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A **bnp** PUBLICATION
media

January 2020 • Volume 27, Number 1

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PROTECTING RENTAL BOILER EQUIPMENT

from Freezing Winter Conditions

Preventive measures must be taken when renting a boiler through the winter and in locations with temperatures that can reach below freezing.

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Boilers are an integral part of the processing industry's success, providing steam for a variety of manufacturing applications. When a facility boiler goes down for planned maintenance or an upset occurs, the lost production time can be costly. The rental boiler industry emerged nearly a century ago to mitigate this issue and support facilities when their boilers are down for inspection, maintenance or repairs. Temporary boilers also are utilized to alleviate the risk of downtime and to support

enhanced production schedules.

In most cases, facility boilers are housed in a boiler room providing a controlled environment. By contrast, temporary boilers typically are installed outdoors in an uncontrolled environment. Because rental units are unprotected from the vagaries of weather, preventive measures must be taken when renting a boiler through the winter in locations where the temperatures may fall below freezing. The risk to boiler controls, piping and even the vessels themselves must be taken into account when freezing temperatures are anticipated.

Though the winter season is in full swing, it still can help to review the key points to

avoiding freeze damage throughout the cold season. The need for a rental boiler can at times crop up unexpectedly, and boiler renters should know what is required to prepare a rental boiler for reliable winter operation.

While rental boilers are designed and built for outdoor installations — with the inclusion of NEMA 4 enclosures, TEFC motors and all seal-tight conduit — extra precautions must be taken to avoid freeze damage. The first point is to identify the typical boilers offered on the rental market. Though temporary boilers can vary greatly in size, type and operational capabilities, the most common include the following configurations.



This trailer-mounted watertube rental boiler with heat tracing and insulation is properly protected from the elements.

► Boilers



An 82,500 lb/hr trailer-mounted watertube rental boiler is equipped with front and rear enclosures.

- **Mobile Boiler Rooms.** Mobile boiler rooms usually include a packaged fire-tube boiler (typically 50 to 1,000 hp and up to 290 psig) with a feedwater system, water softener, chemical-feed system and control panel. All are prepiped and prewired before being installed inside an enclosed trailer or container. When compared to non-enclosed alternatives, these units are suited for outdoor installations and inclement weather.
- **Mobile Steam Plants.** Mobile steam plants include all of the same equipment as a mobile boiler room; however, the

equipment is installed on an open trailer and is completely exposed to the environment. Units typically range in size from 50 to 1,000 hp and up to 250 psig.

- **Trailer-Mounted Boilers.** Trailer-mounted boiler systems include a packaged fire-tube or watertube boiler with capacities up to 125,000 lb/hr, saturated or superheated steam, and typical design pressures limited to 750 psig. These units are completely exposed to the environment and permanently mounted on highway-legal trailers for mobility.
- **Skid-Mounted Boilers.** Skid-mounted

boilers offer a fire-tube or watertube boiler up to 200,000 lb/hr, saturated or superheated steam, and up to 1,000 psig. Also completely exposed to the environment, they require cranes to load and offload for shipment and installation.

- **Mobile Feedwater Systems.** An alternate offering to supplement larger boiler operations, mobile feedwater systems include a deaerator or atmospheric feedwater system, feedwater pumps, water softener and chemical-feed system. The equipment is prepiped and prewired before it is installed inside a trailer or container. Similar to mobile boiler rooms, they are well suited for outdoor conditions.
- **Skid-Mounted Deaerators and Other Auxiliary Equipment.** This category include high pressure deaerators, atmospheric feedwater systems, water softeners and chemical-feed tanks. Such systems also offered are as loose equipment. Oftentimes, equipment in this category is skid-mounted and completely exposed to the environment.

As noted already, mobile boiler rooms and mobile feedwater systems — because they are installed in enclosed trailers or containers — are best suited for outdoor installations. The equipment is better protected when installed inside of an enclosure or container, and some systems include an electric space heater. Even with mobile boiler rooms and mobile feedwater systems, however, any external drains and makeup water lines will require heat tracing and insulation. In an extremely cold environment, drains and makeup water piping within the trailer may require heat tracing as well.

Dealing with Non-Enclosed Boilers

The protection of non-enclosed boilers and equipment from freeze damage is imperative. One common preventive measure is building a temporary enclosure and utilizing an external heat source to shield the boiler components and piping from potential freeze damage.

For mobile steam plants, the enclosure should be built around the entirety of the boiler system to protect not only the boiler



A temporary enclosure protects this mobile steam plant, which contains a boiler, feedwater system, water softener, chemical-feed system and control panel.

but also the auxiliary equipment mounted on the trailer. For trailer- and skid-mounted boilers, a housing can be built around the front and rear of the boiler. Even with an enclosure built around the system, any external drains and piping should be insulated and heat traced.

Another common measure taken to avoid freeze damage is insulation and heat tracing. Heat tracing is used to maintain or raise the temperature of the component to prevent water from freezing, expanding and damaging the equipment. Insulation is used to protect exposed static water lines, all main lines and piping components, and boiler controls. This includes control sensing lines, water cut-offs, water column and level control blowdown. For installations with longer piping runs, the main and continuous blowdown also should be heat traced. Keep in mind that heat tracing should be utilized for all lines if the temperatures are below freezing — whether the equipment is in operation or not.

Heat tracing can be setup in one of two ways: using steam or electricity. Steam tracing heats the piping via circulation of low pressure steam around the pipes, generally through stainless steel copper tubing. The alternative utilizes an electric heating element, which runs the length of the pipe. Both methods will maintain the tempera-

ture of the pipe as well as the temperature and state of the liquid within the pipe. There are pros and cons to each of these methods of heat tracing.

Electric trace heating can be cost effective, energy efficient, less maintenance intensive and easier to control when compared to steam trace heating. In addition, it is easier to move to a remote location if needed. The biggest pitfall to electric heat tracing is that the cables can overheat and cause damage to the system if not monitored carefully. Also, electric heat tracing cannot achieve the higher temperatures possible through heat tracing with steam.

For a rental boiler application, steam tracing may be less expensive and, therefore, the preferred method for maintaining appropriate pipeline temperatures. Plants requiring rental boilers, after all, have steam readily available at the plant, and the operator is able to realize further savings through the use of condensate return. At the same time, electric tracing can be more dependable if the steam source is not constant or, in a worst-case scenario, the unit supplying the steam goes out of service. The steam utilized for steam tracing should come from an independent source (not from the rental boiler).

In addition to heat tracing, static sensing lines can be protected with an antifreeze

solution. To do so, the lines would need to be drained completely, disconnected and filled with the 50/50 solution of water and glycol prior to reconnecting. This solution is a safe antifreeze mixture that has a lower freezing point than that of water.

When an extended boiler downtime is expected, or when the rental boiler is no longer needed, the unit should be drained completely. Also, all static water lines should be cleared. The easiest way to ensure the boiler is fully drained is to open every valve on the unit after it has been disconnected and prior to its return.

All things considered, planning in advance for temporary enclosures or heat tracing on your rental boiler equipment will provide peace of mind, knowing that it is protected from inclement weather conditions and less susceptible to damage. Just remember that any lines without a constant flow of water will freeze and must be insulated and heat traced unless protected by a temporary enclosure. Even then, you must always make sound engineering judgment calls to avoid the repercussions of freeze damage. ❄

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