ENGINEERING POLICY

SUBJECT: Precautions Relating to the Usage of Direct Suction Compressors in Cube Ice Machines

Publication no. EP-16

Issued: July 27, 2016

REV DATE: 12/5/2016

Driven by a combination of government regulations and increasing energy costs, the demand for improved efficiency has prompted compressor design engineers to consider both ***direct*** and ***semi-direct*** suction. This design approach routes the refrigerant towards the inlet of the suction muffler, internal to the compressor. The net result is that refrigerant gas absorbs only a minimal amount of heat from the motor prior to entering the cylinder, thus improving compressor efficiency. Due to this type of design, the compressor becomes more vulnerable to liquid refrigerant entering the compression chamber.

The following factors ***must*** be considered when applying direct or semi-direct suction compressors in Cube Ice Machines.

Liquid Flood Back – Compressor Running

Due to the inherent design of Cube Ice Machines, a large quantity of refrigerant can return to the compressor at the beginning of the harvest cycle which can lead to bearing wear, broken valves, and excessive oil in the system.

Liquid Migration – Prolonged Off Cycle

During a prolonged off cycle (no demand for ice), refrigerant will tend to migrate to the evaporator (ice grid) especially with a full bin of ice. With the bin full it will tend to keep the ice grid colder, creating an ideal condition for refrigerant migration. When the demand for ice is initiated, the compressor will see a surge of refrigerant at start-up. This type of condition is usually associated with an audible slug and can be damaging to the compressor.

Testing has proven that the proper selection and application of a suction line accumulator is an effective means of preventing liquid refrigerant from entering the compressor during harvest cycles and prolonged off periods.

NOTE: The selection and application of a suction line accumulator will be a part of the OEM system development and design program with testing required to confirm system performance and reliability.

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Accumulator Requirements

1. Must be able to hold 100% of the system's designed refrigerant charge
2. Must allow for oil return to the compressor (orifice)

Accumulator Selection

Consult the accumulator manufacturer for proper selection and sizing.

Reference Tecumseh Publication no. ER-12 for additional information on accumulator selection.

Considerations for Accumulator Selection

1. Effective Refrigerant Holding Volume
2. Minimum and Maximum Flow Rates
3. Minimizing Pressure Drop

Accumulator Location

In general, the suction line accumulator should be located on the same level as, and adjacent to the compressor, in order to minimize the length of the suction line between the accumulator and compressor.

Compressor Information

Tecumseh compressor series that incorporate a ***direct*** or ***semi-direct*** suction design are listed below.

Compressor Series with Direct or Semi-Direct Suction							
AZ / TH	TA / TA^2	TC	TP	AE^2 / AEX	AK^2	AW^2	VA

Please consult with your Tecumseh Sales Representative and/or Application Engineer to provide up-to-date information on Tecumseh compressor series that utilize a direct or semi-direct suction design.

NOTE: ***Some compressors offer different tube configurations that allow for an alternate suction tube (i.e., suction through process.***

Also reference Tecumseh Policy Bulletin No. PB-120 entitled "Usage of Direct Suction Compressors."