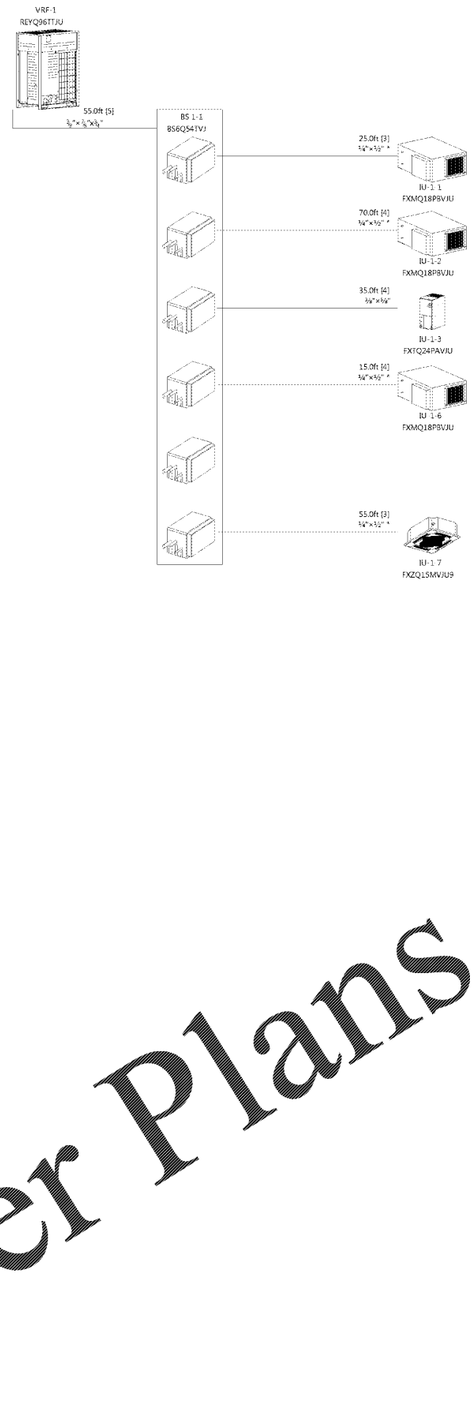


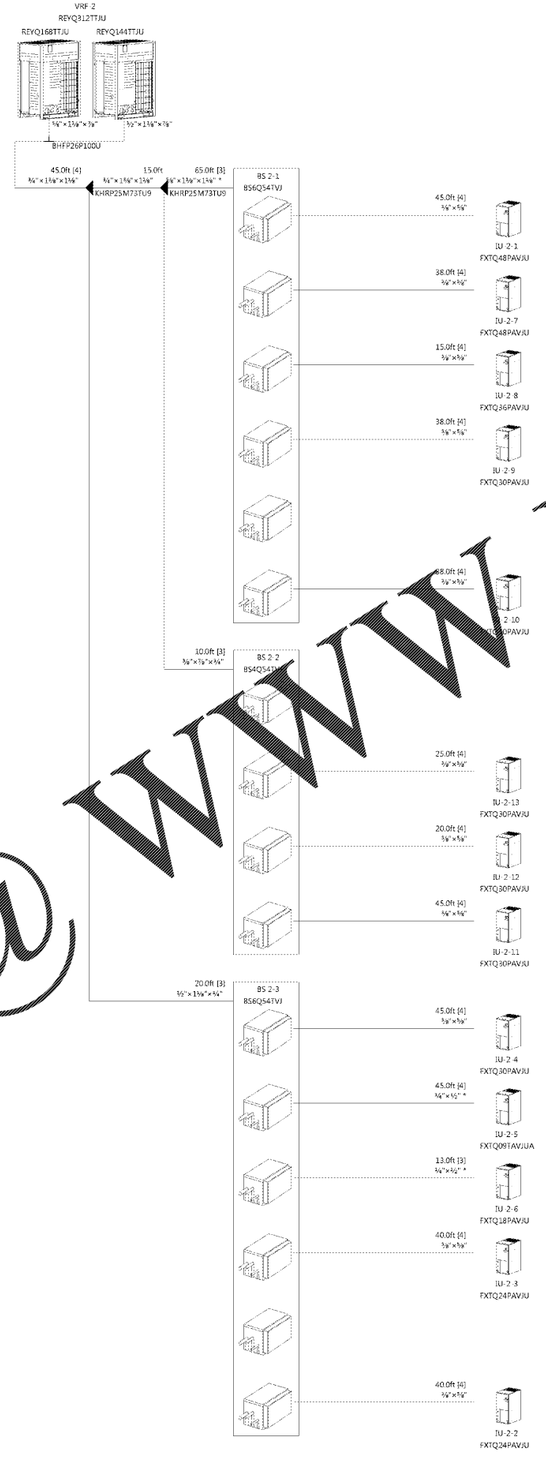


## VRF/VRV REQUIREMENTS:

VALVES:

1. INSTALL REFRIGERANT SHUT OFF VALVES ON EACH SUCTION, LIQUID AND HOT GAS LINE AT INCOMING AND LEAVING CONNECTIONS TO EACH BRANCH SELECTOR.
2. REFRIGERANT VALVES SHALL BE FULL PORT TYPE EQUAL TO SHERWOOD "WAS" SERIES WITH ACCESS FITTING AND BRAZED CONNECTIONS..

REFNET (Y BRANCH) FITTINGS, CHANGES IN DIRECTION, CONNECTIONS:

1. MINIMUM OF 20" OF STRAIGHT PIPE UPSTREAM AND DOWNSTREAM OF EACH REFNET PRIOR TO CHANGE IN DIRECTION.
2. MINIMUM OF 40" OF STRAIGHT PIPE BETWEEN REFNETS AND/OR HEADERS.
3. MINIMUM OF 20" OF STRAIGHT PIPE UPSTEAM OF CONNECTION TO INDOOR UNITS AND BRANCH SELECTORS.
4. MINIMUM OF 20" OF STRAIGHT PIPE DOWNSTREAM OF BRANCH SELECTORS PRIOR TO CHANGE IN DIRECTION.
5. ALL CHANGES IN DIRECTION SHALL BE WITH LONG SWEEP ELBOWS.
6. ALL REFNETS SHALL BE INSTALL IN THE HORIZONTAL POSITION. DEVIATION FROM HORIZONTAL SHALL NOT EXCEED MANUFACTURERS LIMITATIONS.
7. OTHER REQUIREMENTS PER THE MANUFACTURERER'S INSTALLATION REQUIREMENTS.

PIPE HANGERS/SUPPORTS LOCATIONS:

1. PIPE HANGERS AND SUPPORTS SHALL BE NO GREATER THAN 12" FROM THE CONNECTIONS TO EACH INDOOR UNIT, TO EACH BRANCH SELECTOR AND TO EACH OUTDOOR UNIT.
2. SPACING OF HANGERS/SUPPORTS ON STRAIGHT RUNS OF PIPE SHALL BE NO GREATER THAN 48" ON CENTER.
3. THERE SHALL BE A HANGER/SUPPORT WITHIN 12" OF EACH CHANGE IN DIRECTION.
4. PROVIDE HANGERS/SUPPORTS AT OTHER LOCATIONS AS REQUIRED BY THE MANUFACTURER.

PIPE GUIDES & EXPANSION LOOPS:

1. INSTALL PIPE GUIDES AND EXPANSION LOOPS WHERE REQUIRED BY THE MANUFACTURER BASED ON THE ACTUAL ROUTING OF THE REFRIGERANT PIPING.

PIPING, PRESSURE TESTING, LEAK CHECKING, EVACUTION, REFRIGERANT CHARGING:

1. ALL JOINTS SHALL BE BRAZED COPPER EXCEPT AT THE INDOOR UNITS WHERE SHALL BE FLARED CONNECTIONS.
2. FLARED TUBE ENDS SHALL SMOOTH, EVEN, ROUND FLARE OF SUFFICIENT LENGTH TO FULLY COVERAGE THE MATING SURFACE AND FLARE NUT WITHOUT PROTRUDING AT THE THREADS. USE ONLY "ITW ACROPET" REFRIGERATION OIL WHEN MAKING FLARES. DEDICATED FLARING TOOL AND FLARING TOOL IS REQUIRED. USE ONLY SYNTHETIC OIL ON THE FLARE NUT.
3. ALL REFRIGERATION PIPING SHALL BE HARD COPPER "ACR" TYPE L UNLESS NOTED FOR FLEXIBLE PIPING SHALL BE RATED FOR 600 PSI AND SHALL BE ASME B31.5-2010.
4. NITROGEN MUST BE USED DURING BRAZING OF FITTINGS. A PRESSURE OF 2-3 PSI SHALL BE MAINTAINED TO PREVENT COPPER FROM OXIDATION FORMATION.
5. PRESSURE TESTING: WRITTEN DOWN ALL VALVES BEFORE ANY PRESSURE TESTING TO PREVENT NITROGEN FROM LEAKING BACK THROUGH THE CONDENSER AND CONTAMINATING THE REFRIGERANT. PRESSURE TESTING GUIDE DON IN THREE STEPS: a) LEAK CHECK AFTER 3 MINUTES @ 150 PSI, b) LEAK CHECK AFTER 5 MINUTES @ 225 PSI, c) LEAK CHECK AFTER 24 HOURS AT 590 PSI (450 PSI FOR SYSTEMS WITHOUT AIR HANDLERS).
6. [illegible] AND EVACUATION IS RECOMMENDED TO BE IN ACCORDANCE WITH THE US EPA "GREEN CHILL BEST PRACTICES GUIDELINES ENSURING EFFICIENT INSTALLATION OF COMMERCIAL REFRIGERANT EQUIPMENT."
7. EVACUATION PROCEDURES SHALL BE PERFORMED BY THE MECHANICAL CONTRACTOR AS FOLLOWS: a) EVACUATE TO 4500 MICRONS, BREAK VACUUM WITH NITROGEN TO A PRESSURE OF 2-3 PSI AND HOLD FOR 15 MINUTES, b) EVACUATE TO 1500 MICRONS AND MAINTAIN FOR 60 MINUTES, BREAK VACUUM WITH NITROGEN TO A PRESSURE OF 2-3 PSI AND HOLD FOR 15 MINUTES, c) EVACUATE TO BELOW 500 MICRONS AND HOLD FOR 60 MINUTES, d) EVACUATE TO 300 MICRONS AND HOLD FOR 24 HOURS, e) THE FINAL 300 MICRON EVACUATION ITEM d) SHALL BE WITNESSED, VERIFIED AND DOCUMENTED BY AN INDEPENDENT 3RD PARTY PRIOR TO CHARGING THE SYSTEM WITH REFRIGERANT.
8. [illegible] PUMP CHECK VALVE SHOULD BE USED TO PREVENT MINERAL OIL FROM BEING DRAWN IN TO THE SYSTEM.
9. [illegible] CHARGING: MECHANICAL CONTRACTOR SHALL RECORD REFRIGERANT LINE LENGHTS. CALCULATE REFRIGERANT CHARGE BASED ON ACTUAL LINE LENGTHS/SIZES. WEIGH IN ADDITIONAL REFRIGERANT WITH DIGITAL SCALES. CHECK WITH EACH UNIT MODEL FOR CORRECT MULTIPLIER. CHARGE THE ADDITIONAL REFRIGERANT IN ITS LIQUID STATE THRU THE LIQUID STOP VALVE SERVICE PORT.
10. MAKE SURE THE INSTALLATION TOOLS USED ARE EXCLUSIVELY FOR USE ON R410A INSTALLATIONS TO WITHSTAND THE PRESSURE AND TO PREVENT FOREIGN MATERIAL FROM ENTERING AND MIXING INTO THE SYSTEM.
11. VRF/VRV SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASHRAE 15 AND ALL LOCAL CODES.
12. OTHER REQUIREMENTS PER THE MANUFACTURER'S INSTALLATION REQUIREMENTS. IF THE ABOVE CONFLICTS WITH THE MANUFACTURER'S REQUIREMENTS, THE MANUFACTURER'S REQUIREMENTS SHALL TAKE PRECEDENT.

TRAINING & CERTIFICATION:

1. VRF/VRV SYSTEMS SHALL ONLY BE INSTALLED BY A MANUFACTURER CERTIFIED AND TRAINED CONTRACTOR. CONTRACTOR SHALL HAVE AND PROVIDE DOCUMENTION OF INSTALLATION, COMMISSIONING AND SERVICE TROUBLESHOOTING TRAINING. DOCUMENTATION SHALL BE FURNISHED WITH THE CONTRACTORS BID AND/OR NOTICE TO PROCEED.

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116 Camp Daniels Road, Elloree, SC

SHEET ISSUE:

| NO. | DATE | DESCRIPTION | BY |
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BID SET 09/15/2017

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| PRINCIPAL IN CHARGE: | SCS |
| PROJECT ENGINEER: | SCS |
| DRAWN BY: | SCS |

SHEET TITLE:
VRV PIPING SCHEMATICS

SHEET NO. PROJ. NO. 015315.00

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