSTEMS AND RELATED MATERIAL AND FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION NEW A/C EQUIPMENT/SYSTEMS AS INDICATED ON DRAWINGS. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.

B. THE CONTRACTOR SHALL FILE DRAWINGS WITH THE GOVERNING AUTHORITIES HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

D. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, PROVIDE COMPLETE SET OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, PIPING AND CONTROL SYSTEMS INDICATING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ENGINEER.

3. SHOP DRAWINGS

A. INDICATE ON EACH SUBMISSION: PROJECT NAME AND LOCATION, ENGINEER, ITEM IDENTIFICATION AND APPROVAL STAMP OF PRIME CONTRACTOR.

B. SUBMISSIONS:

1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND THREE COPIES TO THE ENGINEER FOR APPROVAL. ALL CATALOG CUTS SHALL BE COMPLETE.

2) SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT FOUR PRINTS TO THE ENGINEER.

C. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

1) AC UNITS.

2) PIPING AND DUCTWORK LAYOUT.

3) OPERATING SEQUENCES.

4) VIBRATION ISOLATION.

5) AUTOMATIC CONTROL SYSTEMS AND DEVICES.

6) STRUCTURAL SUPPORTS AND PIPE HANGERS.

7) ROOF FLASHING DETAILS.

4. AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. ON COMPLETION AND ACCEPTANCE OF WORK, THIS CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS, EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE-RING BINDERS WITH CLEAR ACETATE COVERS. THE CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.

C. THE INSTRUCTION BOOKLET SHALL BE ORGANIZED IN SECTIONS, WITH ONE SECTION PER SYSTEM. THE COVER OF THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND PHONE NUMBER OF THE PROJECT, ENGINEER, MECHANICAL CONTRACTOR AND SUBCONTRACTORS.

D. REPRODUCIBLE "AS-BUILT" DRAWINGS INDICATING AS INSTALLED CONDITIONS SHALL BE PROVIDED TO THE ENGINEER AFTER COMPLETION OF THE INSTALLATION.

5. TESTING AND BALANCING

A. TEST NEW EQUIPMENT IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS. PROVIDE FACTORY AUTHORIZED TECHNICIAN TO START AND TEST SYSTEMS.

B. THE CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR REQUIRED TO TEST, ADJUST, AND BALANCE SYSTEMS.

6. DUCTWORK

A. ALL DUCTWORK SHALL BE INSTALLED IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE LATEST EDITION.

B. PROVIDE FLEXIBLE CONNECTIONS ON DISCHARGE AND INTAKE OF ALL AIR HANDLING UNITS. FLEXIBLE CONNECTIONS SHALL BE NEOPRENE OR APPROVED EQUAL.

C. PROVIDE VOLUME DAMPERS AND FIRE DAMPERS WHERE INDICATED ON DRAWINGS.

7. INSULATION - GENERAL REQUIREMENTS

A. ALL INSULATION MATERIALS, INCLUDING JACKETS, FACING, ADHESIVE, COATINGS, AND ACCESSORIES ARE TO BE FIRE HAZARD RATED AND LISTED BY UNDERWRITERS LABORATORIES, INC. USING STEINER TUNNEL TEST METHOD FOR FIRE HAZARD CLASSIFICATION OF BUILDING MATERIALS, STANDARD UL 723 (ASTM E-84), (ASA A2.5-1963). FLAMESPREAD: MAXIMUM 25. FUEL CONTRIBUTED AND SMOKE DEVELOPED: MAXIMUM 50. FLAMEPROOFING TREATMENTS SUBJECT TO DETERIORATION FROM MOISTURE OR HUMIDITY ARE NOT ACCEPTABLE.

B. DEFINITIONS:

1) EXPOSED: INDOOR PIPING OR EQUIPMENT LOCATED IN MECHANICAL EQUIPMENT ROOMS AND IN AREAS WHICH WILL BE VISIBLE WITHOUT REMOVING CEILINGS OR OPENING ACCESS PANELS.

2) CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT WHICH IS NOT EXPOSED.

3) OUTDOOR: PIPING OR EQUIPMENT WHICH IS EXPOSED TO THE WEATHER.

8. PIPING INSULATION

A. INSULATE ALL PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

INSULATION SCHEDULE - PIPING

SERVICE	SIZE	THICKNESS	MATERIAL	FINISH
REFRIGERANT	ALL	1 1/2"	P-1	VAPOR SEAL
PIPING CONDENSATE	ALL	1/2"	P-1	VAPOR SEAL

B. PIPING AND FITTINGS TO BE INSULATED:

1) LOW TEMPERATURE PIPING SYSTEMS - 40 TO 100 DEG F INCLUDING:

a. REFRIGERANT LIQUID & SUCTION PIPING.

b. CONDENSATE DRAIN PIPING.

C. MATERIAL:

1) TYPE P-1: MINIMUM 6 LB CLOSED CELL MOLDED FOAM. MAXIMUM 0.27 K-FACTOR AT 75 DEG F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II.

D. OUTDOOR PIPING:

1) FOR ALL PIPING, FITTINGS AND VALVES LOCATED OUTDOORS. PROVIDE VAPORSEAL ON ALL OUTDOOR PIPES AND FITTINGS SUBJECT TO CONDENSATION.

E. INSTALLATION:

1) BEFORE APPLYING INSULATION ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED.

2) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 IN. LAMP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS.

3) ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTINUOUS PASSING THROUGH SLEEVES, HANGERS, ETC., OR OTHER OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTION.

4) INSULATION FOR STRAINERS OR OTHER FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

9. VIBRATION ISOLATION

A. GENERAL:

1) PROVIDE ISOLATION FOR EQUIPMENT AND PIPING.

2) INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

3) PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4 IN.

4) ACCEPTABLE MANUFACTURERS:

a. MASON INDUSTRIES, INC.

b. VIBRATION ELIMINATOR CO.

c. KORFUND DYNAMICS CORP.

B. FLOOR MOUNTED EQUIPMENT HAVING INTERNAL ISOLATION:

1) PROVIDE 5/16 IN.-THICK NEOPRENE ACOUSTICAL BASE PADS OF RIBBED OR WAFFLE CONSTRUCTION. SIMILAR TO MASON TYPE W.

2) 50 PSI MAXIMUM LOADING. PROVIDE STEEL BEARING PLATE TO DISTRIBUTE LOAD WHERE REQUIRED.

C. FLOOR-MOUNTED EQUIPMENT REQUIRING EXTERNAL VIBRATION ISOLATION:

1) PROVIDE BUILT-IN RESILIENT VERTICAL LIMIT STOPS. PROVIDE TWO LAYERS OF 1/4 IN. NEOPRENE BASE PAD SEPARATED BY 1/16 IN. SHEET STEEL. TAPPED HOLES SHALL BE IN TOP PLATE FOR BOLTING TO EQUIPMENT. ISOLATORS SHALL BE CAPABLE OF SUPPORTING EQUIPMENT AT A FIXED ELEVATION DURING ISOLATION.

2) 1 IN. MINIMUM STATIC DEFLECTION.

3) CORROSION RESISTANT WHEN EXPOSED TO WEATHER.

4) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS.

10. PIPING - GENERAL REQUIREMENTS

A. COMPLETE WITH: PIPE, FITTINGS, HANGERS, SUPPORTS, GUIDE, SLEEVES, AND ACCESSORIES.

B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:

1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).

2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).

3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).

4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSS).

5) REFRIGERATION SERVICE ENGINEERS SOCIETY (RSES).

C. ALL REFRIGERATION PIPING TO BE TESTED EVACUATED AND CHANGED IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURES INSTALLATION INSTRUCTIONS.

D. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED.

E. PIPE SUPPORTS:

1) PROVIDE ADEQUATE SUPPORT FOR PIPE AND CONTENTS TO PREVENT SAGGING, VIBRATION, OR SWAYING AND ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE STRUCTURE CANNOT SUPPORT POINT LOADS.

2) HORIZONTAL PIPING TO BE SUPPORTED BY COPPER PLATED FORGED STEEL ADJUSTABLE CLEVIS TYPE HANGER. MAXIMUM SPACING AS FOLLOWS:

a. COPPER 3 IN. AND SMALLER: 7 FT.

b. PROVIDE ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, RUNOUTS, AND CONCENTRATED LOADS DUE TO VALVES, ETC.

3) VERTICAL PIPING:

a. SUPPORT FROM WALL AND SLAB.

b. GUIDES AT EVERY FLOOR (SPACING NOT TO EXCEED 25 FT).

c. TOP SUPPORT HANGER OR SADDLE IN HORIZONTAL CONNECTION WITH PROVISIONS FOR EXPANSION.

d. INTERMEDIATE COPPER PLATED STEEL RISER CLAMP SUPPORT BOLTED TO PIPE BEARING ON STEEL OR BEARING PLATE AT FLOOR OR ENGINEER APPROVED HANGER.

11. REFRIGERANT PIPING & SPECIALTIES

A. COPPER TUBE: ASTM B 280, H58 HARD DRAWN OR O60 SOFT ANNEALED, ASME B16.22 WROUGHT COPPER FITTINGS, BRAZED, AWS A5.8 BCUP SILVER/PHOSPHORUS/COPPER ALLOY. PIPE SUPPORTS AND ANCHORS: CONFORM TO ASME B31.5.

B. INSTALL REFRIGERATION SPECIALTIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ROUTE PIPING IN ORDERLY MANNER, WITH PIPING PARALLEL TO BUILDING STRUCTURE, AND MAINTAIN GRADIENT. FLOOD PIPING SYSTEM WITH NITROGEN WHEN BRAZING. FOLLOW ASHRAE STD 15 PROCEDURES FOR CHARGING AND PURGING OF SYSTEMS AND FOR DISPOSAL OF REFRIGERANT. FULLY CHARGE COMPLETED SYSTEM WITH REFRIGERANT AFTER TESTING. TEST REFRIGERATION SYSTEM IN ACCORDANCE WITH ASME B31.5.

12. CONDENSATE DRAIN PIPING

A. PIPE: ASTM B88, HARD DRAWN COPPER TUBING TYPE "L".

B. FITTINGS: WROUGHT COPPER SOLDERED JOINT FITTINGS, 95/5 SOLDER.

C. PITCH, EXCEPT AS NOTED:

1) 1 IN. IN 12 FT MINIMUM.

D. SWING CHECK VALVES: AT CONDENSATE PUMP DISCHARGE. 300 LB WOG, BRONZE BODY SOLDER ENDS, REGRIND BRONZE DISC TO BE USED WITH COPPER TUBING.

13. MOTORS:

A. MOTORS (UNDER HVAC WORK): IN ACCORDANCE WITH NEMA, IEEE AND ANSI C50 STANDARDS:

1) MANUFACTURERS STANDARD EFFICIENCY UNLESS OTHERWISE NOTED.

2) 1.15 SERVICE FACTOR.

3) SQUIRREL CAGE INDUCTION, OPEN DRIPPROOF TYPE, 1750 RPM, NEMA TYPE B INSULATION CLASS, CONTINUOUS DUTY, EXCEPT AS NOTED.

14. MOTOR CONTROLLERS (NOT PROVIDED AS PART OF EQUIPMENT

A. NEMA ENCLOSURE, WEATHERPROOF WHERE MOUNTED OUTDOORS.

B. WITH OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES.

C. 1/3 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED.

1) MANUAL TYPE: 2-POLE TOGGLE SWITCH WITH OVERLOAD PROTECTION AND PILOT LIGHT.

D. 1/2 HP AND LARGER: PROVIDE MAGNETIC STARTER:

1) COMBINATION UNFUSED DISCONNECT SWITCH AND MAGNETIC STARTER EXCEPT AS NOTED.

2) OVERLOAD PROTECTION IN EACH PHASE LEG WITH RESET IN ENCLOSURE.

3) HOA SELECTOR SWITCH FOR AUTOMATICALLY OPERATED MOTORS. SAFETY CONTROLS COMMON TO BOTH CONTROLS.

4) RED, GREEN AND AMBER PILOT LIGHTS.

5) SWITCHES: HORSE-POWER-RATED, EXTERNAL PADLOCKING TYPE.

6) HOLDING COILS: 10 WATT, 120 VOLT.

7) CONTACTS: MAIN LINE AND MINIMUM (2) - NORMALLY OPEN, (2) - NORMALLY CLOSED 10 AMP AUXILIARIES, IN ADDITION TO CONTACTS REQUIRED FOR CONTROLS SPECIFIED.

8) CONTROL TRANSFORMER: FOR MOTORS OVER 120 VOLTS, TO STEP DOWN CONTROL VOLTAGE TO 120 VOLTS; OF THE REQUIRED CAPACITY WITH FUSE AND GROUND CONNECTION ON VOLTAGE SIDE.

9) FUSES: SIMILAR TO BUSSMAN.

10) RELAYS: TO SUPPLEMENT AUXILIARY CONTACTS IN CONTROLLER. MINIMUM 10 WATT COIL AND TWO 10 AMP CONTACTS.

11) TERMINALS: SUITABLE FOR CONDUCTORS NOTED AND AS APPROVED.

E. ACCEPTABLE MANUFACTURERS:

1) CUTLER-HAMMER.

2) SQUARE D.

3) ALLEN BRADLEY.

15. EQUIPMENT

A. DUCT AND DUCTLESS SPLIT SYSTEM HEAT PUMPS

16. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS

A. FURNISH AND INSTALL A COMPLETE ELECTRONIC CONTROL SYSTEM TO PROVIDE TEMPERATURE CONTROL AS SPECIFIED UNDER DESCRIPTION OF OPERATION. CONTROLS SHALL BE PROVIDED BY AC EQUIPMENT MANUFACTURER AS PART OF THEIR EQUIPMENT.

B. WORK SHALL INCLUDE ALL WIRING, CONTROL EQUIPMENT, AND ACCESSORIES NECESSARY TO MAKE THIS SYSTEM COMPLETE. ALL WIRING SHALL BE 24 VOLT. COORDINATE WITH MANUFACTURER FOR INTERCONNECTION WITH CONTROLS INCLUDED IN EQUIPMENT. ALL CONTROL WORK SHALL BE INSTALLED BY HVAC CONTRACTOR.

C. ACCEPTABLE MANUFACTURERS:

1) MITSUBISHI OR ENGINEER APPROVED EQUAL.

D. SEQUENCE OF OPERATION:

1) VRF SYSTEM:
a. REMOTE CONTROLLER SHALL CYCLE VRF AC SYSTEM TO MAINTAIN SPACE SET POINT TEMPERATURE OF ±7.5°F ADJUSTABLE.

b. AIRFLOW AND REFRIGERANT FLOW SHALL VARY TO MEET SPACE LOAD AND MODULATE DOWN TO 10% OF CAPACITY.

Rev.	Description	Date
	ISSUED FOR CLIENT APPROVAL	09/03/14
	ISSUED FOR BID	11/10/14

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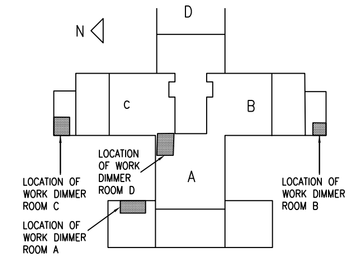

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MECHANICAL SPECIFICATIONS

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