



UNITED STATES COAST GUARD
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MARINE SAFETY ALERT
Inspections and Compliance Directorate

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Safety Alert 07-20

**AIR CONTAMINANTS AND PAINT COATINGS CAN LEAD TO DANGEROUS
STATIC DISCHARGES!**

Recently the Coast Guard conducted an investigation into a tank barge explosion and issued a Safety Alert based on the preliminary findings. This Safety Alert is being issued to supplement those findings and the recommendations made in [Marine Safety Alert 01-20](#), in hopes that this information will raise awareness and prompt companies to review and update their procedures to prevent similar casualties from occurring.

Compressed Air Contaminated with Water and Rust Particles Increases Static Generation

During the investigation, it was discovered that at the time of the tank barge explosion, workers had arranged portable pneumatic blowers to gas free the cargo tanks. These pneumatic blowers were made of conductive materials – each with an aluminum base and a sheet metal cone. An air compressor supplied the blowers with compressed air, which passed through an air-drying plant and into a carbon steel compressed air manifold, which ran north and south along the length of the dock. Air hoses were connected to connection points along this manifold to supply air to the pneumatic air blowers used in gas-freeing operations. Post casualty inspection of the compressed air manifold revealed that the interior of the manifold was contaminated with a thin film of water liquid and rust particles. Compressed air contaminated with water and rust particulates, directed against a conductive object, such as the aluminum pneumatic blowers and sheet metal cones, will cause static electricity to accumulate unless the conductive object is properly grounded/bonded. If the accumulated static charge is sufficient, and occurs in the presence of a flammable atmosphere, a static arc and ignition may result.¹

Paint Coatings Interfere with Bonding and the Safe Dissipation of Accumulated Static

As previously highlighted in [Marine Safety Alert 01-20](#), it is essential to electrically bond air moving equipment to the steel structure of a vessel in order to allow any accumulated static to safely dissipate. However, the steel structure on a barge where a pneumatic blower would be arranged is typically covered with paint coatings. Post casualty tests conducted by an independently hired fire investigator tested electrical continuity through the paint coatings on the barge involved in this casualty. The tests produced results that would have prevented the safe dissipation of accumulated static to the vessel's steel structure. To safely bond air moving equipment to a vessel's steel structure, the bonding mechanism must adequately penetrate any coatings so that a direct metal-to-metal connection to the vessel's steel structure can be made. To accomplish this, most portable pneumatic blowers used in gas freeing operations have a bonding wire connected to the blower's frame, with a spring-loaded alligator clamp affixed to the end of the bonding wire. These clamps typically have teeth or a pin that are meant to help the user penetrate paint coatings in order to make a bonding connection to the bare steel structure of the vessel. While this is a good idea in concept, due to the thickness of paint coatings, condition of

the bonding clamp, or both, these clamps may not be able to provide an adequate/reliable bond to the vessel's steel structure. Furthermore, portable pneumatic blowers and their bonding clamps typically do not have a means or an indicator which a worker can utilize to verify that they actually have a proper bonding connection through the vessel's paint coatings. This means that after the clamp is affixed to a coated surface, a visual inspection will not be able to determine whether the clamp is adequately bonded to the vessel's steel structure.



Not installing "point of use" air dryers/filters at hose connection points for pneumatic air blowers (left photo) & attaching air blower bonding clamps to painted surfaces instead of bare metal (right photo) can lead to dangerous static build up.

As a result of these findings, the Coast Guard **strongly encourages** all who work or may be employed at facilities or on board vessels involved with cargo tank cleaning and gas freeing operations to take the following actions:

- Facility Managers, Safety Supervisors, Shipyard Competent Persons (SCPs), and Persons in Charge (PICs) of cargo tank cleaning/gas freeing operations, should review their company Standard Operating Procedures (SOPs) for tank cleaning and gas freeing operations, and ensure the following:
 - Recommendations outlined in [Marine Safety Alerts 10-14](#) and [01-20](#) have been implemented at their facilities and incorporated into the SOPs used by personnel during cargo tank cleaning/gas freeing operations.
 - Implement engineering and administrative controls for compressed air systems, to ensure that compressed air supplied to pneumatic blowers is free of liquid and metallic oxide contaminants, which can greatly increase dangerous static generation. Examples of such controls are the installation of "point of use" air dryers/filters at hose connection points where pneumatic air blowers are connected to the facility's compressed air system; and the daily inspection/removal of contaminants from compressed air receivers, piping, and dryers/filters prior to use.
 - Ensure that workers are trained and aware that connecting the bonding clamp for portable air moving equipment to a painted surface may not provide an adequate

bonding connection, which could lead to static ignition of flammable vapors and an explosion.

- Implement procedures for workers to bond portable air moving equipment to the bare metal of a vessel's steel structure. *****Bonding to hatch dogs and associated hardware may not provide an adequate bond, even if the components are not coated.*****

This Safety Alert is provided for informational purposes only and does not relieve any domestic or international safety, operational, or material requirement. Developed by the Investigators of the Marine Safety Unit Chicago and the Office of Investigations and Analysis. Questions may be sent to HQS-PF-flr-CGF-INV@uscg.mil.

¹ See text on Generation of Static Electricity in Gases; National Fire Protection Association (NFPA) 921 – Guide for Fire and Explosion Investigations, 2017 Ed., Chapter 9 Section 9.12.2.6.