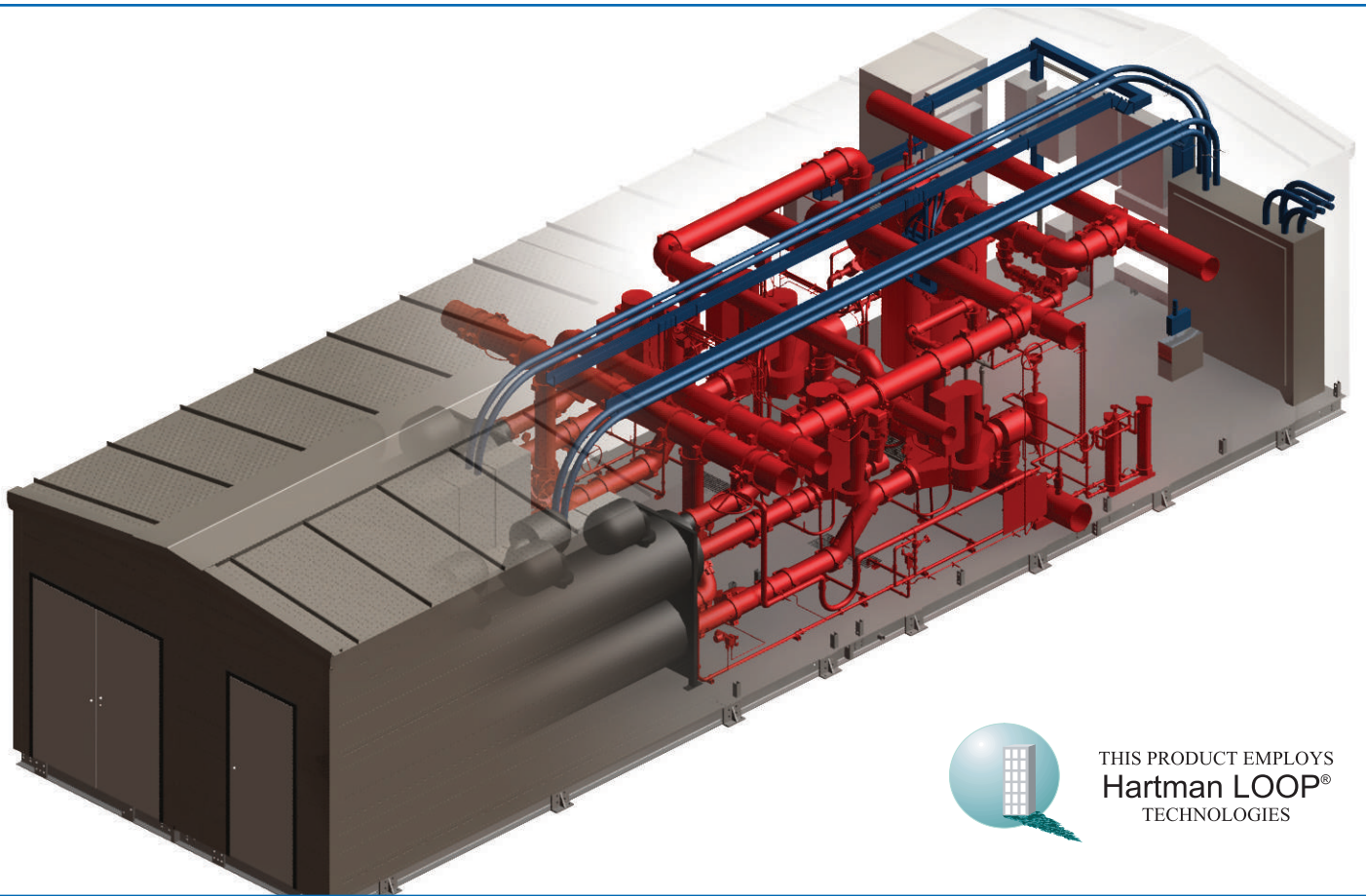


ARMSTRONG



THIS PRODUCT EMPLOYS
Hartman LOOP®
TECHNOLOGIES

Ultra-Efficient Chilled Water Integrated Plant Package

FILE NO:	81.13
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SUPERSEDES:	81.13
DATE:	Dec. 15, 2009

Experience the risk-free approach to the most energy efficient chilled water plant solution.



The Armstrong chilled water line of Integrated Plant Packages (IPP-CHW) offers the most space, energy and environmentally efficient solution for the 80 to 1,000 ton at 60 Hz and 300 to 3,600 kW at 50 Hz ranges.

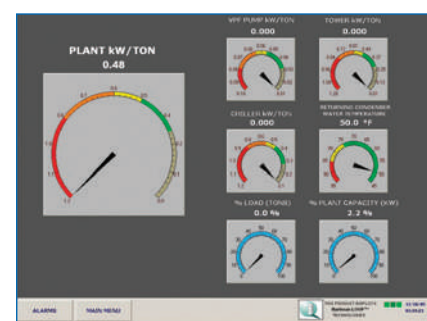
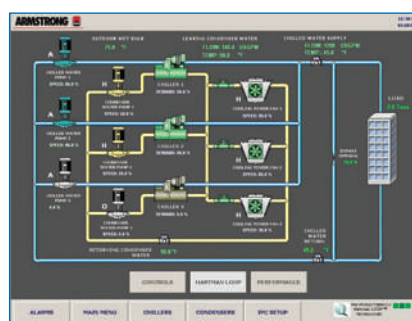
Available for exterior installation with full weather proof enclosure or mechanical room installation, the IPP-CHW solution brings about a new way of constructing a facility.

The IPP-CHW solution is an integrated factory-built system, optimized for quick installation with future service needs in mind.

All IPP-CHW solutions incorporate Armstrong split-coupled dualArm Series 4302 pumps, oil-free frictionless compressors, and Armstrong IPC 11550 ultra-efficient chilled water plant control system with Hartman LOOP® technology. This impressive combination provides important benefits for the end user including:

- ▶ Operating plant efficiencies of less than 0.5 kW/ton or COP of 7.3 (on an annual average basis)
- ▶ Remote monitoring and control functionality through the web for multi-facility operation
- ▶ The world's simplest pump seal replacement procedure
- ▶ Lubricant (oil) free compressor operation (saves on maintenance time and lubricant costs)
- ▶ Extremely quiet operation from the magnetic bearing (less than 75 dBA) compressor and the VIL pumps
- ▶ Extraordinarily low vibration levels from the VIL pumps and magnetic compressors
- ▶ Easy access to components for compressor service, pump service and chiller tube bundle maintenance
- ▶ Best-in-class user interface for capturing operation data, or fine tuning system parameters through the IPC 11550 user interface screens

The IPP-CHW solution is available as a variable primary flow configuration for building designs with medium or high pump head (up to 200ft/86psi). Units can be configured to include an optional variable flow cooling tower, or a cooling tower can be connected on-site separately.



The IPP-CHW base plants are shipped to site as one assembly for ratings up to 800 tons at 60 Hz or 2,700 kW at 50 Hz. For larger ratings or enclosed designs, the IPP-CHW is shipped to site as separate sections. The optional cooling towers are sent as a separate shipment.

Armstrong Integrated Plant Packages offer you a new business proposition for:

- ▶ Reducing project risk with reduced delivery time, cost over-runs, warranty call backs and increased integrated performance
- ▶ Growth opportunity by better leveraging your firms design and site resources
- ▶ Offering your customer a unique combination of technologically advanced hardware

Armstrong Chilled Water Integrated Plant Packages

► Base Plant Configurations

Tonnage	IPP Length			
	Type 1	Type 2	Type 3	Type 4
80 ton (1 Chiller)	23' 2"	29' 5"	-	-
130 ton (1 chiller)	23' 2"	29' 5"	-	-
160 ton (2 chillers)	-	29' 5"	-	-
168 ton (1 chiller)	23' 9"	30'	-	-
210 ton (1 chiller)	28' 11"	35' 5"	-	-
260 ton (1 chiller)	30' 10"	35' 5"	-	-
260 ton (2 chillers)	-	29' 5"	-	-
336 ton (2 chillers)	-	30'	38' 9"	37' 8"
360 ton (1 chiller)	32' 3"	36' 8"	-	-
420 ton (2 chillers)	-	35' 5"	44' 1"	42' 10"
425 ton (1 chiller)	33' 10"	38' 4"	-	-
500 ton (1 chiller)	35' 6"	-	-	-
520 ton (2 chillers)	-	35' 5"	44' 1"	-
720 ton (2 chillers)	-	36' 8"	45' 4"	44' 2"
850 ton (2 chillers)	-	-	47'	45' 10"
1000 ton (2 chillers)	-	-	48' 8"	-
Open Type (no enclosure)	Y	Y	Y	Y
Weather-proof enclosure	N	Y	Y	Y
Sections	2	1 or 2	4	5
Width	7' 6"	11' 10"	15'	15'

Contact your local Armstrong Representative for the most up-to-date configurations.

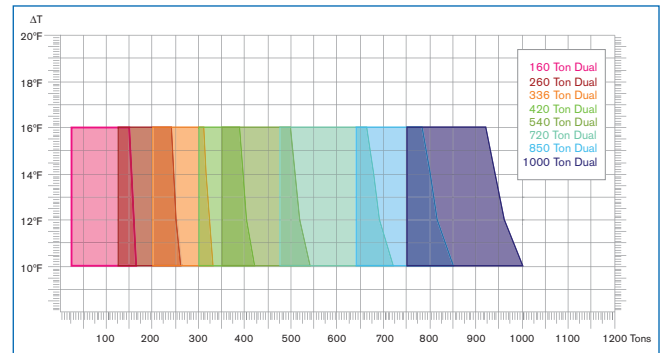
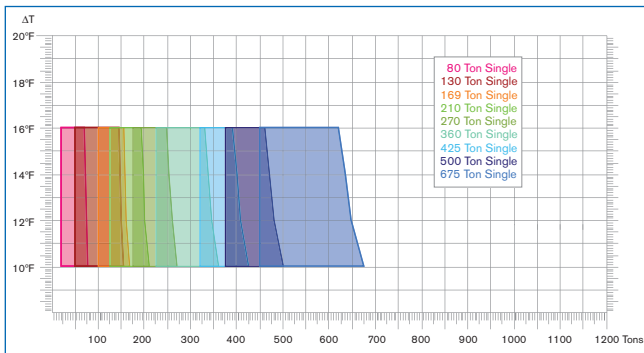
*With the objective of continuous improvement, Armstrong reserves the right to make changes to configurations without notice.

The IPP-CHW base plant is a complete chilled water plant built to local standards and includes:

- 1 or 2 centrifugal R134a chillers
- 1 or 2 primary and condenser water dualArm pumps
- Standard pumps are split-coupled dualArm Series 4302
- Chiller and pump isolation butterfly-style valves
- Pump suction guides and flo-trex valves, cooling tower y-strainer
- An optional insulated weather proof enclosure that includes refrigerant detection, appropriate code compliant ventilation, lighting, service access doors and insulated floor, noted for seismic zone D and hurricane wind loads
- An IPC 11550 Control System with Hartman LOOP® technology
- All necessary variable speed drives and electrical plant power distribution
- Armstrong Dirt & Air Separator (DAS)
- All inter-connecting piping, elbows and isolation valves
- All chilled water piping is fully insulated with rugged PVC coating
- For coastal environments, optional PVC or stainless steel exterior piping to the cooling tower can be selected

► Design Envelope

The Armstrong IPP-CHW solution is offered in a Design Envelope selection. Shown are the Design Envelopes for ARI design conditions. Contact Armstrong for other design conditions.



► Typical Specifications - Chilled Water Plant Package

The pre-fabricated chilled water plant shall include all necessary equipment to provide the building load cooling requirements with design day chilled water over a design envelope defined by the following design day dimensional ranges and meet the specified turndown ratios, for:

- ▶ A capacity range of ____ tons (kWc) to ____ tons (kWc)
- ▶ A system design day delta T range of ____ °F (°C) to ____ °F (°C)
- ▶ An ambient design day wet bulb temperature range of ____ °F (°C), to ____ °F (°C)

The design day chilled water supply temperature is ____ °F (°C).

The chilled water plant configuration shall be an all variable speed plant with variable primary flow. The general plant assembly shall be an <enclosed/open> designed for <exterior/interior> installation with weather proof design for ambient low temperatures of ____ °F (°C), and ambient high temperatures of ____ °F (°C).

The general scope of supply of the chilled water plant shall include:

- ▶ <One (1)/Two (2)> variable speed chillers, of oil free magnetic bearing design
- ▶ The equipment configuration shall be <100% duty/100% duty and standby>
- ▶ Dedicated dualARM style pumps with 100% design capacity, for each chiller, condenser water and chilled water pump
- ▶ An all-variable speed chilled water plant automation system capable of operating the plant at an annual average efficiency level of better than 0.5 kW/ton (COP of 7.0 or greater)
- ▶ The chilled water plant shall have a turn-down capacity of 10:1 or greater (based on design day rated capacity (tons/kWc))
- ▶ Pump suction guides and Flow-trex valves
- ▶ All necessary electrical control and distribution panels such that one master feed power cable can make a single point power connection
- ▶ An inertia type Dirt and Air (DAS) separator (vortex style will not be permitted)
- ▶ All chilled water pipe and components shall be fully insulated with rugged PVC coating as to preventing the formation of condensation
- ▶ All necessary inter-connecting piping, elbows, isolation valves, expansion tanks, drain lines, galvanized superstructure, and components to comply

with the code requirements for the process design requirements of a commercial chilled water plant

- ▶ An optional weather proof insulated enclosure including; refrigerant detection, lighting, an independent electrically driven cooling system, ¼" non slip floor, service and personnel access doors, safety monitoring and shutdown systems, refrigerant leak detection and alert systems, constructed to comply with ASHRAE Std. 15 and building code requirements
- ▶ The packaged system manufacturer shall take responsibility for the independent control logic of the equipment, and the integration of these independent control systems into the master control platform. The mechanical system controls must be a recognized manufacturer in the country of destination, and be capable of communicating with the building automation system (BAS)
- ▶ The manufacturer shall have a quality assurance manual available for the customer upon request
- ▶ All piping systems shall be pressure tested in the factory before shipping
- ▶ Factory testing equipment shall be calibrated as outlined in the quality assurance manual, and made available for customer inspection upon request.
- ▶ The chilled water plant control system shall utilize demand based control for the tower fan and pump speed, and shall provide the chiller with a chilled water supply temperature set-point for the chiller to govern its operation to. The chillers shall be sequenced/staged, both on and off in a manner to maintain their operation as close as possible to the Natural Curve. The cooling tower fan speed and pump speed settings shall vary in accordance with the Equal Marginal Performance principle. The "natural curve", "demand based control", and "equal marginal performance principle" methodologies described above are to be in accordance with the Hartman LOOP™ operating principles of an all variable speed chiller plant. Alternate plant control sequences that can be proven to provide a net plant efficiency level of 0.5kW/ton or better will be considered with a written proposal submitted at the time of quotation. Net plant efficiency level is calculated as the average annual kW/ton for the annual energy input to the chiller, cooling tower and distribution pumps, divided by the annual tons delivered to the system.
- ▶ All piping, bases, and enclosure floors and exteriors are to be factory painted.

EXPERIENCE BUILDING...



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