QuickSpecs

Large Tonnage Solutions

YST - **YORK Steam Turbine Driven Centrifugal Chillers**
600-2800 Tons

From Customer Need to Competitive Advantage

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Johnson Controls

QuickSpecs

YST - YORK Steam Turbine Driven Centrifugal Chillers

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This Quickspecs document is designed to help Johnson Controls HVAC salespeople work with their Consulting Engineer customers and help them specify Large Tonnage Solutions projects efficiently and effectively. Each Quickspec item summarizes advantages that should be included in the project specifications in order to ensure the owner receives the full benefit of the features.

The Bottom Line

This section tells you what specific advantages exist, and what language should be included in the project specification in order to ensure that the owner understands and receives the full benefit of the features of YORK brand YST Steam Turbine Driven Centrifugal Chillers.

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The Bottom Line 1-7

Bottom Line 1: Chiller manufacture shall supply examples of sites operating chillers of similar capacity and design installed within the last five years.

Bottom Line 2: Chiller manufacture shall supply capacity control via variable speed operation based on chiller load, with variable geometry diffuser, and modulating inlet guide vanes to achieve optimum energy efficiency.

Bottom Line 3: Provide microprocessor based integrated control for the operation of the compressor, steam turbine, and steam condenser.

Bottom Line 4: The chiller manufacturer shall supply a unit mounted steam condenser package, functionally matched in capacity to the design steam supply requirement.

Bottom Line 5: Chiller capacity of __ tons required to occupy a footprint area of __ L x __ W available for installation. The chiller fully assembled or knocked down. shall be capable of passing through building openings dimensions of __ W x __ H, required to rig equipment into the plant room.

Bottom Line 6: Steam driven chiller(s) shall operate using facility steam without the use of pressure reducers or de-superheaters.

Bottom Line 7: Provide evaporator and condenser tubes with minimum tube wall thickness of 0.035" at the plain lands contacting the intermediate tube supports and end sheets.

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The Details

This section tells you the background and peripheral information pertinent to each individual "Bottom Line" QuickSpec item, including:

- The customer need, including a sample of how the customer would actually say it
- The feature that addresses the stated need
- A "So what" statement highlighting the feature's value and impact
- The competitive advantage the feature provides
- The Bottom Line: What specific language should be included in the project specification

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QuickSpec 1:
Manufacturer Experience

What customers are saying: "Are steam turbine driven chillers new technology? How many of these chillers have you installed? We do not want to be a test site."

Customer Need: A reliable chiller that that is not subject to problems or failures that are often seen with new products.

YORK YST chiller feature: YST chillers have been sold for many years. YORK brand YST chillers utilize the same equipment designs as the popular YK electric chillers.

So what: All of the YST's major components have proven designs in various installations around the world. This includes the steam condenser which also is a proven design, modified to facilitate the arrangement of packaged components.

Our competitive advantage: Three of the four major chiller manufactures have at one time produced turbine driven chillers. Only the YORK brand has consistently supplied state of the art turbine driven chillers. Over 70 YST's have been sold after the integration of factory packaged controls, and over 100 YST's prior to that.

What to specify:

- Chiller manufacture shall supply examples of sites operating chillers of similar capacity and design installed within the last five years.
- The installed chiller shall have all major components assembled and operating as a single footprint package with integrated controls operating all functioning components.

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QuickSpec 2:
Variable Speed Operation

What customers are saying: "This chiller plant operates at design full load conditions only a fraction of the time. Most steam driven chillers have only a small efficiency improvement when operating at part load. Can NPLV's be improved with a turbine driven chiller?"

Customer Need: A steam driven chiller that operates efficiently at part load conditions.

YORK YST chiller feature: Variable speed operation is standard on all YST chillers.

So what: Variable speed operation optimizes steam energy across all load points; providing savings in energy costs where the chiller operating time is the highest.

Our competitive advantage: YSTs with variable speed operation and integrated controls provide better NPLVs than large capacity absorbers or constant speed chillers.

What to specify:

- Chiller manufacture shall supply capacity control via variable speed operation based on chiller load, with variable geometry diffuser, and modulating inlet guide vanes to achieve optimum energy efficiency.
- Part Load Performance: Provide chiller efficiencies with both ARI and constant tower water temperature unloading at 10% load increments from 100% to 15% of design capacity.

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QuickSpec 3:
OptiView Control Panel

What customers are saying: "With a turbine driven chiller using a steam condenser, are there separate controls for the chiller, the turbine, and steam condenser?"

Customer Need: A single chiller control system that monitors chiller, turbine, and steam condenser operations, and avoids expensive downtime issues. The control system must be operator friendly and operate the chiller efficiently.

YORK YST chiller feature: YORK's OptiView control panel offers an intuitive, easy-to-use, full-color, graphical user interface that delivers complete chiller system monitoring and control.
Features include:

- Animated graphic LCD microprocessor control
- Intuitive controls on a high resolution display
- Reliable starting procedure with operator prompts, or automated start option
- Separate graphic screens for operating details on major components
- Fully integrated controls optimizing the compressor, turbine, and steam condenser
- Quick reacting thermal chiller control

So what: Optimized chiller hardware and software ensures that chillers are operating as efficiently and reliably as possible, helping to mitigate the risk of potential operator errors.

Our competitive advantage: The YORK OptiView panel has been the market leader since its inception. The YST is the only turbine driven chiller offering integrated graphic controls optimized for variable speed operation.

What to specify:

- Provide microprocessor based integrated control for the operation of the compressor, steam turbine, and steam condenser
- Provide chiller control panel with a full-color, graphical screen, capable of on-screen trending and history capture of the last normal shutdown, last fault while running, and last 10 faults running or stopped
- Chiller controls shall provide variable speed operation to optimize efficiency over the full range of operating conditions
- Information Display: 10.4" color liquid crystal display (LCD) mounted on lockable control panel enclosure door
- User interface: operating parameters displayed in a user-friendly, color, graphical format with soft-key keypad
- Data tracking and trend display: on-screen graphical display of at least six parameters

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QuickSpec 4:
Packaged Steam Condenser

What customers are saying: "Are components on the YORK YST designed to handle exhaust steam from the turbine? Are additional controls and condensate pumps required?"

Customer Need: A unit mounted steam condenser package with both condensate removal and vacuum systems.

YORK YST chiller feature: A unit mounted steam condenser fully packaged with condensate and vacuum pump systems. The steam condenser's base is designed to mount directly on the refrigerant condenser, and fully piped to accommodate field connections.

Features include:

- Condensate removal system with hotwell level controls
- Vacuum pump system for removal of non-condensable matter
- Atmospheric relief valve
- Wiring harness supplied for power and control connections to the OptiView control panel

So what: The steam condenser package is completely factory assembled and mounted to save plant room floor space. No further engineering, controls, or components are required.

Our competitive advantage: The YST's design allows for unit mounting of the steam condenser, where some competitors require additional floor space. No additional engineering time is required to select components, and no third party controls are needed, thus avoiding any incompatibility issues.

What to specify:

- The chiller manufacturer shall supply a unit mounted steam condenser package, functionally matched in capacity to the design steam supply requirement
- Steam condenser control shall be conducted by the unit mounted chiller control center
- Steam condenser package shall include all components necessary for the removal of condensate from positive pressure at the field connection

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QuickSpec 5:

Footprint and Assembly Advantages

What customers are saying: "We would like to use a steam driven chiller but there is limited floor space and rigging in a large thermal chiller will require expensive demolition."

Customer Need: A small footprint steam turbine driven chiller capable of knock-down shipment.

YORK YST chiller feature: Using compressors and heat exchanger designs that are based on the YORK YK electric chiller allows the YST to be reduced into four assembles suitable for rigging into smaller building openings and rigging through tight areas.

So what: No other steam driven chiller manufacturer offers smaller chiller footprints or rigging dimensions that can accommodate tight equipment rooms or narrow passages.

Our competitive advantage: Other thermal chillers using steam as an energy source have much larger footprints. Their breakdown assemblies are also larger and more difficult to rig into small building openings.

What to specify: Chiller capacity of ___ tons required to occupy a footprint area of __ L x __ W available for installation. The chiller fully assembled or knock down shall be capable of passing of through building openings dimensions of __ W x __ H, required to rig equipment into the plant room.

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QuickSpec 6:

Steam Pressure Flexibility Advantages

What customers are saying: "The steam pressures in our facility do not match the requirements of absorbers. We either need to reduce the higher pressure steam and lose energy, or use lower pressure steam with an oversized absorber to obtain capacity."

Customer Need: A chiller that can be tailored to operate over a wide range of steam pressures and temperatures.

YORK YST chiller feature: YST chillers are specifically designed for a site's available steam pressure and temperature; accommodating reduced pressures to maintain full capacity. A YST chiller operates at a design steam pressure, between 90 to 200 psig, with special options, between 60 to 400 psig

So what: Because the YST chiller is designed to operate at a customer's available steam supply, unnecessary energy loss due to adjusting steam pressure or temperature are avoided.

Our competitive advantage: The YST chiller can operate over a broader range of steam pressures and temperatures than other market incumbents. YST chillers have a much wider steam pressure range than large two stage absorbers, and deliver industry leading partload (NPLV) performance.

What to specify:

- Steam driven chiller(s) shall operate using facility steam without the use of pressure reducers or de-superheaters
- Steam driven chiller shall provide full specified capacity when supplied with facility steam at design pressure and temperature, and also during periods of reduced steam pressure as specified under performance section

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QuickSpec 7:
Skip-Fin Tubes

What customers are saying: "Ruptured chiller tubes have had catastrophic effects on my building system. Shutting down chillers for tube replacement is costly and is very, very disruptive to regular operations in our building. We just can't afford failures like this."

Customer Need: A robust and reliable chiller tube design that mitigates the risk of tube ruptures, without sacrificing efficiency.

YORK YST chiller feature: YORK brand chillers utilize skip-fin tube technology in both the evaporator and condenser shells. Skip fin tubes are nearly twice as thick at tube supports as they are throughout the rest of tube, where heat exchange efficiency is paramount.

So what: Tube failures typically occur due to vibration at tube supports. Increased tube thickness at tube supports mitigates that risk; while keeping thinner tube walls throughout the rest of the chiller ensures high chiller efficiency. Best of both worlds!

Our competitive advantage: Some competitors utilize tubes that are continually enhanced, both internally and externally, along the entire length of the tube. Therefore tube thickness at tube supports is minimal and the risk for a costly tube failure is increased.

What to specify:

- Provide evaporator and condenser tubes with minimum tube wall thickness of 0.035" at the plain lands contacting the intermediate tube supports and end sheets
- Tubes: Internally rifled, externally enhanced, individually cleanable, individually replaceable from either chiller end, roller expanded into tube sheets, skip-fin design

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