TECHNICAL SAFETY BC

DIRECTIVE

DETERMINING THE CAPACITY OF REFRIGERATION SYSTEMS

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The following directive provides an interpretation of how prime mover nameplate rating is to be defined and calculated when determining refrigeration plant capacity.

Definitions

Refrigeration System: means a refrigeration plant;

Refrigeration Equipment: means machinery in which refrigerants are capable of being vaporized, compressed and liquified;

Refrigeration Plant: means an assembly of refrigeration equipment and includes a pressure plant connected to it;

General details

The Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation (the Regulation) requires that the capacity of a refrigeration system be determined from the prime mover nameplate rating.

Section 46.1 of the Regulation, states that "For the purposes of this regulation, the capacity of a refrigeration plant is the total kW of all refrigeration equipment prime mover name plate ratings connected to the refrigeration plant." The Regulation does not provide a definition for prime mover name plate rating or a method for calculating prime mover kW rating.

Specific details

Technical Safety BC interprets a prime mover in a refrigeration system as the motor which drives the refrigeration compressor(s).

The nameplate kW rating of the prime mover is the power output of the driver (such as electric motor or internal combustion engine) that is connected to the compressor, measured in kW.

When more than one compressor is connected to a refrigeration system on the refrigerant side, so that the system refrigerant is shared between all compressors, the capacity of the refrigeration system is determined by the addition of the nameplate kW rating of all compressors connected to it.

Refrigeration Plant Capacity = C1 (kW) + C2 (kW)
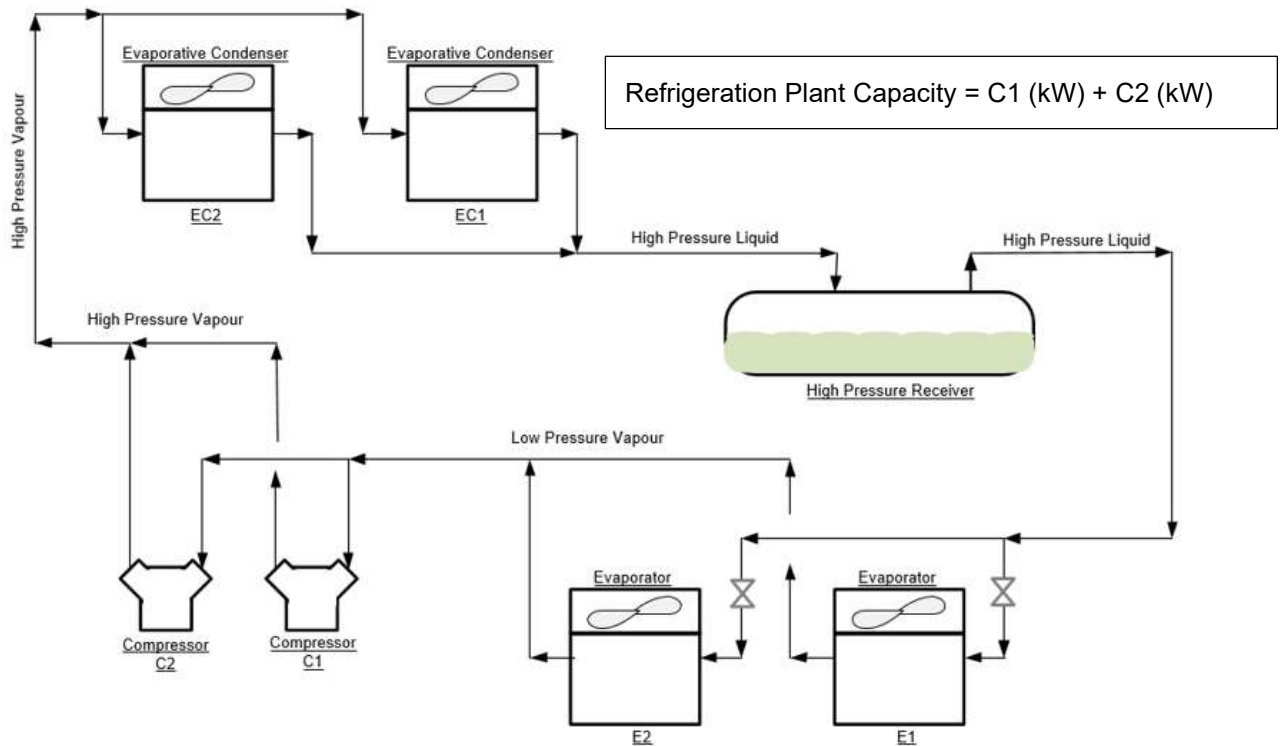
If the power output (kW) is not marked on the name plate, it shall be calculated from the information on the nameplate using one of the following formulas. All calculations must be based on information marked on the prime mover nameplate.

$$Power(kW) = \text{HP} \cdot 0.7457$$

Three phase motor:

$$Power(kW) = \frac{\sqrt{3} \cdot V \cdot I \cdot PF \cdot Eff}{1000}$$

Single phase motor:

$$Power(kW) = \frac{V \cdot I \cdot PF \cdot Eff}{1000}$$

Where,

HP = horsepower
kW = kilowatts
V = voltage (marked on unit nameplate)
I = amperage (Rated Load Amp (RLA), or Full Load Amp (FLA) as marked on the motor nameplate)
PF = power Factor (if not marked on the nameplate, it must be assumed as 1)
Eff = efficiency (if not marked on the nameplate, it must be assumed as 1)

For motor-compressors of the hermetically sealed type, the amperage to be used in the formula above is as follows.

- o For motors driven by "adjustable speed drives": Maximum Rated Current (MRC) at the input of the electronic circuit controlling the motor
- o For motors other than those driven with "adjustable speed drives": Full load ampacities marked on prime mover nameplate. These may be indicated as FLA, MCC, MCA, RA, RLA, I-Max, etc.

Locked rotor ampacities (RLA) may not be used for the calculation of the nameplate kW rating

Provincial Safety Manager - Boiler, Pressure Vessel, and Refrigeration

References:
Safety Standards Act
Power Engineers, Boiler, Pressure Vessel & Refrigeration Safety Regulation
Safety Standards General Regulation