Marketing Guide

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Comparison Of Trane Purifier™ Purge With York Turboguard II Purge And York Skyguard II Purge

Preface: this document is intended for Trane field sales engineers and HVAC system designers. This Marketing Guide provides comparative information on the Trane Purifier Purge models versus the York Turboguard II Purge and the York Skyguard II Purge. All purges are not equal.

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General Description And Features

Trane Purifier™ Purge
The Trane Purifier Purge is a thermal purge having a separate air-cooled HFC-134a circuit with evaporator, air-cooled condenser and compressor. The Trane Purge can be operated while the chiller is idle. The air/R-123 mixture is drawn from the condenser into the low temperature tank (evaporator) of this system, condensing the R-123, returning the liquid R-123 to the condenser via gravity while removing the air using a 1/20 hp pump with an efficiency of .7 lb. refrigerant / lb. air per ARI Standard 580. It removes the small amount of water that may be in the chiller using a filter drier and water sight glass / drain, monitoring and recording the amount of non-condensables removed from the chiller, and being able to run independently of the chiller per ASHRAE Guideline 3, para 4.4.1.2. Trane Purifier Purge is available as a retrofit product.

Trane Purifier Purge With Purifier Plus® Canister
This purge is identical functionally to the Trane Purifier Purge. The difference is the addition of the Purifier Plus canister that provides an efficiency of .0019 lb. refrigerant / lb. air per ARI Standard 580. Trane Purifier Purge with Purifier Plus canister is standard on all new Trane centrifugal chillers and is also available as a retrofit.

York Turboguard II Purge
Oil from the chiller oil pump alternately fills and empties the purge heat exchanger, creating a fluid piston which collects and compresses non-condensable gases and water vapor. A refrigerant cooled heat exchanger condenses the refrigerant, returning it to the system. The York Turboguard II purge cannot be operated while the chiller is idle.

York Skyguard II Purge
Similar functionally to the Trane Purifier purge. The York Skyguard II purge can be operated while the chiller is idle. It is used by York to conform to specifications requiring this capabililty. Also see comparison chart which follows.

Almost all customers agree that reducing refrigerant emissions is of key importance. Based upon the ARI data, the York TurboGuard II emits to the atmosphere nearly 500 times more refrigerant than the Trane Purifier purge. Specifications should include the York Skyguard II purge to be provided on York's products, which provides a much more comparable efficiency rating and features set to our standard offering of the Purifier purge.

GENERAL	TRANE PURIFIER PURGE W/ PURIFIER PLUS	YORK TURBOGUARD II PURGE	YORK SKYGUARD II PURGE W/ CRYO-LINE CANISTER
Efficiency Thermal purge units with carbon filtration lose less than .002 # refrig / # air per ARI Standard 580. The York Turboguard II purge has a lower efficiency per ARI Standard 580. Purges have various efficiencies. For example, per ARI Standard 580, the Trane Purifier Purge is ≈ 474 times more efficient than the York Turboguard II Purge.	.0019 # Refrig / # Air efficiency rating per ARI Standard 580. **Note:** The efficiency of the Purifier Purge (exclusive of the standard canister) is ≈.7 # refrig/# air, thus less refrigerant is removed from the chiller than the York Turboguard II purge. The purge canister is changed out after 4000 pumpout minutes or 3 years, whichever comes first. Replacement is a simple procedure.	.9 # refrig / # air efficiency rating per ARI Standard 580.	.0004 # refrig / # air efficiency rating per ARI Standard 580. **Note:** The efficiency of the York Skyguard purge (exclusive of the std. canister) is ≈.57 # refrig / # air, thus less refrigerant is removed from the chiller than the York Turboguard II purge.
Operate When Idle.	Can operate when the chiller is idle.	**Cannot** operate when the chiller is idle.	Can operate when the chiller is idle.
Low Dew Point A lower saturation temperature of the purge condenser causes more refrigerant to be condensed / removed from the chiller. The proof of the purge system efficiency is in the rating of the purge per ARI Standard 580 (see various purge ratings under "Efficiency" above).	Separation Temperature ≈ -5 F	Separation Temperature ≈ 40 F	Separation Temperature ≈ -5 F
Recording Thermal purge units are microprocessor- based to log purge data including pump-out time which gives the magnitude of the leak. Hence thermal purges are leak detectors for refrigerant integrity – whether the chiller is operating or idle. It is important that the purge data be available at the chiller control panel in a clear (non-coded) display and available to be communicated to a BAS when applicable.	Purge data available at control panel. Operates when chiller is operating or idle to act as a leak detector. The Trane Purifier Purge logs the chiller purging both while the chiller is operating and while it is idle. The control system keeps a daily and monthly log. This data is stored in a non-erasable memory which does not require battery back-up.	Purge data available at control panel. Cannot operate when the chiller is idle and hence **cannot** operate as a leak detector when the chiller is idle. See note from York manual under the Skyguard II Purge. ➔	Does not communicate to chiller control panel. Operates when chiller is operating or idle to act as a leak detector. The Skyguard II Purge keeps a daily and monthly log, but requires a battery back-up for storage of logged data. If the battery fails when the purge power is lost, the logged data is lost. This is important as evidenced in the York Skyguard II Installation Operation and Maintenance Manual 1043-03. "If the majority of pumpout activity occurs when the chiller is off (as indicated by the "Purge 30-day average pumpout time while chiller is OFF" log) it can be assumed the air-leak source is on the "High" side of the chiller. It can be further assumed that when the chiller is running, this same leak allows refrigerant to leak out."

GENERAL	TRANE PURIFIER PURGE W/ PURIFIER PLUS	YORK TURBOGUARD II PURGE	YORK SKYGUARD II PURGE W/ CRYO-LINE CANISTER
Monitoring, Measurement, and Removal of Moisture Thermal purges allow for the accumula- tion and storage of excessive moisture. This makes them excellent leak detectors for tube integrity.	Also has a purge tank sight glass, a water catch chamber, a water drain, a large capacity filter drier, and a moisture sight glass that indicates drier saturation. The Purifier Purge allows no direct return of water to the oil system.	Has two small filter dryers as the sole means of moisture elimination. This purge does not have a purge tank sight glass, a water drain, or moisture indicating sight glasses. This is of special concern because any water that escapes the purge tank filter drier is mixed with the chiller's oil and returned to the oil tank. Here the chiller's oil is acidified with hydrofluoric acid when heat and pressure cause the water to react with refrigerant.	Has a large capacity filter drier. Also has water sight glass and drain to prevent water from returning to the chiller. The Skyguard Purge allows no direct return of water to the oil system.
Always Active Thermal purges operate even when the chiller is idle. This enables them to act as leak detectors and to remove non-condensables during shutdown periods. This can avoid service calls for chillers (with purges that will only operate when the chiller is operating) that keep tripping-out on high condenser pressure due to trapped non-condensables that were not able to be removed during periods of inactivity. And the remedy of venting air and refrigerant to get rid of the air violates the U.S. Clean Air Act. Also see discussion of ASHRAE Guideline 3, para 4.4.1.2 below.	Purge can function when the chiller is idle or operating to remove non-condensables at any time. When chiller is idle, operates as a leak detector during this period. The UCP-2 controls are "adaptive" which means that the purge operates on an "as required" basis, reviewing the pump-out time to determine how often and long the purge needs to operate. Even when the chiller is idle, the purge efficiency is .0019 # refrig / # air.	**Cannot** operate when the chiller is idle. Could have problems with trip-out on high condenser pressure (due to non-condensables entering the chiller during periods of chiller idleness). If problems, may have to call service agency. When chiller is idle, **cannot** operate as a leak detector during that period.	Purge can function when the chiller is idle or operating to remove non-condensables at any time. When chiller is idle, can operate as a leak detector during that period. Even when the chiller is idle, the efficiency is .0004 # refrig / # air. (Also see note under "Recording").
Reliability There are three aspects to purge reliability. 1. Reliability of the purge itself. 2. Reliability of the chiller as affected by the purge. 3. Reliability as affected by the ability to remove non-condensables when the chiller is idle. • The purge reliability is a function of the purge design and the attitude of the company toward quality and reliability. The Trane design is superior. The quality attitude of Trane in the HVAC industry is super.	Uses a compressor, evaporator, air-cooled condenser, a large filter drier, and a siphon to return the R-123 and trap excessive water. There are redundant safeties on the Purifier Purge such that the chiller liquid refrigerant charge is not lost. This control automatically detects a flooded condition and locks out purge operation.	Uses an oil boost pump, pressure switch, dual liquid level float switches, 2 three-way valves, and a refrigerant orifice. Also, two small filter dryers.	Uses a compressor, evaporator, condenser, a larger filter drier, and a siphon to return the R-123 and trap excessive water float switch. The York Skyguard II Purge does not have a redundant safety feature to protect against tank flooding. The float switch used to drain the purge tank is also used to detect tank flooding. If the float switch fails, there is no redundant safety control to lockout purge operation and prevent pumpout of the chiller liquid refrigerant charge.

GENERAL	TRANE PURIFIER PURGE W/ PURIFIER PLUS	YORK TURBOGUARD II PURGE	YORK SKYGUARD II PURGE W/ CRYO-LINE CANISTER
• Keeping water from the system is extremely important in keeping acids from the system. See "Monitoring Measurement + Removal of Moisture" above. The Purifier Purge is superior in keeping water from the system. • It is important to be able to remove non-condensables and water from the system while the chiller is idle. See "Always Active" above. The Purifier Purge has this capability.	The annual failure rate of the Purifier Purge is less than 1.5%. The chiller control panel also includes a purge diagnostic to advise the specific fault.	The annual failure rate (including oil pump failures) is unknown, but is believed to be in excess of 2.5%.	The annual failure rate is believed to be similar to the Trane Purifier Purge.
ASHRAE Guideline 3-1996, Para 4.4.1.2: "A purge system that is able to operate when the chiller is in standby or idle allows the purging on non-condensables when the chiller is idle without the venting of chiller's refrigerant to the atmosphere. The use of a purge unit with the capability of operating while the chiller is idle is encouraged." This recommendation is excellent. When this section was written, it passed unanimously – no dissenting votes at that time and no objections or negative comments during the 5 years that it took to write, review, and publish the ARI guideline. Also see Section "Always Active" above.	Purge can run when the chiller is idle. This allows the purge to monitor for air leakage into the system at all times.	**Cannot** operate when the chiller is idle. Cannot monitor for leakage into the system at all times.	Purge can run when the chiller is idle. This allows the purge to monitor for air leakage into the system at all times.
ASHRAE Guideline 3-1996, Para 4.4.1.1 "… Purging devices should emit less than 1 part refrigerant per part of air as rated in accordance with the methods prescribed in ARI Standard 580."	Purifier Purge w/ Purifier Plus has a certified rating of .0019 # refrig / # air per ARI Standard 580.	York Turboguard II Purge has a certified rating of .9 # refrig / # air per ARI Standard 580. Comparatively $\left\{ \frac{.9}{.0019} \approx 474 \right\}$; the York Turboguard II Purge has an emission rate ≈ 474 times higher than the Trane Purifier Purge.	York Skyguard II Purge has a certified rating of .001 # refrig / # air per ARI Standard 580.
Other	More than 30,000 Trane Purifier Purges have been sold since 1990, attesting to their efficiency, reliability, and quality.	Barely meets the minimum efficiency recommendation of 1.0 # refrig / # air per ASHRAE Guideline 3, cannot operate when the chiller is idle.	The Skyguard II Purge (purchased from Redi and mounted on the York chiller) was introduced ≈ 2 years after the Trane Purifier Purge was first shipped and very similar in design. It does lack some communication features that are incorporated in the Trane Purifier Purge design.

Summary

The Trane Purifier™ Purge, Trane Purifier Purge with Purifier Plus®, and the York Skyguard II Purge are similar thermal purges, both able to operate while the chiller is idle (per ASHRAE Guideline 3-1996, para 4.4.1.2) and having purge efficiencies in the .0004 - .002 range per ARI Standard 580. The advantage of this feature is discussed in this engineering bulletin.

The Trane purge models also have the advantage over the Skyguard II Purge of being able to communicate with the chiller control panel. Other advantages are discussed above.

The York Turboguard II Purge incorporates a design that utilizes oil pressure to compress the refrigerant air mixture from the condenser and a coil to extract the air and water vapor. This purge **cannot** operate when the chiller is idle and has a much lower efficiency than the thermal purges.

To obtain the capability of being able to operate when the chiller is idle and to have a much higher efficiency per ARI Standard 580, the chiller specification can read "Low pressure chillers are to be furnished with a thermal purge that can operate when the chiller is idle per ASHRAE Guideline 3 and has an ARI Standard 580 certified efficiency less than .002 lb. refrigerant / lb. air. Acceptable purges are the Trane Purifier Purge and the York Skyguard II Purge".