

Specification No. EG-2411
Engineering Department
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SPECIFICATION NO. EG-2411
DESCALING AND CLEANING STEEL PIPING

1. GENERAL

- 1.1 This Specification covers removal of scale from piping systems for lube oil or oil service and from compressor suction piping. It also covers final cleaning before startup.
- 1.2 Scale may be removed by acid pickling solutions, vapor-phase descaling, or sandblasting. All steel piping (welded and screwed fittings) assembled in the field for the specified piping systems must be internally descaled. The descaled pipe must be free of scale, rust, weld flux, oil, grease and other foreign materials, and must be equivalent to the surface described as SP-5 by the Steel Structures Painting Council.

2. ACID PICKLING

Selection of pickling solutions and inhibitors is CONTRACTOR'S responsibility. Proper control of pickling solution to avoid excessive corrosion also is CONTRACTOR'S responsibility. To avoid excessive corrosion, test samples of all materials in the system shall be exposed to the solution before using it. Samples shall be exposed during the cleaning operation to check good inhibition of corrosion.

Do not allow acid pickling solutions to contact parts of the compressor.

2.1 Precleaning

Use Oakite No. 30 or equal to remove grease or oil films from the pipe before pickling. Mix the mixture in accordance with the manufacturer's instructions, and treat the pipe for 1 to 2 hours. All oil and grease must be removed from surfaces before pickling.

2.2 Descaling in Acid

Pickle the parts in an inhibited 10% sulfuric acid solution at 150°F for 4-6 hours to remove all scale. (When making acid solutions, always add acid to water. Do not add water to acid.) Agitate either the piping or the solution to flush out loose scale. Use the inhibitor in accordance with the manufacturer's instructions. Acceptable inhibitors include:

- 1) Oakite No. 3
- 2) Acitrol No. 3129
- 3) Sharples No. 1148

Be sure to use test samples to check solutions before pickling piping.

2.3 Neutralizing

After pickling for 4-6 hours, wash the piping with a neutralizing bath to remove all traces of the acid from the metal surface. Use neutralizing solutions in accordance with the manufacturer's instructions. Some acceptable solutions are:

- 1) Oakite No. 29
- 2) Oakite No. 30
- 3) Oakite No. 37

2.4 Rinse

After neutralizing, rinse the pipes with cold water until all traces of acid and neutralizing solution have been removed. Change the rinse water frequently or continuously discard some of it so that it does not become too contaminated.

2.5 Phosphate Coating & Sealing

After rinsing, protect the descaled pipe from further corrosion by applying a phosphate coating. Do this by filling the pipe with a 2% phosphoric acid solution at 120°F for about five hours. This solution can be prepared from raw phosphoric acid or from Oakite CrysCoat. Following phosphate coating, the pipe must be air dried (preferably with forced air) to accelerate drying and prevent corrosion. Then close the piping tightly, blanket it with dry inert gas, or fill it with oil to minimize subsequent corrosion and contamination.

2.6 Safety

All of the above acids and most other solutions are harmful if spilled on people or if people breathe the fumes. Therefore, anyone exposed to them should be completely protected with rubber goggles, aprons and shoes. Breathing apparatus should be supplied for those exposed to dangerous levels of any toxic fumes given off. In addition, during the acid treating part of the cycle, hydrogen gas is liberated by the reaction of the acid upon the metal. Suitable precaution should be taken to minimize any explosion danger resulting from an accumulation of this gas.

3. SANDBLASTING

Scale may be removed by sandblasting using clean, dry, washed sand. Sandblasting must remove all scale, grease, debris, etc., to leave a white surface equal to Steel Structures Painting Council Standard SP-5. All sand, dust and foreign material must be removed from the piping. After blasting and cleaning, the piping must be treated with a phosphate coating and sealed as described in Paragraph 2.5.

4. VAPOR PHASE DESCALING

Vapor phase descaling may be used to accomplish requirements listed in Paragraphs 1 to 2.6.

5. FINAL CLEANUP

- 5.1 Immediately before starting the equipment, lube oil systems must be flushed to remove all debris. Circulate the flush oil with bearings removed or bypassed until no foreign material can be detected by centrifuge test of the oil ahead of filters. Then circulate flushing oil through the bearings until similar oil cleanliness is again observed. Drain flushing oil and wipe crankcase clean of any foreign material not removed by flushing, being careful not to leave any dirt behind.
- 5.2 Immediately before startup, suction piping to reciprocating compressors shall be cleaned by blowing with air or gas at velocities in excess of that to be encountered in service. Blow the piping until no more foreign material can be blown out. Do not blow discharge into the compressor cylinder unless piston and rod are removed and packing is plugged off. After cleaning, the cylinder must be wiped clean of any foreign material.