

Heat Treatment Checklist



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Armstrong Heat Treatment Checklist

Prior to Heat Treatment

- Appoint site heat-up planning team (include engineering). Elect a team leader to coordinate the effort.
- Identify specific areas to be heated and make site plan. Determine local heat/air sources.
- Identify heat-sensitive structures and supports, including roofs. If protection or engineering assurances cannot be developed, damage to structures.
- Identify heat-sensitive equipment within the facility. Develop measures for protecting this equipment.
- Identify sealing materials needed inside and outside the heat zone to exclude pest harborage.
- Identify air movement plan, circulation equipment, fan placement, extension cords to spread out the amp load for air movement.
- Establish fire protection plan. Check with insurance carrier for coverage on any damage to structures or equipment.
- Repair damaged doors, windows, or other openings that would allow heat to escape. Eliminate major drafts from unheated areas.
- Notify corporate safety, engineering, and regional personnel of intent to conduct heat-up.
- Notify local (city and county) fire and police departments of intent to conduct heat-up.
- Notify contractors or other persons who may be using the facility so their equipment, materials, and supplies can be removed.
- Use 100-150 um thick (4-6 mil) polyethylene sheets to seal off exhaust fans, dust collectors, or air make-up systems that exhaust to the outside.
- Remove heat-sensitive products or raw materials from the heated area. Examples are vitamins, shortenings, and some packaging material. Most products are not conducive to the high temperatures use during heat treatments.
- Empty paper bags and bagged or bulk raw or processed products should be placed in a reefer trailer and fumigated with phosphine to kill residual infestations.
- Remove pressurized containers and cylinders from the heated emergency "near-by use" during heat treatments.
- Where possible, remove electronic equipment; any that cannot be removed must be unplugged. Where computer programs are involved backup copies should be made. A simple experiment run at a Kansas State University heat workshop has shown no adverse effects on computers after they have been subjected to a typical heat treatment.
- Empty all trash, waste, and product containers. Set containers upside down in the heated area.
- Check sprinkler system and head sensitivity for 141°C (286°F). If less sensitive, replace heads. An option is to drain the sprinkler system and post fireguards during the activation period. Check system for tripped heads and refill slowly before activation.
- Older sodium or mercury vapor lights should be turned off during heat treatment. Check with engineering staff or the supplier regarding heat tolerance of these lights. Identify alternative lighting plan to minimize plant power usage.
- Check bearing and belt types, and loosen where necessary.

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- Check lubricant type and reservoirs, and provide for expansion due to heating.
- Identify plastic-type material, including PVC piping and Tygon tubes, and monitor these for possible heat damage. Also check pneumatic-line plastic connectors for any adverse heat-related effects.
- Double check temperature limitations on all solid-state equipment such as any electronic controllers, small computers, or photo eyes. The best source for this information is the equipment suppliers. Sensitive equipment can be protected by providing it a cool zone during the heat treatment itself. Develop floor-by-floor and area-by-area specific checklist for planned preparation activity of the sensitive equipment within the heat-treatment zones.
- Take precautions about magnets that could lose their activity as a result of exposure to high temperatures. Contact the manufacturers for temperatures beyond which the magnets lose their desired properties.
- Remove loose rubber gaskets and sensitive caulking and replace them with heat-resistant materials.
- Establish an employee safety plan that includes warning signs, buddy system (people working in teams of two), clothing, drinking/eating, heat stress first aid, ambient room, first aid kit, emergency phone numbers, employee heat tolerances based on physicals, and cool vents.
- Identify and provide appropriate personal equipment (PPE), such as bump caps with cloth lining and cloth gloves. It is advisable to wear light, loose-fitting clothing.
- Note any metal that should not contact the skin directly, such as metal buttons, glasses, or brass, as these are good conductors of temperature.
- Establish temperature-monitoring plan, including key locations to be monitored manually or with any remote temperature-measuring devices, and frequency for recording temperatures. Calibrate all monitoring tools with reference to a standard mercury thermometer.
- Identify all areas adjacent to heated areas. Spray surfaces, especially floor-wall junctions and doorways, with a wettable powder/microencapsulated residual insecticide to preclude insect migration to unheated areas. A Tempo 20WP or Demand CS products are examples of some products that can be used at the present time.
- Determine numerous locations on the plant layout for placement of insect test cages. The cages should have an insect species that is problematic within the specific facility, and temperatures should be measured near the test cages. It is also important to use the most heat-tolerant stage of the insect species in the cages. If information on heat tolerance of a species is unknown, then expose eggs, young larvae, old larvae, pupae, and adults of the insect species separately in test cages.
- Do a thorough job of sanitation, especially within pieces of accessible equipment. After cleaning, close the equipment. Heat penetrates open equipment only 20 min faster than unopened equipment, and the 20-min time savings is small relative to the 24-36 hr heat-treatment period.
- Identify the person responsible to turn off plant power, if necessary.



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During Heat Treatment

- Before heaters are turned on, walk through the facility with the “heat-treatment team” to determine whether the level of sanitation is adequate and ensure that all critical items have been removed from the facility.
- Measure and examine temperatures from as many locations as possible within the facility to identify cool as well as over heating areas. Areas with temperatures exceeding 60°C (140°F) should be lowered with in the target zone immediately.
- Elevate temperatures outside and around the infested area and move elevated temperatures inward toward the infestation to kill insects and prevents them from escaping the treated area.
- If the heat treatment is provided by a private company as a service, that company can be responsible for the operation of the rental power and/or heating equipment and assisting with temperature and humidity monitoring. Facility maintenance personnel should monitor specific structure and heat-sensitive equipment, in addition to providing oversight during heat treatment.
- Numerous 60-to 90-cm air circulators should be used of distribution of heat within the facility. Box fans can be used for small areas.
- Monitor and record temperatures and humidity at predetermined locations, initially every hour, and every two hours after temperatures have reached 50°C (122°F). Check areas near insect cages on a regular basis. Remember that insects exposed to sudden heat shock appear dead but may come back to life if they are removed from the heated area. Insect test cages with adults removed from the heated area. Insect test cages with adults removed during heat treatment should be kept at room conditions for 24 hr before insect mortality is assessed. All other stages should be reared to adulthood for mortality assessments.
- Designate an office as a “heat-treatment command center” with phone, first aid kit, temperature log sheets, fluids (water or other hydrating beverages), and emergency phone numbers.

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After Heat Treatment

- Discontinue heating after the desired exposure time and temperature are achieved. Keep air movers running during and after shutting down the heaters.
- Uncover roof/wall vents, air intakes, and other openings for exhausting hot air. Open screened windows.
- Turn on plant power when temperature cools down to approximately or below 43°C (109.4°F).
- Recover insect test cages and temperature-sensing equipment or charts. Record insect mortality.
- Where survival occurs in insect test cages, treat that area with a residual insecticide.
- Start the exhaust fans in heated areas. Monitor temperatures during the cool-down period.
- Replace fire extinguishers at proper locations and return plant to normal fire protection standards. If sprinkler system was drained, check each sprinkler head before activation. Refill slowly.
- Start removing potable power or heater equipment and begin reassembly of plant equipment, to get ready for normal operation.
- Remove all sealing equipment and complete post-treatment clean-up. “Flush” the initial material out for about 10-20 min of the process and dispose of it as trash. A high degree of insect fragments may exist inside the processing equipment in this initial flush. Check the flushed material and record information on the types and numbers of insects present.
- The “heat-treatment team” should review treatment activity and effectiveness and list suggestions to improve a future application.
- Prepare post-heat-treatment report. This report should be detailed and serve as baseline information for future heat treatments.

Armstrong provides intelligent system solutions that improve utility performance, lower energy consumption, and reduce environmental emissions while providing an “enjoyable experience.”



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