

1513.0480 REFRIGERATION LOAD AND EQUIPMENT.

Subpart 1. **Computation.** The total refrigeration load must be computed as the sum of the following:

A. load imposed by heat flow into a container caused by the temperature differential between the ambient temperature and the storage temperature;

B. load imposed by heat flow into the tank caused by maximum sun radiation;
and

C. maximum load imposed by filling the tank with ammonia warmer than the design storage temperature.

Subp. 2. **Multiple storage tanks.** More than one storage tank may be handled by the same refrigeration system.

Subp. 3. **Compressors.** Compressors must meet requirements of part 1513.0200, subpart 7.

A. A minimum of two compressors must be provided, either of which is of sufficient size to handle the loads listed in subpart 1, items A and B, except as provided in item C. If more than two compressors are provided, minimum standby equipment equal to the largest normally operating equipment must be installed. Compressors required for subpart 1, item C, may be used as standby equipment for compressors required in subpart 1, items A and B.

B. Compressors must be sized to operate with a suction pressure at least ten percent below the minimum setting of the pressure relief valves on the storage tank and must withstand a suction pressure at least equal to 121 percent of the design pressure of the tank. Discharge pressure is governed by condensing conditions.

C. If facilities are provided to safely dispose of vented vapor to an automatic flare or to a process unit, a single compressor of sufficient size to handle the load listed in subpart 1, items A and B, must be allowed.

Subp. 4. **Compressor drives.** Each compressor must have its own drive unit. Any standard drive consistent with good design may be used. An emergency source of power of sufficient capacity to handle the loads listed in subpart 1, items A and B must be provided, unless facilities are provided to safely dispose of vented vapors while the refrigeration system is not operating.

Subp. 5. **Automatic control equipment.** Automatic control equipment is governed by items A to D.

A. The refrigeration system must be arranged with controls to govern the compressor operation in accordance with the load as evidenced by the pressure in the containers.

B. An emergency alarm system must be installed to function in the event the pressure in the containers rises to the maximum or falls to the minimum allowable operating pressure.

C. An emergency alarm and shut-off must be located in the condenser system to respond to excess discharge pressure caused by failure of the cooling medium.

D. Automatic controls must be installed in a manner to preclude operation of alternate compressors unless the controls will function with the alternate compressors.

Subp. 6. **Separators.** An entrainment separator of suitable size and design pressure must be installed in the compressor suction line. The separator must be equipped with a drain and gauging device. A maximum liquid level control with alarm must be installed.

An oil separator of suitable size must be installed in the compressor discharge line. It must be designed for at least 250 psig and equipped with a gauging device and drain valve. A maximum oil level control with alarm must be installed.

A separator must be equipped with a pressure relief valve if the separator can be isolated with shut-off valves.

Subp. 7. **Condensers.** A condenser system may be cooled by air or water or both. The condenser must be designed for at least 250 psig. Provision must be made for purging noncondensibles either manually or automatically. The condenser must be equipped with a pressure relief valve if the condenser can be isolated with shut-off valves.

Subp. 8. **Receiver and liquid drain.** A condenser effluent receiver must be provided which is equipped with automatic level controls and valving designed to discharge the liquid ammonia to storage or with a high pressure liquid drain trap of suitable capacity. The receiver must be designed for at least 250 psig operating pressure and equipped with the necessary connections, pressure relief valves, and gauging device.

Subp. 9. **Insulation.** Refrigerated containers and pipelines that are insulated must be covered with a material of suitable quality and thickness for the temperatures encountered. Insulation must be supported and protected against the weather. Weatherproofing and insulation must be of a type that will not support flame propagation and will not cause corrosion when wet.

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