Protecting Rotating Equipment During Abrasive Blasting Operations On Offshore Platforms

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Prepared By:

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1.0 Introduction

1.1 This document provides a procedure to improve protecting rotating equipment during abrasive blasting operations. The main concern lies within expensive overhauls of gas compressors, both turbines and reciprocating. Abrasive blasting on paint projects is known to contribute to this cause.

1.2 The purpose of this specification is to provide a standard practice associated with protecting rotating equipment on the offshore platform during abrasive blasting operations. This specification is an addendum to the Offshore Maintenance Painting Specifications (OMPS) and intended to work with the specification and not supercede the OMPS. This specification is a guideline with the understanding that on each platform, the equipment location and layout is different and must be evaluated individually.

1.3 The goal is to protect the equipment filters from abrasive debris and dust during the abrasive blasting operations, thus, minimizing engine overhauls and downtime. This can be accomplished by establishing a joint understanding between all parties; considering the production facility ongoing operations; understanding the corrosion condition of the facility with a heavy emphasis on protecting rotating equipment; and completing the scope of work safely and accident free while maintaining a high standard of work practices.

1.4 Rotating equipment (equipment) shall mean a unit of machinery with air filtration or air intakes; exposed bearings; open rotating shafts; turbine powered; reciprocating powered; electric powered; hydraulic powered; pneumatic powered; and any associated parts; moving objects, or electronics.

1.5 The life and performance of all equipment is essential to the operating of the offshore production facilities. Platforms that have gas compressors have a special concern, as they are vital to the production operation of that facility as well as possibly other facilities. It is to the utmost importance to insure all equipment is properly protected.

1.6 The most volatile means of internal damage to equipment is caused by debris entering the air intake. Therefore, air filters were designed and installed to filter debris. However, the OEM air filters are not designed to handle large amounts of debris such as abrasive dust. Applying filter media over the air filter to catch debris causes air restriction to some degree and the engine temperature rises. Therefore, the OEM filter must be upgraded to a filter that allows more airflow or less pressure drop across the filter thus lowering the engine temperature, which provides more temperature headroom before reaching the maximum operating temperature.

1.7 Items of moving parts include but not limited to:
   1.7.1 Turbine generators and gas compressors;
   1.7.2 Gas powered reciprocating generators and gas compressors;
   1.7.3 Diesel powered pumps, cranes, generators;
   1.7.4 Electric powered pumps, generators, air compressors and air conditioner units.

1.8 Some moving parts such as oilers, pre-lube pumps, plungers, shafts, open bearings, etc can be difficult to protect from abrasives. The best means of protecting shall be employed. The best means may include abrasive-free blasting as in Ultra High Pressure (UHP) blasting or sponge blasting. Deck plate in the area of equipment may incorporate the Blast Trac process where feasible. These operations have successfully been used in the past and are dust free operations.
Each of these operations requires a specialized equipment, trained operator and procedure, which most paint crews have.

1.9 All equipment not intended to be abrasive blasted and painted shall be protected from abrasive debris, dust and paint overspray.

2.0 Pre Planning Procedure

2.1 Prior to mobilizing a paint crew to a platform location, the person responsible for the paint project shall notify the designated technical assistant (TA) about the upcoming paint project.

2.2 The TA will research what equipment is on the platform and what filter upgrade is required. The TA will dispatch a representative to the location to take photos of the equipment; obtain existing engine and filter model number(s); obtain the filter measurements (LxWxH) from the replacement filters on the platform; and perform a physical overview with a photo log of the external filter housing to identify any corrosion, damage, or breaches in the filter housing.

2.3 The TA will list each piece of equipment that requires secondary filter media housing and proposed configuration of the housing.

2.4 The TA will list each piece of equipment that requires primary filter protection only and a proposed method of abrasive blasting in this area.

2.5 The TA will provide the designated filter supplier with the information required to obtain the upgraded filter(s).

2.6 The TA will provide the paint contractor with a materials list needed for building secondary filter media framing.

2.7 The TA will provide the type of surface preparation procedure required for the sight specific project to the Production Foreman or the Construction Engineer responsible for the project.

2.8 The TA will coordinate with the filter supplier to get the new filters to the platform location. He will coordinate with the Area Maintenance Foreman and Production Operator to have the new filters installed.

2.9 Any secondary filter housings to be constructed will be built by the paint contractor when the paint crew mobilizes to the job site.

2.10 Any specialized concerns or details will be shared with the Area Foreman or Construction Engineer responsible for the project to determine the appropriate application options.

3.0 Equipment Protection

3.1 Equipment protection shall be installed prior to abrasive blasting on a platform. Because abrasive dust can migrate from the waterline to the main deck, location of abrasive blasting on a platform does not exclude protecting equipment. How much protection is required will be determined and agreed on between Company, Company Representative and Contractor prior to start of project.
3.2 High consideration of safety shall be used in determining the best means of protecting equipment. Filter media, duct tape, rope, visquene and other objects can become entangled with rotating equipment, which can cause personnel injury and/or equipment damage.

3.3 Windscreens shall be utilized between decks, to minimize the dust drift. Vertical and horizontal cables shall be used to secure the windscreens. 80% windscreens shall be used which will allow ventilation and light in the work area while containing debris and dust.

3.4 Deck penetrations between decks shall be protected with filter media to prevent debris and dust from escaping the work area.

3.5 Secondary filter media housing (Chicken Coop) shall be installed at each intake of turbine and gas compressors. This can be constructed of 2x4 lumber with a plywood floor and roof and wrapped with chicken wire.

3.6 The wood framing shall be attached to the housing of the equipment by caulking with a silicone calk material. The objective of the Chicken Coop is to increase the surface area of filtration by two to three times the original filter size.

3.7 To install the primary filter media a door has to be incorporated into the framing of the Chicken Coop framing.

3.8 When overlapping two pieces of filter media overlap shall be six inches, rolled together and tied-wired to prevent dust from entering between the two layers of filter media.

3.9 Outside seams of the filter media shall be taped, stapled or secured in a manner that prohibits dust and particulate matter from by-passing the filter media.
3.10 Air intake filters for compressors, some generators and pumps shall be upgraded to Viledon filters prior to abrasive blasting. Listed are some of the typical filter models. The application requirement for filter upgrade shall be determined by the exposure to abrasive blasting.

<table>
<thead>
<tr>
<th>Viledon Filter</th>
<th>Application</th>
<th>Approximate size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV95</td>
<td>Solar turbine compressors and generators</td>
<td>24x24x12</td>
</tr>
<tr>
<td>MV95 Reverse flow</td>
<td>Waukesha recip gas compressors</td>
<td>20x20x12</td>
</tr>
<tr>
<td>Mini Pleat</td>
<td>Turbine generators</td>
<td>20x20x5</td>
</tr>
<tr>
<td></td>
<td>Gas generators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gas pipeline pumps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gas or diesel firewater pumps</td>
<td></td>
</tr>
</tbody>
</table>

3.11 All compressor filters shall have primary filter media protecting the filters utilizing Timbalier TSR-1 filter media and monitor condition on a scheduled basis. The filter media shall be installed over the filter housing and secured in a manner that will prevent debris or dust to by-pass the filter media.

3.12 All gas compressors shall have secondary filtration utilizing Timbalier TSR-1 filter media to protect the primary filter media and monitor condition on a scheduled basis. If the equipment is in a building, the secondary filter may not be required.

3.13 All skid and deck drains associated with or in the area of the equipment shall be tested to be operational before abrasive blasting begins and after project is complete. Any drain found clogged before project begins shall be unclogged before project begins. Any drain found clogged at the end of project shall be unclogged before leaving the job site.

3.14 Compressor and generator buildings shall have the doors closed to prevent abrasive and dust from entering the building. If the doors are open and not operational, install windscreens over the doorway to protect abrasive and dust from entering the building. Proper sealing shall be used to prevent dust from by-passing the windscreen.

4.0 Approved Equipment
4.1 **Blast Trac** Blast Trac unit is the preferred equipment for abrasive blasting on deck plate in the area of equipment. Blast Trac is a dustless operation and can be maneuvered into tight areas. Areas not accessible with the Blast Trac shall be addressed with power tools, sponge blast or UHP.

4.2 **Sponge Blasting** Sponge blasting is close to dustless and a user friendly operation. Sponge comes in different grit sizes, is recyclable; is a good option for cutting in around skids, piping, kick plates and deck penetrations.

4.3 **Ultra High Pressure (UHP) Water Blasting**

Selective in area of use. Intended to use on deck plate and areas where scaffolding is not required.

5.0 **Company Responsibility**

5.1 Company shall provide access to the work site.

5.2 Company shall insure the OEM filters have been upgraded in accordance with this document.

5.3 Company shall perform a walk-through with the Company Representative and the Contractor paint foreman to insure the paint crew has installed the proper protection for equipment.
5.4 To help determine impact of equipment protection, Company shall take an oil sample of each piece of equipment at the beginning of a paint project. Additional samples shall be taken monthly during the course of the paint project, and another sample at the end of the paint project. The result will help determine if the equipment protection is adequate during an abrasive blasting project.

6.0 Contractor Responsibility

6.1 The contractor shall install and maintain the proper equipment protection as required during the course of the project.

6.2 Monitor filter protection materials to insure 100% protection of the air filters and replace filter media and other protection materials as needed.

6.3 Maintain an equipment protection log identifying the equipment; date and time the filter media was changed; and who changed the filter media.

6.4 At completion of each area, clean up all debris from equipment and equipment skids. Insure all deck and skid drains are functioning properly.

6.5 At completion of the project contractor shall remove all temporary rigging, primary and secondary filter media and any temporary closures. Insure all areas are clean of abrasives and debris.

6.6 Any request to deviate from this specification shall be made to APACHE. The decision to deviate shall be made in writing by APACHE to the APACHE Representative and Contractor.

6.7 While this document is intended to be full and complete in itself, Contractor shall consider himself bound by customary good practices whether or not they are referred to specifically. In the event of a conflict with the OMPS, application of materials, standards, regulations, or documentation, Contractor shall refer to the APACHE Representative for resolution. If the APACHE Representative cannot resolve the conflict, the conflict shall be referred to APACHE management for resolution.