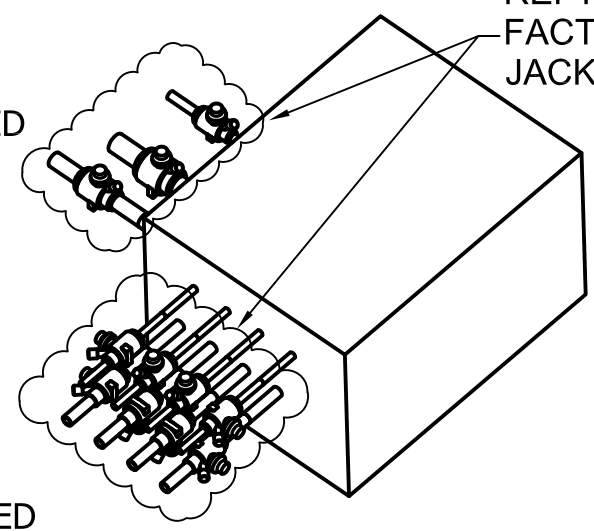


PIPING TO AND FROM OUTDOOR UNIT(S) TO BE H55 STRAIGHT LENGTH COPPER. SCHRADER PORTS TO BE INSTALLED TOWARDS BRANCH SELECTOR.



REFTEKK "JBV" SERVICE VALVE WITH FACTORY PROVIDED EPDM INSULATION JACKET (NOT SHOWN)

PIPING TO AND FROM INDOOR (FAN COIL) UNITS TO BE O60 ANNEALED COILS OR H55 STRAIGHT LENGTH COPPER. SCHRADER PORTS TO BE INSTALLED FACING AWAY FROM BC CONTROLLER

- ALL BRANCH SELECTOR PIPING PORTS (INLET AND OUTLET) SHALL BE FITTED WITH A REFRIGERANT SERVICE VALVE WITH INTEGRAL SCHRADER PORT.
- ALL REFRIGERANT SERVICE VALVES SHALL BE RATED FOR R-410A.
- ANY UNUSED PORTS TO HAVE VALVE INSTALLED WITH 6" LENGTH OF PIPING WITH BRAZED CAP.
- VALVE SHALL BE IN THE CLOSED POSITION ON ANY UNUSED PORTS.
- ALL PIPING AND VALVES SHOULD BE SUPPORTED WITHIN 12" OF THE BRANCH SELECTOR.
- ALL VALVES SHALL BE FURNISHED AND INSTALLED WITH FACTORY SUPPLIED EPDM INSULATION JACKET.
- FACTORY JACKETS AND PIPING INSULATION MUST BE SEALED VAPOR TIGHT AT ALL LONGITUDINAL AND BUTT JOINTS.
- PIPING INSULATION AND VALVE JACKETS MUST BE SEALED VAPOR TIGHT TO THE BRANCH SELECTOR TO PREVENT CONDENSATION.
- ALL PIPING INSULATION AND VALVE JACKETS MUST KEEP THE PIPING DRY.

DETAIL SHOWS 4 PORT BRANCH SELECTOR. ALL OTHER BRANCH SELECTOR SIZES SIMILAR. INSULATION AND VALVE JACKETS NOT SHOWN FOR CLARITY.

**DETAIL 1
BRANCH SELECTOR PIPING
with SERVICE VALVES**

**3-PIPE VRV/VRF
(DETAILS ABOVE LINE)**

The following Table is enhanced for application to VRF/VRV Refrigerant Piping Systems

REFRIGERANT CONDITION or PHASE	REFRIGERANT TEMPERATURE RANGE (°F)	INSULATION MEAN RATING TEMPERATURE (°F)	ACR TUBING OUTSIDE DIAMETER (INCHES)								
			1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1-1/8"	1-3/8"	1-5/8"
			MINIMUM INSULATION THICKNESS REQUIRED (INCHES)								
HIGH PRESSURE VAPOR	201-250	150	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"
	141-200	125	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	2"
LIQUID	104-140	100	1"	1"	1"	1"	1"	1"	1-1/2"	1-1/2"	1-1/2"
LOW PRESSURE VAPOR	40-60	75	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"
	BELOW 40	50	1"	1"	1"	1"	1"	1"	1-1/2"	1-1/2"	1-1/2"

PIPE INSULATION THICKNESS for ACR REFRIGERATION PIPING per 2016 & 2019 CALIFORNIA TITLE 24

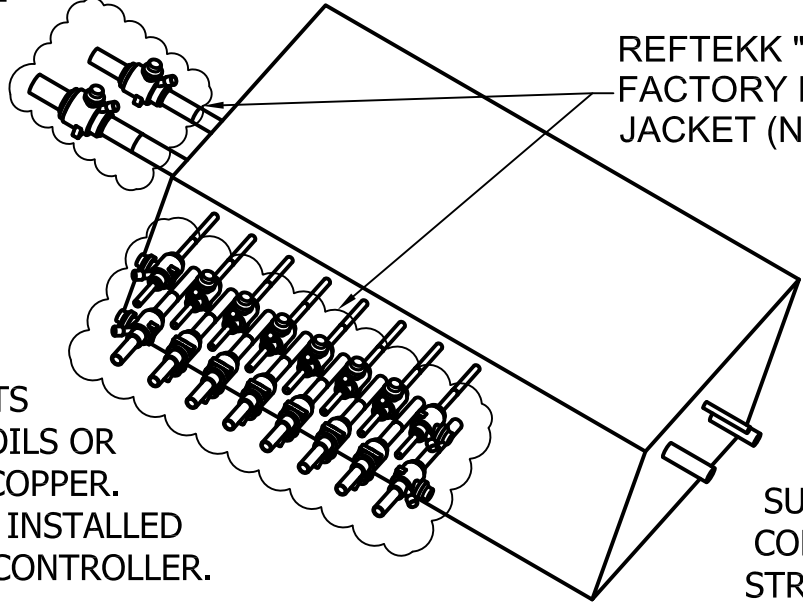
NOTES

- THE ABOVE TABLE INDICATES MINIMUM PIPE INSULATION THICKNESSES BASED ONLY ON ENERGY CODE REQUIREMENTS. ACTUAL THICKNESSES TO BE THE GREATER OF 1) ENERGY CODE REQUIREMENTS, 2) LOCAL JURISDICTION REQUIREMENTS, 3) MANUFACTURER INSTALLATION REQUIREMENTS, and 4) LOCATION DEPENDENT HUMIDITY CALCULATIONS FOR CONDENSATION CONTROL.
- VERIFY MIN/MAX REFRIGERANT FLUID OPERATING TEMPERATURE RANGES WITH EQUIPMENT MANUFACTURER.
- THE ABOVE TABLE APPLIES TO ALL REFRIGERATION PIPING SYSTEMS, INCLUDING COOLING ONLY with/without HOT GAS BYPASS. HEAT PUMP SYSTEMS INCLUDING MINI-SPLITS, AND VRF/VRV HEAT PUMP AND HEAT RECOVERY SYSTEMS.
- VRV/VRV 3-PIPE HEAT RECOVERY SYSTEMS TYPICALLY HAVE HIGH PRESSURE VAPOR PIPING (FOR HEATING) THAT EXCEEDS 200° F.
- VRV 2 PIPE HEAT RECOVERY SYSTEMS TYPICALLY HAVE HIGH PRESSURE VAPOR/LIQUID 2 PHASE (FOR HEATING) THAT IS LESS THAN 200° F.
- FOR VRF/VRV HEAT RECOVERY SYSTEMS, THE ABOVE TABLE APPLIES TO PIPING BETWEEN THE OUTDOOR UNIT AND MODE SELECTION BOX AND BETWEEN THE MODE SELECTION BOX AND INDOOR UNITS (FAN COILS).
- ALL INSULATION WALL THICKNESS GREATER THAN 1-1/2" REQUIRES DOUBLE LAYER (1" base layer plus 1-1/2" outer layer) TO MEET ASTM E84 (UL 723). EACH INDIVIDUAL LAYER MUST BE FULLY VAPOR PROOF SEALED AND MEET ASTM E84 25/50 FLAME SPREAD/SMOKE GENERATED RATINGS.

PIPE HANGER SPACING	
TUBE SIZE (in)	SPACING (ft)
1/4"	5
3/8"	5
1/2"	5
5/8"	5
3/4"	6
7/8"	6
1-1/8"	7
1-3/8"	8
1-5/8"	8
2-1/8"	8

**DETAIL 7
INSULATION THICKNESS AND HANGER SPACING TABLES
(APPLIES TO ALL REFRIGERANT PIPING SYSTEMS)**

PIPING TO AND FROM OUTDOOR UNIT(S) TO BE H55 STRAIGHT LENGTH COPPER. SCHRADER PORTS TO BE INSTALLED TOWARDS BC CONTROLLER.



REFTEKK "JBV" SERVICE VALVE WITH FACTORY PROVIDED EPDM INSULATION JACKET (NOT SHOWN)

PIPING TO AND FROM INDOOR (FAN COIL) UNITS TO BE O60 ANNEALED COILS OR H55 STRAIGHT LENGTH COPPER. SCHRADER PORTS TO BE INSTALLED FACING AWAY FROM BC CONTROLLER.

PIPING TO AND FROM SUB BRANCH CIRCUIT (BC) CONTROLLER(S) TO BE H55 STRAIGHT LENGTH COPPER.

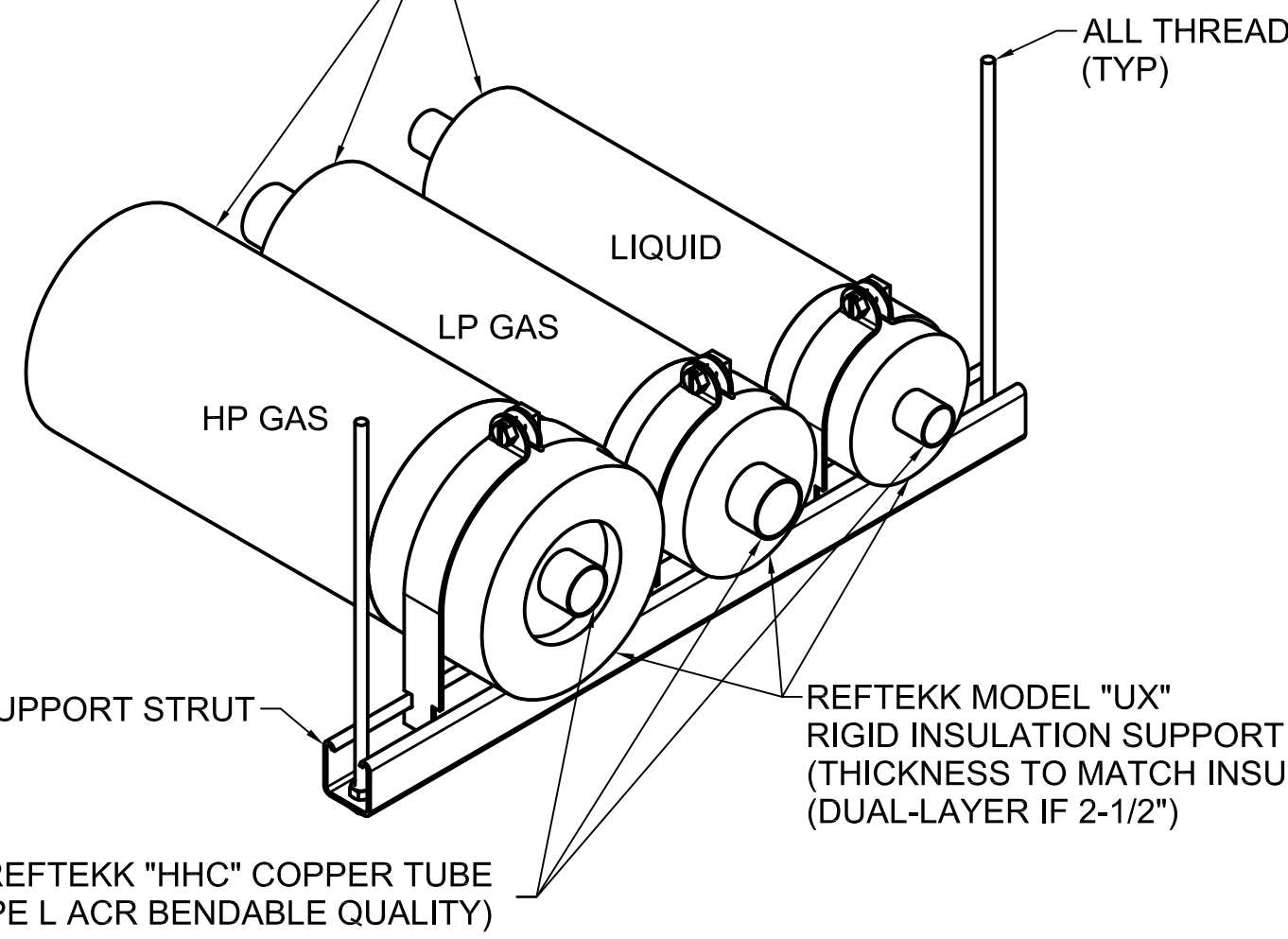
MAIN BRANCH CIRCUIT (BC) CONTROLLER

- ALL BRANCH CONTROLLER PIPING PORTS (INLET AND OUTLET) SHALL BE FITTED WITH A REFRIGERANT SERVICE VALVE WITH INTEGRAL SCHRADER PORT.
- ALL REFRIGERANT SERVICE VALVES SHALL BE RATED FOR R-410A.
- ANY UNUSED PORTS TO HAVE VALVE INSTALLED WITH 6" LENGTH OF PIPING WITH BRAZED CAP.
- VALVE SHALL BE IN THE CLOSED POSITION ON ANY UNUSED PORTS.
- ALL PIPING AND VALVES SHOULD BE SUPPORTED WITHIN 12" OF THE BC CONTROLLER.
- ALL VALVES SHALL BE FURNISHED AND INSTALLED WITH FACTORY SUPPLIED EPDM INSULATION JACKET.
- FACTORY JACKETS AND PIPING INSULATION MUST BE SEALED VAPOR TIGHT AT ALL LONGITUDINAL AND BUTT JOINTS.
- PIPING INSULATION AND VALVE JACKETS MUST BE SEALED VAPOR TIGHT TO THE BC CONTROLLER TO PREVENT CONDENSATION.
- ALL PIPING INSULATION AND VALVE JACKETS MUST KEEP THE PIPING DRY.

DETAIL SHOWS 8 PORT MAIN BC CONTROLLER AND 8 PORT SUB BC CONTROLLER. ALL OTHER BC CONTROLLER SIZES SIMILAR. INSULATION AND VALVE JACKETS NOT SHOWN FOR CLARITY.

**DETAIL 4
BRANCH CONTROLLER PIPING with SERVICE VALVES
ONLY APPLICABLE TO HEAT RECOVERY SYSTEMS**

REFTEKK "AC" OR "AC-SSPT" EPDM INSULATION, MINIMUM THICKNESS PER DETAIL 7 (DUAL-LAYER IF 2-1/2" THICKNESS IS REQUIRED)



SUPPORT STRUT
REFTEKK "HHC" COPPER TUBE (H55 TYPE L ACR BENDABLE QUALITY)

ALL THREAD (TYP)

REFTEKK MODEL "UX" RIGID INSULATION SUPPORT (THICKNESS TO MATCH INSULATION) (DUAL-LAYER IF 2-1/2")

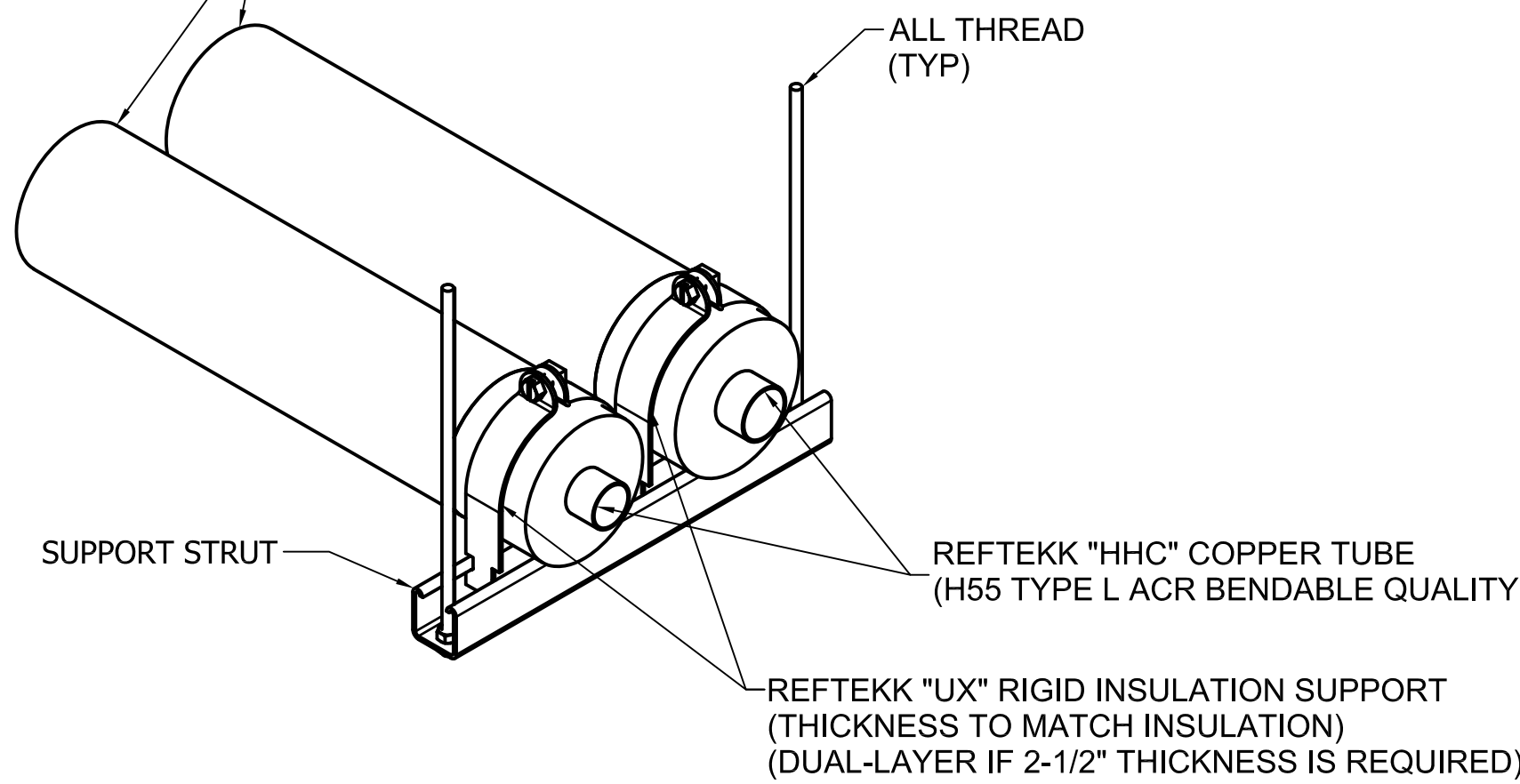
- PIPE INSULATION AND PIPE SUPPORTS MUST BE INSTALLED STRICTLY IN ACCORDANCE WITH INSULATION MANUFACTURERS INSTALLATION INSTRUCTIONS.
- ALL BUTT JOINTS, LONGITUDINAL SEAMS AND INSULATION TERMINATIONS MUST BE GLUED AND SEALED PER INSULATION MANUFACTURERS INSTRUCTIONS.
- INSULATION MUST BE INSTALLED UNDER SLIGHT COMPRESSION. DO NOT STRETCH INSULATION.
- PROVIDE VAPOR DAM (2" LENGTH OF INSULATION GLUED TO PIPE) EVERY 12' TO 18', AND AT ALL INSULATION TERMINATIONS (EQUIPMENT CONNECTIONS, VALVES, REFRIGERATION SPECIALTIES).
- EPDM INSULATION MUST BE SEALED VAPOR TIGHT ALONG THE ENTIRE LENGTH OF THE PIPE AND MUST PASS CONTINUOUSLY THROUGH PIPE SUPPORTS AND BUILDING STRUCTURAL AND FIRE RATED PENETRATIONS.
- DO NOT ATTACH ANYTHING TO THE INSULATION (I.E. CONTROL WIRING, DATA CABLING, ETC.)
- DO NOT SECURE INSULATION OR ATTACH ANYTHING TO THE INSULATION WITH TIE WRAPS.
- DO NOT ALLOW CEILING SUPPORT HANGER WIRES TO TOUCH THE INSULATION.
- DO NOT ALLOW THE INSULATION TO BE COMPRESSED BY STRUCTURAL MEMBERS OR PENETRATIONS THROUGH WALL, CEILINGS, OR FLOORS.
- PIPING AND INSULATION MUST BE CLEAN AND DRY PRIOR TO APPLICATION OF INSULATION.
- ONLY APPLY INSULATION TO PIPES THAT ARE AT AMBIENT TEMPERATURE. DO NOT APPLY INSULATION TO PIPES THAT ARE IN OPERATION.
- THE INSULATION MUST KEEP THE PIPE DRY AT ALL TIMES AND PROTECT AGAINST WATER INTRUSION FROM RAIN AND CONDENSATION.
- HANGER SPACING MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- ALL-THREAD ROD SIZE AND STRUCTURAL CONNECTION MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE ADDITIONAL SEISMIC SUPPORT AND BRACING AS REQUIRED BY LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE 1" MINIMUM SPACE BETWEEN INSULATED PIPES FOR AIR CIRCULATION
- PROVIDE 1" MINIMUM CLEARANCE BETWEEN INSULATION AND ALL-THREAD.

**DETAIL 2
COPPER STRAIGHT LENGTH - EPDM INSTALLATION
(IN EXAMPLE SHOWN, HIGH PRESSURE GAS > 200° F)**

**3-PIPE VRV/VRF
(DETAILS ABOVE LINE)**

**(DETAILS BELOW LINE)
2-PIPE VRF**

REFTEKK "AC" OR "AC-SSPT" EPDM INSULATION, MINIMUM THICKNESS PER DETAIL 7 (DUAL-LAYER IF 2-1/2" THICKNESS IS REQUIRED)



SUPPORT STRUT

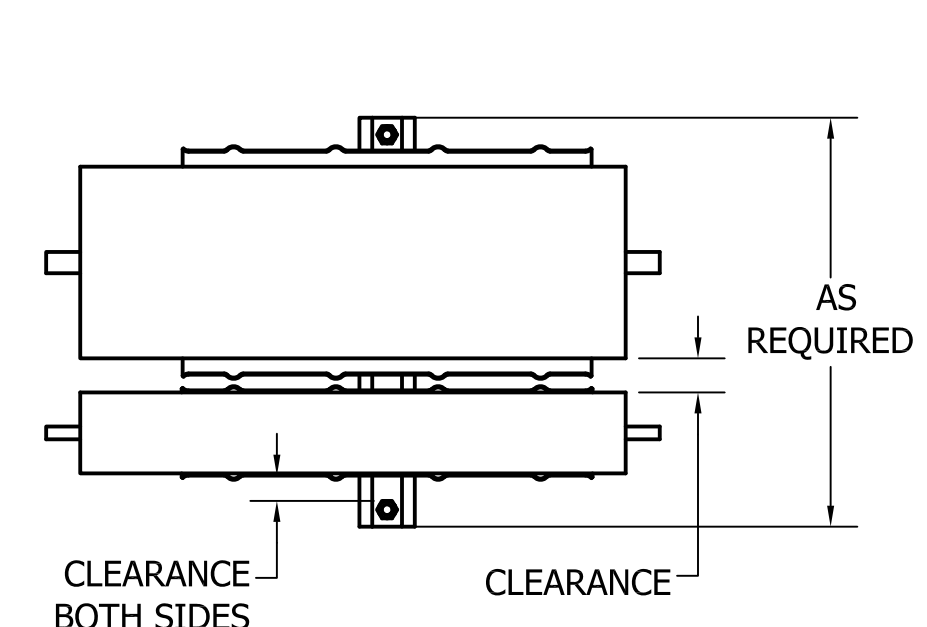
ALL THREAD (TYP)

REFTEKK "HHC" COPPER TUBE (H55 TYPE L ACR BENDABLE QUALITY)

REFTEKK "UX" RIGID INSULATION SUPPORT (THICKNESS TO MATCH INSULATION) (DUAL-LAYER IF 2-1/2" THICKNESS IS REQUIRED)

- PIPE INSULATION AND PIPE SUPPORTS MUST BE INSTALLED STRICTLY IN ACCORDANCE WITH INSULATION MANUFACTURERS INSTALLATION INSTRUCTIONS.
- ALL BUTT JOINTS, LONGITUDINAL SEAMS AND INSULATION TERMINATIONS MUST BE GLUED AND SEALED PER INSULATION MANUFACTURERS INSTRUCTIONS.
- INSULATION MUST BE INSTALLED UNDER SLIGHT COMPRESSION. DO NOT STRETCH INSULATION.
- PROVIDE VAPOR DAM (2" LENGTH OF INSULATION GLUED TO PIPE) EVERY 12' TO 18', AND AT ALL INSULATION TERMINATIONS (EQUIPMENT CONNECTIONS, VALVES, REFRIGERATION SPECIALTIES).
- EPDM INSULATION MUST BE SEALED VAPOR TIGHT ALONG THE ENTIRE LENGTH OF THE PIPE AND MUST PASS CONTINUOUSLY THROUGH PIPE SUPPORTS AND BUILDING STRUCTURAL AND FIRE RATED PENETRATIONS.
- DO NOT ATTACH ANYTHING TO THE INSULATION (I.E. CONTROL WIRING, DATA CABLING, ETC.)
- DO NOT SECURE INSULATION OR ATTACH ANYTHING TO THE INSULATION WITH TIE WRAPS.
- DO NOT ALLOW CEILING SUPPORT HANGER WIRES TO TOUCH THE INSULATION.
- DO NOT ALLOW THE INSULATION TO BE COMPRESSED BY STRUCTURAL MEMBERS OR PENETRATIONS THROUGH WALL, CEILINGS, OR FLOORS.
- PIPING AND INSULATION MUST BE CLEAN AND DRY PRIOR TO APPLICATION OF INSULATION.
- ONLY APPLY INSULATION TO PIPES THAT ARE AT AMBIENT TEMPERATURE. DO NOT APPLY INSULATION TO PIPES THAT ARE IN OPERATION.
- THE INSULATION MUST KEEP THE PIPE DRY AT ALL TIMES AND PROTECT AGAINST WATER INTRUSION FROM RAIN AND CONDENSATION.
- HANGER SPACING MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- ALL-THREAD ROD SIZE AND STRUCTURAL CONNECTION MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE ADDITIONAL SEISMIC SUPPORT AND BRACING AS REQUIRED BY LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE 1" MINIMUM SPACE BETWEEN INSULATED PIPES FOR AIR CIRCULATION
- PROVIDE 1" MINIMUM CLEARANCE BETWEEN INSULATION AND ALL-THREAD.

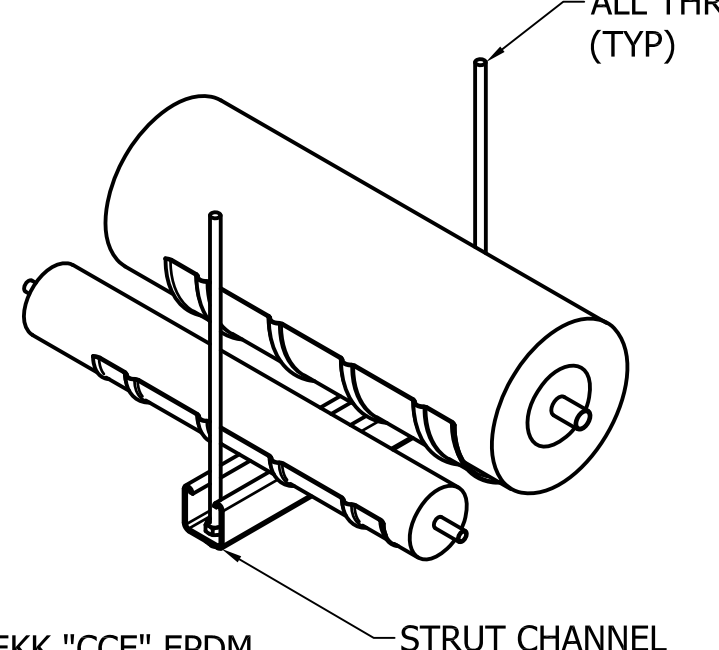
**DETAIL 5
COPPER STRAIGHT LENGTH - EPDM INSTALLATION
(IN EXAMPLE SHOWN, HIGH PRESSURE GAS ≤ 200° F)**



CLEARANCE BOTH SIDES

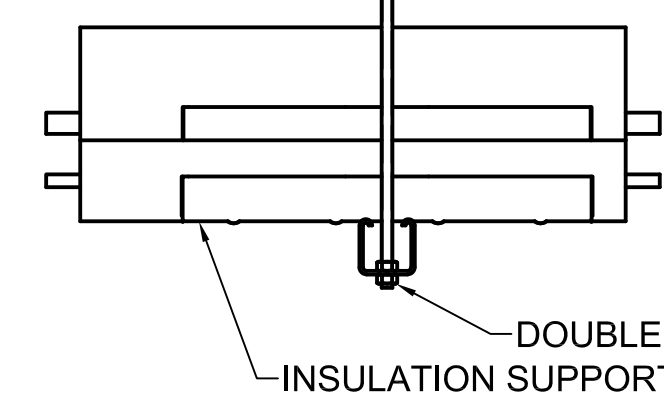
CLEARANCE

AS REQUIRED



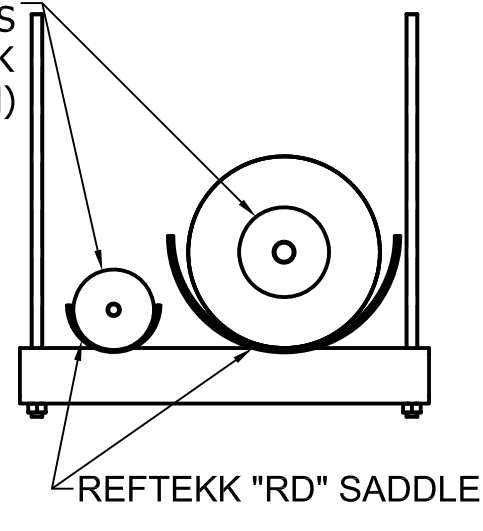
STRUT CHANNEL

INSTALL PIPE SUPPORT EVERY 5' OF PIPE LENGTH OR PER LOCAL CODE REQUIREMENTS



DOUBLE NUT
INSULATION SUPPORT SADDLES

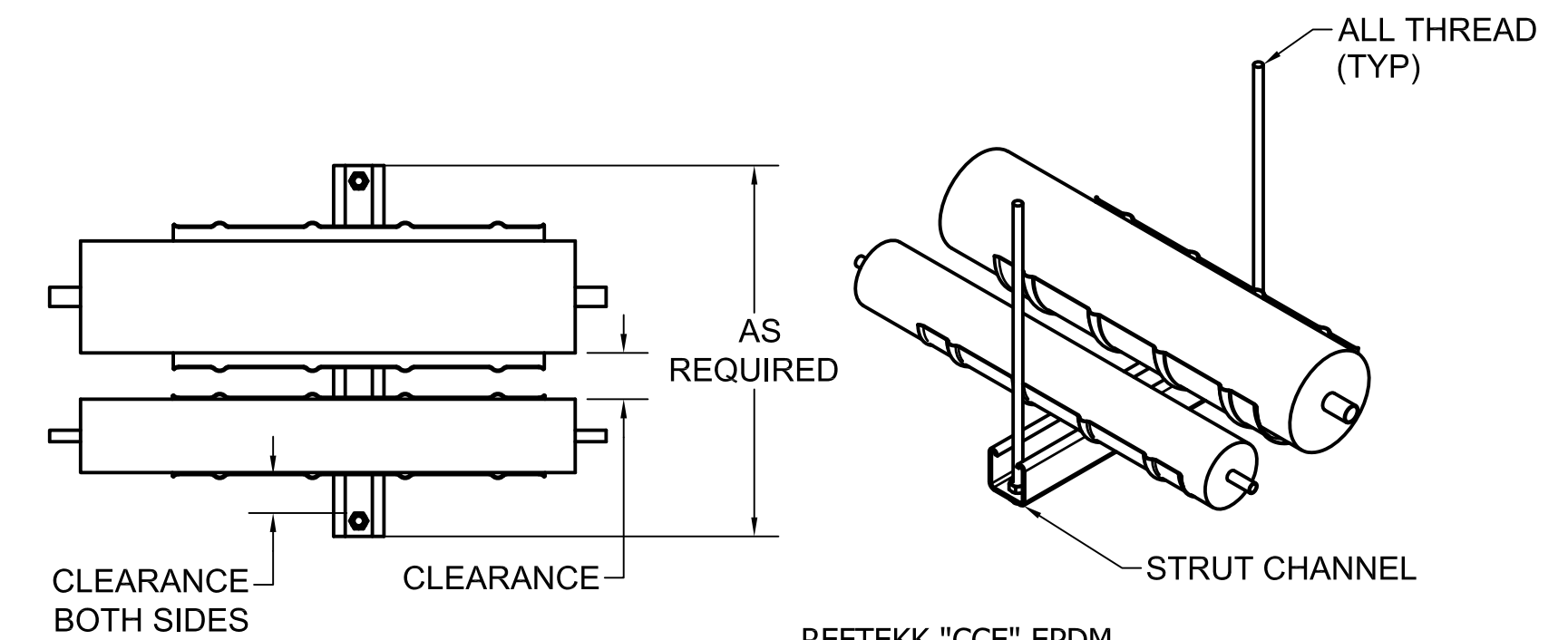
REFTEKK "CCE" EPDM INSULATED ANNEALED COPPER MINIMUM THICKNESS PER DETAIL 7 (DUAL-LAYER IF 2-1/2" THICKNESS IS REQUIRED, OUTER LAYER TO BE REFTEKK "AC" or "AC-SSPT" EPDM INSULATION)



REFTEKK "RD" SADDLE

- PIPE INSULATION AND PIPE SUPPORTS MUST BE INSTALLED STRICTLY IN ACCORDANCE WITH INSULATION MANUFACTURERS INSTALLATION INSTRUCTIONS.
- ALL BUTT JOINTS, LONGITUDINAL SEAMS AND INSULATION TERMINATIONS MUST BE GLUED AND SEALED PER INSULATION MANUFACTURERS INSTRUCTIONS.
- INSULATION MUST BE INSTALLED UNDER SLIGHT COMPRESSION. DO NOT STRETCH INSULATION.
- PROVIDE VAPOR DAM (2" LENGTH OF INSULATION GLUED TO PIPE) AT ALL INSULATION TERMINATIONS (EQUIPMENT CONNECTIONS, VALVES, REFRIGERATION SPECIALTIES).
- HANGER SPACING MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- ALL-THREAD ROD SIZE AND STRUCTURAL CONNECTION MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE SEISMIC SUPPORT AND BRACING AS REQUIRED BY LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- EPDM INSULATION MUST BE SEALED VAPOR TIGHT ALONG THE ENTIRE LENGTH OF THE PIPE AND MUST PASS CONTINUOUSLY THROUGH PIPE SUPPORTS, AND BUILDING, STRUCTURAL AND FIRE RATED PENETRATIONS.
- THE INSULATION MUST KEEP THE PIPE DRY AT ALL TIMES AND PROTECT AGAINST WATER INTRUSION FROM RAIN AND CONDENSATION.
- PIPING SUPPORTED ON INSULATION SADDLES FOR **INDOOR USE ONLY**. DO NOT USE SADDLE SUPPORTS OUTDOORS.

**DETAIL 3
ANNEALED COPPER COIL (LINE SETS) SUPPORT
(IN EXAMPLE SHOWN, HIGH PRESSURE GAS > 200° F)**



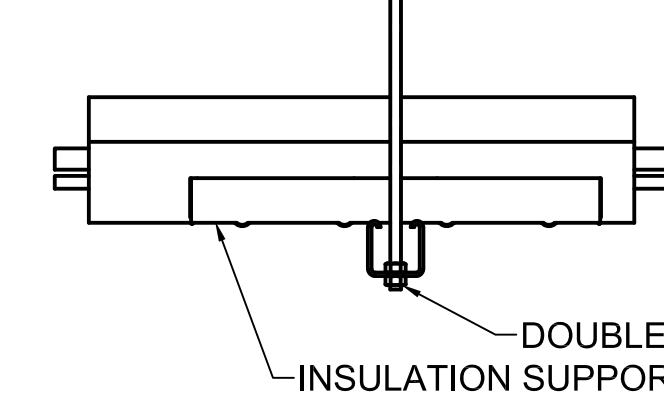
CLEARANCE BOTH SIDES

AS REQUIRED

ALL THREAD (TYP)

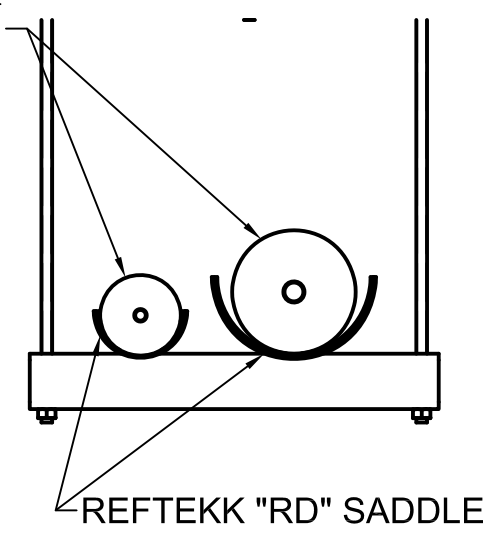
STRUT CHANNEL

INSTALL PIPE SUPPORT EVERY 5' OF PIPE LENGTH OR PER LOCAL CODE REQUIREMENTS



DOUBLE NUT
INSULATION SUPPORT SADDLES

REFTEKK "CCE" EPDM INSULATED ANNEALED COPPER MINIMUM THICKNESS PER DETAIL 7 (DUAL-LAYER IF 2-1/2" THICKNESS IS REQUIRED, OUTER LAYER TO BE REFTEKK "AC" or "AC-SSPT" EPDM INSULATION)



REFTEKK "RD" SADDLE

- PIPE INSULATION AND PIPE SUPPORTS MUST BE INSTALLED STRICTLY IN ACCORDANCE WITH INSULATION MANUFACTURERS INSTALLATION INSTRUCTIONS.
- ALL BUTT JOINTS, LONGITUDINAL SEAMS AND INSULATION TERMINATIONS MUST BE GLUED AND SEALED PER INSULATION MANUFACTURERS INSTRUCTIONS.
- INSULATION MUST BE INSTALLED UNDER SLIGHT COMPRESSION. DO NOT STRETCH INSULATION.
- PROVIDE VAPOR DAM (2" LENGTH OF INSULATION GLUED TO PIPE) AT ALL INSULATION TERMINATIONS (EQUIPMENT CONNECTIONS, VALVES, REFRIGERATION SPECIALTIES).
- HANGER SPACING MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- ALL-THREAD ROD SIZE AND STRUCTURAL CONNECTION MUST COMPLY WITH LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- PROVIDE SEISMIC SUPPORT AND BRACING AS REQUIRED BY LOCAL CODE OR AUTHORITY HAVING JURISDICTION.
- EPDM INSULATION MUST BE SEALED VAPOR TIGHT ALONG THE ENTIRE LENGTH OF THE PIPE AND MUST PASS CONTINUOUSLY THROUGH PIPE SUPPORTS, AND BUILDING, STRUCTURAL AND FIRE RATED PENETRATIONS.
- THE INSULATION MUST KEEP THE PIPE DRY AT ALL TIMES AND PROTECT AGAINST WATER INTRUSION FROM RAIN AND CONDENSATION.
- PIPING SUPPORTED ON INSULATION SADDLES FOR **INDOOR USE ONLY**. DO NOT USE SADDLE SUPPORTS OUTDOORS.

**DETAIL 6
ANNEALED COPPER COIL (LINE SETS) SUPPORT
(IN EXAMPLE SHOWN, HIGH PRESSURE GAS ≤ 200° F)**