

SECTION 11 41 43 - REFRIGERATION SYSTEM INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

A. General:

1. This Section specifies installation of the refrigeration system furnished by the Kroger Company referred to as the Owner.
2. This Section includes various store type installations. Some of the items specified in this Section will not be used on the Project. Refer to Drawings for items included in the Project.
3. The Installer is responsible for supervising their own work and meet dates shown on the installation schedule.

B. Section includes:

1. **KROGER DIRECT BUY PROGRAM:** Owner supplied/Contractor installed.
 - a. The Kroger Company will supply the following equipment:
 - 1) Refrigeration pipe and fittings.
 - b. Comply with requirements in Division 00 Section "General Conditions."
 - c. Refer to Division 00 Sections "Instructions to Bidders" and "Direct Buy Refrigeration Copper Pipe Bidding" for bidding procedures.
2. Contractor supplied items:
 - a. All other material and equipment specified in this Section and on the Drawings necessary for a complete and working installation of Owner's refrigeration system.
3. Installation of the Owner furnished items shown on the Drawings including, but not limited to the following:
 - a. Refrigeration piping and copper fittings.
 - b. Condensing units/systems.
 - c. Remote condensers.
 - d. Refrigerant for charging systems.
 - e. Refrigeration system devices associated with controls.
 - f. Refrigeration Systems.
4. Installation of Installer supplied items including, but not limited to the following:
 - a. Miscellaneous copper tubing and fittings not provided in the Direct Buy take off.
 - b. Refrigeration oil.
 - c. Identification of systems.
 - d. Valves and controls for existing systems.

- C. Modifications and additions to this Section, if required, are indicated in Section 11 41 43.01 "Supplementary Refrigeration System Installation." If Section 11 41 43.01 "Supplementary Refrigeration System Installation" is not included in this Project Manual, no modifications and additions to this Section are indicated. Where any portion of this Section is modified or deleted by Section 11 41 43.01 "Supplementary Refrigeration System Installation," the unaltered portions shall remain in effect.

1.2 REFERENCES

A. Definitions

- 1. Certain terms and words used throughout Section shall be defined as follows:
 - a. **Owner:** The person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's Representative.
 - b. **Contractor:** The General Contractor with overall responsibility to build a complete store, on schedule, ready for operation as a complete food store.
 - c. **Installer:** The entity identified in this Section responsible for but not limited to material and installation of the refrigeration system, as identified in this Section.

B. Reference Standards

- 1. Kroger Refrigerant Management Policy: See end of this Section.
- 2. Code of Federal Regulations 40 C.F.R. part 82 - Protection of Stratospheric Ozone
- 3. Kroger Controller Set Points Document: Located in Owner's project management website.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Report to Owner any defaults in work furnished and installed by others that causes conditions unsuitable for Installer's Work. Failure to inspect and report unsuitable conditions shall constitute acceptance of work furnished and installed by others as fit and proper for coordination with the Installer's work.
- B. Cooperation with Other Trades: Cooperate with other installers doing work on the Project to prevent any conflict that would require moving or changing any refrigerant lines, devices, or other equipment, or require other installers to relocate devices and piping when installed according to plans and specifications.
 - 1. Where interference exists, notify Owner before proceeding with installation.
- C. Work Schedules
 - 1. Typical work schedule shall consist of five 8-hour workdays ending no earlier than 3:00 p.m. local time at the store or in shifts as required in the Phase Plan or Project Schedule.
 - a. For non-local Installers, as approved by the Owner, work may be conducted in four 10-hour days provided the work day does not end prior to 3:00 p.m. local time.

2. Three weeks prior to opening day, the Installers work crews will work minimum of five 8-hour days.
 3. Work Restrictions: For remodels, pre-piping of systems that require blocking a shopping pattern must be done between the hours of 10 P.M. and 7 A.M., unless receiving prior approval of the Owner.
- D. For remodels, temporarily relocate cases and or systems as indicated or directed by Owner. Verify special project scope and schedule.

1.4 SUBMITTALS

- A. The Owner will provide the following submittals for Owner supplied items for the Installer's information upon request:
1. Product Data: For each item and accessory supplied electronically by Owner.
 2. Shop Drawings: For special components and installations not detailed in manufacturer's product data.
- B. Pre-Construction Submittals
1. Pre-inspection checklist.
 2. Proposed line routing plan.
- C. Closeout Submittals
1. Operation and Maintenance Data: For equipment provided by Installer and equipment provided by Owner to include in operation and maintenance manuals. Include service and installation instructions.
 - a. Collect manuals for equipment installed in this Section and place in a three-ring binder. Deliver to the Owner's store manager upon completion of the Work. Refer to General Condition for additional requirements.
 - b. The Owner will supply the Installer with receiver copies of all equipment and fixture purchase orders to include in Operation and Maintenance Manual.
 2. Record Drawings: As-built drawings showing the location of refrigeration lines. Include the location of isolation valve, control valves (EPR's and solenoids) and line sizing.
 3. Kroger Refrigerant Management Tracking Form.
 4. Accidental Release Report.
 5. Completed Kroger Site Punch List.
 6. Piping Test Check Sheet.
 7. Superheat Recording.

1.5 QUALITY ASSURANCE

- A. Work, materials, and equipment shall comply with rules and regulations of authorities having jurisdiction. Continually monitor field installation for code compliance and workmanship quality. Installation shall comply with all manufacturers' recommendations.

- B. All refrigeration Work to be in compliance with the Kroger Refrigeration Management Policy.
- C. Maintain a set of Contract Documents easily accessible within the building for Owner to review and verify any discrepancies.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. For remodels, do not store material in the sales area. Material stored in the back room must be out of the way of the Owner's operations.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of other construction by field measurements before beginning Work. If there are any discrepancies notify Owner.

1.8 WARRANTY

- A. The Installer agrees to repair or replace any component that deteriorates or malfunctions as a result of improper installation by the Installer within specified warranty period including replacement of all components under warranty of equipment manufacturer.
 - 1. Warranty Period: 90 days from date of store Grand Opening provided installation is accepted and approved as completed in compliance with the Contract Documents by the Owner.
 - 2. Return of Warranted Parts: The Installer is responsible for the return of all manufacturers' warranted parts, and will be held liable for all in-warranty parts not returned. The equipment manufacturer will be liable for all costs incurred due to defective material and workmanship of equipment. If loss is due to installation, then the responsibility is that of the Installer. If the loss is joint responsibility, then the Owner will hold both parties responsible and The Owner will allocate responsibility for each liable party. If failure is due to the Owner's negligence or the service company performing maintenance, then it will be the Owner's responsibility. Although the original equipment manufacturer (OEM) and other trades may assist the Installer with operation issues, final responsibility for the operation is the is that of the Installer.
 - 3. Manufacturer Warranted Equipment: Before the store Grand Opening, the warranty is to include labor and replacement of all parts. Obtain manufacturer's approval before making repairs. If approved, the manufacturer will accept invoicing for expenses involved in the repair. Where repairs must be made on an emergency basis without obtaining manufacturer's approval, the installer shall obtain Owner's approval and proceed with repair. Installer shall be reimbursed for necessary labor and materials required to make emergency repair.
 - 4. Warranty Retainage: Until the end of the warranty period, 5 percent of the contract amount due the Installer will be held as a retainage unless a different retainage percentage is required by the Authority Having Jurisdiction.
 - 5. Warranty Service: During the warranty period, regardless if the service call is due to failure of equipment or failure of the installation, the Installer shall enter the service call with Service Hub, the Owner's electronic service call system. Submit service reports to the Owner at the end of the warranty period.

- a. In the event that the Installer fails to respond to an emergency call within the specified time during the warranty period as defined in the details of the call they receive from Service Hub, the Owner reserves the right to have the problem corrected at the Installer's expense.
- b. In the event that the Owner's in-house personnel (service person) must complete items, Installer agrees to pay time and material to the Owner for the work. The Owner's time will be charged at the Installer's current billable rate for straight time or overtime as appropriate. Charge includes any lodging and travel cost associated with repair.
- c. As part of the Installer's warranty service, the Installer shall make arrangements to have a service technician present at the store for the Grand Opening day to correct problems or make adjustments designated by the Owner, working a minimum of four hours, commencing two hours before store opening.

B. 60 Day Warranty Inspection

1. Schedule a warranty walk-thru with the Owner 60 days after the Grand Opening as specified in article "Field Quality Control" in Part 3 of this Section. Within two weeks of the 60-day warranty inspection and prior to acceptance by the Owner and release of the refrigeration installer's warranty, correct all deficiencies noted at the time of the inspection.

C. Refer Division 00 Section "General Conditions" for general warranty information.

PART 2 - PRODUCTS

2.1 GENERAL

- A. New Equipment: Liquid line solenoids/suction stops, EPRs and solenoid coils are sized and supplied by the refrigeration equipment manufacturer as indicated on refrigeration equipment manufacturer's Shop Drawings.
- B. Existing Equipment: Installer is to provide liquid line solenoids/suction stops, EPRs and solenoid coils required in the existing equipment within the store. See refrigeration design plans for clarification.

2.2 OWNER FURNISHED PRODUCTS

- A. Receive, handle, store, and protect materials, equipment, fixtures or supplies delivered to the site by the Owner for installation under this Section. Schedule and coordinate deliveries.
- B. Refrigeration Tubing and Fittings.
 1. The Owner will furnish all refrigeration pipe and fittings including copper P-Traps through the Direct Buy Refrigeration Copper Pipe Bidding procedure as described in Division 00 Sections "Instructions to Bidders" and "Direct Buy Refrigeration Copper Pipe Bidding."

- a. Piping: ACR, Type L, hard copper piping (cleaned, dehydrated, and capped lengths).
 - b. CO2 System Piping:
 - 1) Circuit Piping (1-3/8 inch and smaller): ACR, Type L, hard copper piping (cleaned, dehydrated, and capped lengths).
 - 2) Circuit Piping (1 5/8 inch and larger): ACR, Type K, hard copper piping (cleaned, dehydrated, and capped lengths).
 - 3) Pressure Relief Lines: ACR, Type K, hard copper piping (cleaned, dehydrated, and capped lengths).
 - 4) Supply and Return Lines from Gas Coolers: Iron/copper piping (cleaned, dehydrated, and capped lengths).
 - a) Product: Mueller Streamline Co.; Streamline XHP.
2. The Owner will permit the Installer to make adjustments before the Owner places the actual order as long as the adjustments do not exceed the value of the total copper pipe originally calculated on the Copper Pipe Take-Off Form. If the changes translate to higher cost in relation to the total copper price originally calculated, the Installer will be responsible for the difference by providing any additional copper pipes, fittings, and other material equal in quality to Owner supplied items, to complete the Work at the sole expense of the Installer. All left over copper tubing and fittings are the installer's property to remove from the premises.
- C. Refrigerant: New and recovered refrigerants remain the property of the Owner and shall be accounted for as identified in the Kroger Refrigerant Management Policy (attached to this section).

2.3 INSTALLER FURNISHED PRODUCTS

- A. General: Unless otherwise specified, all materials and equipment items shall be new. All materials used in the Project shall be equal to approved samples in every respect. When required by the Owner, the Installer shall provide certificates of conformance for materials specified.
- B. Isolation Ball Valves: Full port construction matching line size ID with access port to allow the isolated portion of the circuit to be serviced. Access valve to be fitted with Mueller A 04544 Flare Seal Cap which contains Mueller A 00401 Copper Flare Gasket and tightened to 8-12 lb-ft or one quarter turn past finger tight. Provide 1 inch (25 mm) thick self-sealing elastomeric insulation cover.
 1. Isolation Ball Valves (CO2 Systems): For circuits 1-1/8 inch and smaller provide Parker Hannifin Corp., Sporlan Division; Sporlan EBV(T)-PR. Circuits over 1-1/8 inch to utilize a standard ball valve and a field installed check valve bypass as shown on refrigeration details.
 2. Manufacturers:
 - a. Danfoss A/S
 - b. Emerson Climate Technologies
 - c. Mueller Industries, Inc.

- d. Parker Hannifin Corp., Sporlan Division.
 - e. Superior Valve Co.
- C. Brazing Rods:
 - 1. Product:
 - a. Lucas-Milhaupt, Inc.; Sil-Fos.
 - b. Johnson Matthey Metal Joining; Easy-Flo.
- D. Piping Insulation: Closed cell polymeric foam insulation.
 - 1. Product:
 - a. Armacell; AP/ArmaFlex II.
 - b. K-Flex, USA; Insul-Tube/K-Flex LS.
- E. Piping insulation plastic saddle pipe support:
 - 1. Product:
 - a. Armacell; Insuguard Pipe Saddle.
 - b. Cooper B-Line; Snap n Shield.
 - c. Hydra-Zorb Co.; Bronco Insulation Tube & Pipe Saddle.
 - d. ZSI-Foster; Snap-A-Saddle.
 - 2. Color:
 - a. White: Where structural steel is to be painted.
 - b. Black: Where structural steel is to remain unpainted.
- F. Insulation joint sealant: Fast drying neoprene contact adhesive.
 - 1. Product:
 - a. K-Flex, USA; K-Flex 320.
 - b. Armacell; #520 contact adhesive.
- G. Slotted Channel Framing to support refrigeration lines: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Basis of Design Product: Unistrut Corporation; Series P-4000 or heavier.
- H. Channel Mounted Pipe Clamping Device (Pipe Clamp): Steel clamp with locknut and thermoplastic elastomer cushion.
 - 1. Basis of Design Product: Unistrut Corporation; Cush-A-Clamp.
- I. Oil for Parallel Compressors: Polyolester (if required)
 - 1. Basis of Design Product: Exxon Mobil Corporation; Mobil EAL ARTIC 22

- J. Silicone Sealant: ASTM C 920, Type S, Grade NS, Class 25, Use NT, A or N-Curing, Mildew-Res.
 - 1. Product:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. Pecora Corporation; 898.
 - d. Tremco, Inc.; Tremsil 200BASF Omniplus.
- K. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
 - 1. Products:
 - a. Bostik, Inc.; Chem-Calk 300.
 - b. Pecora Corporation; BC-158.
 - c. Tremco, Inc.; Butyl Sealant.
- L. Insulation Jacking: UV protection
 - 1. Basis-of-Design Product:
 - a. Johns Manville; Zeston 2000 Series PVC
- M. Receiver insulation UV resistant coating
 - 1. Basis-of-Design Product:
 - a. Armacell; ArmaFlex WB, white finish.
- N. Foam Insulation: Two-component, quick-cure polyurethane foam
 - 1. Basis of Design Product:
 - a. The Dow Chemical Company; Froth-Pak.
- O. Any additional parts or materials required for a complete system to Owner's specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation and provide Owner with line routing plan.
- B. After examination, provide documentation of potential issues and propose recommendations for the refrigeration systems related to the Project and indicate any deficiencies on the Pre-Inspection Checklist.
- C. Identify any debris or hazardous conditions in areas where the Installer will be working.

- D. Note condition of existing insulation on refrigeration lines that will be reused.
- E. Notify Owner of any existing refrigeration line sets that are to be re-used that do not have proper support or saddles.
- F. Walk the store with the Owner and the Owner's refrigeration mechanic or third party and complete the Pre-Inspection Check List. Items that are found as subjects of concern shall have an agreement of resolution documented prior to starting any system modification. After the agreement of resolution is received the Installer shall be responsible for refrigerant leaks on that system until the terms of warranty are satisfied.

3.2 INSTALLATION

- A. General: For stores remaining open during construction, perform work in a manner as to provide a minimum of annoyance and interference to Owner's operations, its customers and vendors.
 - 1. No work shall be done by the Installer that will void a manufacturer's warranty.
 - 2. If during the course of the Work any piece of equipment under the scope of this Work is damaged (the damage occurring after arrival), notify the Owner immediately, listing the model number, serial number, and the extent of the damage. The Installer shall ensure the damage is corrected.

3.3 RECEIVING, UNLOADING, SETTING, AND ASSEMBLY

- A. General:
 - 1. Arrange for equipment manufacturer's representative to be present during unloading and setting (refer to Owner's P.O. and delivery schedule).
 - 2. Immediately upon delivery, inventory contents of containers. Notify supplier and Owner in writing when cases and other refrigerated equipment do not include material normally supplied in accordance with the equipment list, including holding charge. Lack of holding charge is unacceptable.
 - 3. Protect refrigeration equipment prior to installation.
 - 4. Inspect equipment after uncrating. The equipment and accessories furnished are pre-wired and are purchased with the manufacturer's standard one-year parts warranty. If equipment arrives at the Project damaged:
 - a. Obtain a signed inspection report, in duplicate, from carrier.
 - b. Notify the Owner and fixture supplier immediately.
 - c. Do not conduct repairs or replacement until authorized.
 - d. Take photographs of damaged equipment and provide to Owner.
 - 5. Upon Owner's authorization, replace any malfunctioning parts or equipment with manufacturer's original equipment. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 6. Remove and dispose of trash and debris resulting from the uncrating, joining, and assembly of equipment completely and in an orderly fashion. Remove trash and debris daily and dispose of materials lawfully.

7. Receive, unload, uncrate, store, and assemble equipment, materials and supplies covered by this Section including evaporator coils and other equipment that reflects the refrigeration installer's bid for installation.

B. Prefabricated Mechanical Center

1. Remove shipping spacers.
2. Verify that hold down nuts on spring mounted compressors are not touching the compressor feet, and are not more than approximately **1/16 inch (1.5 mm)** above the mounting foot.
3. Check components, including flare fittings, and electrical connections, to insure tight and operative connections.
4. Install the following items included with the prefabricated mechanical center:
 - a. Exhaust fan.
 - b. Intake louvers.
 - c. Rain hoods.
 - d. External light.
 - e. Gasket (roof mounted only).
 - f. Trolley.
 - g. Ambient air sensor.
 - h. Steps (when supplied).
5. Unload and set the refrigeration prefabricated mechanical center.
6. Remove lower lifting hooks that may interfere with the installation of the center.
7. Weld steel channels to top of structural steel.
8. Refrigeration Installer to be present for the setting of the prefabricated mechanical center.
9. If prefabricated mechanical center is roof mounted, ensure curb gasket is installed.

C. Condensers

1. Unload and set the rooftop condensers. Adjust equipment supports to level condensers and secure with screws provided with supports.
2. Secure condensers to equipment supports per direction included in ASD-81 and ASD-81A or as otherwise indicated on Drawings.
3. Install anti-vibration mounting pads under evaporative condensers.
4. Refrigeration Installer to be present for the setting of the condensers. If condensers are roof mounted, ensure curb gasket is installed.

D. Distributive Refrigeration Racks:

1. Remove factory installed panels to access lifting points on frame.
2. Adjustment: Install field supplied shims between vibration isolation pads supplied with each rack and the floor per manufacturer's printed instructions.
 - a. Install field supplied shims. Maintain manufacturer's recommended clearances.
3. Accessibility: Install per manufacturer's recommended clearances and as required by Authorities Having Jurisdiction.

E. Conventional Systems

1. Secure unit to curb for rooftop units.
2. Hang unit from structural steel for cooler top installation.
3. Run refrigeration piping.
4. Screen and foam penetrations.
5. Assist controls installer in programming unit.

3.4 PIPING, REFRIGERANTS, OIL, AND LUBRICATION

A. Refrigerant Lines, Fittings and Accessories

1. Cut spun end off rack circuits, attach 90 degree long radius elbow and pipe through mechanical enclosure wall and seal with grommets provided.
2. When line sizing is not provided or installer is reusing or extending existing lines, verify proper line sizing in accordance with the capacity required. Base line sizing on length of run and height of riser and select the proper line size in accordance with the refrigeration systems manufacturer's line sizing recommendations. Before starting installation, submit a pipe routing plan to the Owner showing the method used to install refrigerant lines in trenches, pits and PVC sleeves. Any required re-routing of lines must be approved by the Owner.
3. Protection: Provide temporary protection of the piping system until the Work is in satisfactory operation. After piping has been inspected and is operational, advise general installation installer to proceed with installing the permanent guards as required to protect the piping and from damage.
 - a. Provide no less than **20 psi (138 KPa)** nitrogen holding charge on plugged copper so that it is not being held with any atmospheric contaminants overnight.
4. Do not allow crossing copper pipes to touch each other. Offset or insulate to avoid copper-to-copper contact. Do not allow refrigerant piping to come in contact with electrical conduit, dissimilar grounded metals, fire retardant wood, pressure treated wood or abrasive surfaces. Install piping to permit expansion and contraction without harm to the system.
5. For underground installations install hard copper piping inside under floor PVC sleeves. Pressure test and insulate lines prior to assembly into pits and burial. Keep refrigerant piping clean and dry. Keep refrigerant piping sealed and pressurized except during cutting or fabrication. Extend lines a minimum **12 inches (305 mm)** above finished floor elevation and cover both lines with insulation to prevent concrete from coming into contact with the copper. Foam in gap between concrete and insulation.
 - a. Arrange for Owner inspection prior to covering underground installations.
 - b. Do not use soft copper in any permanent installation without written approval of Owner.
6. Valves:
 - a. Verify that valves provided by the manufacturer are as called out on the refrigeration schedule and install per refrigeration schedule.
 - b. Supply all other valves that are not supplied by the manufacturer and are not on the refrigeration schedule.

- c. On distributive piping systems, install isolation ball valves to allow isolation of each individual refrigeration circuit including that circuit's control valve.
 - d. Install isolation ball valve in accessible location to isolate under floor section of piping. Locating under cases is not accessible; indicate all isolation valve locations on As-Built plan provided to Owner at project close out.
 - e. Install an access port to allow pump out of the isolated circuit. Access valve to be fitted with Mueller A 04544 Flare Seal Cap which contains Mueller A 00401 Copper Flare Gasket and tightened to 8-12 lb-ft or one quarter turn past finger tight.
 - f. Provide normally closed solenoids with manual lift stem per refrigeration schedule. See refrigeration schedule to identify manufacturer furnished and installed valves.
 - g. Seal and securely tighten cap on valves with caps or stem covers.
 - h. With the exception of island cases, install the valve assemblies on the top of the first case of each system where piping is stubbed out of wall.
7. Provide check valves and pressure equalization line from condensers to ports on receiver, as indicated by manufacturer's installation instructions.
- a. Owner's manufacturer's equipment specification requires cases to contain a braze-in type valve with 1/4 inch (6 mm) SAE male flare access port with a hex head cap with copper gasket in-line before leaving fixture, for checking suction line pressure. Refrigeration walk-in coils also have manufacturer supplied access port.
 - b. Refrigeration walk-in coils also have manufacturer supplied access port. Access valve to be fitted with Mueller A 04544 Flare Seal Cap which contains Mueller A 00401 Copper Flare Gasket and tightened to 8-12 lb-ft or one quarter turn past finger tight.
8. Cutting
- a. Cut tubing with a wheel-type cutter and ream to original bore.
 - 1) Do not saw-cut tubing unless approved in writing by Owner. When saw-cutting is absolutely necessary and approved by Owner, remove all debris and drag or wipe tubing clean after reaming.
 - b. Drag clean any piping left open and sand before using.
 - c. After a cut is made, deburr piping and clean with emery cloth.
9. Pipe Joint Construction:
- a. Fittings:
 - 1) Do not use flare fittings.
 - 2) Material: Wrought copper only.
 - 3) Fabricate changes in line size and direction with fittings.
 - b. Turns:
 - 1) Fabricate turns in hard-drawn refrigeration piping by the use of 90-degree long radius fittings. Short radius is not acceptable.
 - 2) 45-degree fittings are not allowed.

- 3) Do not use stub-in or formed long sweeping elbows, or pulled tees.

c. Brazing:

- 1) Braze joints with a brazing alloy combining a minimum of 15 percent silver for copper-to-copper and 45 percent silver for copper-to-brass or steel.
- 2) Protect equipment against heat damage during brazing operation.
- 3) Use only oxy/acetylene welding equipment to obtain 2500 F (1371 C) tip temperature.
- 4) Do not paint brazed joints with the exception of steel components such as suction accumulators and suction filters. Paint these items with red oxide primer where connections are made. Notify Owner prior to painting to allow for inspection of joints.
- 5) A sufficient amount of dry nitrogen gas must be flowing through the copper lines during brazing to displace oxygen and eliminate scale and oxidation.

10. Pipe Joint Inspection:

- a. The owner has option to cut five brazed fittings to inspect for proper use of nitrogen. If oxidation is present at any one of the fittings inspected, an additional five fittings will be inspected.
- b. Replace all fittings inspected.
- c. If the Owner discovers that dry nitrogen gas is not being used to fill pipes during brazing, the Installer:
 - 1) Will be fined \$1,500.00 per event not limited to one event per day.
 - 2) Shall replace all suction and liquid line filters and any filters located in case and clean all expansion valves and screens.
 - 3) Shall complete above requirement after 48 hours of operation. The Owner reserves the right to have the Installer remove and replace all piping related to circuit of system. The standard requirement to change filter/dryers within 30 days of completion remains the same. All required labor and parts shall be at Installer's expense.
- d. Suction cores & Filters:
 - 1) Prior to performing modifications to a system, replace any missing suction cores.
 - 2) On conventional systems, remove suction cores and inspect after 30 days of operation. Place removed cores in motor room for inspection. If removed filters contain debris, install a second set of cores and run the system for an additional 30 days. Final filter will be felt core supplied by the Refrigeration Installer.
 - 3) For single condensing units affected by the project provide a cartridge suction filter in place of any brazed in filters

11. Completed Piping Holding Charge

- a. Refrigeration control pressure transducers should be shipped loose. If not, remove and plug ports before pressurizing or evacuating.

- b. Maintain each line set under 175 psig (1207 kPa) until ready for connecting to the appliance and the rack.
 - c. Connect a gauge ready access port to each line set to monitor pressure. This may be accomplished with one gauge, provided the liquid and suction lines are looped together, so that both are pressurized as a set.
 - d. Point liquid line tees down. Point suction line tees up.
- 12. Provide a one-piece “P” type oil trap on suction lines with vertical risers of any length.
 - a. For under slab fed piping install one-piece “P” type oil trap at base of riser under slab.
 - b. Oil trap to be size of horizontal run.
 - c. In remodel projects, sizing of vertical risers shall be in accordance with the condensing unit manufacturer’s and Owner’s recommendations.
 - d. When the suction line vertical riser length exceeds 12 feet (3.66 m) install an additional one-piece “P” type oil trap at the midpoint of the riser.
- 13. Keep horizontal runs of refrigeration piping accessible for maintenance and repairs. Do not install behind wall cases or back-to-back frozen food cases. Install along top of case or make additional vertical drops to cases. Attach to cases or metal studs with proper channels and clamps. Do not use metal straps.
 - a. Stub out vertical refrigeration piping from structural steel to case 1.5 inches (38 mm) below the top of cases to ensure proper case top piping.
 - b. For case top refrigeration piping, install long radius suction line P-traps and provide the proper slope for oil return while keeping the piping as close to the case top as possible so that piping will remain hidden behind the 6 inch (150 mm) high case top valance.
 - c. Any horizontal run behind cases must be approved by Owner’s project engineer.
 - d. Any horizontal lines on top of cases shall be supported with unistrut.
- 14. Install refrigeration piping straight and free from kinks and restrictions. Slope horizontal suction lines toward condensing units a minimum of 1/16 inch (1.6 mm) per foot. On horizontal runs behind cases or in any instance, when the standard “trapeze” is not used, provide slotted channel framing with proper clamps.
- 15. Penetrations:
 - a. Building or Prefabricated Mechanical Center: Where refrigerant pipes or electrical conduit penetrate walls, insulate pipe and seal the opening with sealant, screen, and foam. Provide a weather tight pipe box over refrigerant piping roof openings.
 - b. Cooler: Seal electrical conduit penetrating cooler walls to prevent airflow through pipe. Seal penetrations into the cooler with sealant and foam.
 - c. Encase refrigeration piping passing through concrete shall be encased in 1 inch (25 mm) thick closed cell polymeric foam insulation with PVC exterior sleeves.
- 16. Route discharge piping for pressure relief valves from ground mounted mechanical enclosure to ensure safety.
- 17. Install purge valve on drop leg, minimum 3/8 inch (10mm) valve size, at highest point on condenser lines.

B. Hangers and Supports:

1. Provide piping supports spaced no greater than 10 feet (3.05 m) on center, provide additional supports as necessary to hold piping straight and prevent sagging or vibration, Refer to RISD-33.
2. Install hangers to properly prevent vibration or undue strain on any pipe fittings. Double stack supports, only if necessary.
3. Use only plastic saddle pipe supports to support suction and liquid lines.
4. Provide slotted channel framing for vertical supports with channel mounted pipe clamping devices installed on each individual line. Insulate per RISD-34.
5. Suspend channels with a minimum of two 3/8 inch (9.5 mm) minimum all-thread rods with double nuts. Refer to RISD-33.
6. Provide cadmium plated or galvanized nuts and bolts with self-locking nuts or double nuts on pipe clamps.
7. Attach new hanger rods for all new lines to top of joist or at panel points.
8. Unistrut channel series P-4000 or heavier, will be used for vertical supports on each individual line.
9. Pipe clamps:
 - a. Do not clamp over insulation.
 - b. Do not secure piping using tie wraps.
 - c. Provide one clamp for risers under 10 feet (3 m) in height and at least two clamps for risers over 10 feet (3 m) in height. Refer to RISD-33.
 - d. Support piping lines within 4 feet (1220 mm) before and after turns.
10. Provide specified clamp for vertical applications. Alternate clamping device may be provided for horizontal insulated pipe installations where saddles are prohibitive.

C. Insulation

1. Install insulation in accordance with manufacturer's written instructions.
2. Cover directional changes in refrigeration piping by making two 22.5-degree (mitered) cuts and gluing joints. Also, provide four 22.5-degree mitered cuts and glued joints for all traps. Do not pull insulation around elbow or split insulation unless approved by Owner.
3. Insulate all suction lines from accumulator to fixtures and walk-ins.
4. Insulate refrigeration lines, both liquid and suction, heat reclaim, at penetrations through floors and walls for at least 6 inches (152 mm) on both sides of the opening. Seal penetrations with rigid foam.
5. Insulate suction lines from a point one inch inside the case to as close as possible to the compressor.
 - a. Thickness:
 - 1) Pipes Less Than 1 inch (25 mm): 1/2 inch (13 mm) thick for both medium and low temperature applications.
 - 2) Pipes 1 inch (25 mm) or Larger: 0.75 inch (19 mm) thick for both medium and low temperature applications.
 - 3) Low Temperature CO2 Refrigeration System Suction Lines: 1-1/2 inch (38 mm).
 - 4) Medium Temperature CO2 Refrigeration System Suction Lines: 1 inch (25 mm)

6. Insulate liquid header, sub-cooler, and stubs on systems in a parallel installation which have mechanical sub-cooling.
 - a. Thickness: 0.75 inch (19 mm) thick, including liquid line drier shells, except those portions of the line inside the cases.
7. Insulate CO2 refrigeration system liquid lines.
 - a. Thickness: 1 inch (25 mm).
8. Only insulate liquid lines for systems that utilize sub-cooling and all CO2 refrigeration systems.
9. Insulate only the supply lines, all the way to the coils, for heat reclaim lines, HVAC and H2O.
 - a. Thickness: 0.75 inch (19 mm).
10. Seal joints with insulation joint sealant, applied to both surfaces. Allow to become tacky before joining.
11. Wrap exterior pipe insulation with PVC jacking to protect from exposure to UV damage.
12. Insulation for Receivers Located Under Rooftop Condensers:
 - a. New receivers should come insulated and coated with white UV resistant coating. If not, install closed cell rubber sheet insulation and apply white UV resistant coating.
 - b. For existing receivers on remodels, replace missing insulation and remove all existing insulation on that has become deteriorated. Install new closed cell rubber sheet insulation and apply white UV resistant coating.
 - c. Thickness: 0.75 inch (19 mm).

D. Heat Reclaim

1. Install HVAC, water heater, and heat reclaim refrigerant piping prior to start-up of the refrigeration systems.
2. HVAC Heat reclaim coils will be provided by the Owner and will be factory installed into the HVAC unit.
3. Hot water heat reclaim tanks, temperature sensor that controls the three-way valves supplying refrigerant to the heat reclaim water heater, and the three-way valves are supplied by others.
4. If high pressure drops are measured for reclaim water heaters inform the Owner's project manager so that a bypass valve can be installed (pressure drop in excess of 2 psi (13.8 KPa)).
5. Install Shrader fitting in heat reclaim discharge piping near the compressor (or discharge header) for testing and evacuation.
6. Verify that controls are set, and the heat reclaim is working properly.
7. Route heat reclaim piping below the roof.
8. Identify and reuse all heat reclaim. Notify Owner if any heat reclaim circuit will be abandoned.

E. Condensers

1. Examination: Verify that condensers have adequate space to allow proper air circulation with no obstructions that would cause the air to re-circulate. Notify Owner if conditions exist that do not allow free airflow through the condenser. Verify fan rotation including those with VSD control and while in bypass.
2. Install condenser piping as indicated. Include installation of a stub with shut off valve and an access valve fitting at the highest point of the discharge gas line above the condenser inlet manifold. Access valve to be fitted with Mueller A 04544 Flare Seal Cap which contains Mueller A 00401 Copper Flare Gasket and tightened to 8-12 lb-ft or one quarter turn past finger tight.
 - a. Piping Connection to the Condenser Outlet Manifold: Same size as manifold stub.
 - b. Install a ball valve in the drop leg for condenser isolation.
3. When installing an evaporative condenser system, coordinate with Contractor.
4. Install outdoor temperature sensors on the condenser under the no. 1 fan on new outdoor condensing units
5. Clean condenser coils prior to grand opening.

F. Cases, Preparation Areas and Walk-ins

1. Properly support and secure case piping.
2. Line Reductions in Case Piping: Install per manufacturer's recommendations.
3. Run piping for the same application through the cases rather than on the outside, where possible.
 - a. Do not run piping for one case lineup through another case lineup.
 - b. Do not run piping for one system lineup through another system lineup.
 - c. Support piping inside fixtures with foam tape and insulation.
4. Install piping free of kinks in a manner that allows service access to all refrigeration components of the fixture. Protect piping with insulation so that normal servicing of components is not hindered.
5. Vertical Refrigeration Piping Enclosures: For stores with ceilings, conceal refrigeration piping from overhead steel to top of refrigerated cases in PVC pipe false column with pipe diameter to match existing building columns. When the refrigeration piping and other associated electrical conduits will not fit in false column general installation installer to provide vertical pipe enclosure coordinate with general installation installer.
6. Thermometers for new walk-in coolers and freezers are factory installed. For remodels the Installer shall insure that all existing thermometers are installed in **1 inch (25 mm)** by **6 inch (152 mm)** copper pipe with cap and bulb of thermometer installed in tube with pipe filled with refrigerant oil. Insure pipe with bulb is located as far away from the door as possible.

G. Refrigerants

1. Owner will supply refrigerant unless otherwise indicated on Drawings or specified prior to bid. Install only refrigerant identified on the refrigeration legend as provided by the Owner.
 - a. Inform the Owner of the estimated number of pounds required for the Work. Refrigerant will be provided in disposable cylinders, which are to be recycled

when empty in accordance with Kroger Refrigerant Management policy and 40 C.F.R. part 82. guidelines.

2. Reclaim Cylinders

- a. The Owner will supply the reclaim tank unless otherwise specified.
- b. Attach informational tag to reclaim cylinder upon completion of reclaiming process on equipment. Completely fill in information on cylinder tag and store cylinders in compliance with OSHA regulations pending shipment. Complete bill of lading prior to shipment.
- c. Reclaimed cylinders are the sole responsibility of the Refrigeration Installer until cylinders are accepted by the Owner's maintenance department and the Owner's project manager is notified.
- d. Ship reclaim cylinders in accordance with regulations of department of transportation having jurisdiction. Request transportation from Owner's project manager 72 hrs prior to shipment.

H. Guards

1. Fabricate and install guards as necessary to protect any controls (including but not limited to suction stop valves) where subject to damage by Owner's operation.
2. Fabricate guards in such a manner to provide ease of service.

3.5 REFRIGERATION ELECTRICAL INSTALLATION (reference)

- A. Refer to Section 11 41 63 "Fixture and Equipment Electrical Installation."
- B. Coordinate electrical hook up of refrigerated equipment with the Fixture Electrical Installer.

3.6 REMOVAL OF EQUIPMENT (Remodels Only)

A. Existing Compressor Requirements

1. Remove existing compressors as indicated.
2. Seal openings with metal flanges or caps as required. Minimize environmental contamination, physical damage and any other condition that would affect the reusable condition of the removed compressors.
3. Remove existing compressors from areas of operation in preparation for shipment. Palletize units on ground floor in back storage area of stores and notify Owner's project engineer when removed compressors are ready for shipment. Coordinate with store management concerning storage of compressors as to not affect store operations.
4. Submit to Owner's project manager a written inventory report of model/serial numbers of compressors being shipped to supplier.
5. If a new compressor is supplied and not required during remodel, owner will be notified so new compressor shall be shipped back to supplier.

B. Removal of condensing units.

1. Remove existing condenser units as indicated on R1 Drawing or Scope of Work. Remove units carefully in suitable condition for possible reuse.
2. Evacuate refrigerant into reusable approved containers. Follow Owner's refrigerant handling procedure and turn over containers to Owner.
3. Cut and cap refrigeration lines remaining in building and on unit. Verify that the electrical installer has disconnected and removed the electrical supply.
4. If unit is located in an air-cooled compressor room, close off opening between remaining units with **1/2 inch (13 mm)** plywood attached to adjacent units or building walls for air tight condition.
5. Remove existing condenser unit from areas of operation in preparation for shipment on pallet and store on premises as directed by Owner or store director/manager. Do not store in location that will affect store operations. Notify Owner when units have been removed and are ready for shipment.
6. Submit a written inventory report indicating model/serial numbers of units removed to Owner's project manager.

3.7 SYSTEM TESTING AND START-UP

- A. Conduct testing and start-up procedures in accordance with manufacturer's service and installation manual and ASHRAE 147 criteria.
- B. Freezers:
 1. Preparation: Verify that concrete floor slab has cured for at least 7 days prior to commencing refrigeration system start-up.
 2. Pull-Down Process: A gradual temperature pull-down process is recommended in the following sequence:
 - a. 24 hours at **40 degrees F (4.4 degrees C)**.
 - b. Drop to **30 degrees F (-1.1 degrees C)** for 24 hours.
 - c. Drop to **20 degrees F (-6.7 degrees C)** for 24 hours.
 - d. Set to the final operating temperature.
- C. Filters:
 1. Before commencing Work, supply and replace suction filters, liquid line dryers, and oil filters.
 - a. For an existing conventional system with a braised in filter, replace with a canister filter.
 2. Remove suction filters 30 days after store Grand Opening.
 - a. Place filters next to equipment for inspection from Owner. After inspection, properly dispose of filters.
 - b. If filters are showing signs of debris, supply and install a second set of filters in the system for additional 30 days.
 - c. Install pleated suction filters upon verification of clean system at or after grand opening. New systems are provided with canister type filters

- D. Piping Test Check Sheet: Record testing results on Piping Test check Sheet (See end of this Section).
- E. Pre-Check
 - 1. Before beginning the leak check procedures, carry out the following pre-check:
 - a. Visually inspect refrigerant lines and joints for proper piping assembly and installation.
 - b. Ensure proper bracing.
 - c. Ensure that there are no metal-to-metal contact points.
 - d. Manually verify that mechanical joints are tight.
- F. Isolate components not suitable for the pressure levels indicated.
 - 1. Warning: some components are not suitable for high pressure levels, including, but not limited to, some compressors, pressure transducers, and safety relief valves. Check with the component manufacturer if any doubt exists as to whether certain components should be isolated from the rest of the system during pressure tests.
- G. Open all valves, either manually or by energizing the solenoids, including the following:
 - 1. Ball valves to circuits, branches, satellites, condenser, heat reclaim, receiver, etc.
 - 2. Main liquid line solenoid valve.
 - 3. Suction stop EPR valves.
 - 4. Both sides of condenser and heat reclaim piping.
 - 5. De-energize the solenoid valves (which are normally open).
- H. Pressure Testing for leaks
 - 1. Confirm and execute more stringent pressure testing requirements of state or local authorities having jurisdiction. Charge new and existing systems and individual circuits/line sets/case line-ups with regulated dry nitrogen (and the appropriate tracer gas) to hold a minimum stationary pressure of **200 psig (1379 KPa)** for a minimum of 2 hours.
 - 2. Existing circuits to be modified, extended, or reworked shall be isolated by installing a ball valve and cap at a point where the new material is to be tied into the existing lines/system
 - 3. Check system access points to verify pressurization.
 - 4. Carry out the following procedure when a leak is discovered:
 - a. Isolate leak from rest of system.
 - b. Repair leak.
 - c. Retest area to verify leak has been repaired.
 - d. Re-pressurize the area to **200 psig (1379 KPa)**.
 - e. Before continuing, verify that all valves that were closed to isolate the leak are reopened after the leak has been repaired.
 - 5. Release the nitrogen charge to the atmosphere (verify that adequate ventilation is provided in the space).
 - 6. After passing these tests the system or circuit is ready to be evacuated.

I. Pre-Evacuation

1. Before beginning the evacuation process, verify the following:
 - a. Verify that system is completely depressurized.
 - b. Plan procedures so breaking the vacuum with refrigerant does not introduce contaminants into the system.
 - c. Connect the evacuation pump to three points on the rack. If the system is small, connections at 2 points will be adequate.
 - 1) Connect to the **3/8 inch (9.5 mm)** flare ports.
 - 2) Use copper lines in lieu of hoses.
 - 3) If hoses must be used, provide special vacuum hoses in lieu of standard pressure hoses.
 - d. Vacuum pump:
 - 1) Use multistage vacuum pumps. Connect to several branch circuits to access all components of the system.
 - a) Verify that each pump is tested prior to use and vacuum sensors are in working order. The pump must be able to achieve a vacuum of at least 300 microns. Test vacuum gauges and vacuum sensors according to manufacturer's instructions.
 - 2) Use clean vacuum pump oil as recommended by the pump manufacturer.
 - 3) Verify that electrical connections to the pump are secure and uninterrupted.
 - 4) Check vacuum pump connections for leaks.
 - 5) Monitor the pump for signs of normal operation (e.g. "vapor" from the pump exhaust early in the procedure that tapers off).
 - e. Lines and valves:
 - 1) Use copper lines or hoses that are suitable for vacuum duty.
 - 2) Use packless valves.
 - 3) Properly tighten and check Schrader valve caps. Check the condition of o-ring in Schrader valve caps.
 - 4) Properly tighten access valves and caps. Access valve to be fitted with Mueller A 04544 Flare Seal Cap which contains Mueller A 00401 Copper Flare Gasket and tightened to 8-12 lb-ft or one quarter turn past finger tight. In a deep vacuum, the open stems will draw in and cause a loss of vacuum. This will not be noticed during a pressure test.
 - f. Micron vacuum gauge
 - 1) Before beginning evacuation, calibrate the micron gauges per manufacturer's instructions.
 - 2) Verify with a gauge that the vacuum pump can pull a vacuum of at least 300 microns.
 - 3) Attach a gauge prior to vacuum test.

- 4) Measure vacuum at the two most extreme positions of the system, 300 microns at furthest point.
- 5) Once the vacuum pump is isolated and turned off, begin any micron verification test only when the vacuum is determined to be stabilized at or below the required microns.

J. Evacuation Procedure

1. General: Perform evacuation and drying in the following manner after a satisfactory pressure test. Notify the Owner 72 hours in advance of any evacuation tests so that the Owner or their appointed representative may witness the vacuums obtained. The Owner's project manager or their appointed representative must approve and witness final micron readings, before refrigerant is introduced to the system. Provide written test results to the Owner's project manager or appointed representative. Any system placed in operation without final evacuation being witnessed by the Owner shall at the Owner's request be purged and re-evacuated. Reclaimed refrigerant is to be considered contaminated. Remove from the job site and replace with virgin refrigerant at the Installer's expense.
2. New System or Circuit (New Case, Line, or Other System Component that is New and not Previously Charged with Refrigerant or Oil):
 - a. Pull a system (or the isolated portion of a system) vacuum down to at least 1000 microns. If the system cannot pull a vacuum at any step, repair the leak using the previously described procedure with tracer gas.
 - b. If the 1000 micron (+/- 50 microns) vacuum holds stationary for one hour, break the vacuum with dry nitrogen to a pressure of 2 psig (13.8 KPa).
 - c. Install system suction and liquid drier cores.
 - d. Pull a second vacuum to a minimum of 700 microns.
 - e. Close vacuum header valves and allow system to stand for a minimum of one hour.
 - f. If the 700 micron (+/- 50 microns) vacuum holds stationary, break the vacuum with dry nitrogen to a pressure of 2 psig (13.8 KPa).
 - g. Pull a third vacuum to a minimum of 300 microns.
 - h. Close vacuum header valves and allow system to stand (once the vacuum is determined to be stationary at or below 300 microns) for a minimum of 24 hours.
 - i. If the 300 micron vacuum holds stationary for 24 hours, then the new system is ready to be charged with refrigerant.
 - j. For tying in a new circuit or lines into an existing operating system complete the following final procedure:
 - 1) Close valves and isolate the minimum existing section of line/circuit.
 - 2) Complete the final tie-in.
 - 3) Pull a vacuum of at least 1500 microns prior to putting into service.
 - 4) After the circuit is fully operable, thoroughly inspect connections for any refrigerant leaks.
3. Existing System or Circuit (Relocation of Existing Cases, Lines, or other System Components that have been Previously Charged with Refrigerant and Oil):
 - a. Pull a system (or the isolated portion of a system) vacuum down to at least 1500 microns. If the system cannot pull a vacuum at any step, repair the leak using the previously described procedure with tracer gas.

- b. If the 1500 micron (+/- 50 microns) vacuum holds stationary for one hour, break the vacuum with dry nitrogen to a pressure of 2 psig (13.8 KPa).
- c. Pull a second vacuum to a minimum of 1000 microns.
- d. Close vacuum header valves and allow system to stand for a minimum of one hour.
- e. If the 1000 micron (+/- 50 microns) vacuum holds stationary, break the vacuum with dry nitrogen to a pressure of 2 psig (13.8 KPa).
- f. Pull a third vacuum to a minimum of 700 microns.
- g. If the minimum 700 micron vacuum holds stationary for one hour, then the system is ready to be charged with refrigerant.
- h. For tying in a circuit or lines into an existing operating system complete the following final procedure:
 - 1) Close valves and isolate the minimum existing section of line/circuit.
 - 2) Complete the final tie-in.
 - 3) Pull a vacuum of at least 1500 microns prior to putting into service.
 - 4) After the circuit is fully operable, thoroughly inspect connections for any refrigerant leaks.

K. Charging

- 1. Leave open the following:
 - a. Ball Valves: To circuits, satellites, condenser, heat reclaim, receiver.
 - b. Main Liquid Line Solenoid Valve: Should now be under control of the electronic controller.
 - c. Branch Circuit Liquid Line Solenoid Valves: Back out manual open stems.
 - d. Suction Stop EPR: Should now be under control of the electronic controller.
 - e. Split Condenser: Should be operating under pressure controls.
 - f. Verify operation of condenser fans and rotation direction.
 - g. Verify operation of case and evaporator fans to avoid flood back.
- 2. Close ball valve immediately downstream of the receiver.
- 3. Connect proper refrigerant tank to receiver access port through a liquid line drier.
- 4. Charge receivers to 60 percent on the liquid gauge or to the point of pressure equalization.
- 5. Disconnect refrigerant tank from the receiver access port.
- 6. Open ball valve immediately downstream of the receiver.
- 7. Continue charging system by connecting proper refrigerant drum to the suction header.
 - a. Isolate refrigerant circuit liquid line and charge through that port.
 - b. Charge system to 30 percent of the receiver on the liquid gauge.
 - c. Set compressor and all pressure controls.
 - d. Suction pressure should remain below a pressure corresponding to zero degrees temp system. Suction pressure should remain below a pressure corresponding to forty degrees.
 - e. Avoid adding more oil until system is properly charged.
- 8. Supply and install polyolester (POE) lubricant in parallel compressors (typically shipped from factory dry) prior to charging the system with refrigerant.

- a. Check oil level in the compressor between 24 and 48 hours after the refrigeration equipment has been placed in operation and add or remove oil as required to attain proper level.
 - 1) Any additional oil needed for refrigeration systems will be provided by the Contractor.
- b. Before operating fan motors, pump motors, or other associated equipment for refrigeration, check manufacturer's requirements for lubrication. Lubricate equipment only when recommended by manufacturer.

L. Final Check

1. After system is operational, conduct a complete walk-through of the system with a leak detector to make sure there are no leaks.

M. Start-Up

1. The start-up of the system will commence per the Owner's grand opening schedule. If any change to the schedule is required, notify the Owner immediately.
2. The manufacturer will supply at least one technician (manufacturer's representative) to the job site prior to the store grand opening. The manufacturer's representative will assist the Refrigeration Installer to ensure a smooth, timely and complete start-up of the system.
3. Refer to the "Start-up" section in the installation and service manual for proper procedures.
4. Before start-up, verify that electrical installer has checked and tightened each electrical connection, including factory pre-wired components.
5. During start-up of equipment check defrost, fan, light, and compressor circuits for amperage draw and correct if outside design parameters.
6. Check and record superheat.
7. Confirm heat reclaim is working.
8. Check refrigerant levels.
9. Check oil levels.
10. Check adjustments on regulating valves.
11. Adjust adjusting valves on equipment.
12. In new stores, operate case for 24 hours prior to stocking product.
13. Prior to store Grand Opening, provide Owner's store manager a copy of the final Defrost Schedule.

N. Grand Opening Day Service

1. Provide a competent service technician in the store for four hours the morning of the store grand opening. Record fixture temperatures and submit to Owner. Make any adjustments as necessary.
2. The Owner will check fixture temperatures and defrost periods before opening of the store for business. Make any re-adjustments as requested by the Owner.

O. Adjustments of Controls

1. Refrigeration systems shall be completed and operating at product temperatures specified.

2. Make the following adjustments in accordance with the Owner's (Kroger Maintenance and Energy) specifications:
 - a. Set compressor controls to required set points and verify proper case temperatures.
 - b. Make final adjustments.
 - c. Start-up and adjust temperature of self-contained equipment.
3. Set refrigerated circuit, suction temp, condensing temp, condenser control, and heat reclaim set points to Owner's maintenance guideline. Do not alter set points. Immediately notify the Owner if any portion of the system fails to operate at the guideline set points.
4. Set length and number of defrost cycles in accordance with Owner's recommendations. Whenever practical, set defrost cycles to occur other than during store business hours. Defrost cycles, except time-off, are to be staggered to avoid demand peaks.
5. Refrigeration Valves:
 - a. Check and adjust bulb location, verify position, and securely fasten clamp prior to start-up.
 - b. Check and adjust superheat settings after 48 hours of operation, whether or not a problem is detected. Set superheat prior to a defrost time and when the system is operating near the normal fixture operating temperature. (suggested guideline).
 - c. Valves must fully feed evaporator and meet case specifications. Before attempting to adjust the valve, verify that the evaporator is either clear of, or only lightly covered with, frost and that the fixture is within 10 degrees F (5.5 degrees C) of its expected operating temperature. Set all super-heats in the store during start-up and maintain and provide Owner with a log of superheat settings and adjustment for each valve. No exceptions allowed.
 - 1) Superheat to be adjusted as follows:
 - a) Low temperature superheat settings: 4 degrees F to 6 degrees F (-2.2 degrees C to 3.3 degrees °C).
 - b) Medium temperature superheat settings: 6 degrees F to 8 degrees F (3.3 degrees C to 4.4 degrees C).
 - c) Record temperature difference in Attachment K.
 - d. After the expansion valves have been adjusted, check suction temperature 8 inches (200 mm) from the compressor suction service valve for proper temperature of return gas to compressors. When the system is operating at a design temperature, superheated suction gas at the compressor should be 40 degrees F (4.4 degrees C), plus or minus 10 degrees F (5.5 degrees C), above the saturated suction temperatures of the compressor for low temperature units. For medium temperature units, superheated suction gas at the compressor should be 25 degrees F (4 degrees C), plus or minus 10 degrees F (5.5 degrees C), above the saturated suction temperatures of the compressor.
6. Case manufacturer will provide case installed temperature probe (two per refrigeration system) for temperature monitoring only.

P. Refrigeration Lubricant Testing

1. Conduct full spectrum testing for acid, moisture, or other contaminants of refrigeration lubricant after start-up. Submit test results to the Owner's project manager no later than 1 week after startup. If test results are found to be contaminated, replace refrigeration oil as necessary until contamination problems are resolved. The Owner reserves the right to send oil samples to a testing agency if there are any discrepancies in test results provided by the Refrigeration Installer and test results provided by others.

Q. Self-Contained Equipment Installation

1. Check self-contained refrigerated equipment for proper operation and correct temperature settings. Fixture set and electrical hook-up will be by others.
2. Check fixture plan layout, refrigeration equipment plan, and any Addenda for self-contained equipment. Follow manufacturer's specifications for start-up and checking.

R. Temperature Performance

1. Ensure that the equipment maintains the following performance temperatures, and the systems are installed in accordance with the manufacturer's installation instructions. All critical temperature refrigerated storage and merchandising equipment used for potentially hazardous food must maintain Food Code temperatures (currently at **41 degrees F (5 degrees C)**) or below at all times (including defrost), and be NSF-7 approved for supermarket operation. Bulk produce (one touch) not applicable. All food locations, including above or below lamps, ballast and anti-condensate heaters must comply with these requirements. Meet the following temperatures to ensure food quality, as well as food safety.

(See following page for temperature performance chart)

Temperature Performance Chart			
Fixture	Reading Location	Temperature Range (Degree F)	Temperature Range (Degree C)
Dairy, Produce, Med. Temp Nutrition, Pizza, Juice Cases, Open Beer and Wine Cases	(1) & (2)	36 - 38	2.2 - 3.3
Dairy Spot Cases Refrigerated Salad Bars	(1)	36 - 38	2.2 - 3.3
Produce Walk-in Cooler	(4)	36 - 38	2.2 - 3.3
Flower Cases	(1)	38 - 40	3.3 - 4.4
Refrigerated Bakery Cases	(2)	36 - 40	2.2 - 4.4
Produce Preparation Room	(5)	55 - 60	12.8 - 15.6
Single-Deck Meat and Cheese Cases	(1)	29 - 31	-1.7 - -0.56
Multi-Deck Fresh Meat Cases	(1) & (2)	29 - 31	-1.7 - -0.56
Five-Deck Deli Meat and Glass Door Floral Cases	(1) & (2)	34 - 36	1.1 - 2.2
Meat and Seafood Walk-in Coolers and Holding Cooler	(4)	30 - 32	-1.1 - 0.0
Meat Preparation Room	(5)	48 - 50	8.9 - 10.0
Service Meat Cases	(1)	34 - 36	1.1 - 2.2
Self-Serve Meat Cases	(1) & (2)	29 - 31	-1.7 - -0.56
Service Seafood Cases	(1)	33 - 34	0.56 - 1.1
Self-Serve Seafood Cases	(1) & (2)	34 - 35	1.1 - 1.7
Single-Deck and Multi-Deck Frozen Food	(3)	-5 - 0	-20.6 - -17.8
Glass Door Frozen Food Cases	(2)	-5 - 0	-20.6 - -17.8
Glass Door Ice Cream, End Case Ice Cream and Low Temp Nutrition Cases	(2)	-12 - -7	-24.4 - -23.3
Walk-in Freezers and Shelf-Contained Reach-in Freezers	(4)	-15 - -10	-26.1 - -21.7
Service Deli Cases	(1)	36 - 38	2.2 - 3.3
Deli and Dairy Coolers, Walk-in and Reach-in Retarders and Reach-in Refrigerators	(4)	36 - 38	2.2 - 3.3
Glass Door Beer Cases	(3)	34 - 36	1.1 - 2.2
Lobster Tank – Water Temperature	N/A	40 - 45	4.4 - 7.2
Refrig Meat Display – Deli Serving Line – Product Temperature	N/A	Max -40	Max 4.4
Reach-in Deli Refrigerated Dessert Case	(2)	36 - 38	2.2 - 3.3
Pizza Tables with Refrigeration for Ingredients	N/A	Max -40	Max 4.4
Reading Location Notes: (1) Height of product, within load limit line and the center of case, front and back, and end-to-end. (2) Center of shelf, front and back, and end-to-end. (3) Center of case end-to-end, at product edge of return flue. (4) At the wall ceiling joint. (5) At table height.			

3.8 SYSTEM IDENTIFICATION

A. Refrigeration Drawings

1. Provide framed Plexiglas cover for refrigeration schedule sheet and refrigeration floor plan.
2. Refrigeration Floor Plan
 - a. For each system or piece of equipment, show defrost time, electrical panel board, and breaker numbers.
 - b. Show location of controls and associated valves (temp sensors, solenoids and EPR's).
3. Secure framed units permanently on side of distributed refrigeration units or on compressor room or prefabricated mechanical center wall where they can be easily read.

B. Cases

1. Label: Engraved hard black plastic, 1 inch by 2 inch (25 mm by 50 mm) plate with 3/4 inch (19 mm) white lettering.
2. Label new and/or relocated equipment with reference to operating system.
3. Rivet or screw label on each case on upper left hand corner.
4. Provide case and circuit identification on an ongoing basis during the Project. Temporary tags may be used until permanent tags are available.

C. HICA and HOCA

1. Label the inside of the unit with systems refrigerant type, oil type and capacity. Paint compressor head with corresponding color of refrigerant type.
2. Provide adhesive (P-touch) labels for labeling HICA and HICO units. Place labels on electrical panels out of direct sunlight or out of the elements.
3. Paint compressor head on new and replacement compressors. Remove references to past information.
4. Label units with 2 inch (50 mm) black stenciled lettering on the outside designating system.

D. Condensing Units: Label units with 2 inch (50 mm) black stenciled lettering on the outside designating system.

E. Walk in Boxes

1. Label: Engraved hard black plastic, 1 inch by 2 inch (25 mm by 50 mm) plate with 3/4 inch (19 mm) white lettering.
2. Label walk-in boxes on the outside of the door casings above the temperature display.

F. Distributive System

1. Label: Engraved hard plastic, 1 inch by 2 inch (25 mm by 50 mm) plate with 3/4 inch (19 mm) lettering.

G. Remotely Mounted Suction stops

1. Label Circuit Identification: Brass or plastic tags attached to valves with wire tie or plastic zip ties, 1 inch (25 mm) in diameter.

3.9 GRAND OPENING DAY SERVICE

- A. Provide an experienced service technician in the store for four hours the morning of the store Grand Opening. Record fixture temperatures and submit to Owner. Make any adjustments as necessary.
- B. The Owner will check fixture temperatures and defrost periods before opening of the store for business. Make any re-adjustments as requested by the Owner.

3.10 FIELD QUALITY CONTROL

- A. Inspect work and submit to Owner a written punch list on Owner's form.
 1. Walk punch list with Owner to verify completeness.
- B. 60 Day Warranty Inspection: Within sixty to ninety days of the store opening, an acceptance walk-through will take place with the Owner, the manufacturer of the refrigeration equipment and the Installer. The Owner will produce a list of deficiencies that are to be completed prior to the store acceptance by the Owner and release of the Installer's warranty. The following tests and inspections will be run under the direction of the Owner.
 1. Inspect up to ten different Thermal expansion valve's for proper superheat setting.
 2. Inspect complete system for leaks.
 3. Inspect systems for proper temperature.
 4. Test oil for acidity.
 5. Test system for moisture content.
 6. Verify that there is no flood back present on equipment pertaining to remodel.
 7. Inspect for proper programming and controls per Controller Setpoint and Standards Document.
- C. Replace any filter and/or drier in the refrigeration system, which shows a 2 lb. or greater pressure drop across the filter or filter drier.
- D. The Installer's warranty is to remain in effect until all related systems have been formally accepted in writing by the Owner's Facility Engineering Department or their selected representatives to be running in normal condition. These tests will be run under the direction of the Owner. Tests and repairs incurred during the Installer's warranty period will be paid by the Installer.

3.11 ATTACHMENTS

- A. The following pages include:
 1. Kroger Refrigerant Management Policy.

2. Sample forms required for the Installer's work available for downloading on the Owner's project management website:
 - a. Piping Test Check Sheet.
 - b. Superheat Recording.
 - c. Pre-Inspection Checklist.
 - d. Kroger Contractor Refrigerant Management Tracking Form.
 - e. Accidental Release Report.

The Kroger Co.
Refrigerant Management Policy
2/1/2019



KROGER REFRIGERANT MANAGEMENT POLICY

3.1 INTRODUCTION

- A. Regulations in 40 CFR Part 82, that codify Section 608 of the Clean Air Act, prohibit the venting of refrigerant gas into the atmosphere. Additionally, Kroger has signed on to the US EPA's GreenChill Program, which signals our commitment to reducing refrigerant emissions from our facilities. In order to adhere to these requirements and commitments, this policy outlines the procedure and documentation for any and all refrigerant gas handling. This policy outlines the procedure and documentation necessary for any and all refrigerant gas handling.
- B. The Kroger Co. has a **ZERO TOLERANCE LEAK RATE POLICY** in that all leaks will be repaired regardless of the size of the refrigerant system and the calculated leak rate prior to adding refrigerant. This means that refrigerant will not be added to the appliance until it is repaired.
- C. The Kroger Co. has two areas of focus for this policy:
 - 1. Kroger employed, and vendor contracted technicians performing maintenance and services to Kroger owned appliances.
 - 2. Kroger employed, and vendor contracted technicians performing installations and removal of Kroger owned appliances as part of capital improvement projects.

3.2 RECORD KEEPING

- A. A record must be maintained on all appliances and updated each time any of the following occur:
 - 1. Refrigerant is added to an appliance.
 - 2. Refrigerant is removed from an appliance.
 - 3. An appliance changes location.
 - 4. A change in a system that may alter the category of the appliance thus changing the leak calculation rates.
 - 5. A new appliance is added.
 - 6. An appliance is retired.
 - 7. An appliance is mothballed (refrigerant removed but appliance not disposed).
 - 8. An accidental release of refrigerant.
 - 9. Reclaimed refrigerant handling.
 - 10. An Appliance is sold or donated.
- B. Records shall be maintained with copies of all technician certifications for 40 CFR Part 82.
- C. The Kroger Co. uses a maintenance software system to maintain records for refrigerant management. This web-based application includes refrigerant data for all appliances, refrigerant full charge for each appliance, refrigerant leakage rates, appliance installation and removal information. Full charge determination shall be documented on the appliance registration and the definitions of the acceptable determinations are in the REFRIGERANT CHARGE DETERMINATION section of this policy.

- D. Contracted maintenance and project companies must provide copies of all technician certifications to the division Maintenance Manager prior to performing any service that involves 40 CFR Part 82 work. These copies will also be maintained with contractor contact information to include the technicians name. When a contractor is completing a repair involving a leak, the technicians name must be documented in the service call notes field in the Kroger maintenance software system.
- E. All documentation necessary to meet 40 CFR Part 82 must be available at the division office location for a period of 3 years from the date of service. Documents will be archived after exceeding 3 years.

3.3 EQUIPMENT LABELING

- A. All refrigeration systems/appliances shall have a bar-coded label located at or adjacent to each appliance's nomenclature tag. This label ID is to be used for any documentation associated with the appliance.



- B. The label is to be located at the condenser or compressor section nomenclature plate.
- C. Each appliance shall have the refrigerant type clearly labeled in this same area.
- D. Retired or disposed appliances must have a Kroger Refrigerant Recovery label filled out and attached. A carbon copy of this tag shall be sent to the R&S Warehouse or the Division Maintenance Office for record keeping. In addition to the equipment tag, an appliance disposal form must be filled out and uploaded to Site Folio. If the appliance is part of a construction project, the form must be uploaded to that project. If the appliance is not associated with a construction project, the form must be uploaded to the Temp Mon project in Site Folio. Sample of both documents are included in this policy. *Text Documents/Fixturing & Store Equipment/Refrigeration Equipment/Refrigerant Management.*

3.4 KROGER/CONTRACTOR TECHNICIAN MAINTENANCE AND SERVICE

- A. The Kroger Co. has a **ZERO TOLERANCE LEAK RATE POLICY** in that all leaks will be repaired regardless of the refrigeration system and the calculated leak rate prior to adding refrigerant. This means that refrigerant must not be added to the appliance until after it is repaired.
- B. Maintenance services must be performed by service technicians that have been certified to the requirements of 40 CFR Part 82. Technicians following this regulation must use Kroger's automated maintenance program to comply with the documentation section of this policy.
- C. Upon discovery of a leak the technician must begin leak checking the system. If needed, contact with the supervisor is made and additional resources will be allocated to assist in the leak check/repair.

- D. NO SYSTEM will have refrigerant added unless it has been fully leak checked and ALL leaks repaired. This includes systems that may not apply under EPA guidelines.
- E. Following this policy may require removal of product during the leak check activity. If that is the case, proper communication is key between technician, supervisor and the store management and, if necessary, Facility Engineering management.
- F. Contracted maintenance and service, when used, shall require the contracted technician to submit a fully completed Kroger refrigerant management tracking form in Service Hub or to contact the dispatch in Facility Engineering the same day the service is performed. The actual name of the technician shall be documented in the notes field of the service call. This documentation will be necessary before payment is authorized to the purchase order.
- G. Once repaired, and using Service Hub, the proper documentation must be carried out in Service Hub including proper follow-up leak checks. This documentation must be as detailed as possible and must be complete. ALL applicable fields on the leak screens must be accurate and detailed.
- H. Follow-up leak rate calculations will automatically be performed by the maintenance system. A follow-up service call will be automatically created when the leak call action is complete. This follow up verification must be completed within 10 days of the original leak date.
- I. Preventative leak inspection requirements.
 - 1. Locations with Automatic Leak Detection Systems. ALDS locations will schedule an annual PM on the ALDS to maintain operational accuracy. This PM shall be scheduled and documented in Service HUB.
 - 2. Locations without ALDS. These locations shall schedule a quarterly leak inspection to be completed on all appliances in that location. These inspections shall be scheduled and documented in Service HUB.

3.5 KROGER/CONTRACTOR CAPITAL IMPROVEMENT PROJECTS

- A. Capital improvement work performed in Kroger locations shall have a binder labeled as “EPA Refrigerant Log Book” posted on the mechanical room door or other conspicuous location in the store for the duration of the project.
- B. The binder is to be provided by the project manager and is to be posted and maintained by the contractor responsible for the refrigerant record keeping.
- C. The binder shall have:
 - 1. A copy of this policy.
 - 2. Contractor Refrigerant Management Tracking Forms.
 - 3. Refrigerant Recovery labels.
 - 4. Contractor supplied copies of technician certifications not yet on file with Kroger.
 - 5. Instructions and contact information for contractors during the project for complying with the refrigerant management policy.

- D. The forms in the binder shall be updated daily by the installing contractor and be available for review by the project manager, Kroger technician or other authorized individuals. The input forms from the binder shall be uploaded to Site Folio on a regular basis. Upload to: *Text Documents/Fixturing & Store Equipment/Refrigeration Equipment/Refrigerant Management*.
- E. Records for refrigerant ordered for systems during an improvement must be maintained as part of the site records for refrigerant purchases. Refrigerant ordered through any Kroger purchasing system must have copies of the purchase order placed in the binder with prices hidden by the project manager.
- F. Refrigerant purchased for systems during an improvement shall have each refrigerant tank tagged with a specific tank ID number. The tank ID number shall be documented as the purchase order number followed by sequential numbering, i.e. 1147985-1, 1147985-2, etc. These tank ID numbers shall be used to track the movement of refrigerant from each tank into each tagged refrigerated system.
- G. Prior to each system startup an authorized Kroger technician or project manager shall verify that the system has been installed, pressure tested and evacuated in accordance with the Kroger Refrigeration Installation Specifications and documented in the Piping Test Check Sheet. The authorized Kroger representative shall verify the full system charge documented on the refrigerant management tracking forms.
- H. Refrigeration systems should be charged with minimal amounts of refrigerant to allow all heat reclaim and refrigeration circuits to operate normally. Refrigerant added beyond this minimal charge shall be considered unnecessary excess which can lead to greater than necessary refrigerant loss.
- I. At system startup the total quantities of refrigerant transferred from each tank shall be documented before the end of each working day. This information shall be documented in the refrigerant management tracking form and posted in the binder. When the refrigeration system has been fully charged to the receiver level which allows all heat reclaim and refrigeration circuits to operate normally, no additional refrigerant is to be added from the refrigerant tanks tagged with tank ID numbers.
- J. In the event that refrigerant leaks are discovered after the initial pressure test, these refrigerant leaks shall be repaired, and the refrigerant required to fully charge the system to the receiver level to allow all heat reclaim and refrigeration circuits to operate shall be the responsibility of the refrigeration installer.
- K. Kroger authorized technicians shall enter the data documented on the refrigerant management tracking forms into Service Hub and will sign off that the project has been completed. At this time the Kroger technician will enter a service call for a 10 day follow-up check on the new system by a service technician.
- L. At the conclusion of the project, all forms must be signed off by a Kroger Maintenance Manager and approved by the project manager **before payment of the final retainage is made**. The log book must then be turned in to the Maintenance Manager.

3.6 REFRIGERANT CHARGE DETERMINATION

- A. In order to perform leak rate calculations, the refrigeration equipment must be labeled with the refrigerant type and amount of the full charge. The refrigerant full charge can be summarized into four categories:
1. **Manufacturers Determination:** Self-contained equipment, such as retail end displays, soda machines, package HVAC equipment; etc. have a factory nomenclature tag affixed to the equipment.
 2. **Component Volumetric Calculation:** This method measures the interior dimension (ID) of all components and the conditions of the refrigerant in each. The full charge amount of refrigerant is mathematically calculated.
 3. **Refrigerant Added or Evacuated:**
 - a. **New system:** When a new system is installed, the amount of refrigerant installed is the full charge amount.
 - b. **Existing System:** An existing system with an existing full charge determination may have revisions done that change the amount of the full charge.
 4. **Mid-point of Established Range:** Established range based on the best available data regarding the normal operation characteristics and conditions for the appliance. Such as 80 percent of receiver holding capacity.
 5. **Combination of Above**

3.7 APPLIANCE DISPOSAL

- A. Appliances that are disposed of must include all forms that are applicable to the appliance leaving the ownership of the Kroger company when:
1. Transferring an appliance to a new owner.
 2. Transferring an appliance to a recycler.
 3. An appliance being disposed of to a waste hauler.
- B. A refrigerant management documentation form must be filled out and submitted to the project manager or Kroger maintenance manager for each appliance being disposed of. A copy of this form shall be placed in the binder and uploaded to Site Folio.
- C. Refrigerant must be recovered by a certified technician prior to disposal of appliances. A refrigerant recovery label must be completed and attached to that appliance.
- D. An operable self-contained appliance being resold may be resold with the refrigerant charge if the intent of the purchaser is not to scrap the appliance. The appliance must be tagged indicating that the appliance contains refrigerant.
- E. An appliance that is sold or disposed of will need the contact information of the purchasing person documented on the refrigerant management disposal form. Below is an image of the refrigerant recovery label to be filled out in full and placed on the appliance by the data plate. The project manager or Kroger maintenance manager shall ensure that an image of the label is taken and electronically filed for future reference and the disposal form is filled out and uploaded to Site Folio.

APPLIANCE DISPOSAL LABEL

REFRIGERANT RECOVERY	ACTION TAKEN
Date _____	Scrap _____ To R&S _____ Sell _____
From Location _____	Sold with Refrig. Yes _____ No _____
Refrigerant Type _____	Sold with Refrig. Type _____
Refrig. Recovered LBS/OZ _____	Sold with Refrig. LBS/OZ _____
Equip. Model # _____	Sold to Name _____
Equip. Serial # _____	Buyer Contact Info _____
Equip. KR # _____	Technician Name _____
UPDATE EQUIPMENT REGISTRATION & LOCATION IN SERVICE HUB	

APPLIANCE DISPOSAL FORM

Refrigerant Recovery/Equipment Disposal and Sale	
Date	
Filename	
From location	
Refrigerant	
Amount of refrigerant recovered	
Lbs.	
Ozs.	
Technician Certification #	
Recovery Machine Used	
Model	
Serial	
Equipment Description	
Model	
Serial	
Was a refrigeration component	
Equipment ID	
Scrap	
To R&S	
Sold with refrigerant content	
Status of equipment	
Sold to:	
Name:	
Address:	
Phone number:	
A copy of this information is to remain with the equipment while in transit and while mothballed. When equipment is sold or scrapped this information is to be filed in the Facility Engineering Maintenance Office.	

REFERENCES

40 CFR 82.150 through 82.169

Information on the CAA Section 608 requirements may be found at: www.epa.gov/ozone/title6/608.

Revised: 2.28.2012 – Changed reference to EPA 608 to 40 CFR Part 82

Revised 6/10/2016 – Added additional leak repair requirements in support of GreenChill program

Revised 2/1/2019 – Added/changed requirements due to EPA updates that take effect 1/1/2019.



This form is to be signed and provided to the Owner's project manager prior to the commencement of refrigeration installation work.

I, _____,
(print name)

representing the refrigeration installation company listed below, have read, understood, and will follow "The Kroger Co. REFRIGERANT MANAGEMENT POLICY DATED 2/1/2019".

Company: _____

Signature: _____

Date: _____

END OF REFRIGERANT MANAGEMENT POLICY

[illegible]

Superheat Recording				
DATE	SYSTEM	VALVE	READING (TD)	LOW TEMP OR MED TEMP CASE

Pre-Inspection Checklist

Note all pre-existing conditions on systems pertaining to remodel including but not limited to:
Liquid levels, oil Level, and repairs needed.

This will be completed during pre-construction meeting.

Contractor Representative

Signature

Print Name

Kroger Representative

Signature

Print Name

Kroger Contractor Refrigerant Management Tracking Form

STORE#

CONTRACTOR

PROJECT ENGINEER

DATE	SYSTEM ID ¹	REFRIGERANT ADDED			REFRIGERANT RECOVERED			INSTALLING TECH	INPUT VERIFICATION / DATE ³
		TYPE	QUANTITY	TANK ID ²	TYPE	QUANTITY	TANK ID ²		


1. System ID is a bar-coded tag adjacent to the system data plate. If one is not present for new systems contact a Kroger technician.

2. Tank ID# on the refrigerant tank. If one is not present contact a Kroger technician.

3. Kroger technician signature for approval and input into maintenance system.

DATE	SYSTEM ID*	SYSTEM MODIFICATION TYPE*			DESCRIPTION OF MODIFICATION	INSTALLING TECH

*E: Compressor change, case rework, adding or removing self contained appliance, accidental release.

Accidental Release Report				
				
Store Number		Service Date		
Company		Technician Name		
Leak Location		Equipment/Rack ID		
Refrigerant Type		Approximate Amount of Refrigerant Lost		
Description of Event:				
Cause of event:				
What precautions will be taken to prevent this event from repeating itself:				
Who was notified of event:				
Contractor Technician Signature				

END OF SECTION 11 41 43

BLANK SHEET