



**US Army Corps
of Engineers®**

ENGINEERING AND CONSTRUCTION BULLETIN

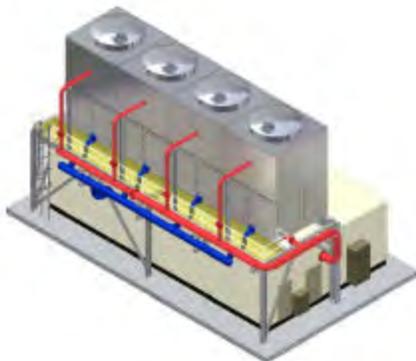
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Subject: Packaged Chilled Water Plants

Applicability: Information

1. Introduction. Complete pre-engineered, factory-built chilled water plants are a proven alternative to traditional site-built facilities. Packaged chiller plants generally include factory-installed chillers, all chilled and condenser water pumps, controls, single-point electrical connection (transformers, MCCs, starters, air conditioning, emergency lighting, etc.). Also included is a seismic, wind, snow-designed enclosure, the cooling tower components (interconnecting piping, platform, ladders, etc.), and all related equipment to provide a complete chilled water system.

2. Background. Packaging of industrial equipment has been an evolving trend for many years. Packaging of complete chilled water plants has been occurring since the late 1990s. Packaged plants have been installed on five continents, have more than 150 installations, and have in excess of 300,000 tons of installed capacity. Packages generally are configured in 400 ton to 8,000 ton single modules and can be combined in any number of ways. Centrifugal, screw, or absorption chilling technologies (along with water or air cooled heat rejection) can be selected to support any chilled water requirement or site limitation. Towers may be installed over, adjacent, or remote to the central plant.



**Schematic of Typical Water Cooled
Packaged Chilled Water Plant**

3. Benefits. There are numerous benefits identified with a packaged plant approach as discussed below.

a. Reduced Installed Cost. Packaged central plants have proven to generally be a lower capital cost solution. Savings are generally between 20% and 40% versus a field-erected chiller plant.

b. Shortened Project Schedule. A packaged central plant can generally be placed into operation in approximately 24 weeks from date of award. Actual site construction of a packaged plant is typically less than 8 weeks. Site-built plants generally require more than 1 year until they are producing chilled water.

c. Guaranteed System Efficiency. Packaged chilled water plants are normally procured with a Total System Efficiency Guarantee. The ability to control energy costs at the plant level is a significant benefit compared with traditional plants where energy optimization is attempted at the component level. The packager of the chiller plant has the opportunity to optimize the overall system through comparisons of chillers, pumps and heat rejection loads in order to develop its particular design. Previous installations have demonstrated electrical power savings of approximately 30% compared with similar site-built plants.

d. Portability. While chiller plants generally remain in one location, the packaged plant offers the flexibility of redeployment. Also, it allows for easy additions of modular plants to increase capacity. The flexibility of a packaged plant is ideal for locations that may grow, have short-term needs, or will be reconfigured in the future.



2,000 Ton Air-Cooled Packaged Plant Being Off-Loaded at Baghdad Airport, Iraq

e. Reduced Site Risk. Moving the majority of manufacturing of a chiller plant from the project site to a controlled factory environment reduces overall risk. Cost, time and safety all benefit from controlling weather, labor supply and quality, quality control and quality assurance processes, and material availability.

f. Simplified Architectural Planning & Budgeting. Utilizing a “standard” product provides for immediate availability of general arrangement and related site planning tools. Quick and inexpensive site conceptualization provides better project planning and budgeting. Additionally, large chilled water loop locations can benefit by locating multiple packaged plants near the loads, rather than having to settle for one large central plant. The package plant comes with a full structural support base and uses a standard reinforced concrete pad, thereby eliminating the need for a heavily engineered structural base.

g. Reduced Footprint. The compact design of a packaged plant generally affords a dramatically smaller footprint compared to traditional designs. The equipment enclosures enable

the packaged units to be placed outdoors and do not occupy valuable building space. Typically, packaged plants can offer a plan area of 3-5 tons per square foot.

h. **Single Point Responsibility.** Use of a packaged central plant places the full commercial and technical responsibility onto a single supplier, controlling the total plant's efficiency, schedule, and cost. This is a dramatic shift from the traditional list of designers, various equipment manufactures and laborers. The single point responsibility can significantly reduce the risk of "finger pointing" if there are problems, or expensive change orders associated with a project's execution, start-up, trade integration or operation.



**Interior of 1,400 Ton Plant
with Expansion Capability
to 3,000 Tons**

4. **Use.** Packaged chilled water plants present a viable option for Corps designs. Packaged plants are presently being used by numerous industries, including commercial HVAC, multi-family housing, power generation, and industrial processes. The goal is to develop a chilled water guide specification to specifically identify the site-built and factory package options. In the interim, projects that require chilled water (new or retrofits) should be evaluated for project-specific benefits and costs of a packaged chilled water plant.

5. **Contact.** The point of contact for this bulletin is Gary Bauer, CECW-CE-D, 202-761-0505.

A handwritten signature in black ink, appearing to read "Donald L. Basham". The signature is fluid and cursive, written over a white background.

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