

# GENERAL INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS FOR QUENCH TANKS

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Following these **GENERAL INSTRUCTIONS** in your manual are the following:

- OPERATING INSTRUCTIONS SPECIFIC FOR YOUR EQUIPMENT
- MECHANICAL PARTS LIST
- ELECTRICAL WIRING AND COMPONENT PARTS LIST
- LITERATURE AND INSTRUCTIONS ON COMPONENTS

These **GENERAL INSTRUCTIONS** have been written for many different types of quench tanks, therefore, some equipment or components referred to may not be present on your particular piece of equipment.

After reading these **GENERAL INSTRUCTIONS**, also read the specific **OPERATING INSTRUCTIONS** written for your equipment. An additional copy of the **OPERATING INSTRUCTIONS** is provided in a plastic cover. Post these instructions at the quench tank for the operator to reference.

## **1 SHIPPING DAMAGE AND HANDLING**

### **DO NOT RETURN DAMAGED MERCHANDISE TO US. FILE YOUR CLAIM AS OUTLINED BELOW**

This merchandise has been thoroughly inspected and carefully packed before leaving our plant. Responsibility for its safe delivery was assumed by the carrier at the time of shipment. Claims for loss or damage to the contents must be made with the carrier, as follows:

#### **1-1 VISIBLE LOSS OR DAMAGE**

Any external evidence of loss or damage must be noted, at the time of delivery, on the freight bill or express receipt and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier refusing to honor a damage claim. Make a written request for inspection by the carrier's agent within fifteen days of the delivery date. Review the inspection report and do not sign it unless it adequately describes the damage.

A claim must be filed with the carrier since such damage is the carrier's responsibility.

#### **1-2 CONCEALED LOSS OR DAMAGE**

Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked. The contents may be damaged in transit due to rough handling even though the carton may not show external damage. When the damage is discovered upon unpacking, contact the carrier and make a written request for inspection by the carrier's agent within fifteen days of the delivery date. Review the inspection report and do not sign it unless it adequately describes the damage.

A claim must be filed with the carrier since such damage is the carrier's responsibility. By following these instructions carefully, we guarantee our full support of your claims to protect you against loss from concealed damage.

#### **1-3 RETURNING DAMAGED EQUIPMENT**

Damaged equipment will not be accepted at our factory unless we have been advised and instructions provided on how it should be returned. A copy of the freight claim must be provided prior to returning the equipment.

#### **1-4 HANDLING**

After inspection, store and handle all equipment and components in their original crates until ready for installation. Handle with care. The equipment may be heavy but some components are of a delicate nature. If the equipment is to be stored, keep it in the original crates and store in a location free from excessive dust, heat and moisture until ready for installation.

## 2 PROPER QUENCH TANK APPLICATION

### 2-1 GENERAL

- 2-1.1** While quench tanks are extremely versatile, they are usually purchased with a specific application in mind. If your process has changed significantly or if you should have reason to doubt that a specific application is a proper use of the equipment, consult the factory before proceeding.
- 2-1.2** To protect the quench tank, quench tank contents, property and personnel, a responsible person should be in attendance during operation. **Do not operate quench tank unattended.** Special attention must be paid to:
- Setting correct temperature, if applicable.
  - Placing combustibles in a quench tank that does not have adequate fire protection.
  - Overloading the quench tank, thereby overheating the quenchant.
  - Using a quench tank for a process other than that for which it was designed.
- 2-1.3** Operator should shut down the quench tank immediately and notify their supervisor if there are changes in performance or a safety interlock trips. The quench tank should not be put back into production until the causes are found and corrected.

### 2-2 PERSONNEL HAZARDS

- 2-2.1** Heat processing equipment must always be used with caution. Proper equipment such as insulated gloves, safety goggles and tongs should be used for reaching into hot equipment. Proper supervision is essential and only trained personnel should be allowed to operate the quench tank.
- Always remember you are working with elevated temperatures.
- Do not touch surfaces - they could be hot and burns could result.
  - Do not breathe hot quench tank fumes. Heated air could burn lungs.
  - Many items become dangerous when heat is applied. Explosion or fire could result. Make sure you know what you are putting in the quench tank can be heated safely at the quench tank operating temperature.
- 2-2.2** Disconnect power before servicing equipment. Quench tanks operate under high voltage and electrical shock is possible. Proper panel lockout procedures should be followed.
- 2-2.3** Disconnect other sources of potential energy such as compressed air, before servicing. Proper lockout procedures should be followed.
- 2-2.4** Do not operate mechanical or electrical equipment with guards removed. Operating with guards removed could result in bodily injury.

## **2-3 MAINTENANCE AND INSPECTION**

- 2-3.1** Regularly scheduled inspection and maintenance of all safety devices shall be performed by user. Failure to do this may contribute to accidental shutdowns and loss of production. See Section 7 - Maintenance and Appendix C - Minimum Periodic Maintenance Report.
- 2-3.2** Regularly scheduled inspection of the quench tank interior and agitator shall be performed by user to determine need for cleaning and repair. Failure to do this may result in component failure resulting in loss of production.
- 2-3.3** It shall be the sole responsibility of the user to establish, schedule and enforce the frequency of and the extent of the inspection/maintenance program (as well as the corrective action to be taken) because only the user can know what the actual operating conditions are. Contact your insurance authority, Factory Mutual or the National Fire Protection Association, whose addresses are listed in Appendix B, for more information on inspection/maintenance programs.
- 2-3.4** It shall be the responsibility of the end user to determine that current processing is within the scope of the original design of the equipment.

## **2-4 RETROACTIVITY**

This equipment has been designed and manufactured in accordance with applicable National Codes in effect as of the date of manufacture. It is the responsibility of the end user to update equipment as necessary to comply with future code changes. If you are in doubt, contact manufacturer to review your equipment design against current National Codes.

### **3 INSTALLATION**

#### **3-1 LOCATION**

- 3-1.1** Quench tanks shall be located to protect them from damage by external heat, vibration and mechanical hazards.
- 3-1.2** Quench tanks should be located as far as practical from furnaces and not positioned on combustible floors or floor mats that can become saturated with quenchant.
- 3-1.3** If quenching oil is to be used, special consideration should be given to the fact that the possibility of fire is always present when a hot part is immersed in flammable quenchant.
- 3-1.4** Operators must be allowed access to the control panel and/or main disconnect to allow them to shut down the quench tank in an emergency.
- 3-1.5** Quench tank should not be located in hazardous (classified) locations as defined in NFPA 70 National Electric Code (see Appendix B).
- 3-1.6** Equipment shall be protected from corrosive external processes and environments, including fumes or materials from adjacent processes or equipment that produces corrosive conditions when introduced into the quench tank environment.
- 3-1.7** The quench tank is not intended for outdoor installation and must be sheltered from weather. Unheated shelters may result in non-uniform temperatures or quenchant being too cold. Condensation may also occur which would be detrimental to the steel structure, electrical components and possibly contaminate quenchant.

#### **3-2 BUILDING CONSIDERATIONS**

- 3-2.1** When selecting the location for a quench tank, consideration must be given to the possibility of building damage and personal injury. Hazards to be considered include overheating of quenchant in the quench tank and escape of vapors into the work place.
- 3-2.2** Quench tank shall be located and erected so that the building structural members are not affected adversely by the maximum anticipated temperature or by the additional loading caused by the filled quench tank and load.
- 3-2.3** Quench tanks should be placed on noncombustible floors or on structures approved for use over combustible floors such as concrete floor slabs or hollow tiles.
- 3-2.4** Level the quench tank using shims, if necessary. Where mounting holes are provided, anchor the quench tank securely. Shims should be permanently mounted to the quench tank after installation.
- 3-2.5** Installing a vent hood with forced exhaust is recommended to remove fumes created when quenching.

### **3-3 CLEARANCES**

- 3-3.1** Quench tank shall be located with adequate space above and on all sides to allow for inspection, maintenance and operator access. Provisions also shall be included for unobstructed discharge of building sprinklers.
- 3-3.2** Quench tanks using non-aqueous quenchant that operate at or above the boiling point of water should be protected from the introduction of water to the quenchant by sprinkler heads in the area.
- 3-3.3** The quench tank should be located so there is unrestricted air circulation around all motors for proper cooling.
- 3-3.4** Do not store material on top of quench tank. The quench tank is not designed to support external loads and material may get hot, ignite and cause a fire.
- 3-3.5** To prevent ignition of combustible material, combustible material shall not be located in the vicinity of a quench tank.

### **3-4 VENTILATION**

- 3-4.1** Where quench tanks are located in basements or enclosed areas, sufficient room ventilation shall be supplied to prevent the hazardous accumulation of vapors from processing.

### **3-5 ELECTRICAL**

- 3-5.1** All electrical connections should be made in accordance with the appropriate local and national codes. Refer to NFPA 70 -- National Electric Code. (See Appendix B)
- 3-5.2** Properly size the electrical supply using information provided on the quench tank nameplate. Electric supply must include a safety shut off such as a circuit breaker or fused disconnect switch between your power supply and the equipment.
- 3-5.3** The quench tank must be adequately grounded. Grounding wire must be sized in accordance with local codes. Where more strict codes do not exist, refer to the National Electrical Code - NFPA 70. A grounding lug has been provided near the power input terminals.
- 3.5.4** Care must be taken during installation of electrical service to the control panel that metal chips or filings do not get into electrical components. Cover components when drilling or cutting control panel.

## **4 PRIOR TO PLACING THE QUENCH TANK IN SERVICE**

- 4-1** If quench tank includes immersion heater, excess temperature limit interlock should be connected to your alarm system. The wiring schematic indicates where the alarm relay should be located for this alarm circuit.
- 4-2** After the installation is completed, replace all covers and guards that had been removed for shipment or installation. At no time should equipment be operated if covers or guards are open, removed or partially closed.
- 4-3** When the equipment is placed in operation, check agitator for proper rotation. Rotation directional arrows are located near each motor. Three phase motors may be reversed by interchanging any two (2) of the three (3) wires which supply power to the quench tank. Do not switch leads at the motor starter or motor. Single phase motors are correctly set at the factory but correct rotation should still be confirmed.
- 4-4** Check incoming voltage against that shown on the nameplate.
- 4-5** Check operating current against the amperage shown on the nameplate.
- 4-6** Tighten all terminals, especially on power connections, to minimize terminal and component failure due to poor contact. Connections should be checked periodically for tightness and signs of overheating.
- 4-7** Commissioning is required prior to releasing equipment for production. The party responsible shall insure that installation is complete and done correctly. Safety systems should be tested and operators trained. At the time of commissioning, the first Periodic Maintenance Inspection should be performed to familiarize personnel with the equipment. See Section 5 - PROCESSING and Section 7 - MAINTENANCE.
  - 4-7.1** Setpoints of all safety interlocks shall be documented for future reference.
  - 4-7.2** Personnel operating, maintaining or supervising shall be instructed and trained in their job functions and be required to demonstrate an understanding of the equipment, its operation and safe operating procedures including emergency shutdown.
  - 4-7.3** Equipment shall be operated in accordance with original design parameters.
  - 4-7.4** Personnel operating, maintaining or supervising shall be informed of the danger of removing, or rendering ineffective, safety devices.

## 5 PROCESSING

### 5-1 **DO NOT LEAVE THIS EQUIPMENT IN OPERATION UNATTENDED**

When using any heat processing equipment there is always the risk of overheating due to a component malfunction. A trained operator should always be present. If this is not possible, the quench tank should be located where overheating will not cause damage to the building, adjacent stock or endanger personnel. Special consideration should be made for the potential of smoke damage should a fire ensue. Fire suppression equipment should be installed to protect the quench tank and building. The excess temperature limit interlock should be connected to the building alarm system.

**5-2** Quench tank must be filled with quenchant before operating agitator or immersion heater if installed.

**5-3** Select correct quenchant types (such as water, oil or polymer) for quenching application.

**5.4** Do not mix quenchant types or quenchant brands as mixture may not react to quenching predictably or safely.

**5.5** Quenchant should be periodically filtered or replaced to remove scale, metal shavings and contaminants, as recommended by supplier.

**5.6** Quenchant must be continually agitated to provide uniform quenching of parts and to prevent localized overheating of quenchant.

**5.7** Extreme care must be taken to avoid water contamination of oil quenchants. Water may cause foaming and potential fire in oil quenchant.

**5.8** All quench tanks using combustible quenchants should have fire protection systems installed.

**5.9** Use of polymer quenching medium is recommended as these quenchants are non-toxic, non-flammable and are more tolerant of water contamination.

**5.10** Quenchant agitator must be on prior to part being quenched. Heavy or large parts can be placed in basket and then the loaded basket lowered into agitated quenchant. For light or small parts, lower basket into quenchant and drop parts directly into agitated quenchant.

**5.11** For start-up, emergency shut down and operation of optional equipment, refer to the specific Operating Instructions for your equipment located elsewhere in the manual. A second set of these specific Operating Instructions are provided for posting at the quench tank for the operator.

**5-12** If quench tank includes immersion heater, care must be taken to avoid touching or insulating the temperature sensor, located in the immersion heater. Free quenchant movement around this sensor is essential for safe and correct temperature control.

**5-13** If quench tank includes immersion heater, the excess temperature limit interlock should be set at least 50°F below the maximum operating temperature allowed for quenchant.

**5-14** If quench tank includes immersion heater, an alarm should be installed that will sound upon the excess temperature limit interlock being activated. This alarm should be installed in an area where it will attract the attention of plant personnel properly trained to take corrective action. The wiring schematic provided in this manual indicates where the alarm relay should be located for this alarm circuit.



- 5-15** Quench tank must be level to provide a consistent height of quenchant within the tank. Do not fill tank higher than 5" below top rim of tank to avoid quenchant splattering out of tank during quenching.
- 5-15.1** Do not under fill tank or agitator will not mix quenchant adequately. Several inches of quenchant should cover all parts being quenched.
- 5-16** Do not overload the quench tank. Quenchant circulation between parts is very important to the proper operation of a quench tank.
- 5-16.1** Leave space between articles to allow quenchant to move between parts and prevent parts from shadowing each other.
- 5-16.2** Parts should be uniformly distributed on the quench tank to prevent hot or cold spots.
- 5-16.3** If using oil quenchant, limit production rate to prevent oil temperature from exceeding 50°F below oil flash point temperature.
- 5-17** Hot loads, tongs and other hot tools or fixtures should be located in areas clearly marked to warn plant personnel of the potential danger of burns or fires caused by the hot parts.

## **6 SAFETY EQUIPMENT**

- 6.1** Practically all building damage and operator injury can be traced back to human error. It should be noted that:
- 6-1.1** For the protection of personnel and property, careful consideration should be given to the supervision and monitoring of conditions that could cause, or could lead to, a real or potential hazard on any installation.
  - 6-1.2** The presence of safety equipment on an installation cannot, in itself, ensure absolute safety of operation.
  - 6-1.3** There is no substitute for a diligent, capable, well-trained operator.
  - 6-1.4** Highly repetitive operational cycling of any safety device can reduce its life span.
- 6-2** Electric relays and safety shutoff valves should not be used as substitutes for electrical disconnects and manual shutoff valves.
- 6-3** Regularly scheduled inspection, testing, and maintenance of all safety devices shall be performed. (See Section 7 - MAINTENANCE and Appendix C - MINIMUM PERIODIC MAINTENANCE REPORT)
- 6-4** Safety devices shall not be removed or rendered ineffective by bypass electrically or mechanically.
- 6-5** Minimum safety equipment recommended. Additional safety equipment may be required for particular applications: (See Appendix A - SAFETY EQUIPMENT, DESCRIPTION & OPERATION)
- 6-5.1** For quench tank immersion heater:
    - Manual reset excess temperature limit interlock
    - Separate heating element control contactors
- 6.6** No matter how much safety equipment is provided on the quench tank, it cannot protect the operator, other personnel or property from unsafe conditions caused by poor judgement or misapplication. Common sense must be used for safe operation. If in doubt, contact the factory. Check the process periodically to ensure quench tank is being used as originally intended.

## 7 MAINTENANCE

- 7-1 For safe quench tank operation, a preventive maintenance program must be developed and followed for each individual quench tank application. The user should review recommendations from their insurance underwriters. We suggest the review of Factory Mutual (FM) Specification 6-9 on Industrial Ovens and Dryers and the National Fire Protection Association (NFPA) Specification 86 on Ovens and Furnaces. We also recommend a Maintenance Report be developed which lists tests and inspections performed. A copy of this report should be kept on file for future review.
- 7-2 Disconnect electric power and any other energy source before servicing equipment. Quench tanks operate under high voltage and electrical shock is possible. Proper OSHA required lockout procedures should be followed.
- 7-3 Quench tank immersion heating elements operate at line voltage. Do not touch them or allow work to come in contact with the heating elements.
- 7-4 Do not operate mechanical or electrical equipment with guards removed. Operating with guards removed could result in bodily injury.

### 7-5 RECOMMENDED MAINTENANCE ITEMS:

It shall be the sole responsibility of the user to establish, schedule and enforce the frequency of and the extent of the inspection/maintenance program (as well as the corrective action to be taken) because only the user can know what the actual operating conditions are. Personnel who are familiar with the equipment should make the tests. It is usually better that maintenance personnel from mechanical and electrical departments check the equipment rather than regular quench tank operators. These observers may catch things that may be otherwise overlooked.

The following are minimum maintenance items we recommend be covered. Your list will vary depending upon the specific quench tank and operating conditions.

#### 7-5.1 Application

- 7-5.1.1 The user is responsible to ensure that the quench tank process has not changed from the conditions for which it was designed and that the quench tank is not modified. Specifically, it must be ensured that quenchant being used is correct for the application.

#### 7-5.2 Quenchant

- 7-5.2.1 Do not mix quenchant types or quenchant brands as mixture may not react to quenching predictably or safely.
- 7-5.2.2 Check quenchant level in tank.

#### 7-5.3 Electrical

- 7-5.3.1 Periodically tighten all terminals, especially on power connections, to minimize terminal and component failure due to poor contact.
- 7-5.3.2 Periodically inspect contacts in contactors, relays, motor starters, etc., for signs of wear or sticking.

#### **7-5.4 Quench Tank Body**

- 7-5.4.1** The exterior of the quench tank should be touched up whenever scratches occur to prevent rusting.
- 7-5.4.2** Do not allow accumulation of combustible material or other foreign matter on the quench tank. Care must be taken in cleaning any combustible build-up to avoid creating a source of ignition (spark).
- 7-5.4.3** Temperature control sensing element and excess temperature limit interlock thermocouple must be inspected periodically for damage. Location of these sensors cannot be changed. They must be located in quenchant not touching any portion of heater, quench tank body, load handling material such as spacers or racks, or the work load.

#### **7-5.5 Lubrication**

- 7-5.5.1** Electric motors having oil holes require lubrication after every 25,000 hours or 3 years of light duty operation. Use a good grade of SAE 10 electric motor oil or as recommended by the manufacturer of the motor. Larger motors in the integral horse power range, which require grease, should be greased every six (6) months or more frequently where the severity of the service would dictate. No special heat resistant grease is necessary.

#### **7-5.6 Electrically Heat Quench Tanks**

- 7-5.6.1** Excess temperature limit interlocks should open separate (back-up) contactor(s).
- 7-5.6.2** Inspect heating elements for contamination, distortion and adequate support.
- 7-5.6.3** Check electrical heating element connections at terminals for tightness.

#### **7-5.7 Temperature Controls (if applicable)**

- 7-5.7.1** Heat quench tank to operating temperature and check quenchant temperature at control point against a separate reliable temperature indicator to make sure temperature controller calibration is correct.
- 7-5.7.2** Heat quench tank above setting of excess temperature limit interlock (or lower excess temperature limit interlock setting) and make sure excess temperature limit interlock shuts down quenchant heat.
- 7-5.7.3** Disconnect one side of thermocouple connection to excess temperature limit interlock to confirm upscale break protection is operative on the excess temperature limit interlock.

#### **7-5.8 Location**

- 7-5.8.1** The user is responsible to determine that facility changes in the vicinity of the quench tank have not created a hazardous condition. Specifically, the quench tank should be protected from external heat, vibration, mechanical hazards and corrosive environment.
- 7-5.8.2** Processes involving flammable liquids or creating explosive vapor or combustible dust clouds must not be located near the quench tank.

- 7-5.8.3 Portable fire extinguishers located in the vicinity of the quench tank must be inspected periodically.
- 7-5.8.4 Fire suppression system installed in the area of the quench tank should be periodically tested.
- 7-5.8.5 Quench tanks using non-aqueous quenchants that operate at or above the boiling point of water should be protected from the introduction of water to the quenchant by sprinkler heads in the area.

## **8 TROUBLESHOOTING**

### **8-1 NO HEAT**

#### **8-1.1 Defective Temperature Control**

Check that the immersion heater temperature control provides power to the immersion heat.

#### **8-1.2 A fuse burned out**

In addition to the fuses in your fused disconnect switch, one or more fuses may be located inside the control panel as shown on the wiring diagram. Depending upon the particular quench tank involved, it is possible for a fuse to open without affecting the pilot lights (or provide other visible sign) and still affect the heat circuit.

### **8.2 REDUCED OR INCORRECT QUENCH TANK TEMPERATURE**

#### **8-2.1 Defective Temperature Controller**

If immersion heater is installed, it includes a temperature controller. This controller could be defective or out of calibration. Refer to temperature controller operating instructions.

#### **8-2.2 Defective Thermocouple**

Excess temperature limit interlock is provided with thermocouple for sensing. If thermocouple is damaged or broken open, the controller display may give thermocouple error codes (see controller manual for proper error code meanings).

### **8-3 EXCESS TEMPERATURE LIMIT INTERLOCK ACTUATION**

Excess temperature limit interlock may be tripped by either an excessively high quenchant temperature or a sensing element failure. Before placing the equipment back into operation, it should be determined what caused the excess temperature limit interlock to actuate and the condition be corrected. See the excess temperature limit interlock manufacturer's literature for the proper operation and adjustment of the control used.

### **8-4 THE MOTOR STARTER OVERLOADS TRIPPED**

All line voltage motors have current sensitive protective features in the motor starter. Manual motor starter needs to be reset if current draw had tripped motor starter. On magnetic motor starters, the "motor running" pilot light will not remain on if the overloads have tripped. The reset button is located on the motor starter inside the control panel. Measure motor amperage and compare to nameplate. If over amperage, determine cause and correct. If motor is only slightly over amperage, the overload can be increased to compensate.

## 9 **APPENDIX A - SAFETY EQUIPMENT DESCRIPTION & OPERATION**

### 9-1 **MANUAL RESET EXCESS TEMPERATURE LIMIT INTERLOCK**

This device will detect and be actuated when the temperature in the quench tank quenchant exceeds a preset level or quenchant level drops below level of excess temperature limit interlock thermocouple. On actuation, the manual reset excess temperature limit interlock will open the control circuit to the main heat by opening the separate contactor.

To restore operation, the operator must manually reset the excess temperature limit interlock. This should be done only after determining the cause of overheating and correcting it. See the manufacturers operating instructions for adjusting the manual reset excess temperature limit interlock. Confirm maximum allowed operating temperature for quenchant is being used.

### 9-2 **SEPARATE CONTACTOR**

A separate contactor is connected in series with the main control contact to open the circuit providing power to the heating elements. These separate contactors are powered through the manual reset excess temperature limit interlock. The separate contactor provides additional protection which cannot be obtained with the main heating element contactor alone. The redundant separate contactors provide a second cutoff device to the heating element which does not cycle to maintain temperature and for this reason is less subject to wear.

## 10 **APPENDIX B - REFERENCES**

The following sources of additional information are provided for reference in these instructions. This is not presented as a complete list of all possible reference sources.

**10.1** Factory Mutual Engineering Corporation  
1151 Boston-Providence Turnpike  
P.O. Box 9102  
Norwood, MA 02062  
Attn: Publications Order Processing

Specifications 6-9, Industrial Ovens and Dryers

**10.2** National Fire Protection Association  
One Batterymarch Park  
Quincy, MA 02209-9101

Most current issue of:

NFPA 86 - Ovens and Furnaces

NFPA 70 - National Electric Code

NFPA 10 - Standard for Portable Fire Extinguishers

NFPA 11 - Standard for Low-Expansion Foam

NFPA 12 - Standard on Carbon Dioxide Extinguishing Systems

NFPA 13 - Standard for the Installation of Sprinkler Systems

NFPA 14 - Standard for the Installation of Standpipe and Hose Systems

NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection

NFPA 17 - Standard for Dry Chemical Extinguishing Systems

NFPA 17A-Standard for Wet Chemical Extinguishing Systems

NFPA 25 - Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

NFPA 30 - Flammable and Combustible Liquids Code

NFPA 79 - Electrical Standard for Industrial Machinery

NFPA 91 - Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists and Noncombustible Particulate Solids

**10.3** ASME Publications  
American Society of Mechanical Engineers  
345 East 47<sup>th</sup> Street  
New York, NY 10017

The most current issue of:

ASME Boiler and Pressure Vessel Code

ASME B31.1 - Power Piping

ASME B31.3 - Process Piping

**10.4** ANSI Publications:

American National Standards Institute  
11 West 42<sup>nd</sup> Street, 13<sup>th</sup> Floor  
New York, NY 10036

The most current issues of:

ANSI Z117-1 - Safety Requirements for Confined Spaces

## 11 APPENDIX C - MINIMUM PERIODIC INSPECTION REPORT

Model: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Inspected By: \_\_\_\_\_ Date: \_\_\_\_\_

### **BEFORE APPLYING POWER CHECK THAT:**

1. \_\_\_\_ No changes in process have been made including types of materials processed and temperature:

-Quench tank originally designed for: \_\_\_\_\_

\_\_\_\_\_

-Quench tank being used for: \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_ All electrical connections are tight without stray strands.

3. \_\_\_\_ All contactors, relays, motor starters and other components with contacts have been inspected for wear or sticking.

4. \_\_\_\_ Quench tank body inspected and painted surfaces touched up to prevent rusting.

5. \_\_\_\_ Remove and clean all work baskets. Inspect and clean interior of quench tank.

6. \_\_\_\_ Locate main temperature controller sensor and excess temperature limit interlock thermocouples; inspect for damage. Make sure sensor and thermocouple are not touching anything.

7. \_\_\_\_ Top of quench tank is clear; no material is stored on top of quench tank.

8. \_\_\_\_ Lubricate motors if required.

### **APPLY POWER AND CHECK:**

9. \_\_\_\_ Supply voltage agrees with quench tank nameplate - measure between all three (3) phases and record; \_\_\_\_/\_\_\_\_/\_\_\_\_.

10. \_\_\_\_ Amperage (with everything running) agrees with quench tank nameplate - measure all incoming lines and record; \_\_\_\_/\_\_\_\_/\_\_\_\_.

11. \_\_\_\_ Check that agitator is rotating in the correct direction.

### **ELECTRIC**

12. \_\_\_\_ Check that temperature controller does not cycle separate (back-up) contactors.

13. \_\_\_\_ Shut down quench tank and make sure separate contactor opens.

14. \_\_\_\_ Inspect heating elements for contamination, distortion and adequate support.

15. \_\_\_\_ Check electrical connection at heating element terminals for tightness.



## **TEMPERATURE CONTROLS**

16. \_\_\_\_ Heat quenchant to operating temperature and check temperature controller calibration.
17. \_\_\_\_ Compare temperature controller settings and excess temperature limit interlock indication to confirm they are similar.
18. \_\_\_\_ Disconnect one side of thermocouple connection to confirm upscale break protection is operating on excess temperature limit interlock.
19. \_\_\_\_ To check excess temperature limit interlock function, lower setting until excess temperature limit interlock shuts down heat by opening separate contactor.
20. \_\_\_\_ Excess temperature limit interlock is set no higher than maximum allowed operating temperature of quenchant being used.

## **LOCATION**

21. \_\_\_\_ No changes in the quench tank area have created a hazardous condition such as external heat, vibration, mechanical hazard or corrosive environment.
22. \_\_\_\_ No process change has resulted in flammable liquids or explosive vapors or dust cloud being stored or produced in vicinity of quench tank.
23. \_\_\_\_ Portable fire extinguishers in the area have been inspected.
24. \_\_\_\_ Fire suppression systems, such as a sprinkler system, have been inspected.
25. \_\_\_\_ Sprinkler heads in quench tank area have been inspected and cleaned and will not introduce water into the non- aqueous quenchant.

## **TRAINING**

26. \_\_\_\_ Review job function, quench tank operation and emergency shutdown with operators and supervisors.

## 12 APPENDIX E - WARRANTY AND LIMITATIONS OF REMEDIES

Any equipment sold by GRIEVE is warranted for one (1) year after the Purchaser receives the equipment to be free from defects of material and workmanship. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF; WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, GRIEVE EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER'S EXCLUSIVE REMEDY FOR ANY BREACH OF THIS WARRANTY SHALL BE FOR THE REPAIR OR REPLACEMENT (AT GRIEVE'S OPTION) OF THE DEFECTIVE EQUIPMENT OR PART.

Parts under warranty are shipped via ground transportation. Express or expedited shipping costs are the sole responsibility of the customer. In order to obtain repair or replacement under this warranty, the user must deliver the defective product or part to GRIEVE's factory on a prepaid basis promptly after discovery of the defect. GRIEVE's warranty ceases to be effective if the equipment is altered or modified, repaired other than by persons authorized by GRIEVE, misused, used by any person in an unsafe or unreasonable manner or used other than in accordance with GRIEVE's written instructions. Although GRIEVE makes no additional or extended warranty with respect to thermostats, recorders, control equipment or other accessories, to the extent such items may also be warranted by their respective manufacturers, those warranties are passed on to you by GRIEVE as agent of the respective manufacturer and not as a separate warrantor.

In no event shall GRIEVE be liable for any direct, indirect, special, incidental or consequential damages hereunder, whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other theory of legal liability.



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