

SPECIFICATIONS FOR RAPID TRANSIT CARS

SECTION 4

HEATING, VENTILATING AND AIR CONDITIONING

4.01 Car Heating

(a) Electric panel heaters shall be installed in openings in the seat risers. Perforated covers shall be of stainless steel.

(b) Each heater shall comprise two strip heating elements of different capacities, and all heaters in the car shall be connected in series circuits so provide three varied degrees of heat.

(c) Thermostatic control of heaters shall be provided.

(d) Heaters and thermostatic control equipment shall be of Consolidated Metal Products type or approved equal.

4.02 Cab Heating

(a) Cab Heaters shall be provided in each motorman's cab. These units shall maintain therein a temperature of not less than 50 degrees F., and shall be so arranged that the heaters will be disconnected when cab is not made up.

4.03 Ventilating and Air Conditioning

A. General

(a) Each car shall be equipped with an air conditioning system designed to re-circulate air, introduce fresh air, and to refrigerate air as required.

(b) The system shall comprise a compressor, condensor, evaporator, blower unit, filters, heat unit, controls, refrigerant piping, grilles and necessary motors.

The equipment shall be installed under floor of car, and in ceiling area adjacent to motorman's cabs.

(c) The direct expansion system shall be employed, and refrigerant shall be Freon (F-12).

(d) The system shall be designed and constructed to eliminate objectionable noise and vibration, either with car in motion or standing.

(e) All equipment shall be so arranged as to provide maximum ease of maintenance. Access panels shall be provided as required.

B. Service Requirements

(a) The air conditioning unit shall deliver a minimum refrigeration effect of 120 000 BTU per hour from the evaporator with a total power input not to exceed 15KW under ambient temperature of 90° F. DB, 75° WB. Circulated air shall be 2 400 CFM minimum with 25% fresh air.

C. Air Distribution

(a) A duct shall be provided in the monitor of suitable capacity to convey air from the unit to the distributors. Duct shall be insulated and shall extend the full length of the car in the space between headlining and roof.

(b) An air distributor of the continuous double trough type shall be provided. The distributor shall be mounted on the headlining, and so arranged that air is discharged parallel to the headlining to avoid objectionable downdrafts. Distributors shall be equipped with suitable adjustable deflectors to eliminate the longitudinal velocity component of the air stream in the duct, and to deflect the air stream into the car body. The air distributors

shall be provided with adjustable dampers so that uniform temperature may be maintained throughout the car body.

(c) Re-circulated air shall be drawn into the system through a grille. Fresh air shall be supplied through exterior louvres. Both re-circulated and fresh air shall be drawn through air filters of the reactivated carbon type.

(d) A blower fan assembly shall be provided to deliver 2 400 CPM minimum against a total static pressure of 1.25 inches water gauge.

D. Refrigeration System

(a) The compressor shall be of an approved, air-cooled type, arranged for capacity control for 100%, 75%, 50% and 25% capacity.

(b) An air-cooled condenser shall be provided. Cooling air shall be drawn into the system through exterior louvres, and discharged under floor of car.

(c) The liquid receiver shall be of the all-welded type, and of sufficient capacity to store a full charge of liquid refrigerant when it is condensed, and to have additional volume for normal expansion. Receiver shall be mounted at low point of the system. A liquid line filter drier and charging valve shall be installed in the line. A suction-liquid line heat exchanger shall be provided.

(d) An evaporator section shall be provided comprising an evaporator coil, distributors, blower fans, electric heater, recirculated air grille, filters and necessary valves. A suitable drip pan shall be provided equipped with means to remove condensate.

(e) Piping shall be seamless, hard drawn Type K copper tubing of suitable size. All joints shall be properly soldered.

E. Refrigeration Control

(a) A selector switch shall be provided, arranged for three-positions - "MANUAL-OFF-AUTOMATIC". Automatic operation shall be governed by a thermostat arranged to modulate at 75° and cycle off at 74°.

(b) A high-low pressure cut-out switch, and necessary gauges shall be provided.

F. Heaters

(a) An electric heating unit of 12 KW capacity shall be provided to heat fresh air when required.

(b) Heaters shall be thermostatically-controlled, and equipped with a thermal cut-out to prevent overheating should blowers be inoperative.

G. Motors and Electrical Equipment

(a) All motors and electrical equipment shall be designed to function normally on voltages from 400 volts to 700 volts DC, and of suitable capacity to perform the required service with an adequate overload capacity.

(b) Motors shall be of an approved type and equipped with shielded or sealed type bearings.

(c) Motors and other electrical equipment shall withstand a potential test of 3500 RMS volts AC for one minute with equipment at operating temperatures.

(d) Controls shall operate on 32-Volt battery circuit.

(e) An approved panel shall be provided equipped with controls for the compressor motor, condenser fan motor and blower fan motor. Motor starters are to be of an approved type. The compressor

motor and condenser fan motor shall be interlocked with the blower fan motor so that a failure of the blower fan motor will shut off the unit. Adequate overload protection shall be provided. The blower fan motor shall be arranged for independent operation for heating or ventilating.