

State of California
Department of Industrial Relations
Occupational Safety and Health Standards Board (Board)

Petition File No. 588

Board Staff Evaluation
Submitted by David Kernazitskas, MSPH, CIH, CSP
Senior Safety Engineer

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State of California
Gavin Newsom, Governor

INTRODUCTION

Petition File No. 588 (Petition) was received from Michael Meister Miller, President and Director, Original Sixteen to One Mine, Inc. (Petitioner) on January 5, 2021. The Petition requests the Occupational Safety and Health Standards Board (Board) amend title 8, section 462(m), regarding the use of plastic piping for supplying compressed air to locations above and below ground. A request for a general update to the standard is also included.

REQUESTED ACTION

The Petitioner states that the existing pressure vessel standard is outdated and needs to be modernized. Although the Petition lacks specific direction on how the Board should move forward, discussions with the Petitioner identified that his goal was to specifically focus on section 462(m) and that he would like to participate in an advisory committee process to update the standard.

PETITIONER'S ASSERTIONS

The Petitioner asserts:

- The pressure vessel standard is very old and in need of updating for the 21st century.
- "Following the old (perhaps 50 years) language increases the dangers to our miners and compromises their health and safety."
- The Division of Occupational Safety and Health Mining and Tunneling Unit cited the Petitioner because the poly [high density polyethylene] pipe he employs is stamped for 200 psi water instead of 200 psi air.
- The process for installing poly pipe is safer than the process for installing iron pipe.

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (DIVISION) REPORT

The Division's evaluation, dated July 27, 2021, recommends denying the Petition because the "petitioner has not provided a basis for, nor any specific amendment to [title] 8 [section] 462(m)." The Division recommends that the Petitioner consider applying for a variance to resolve his concerns.

STAFF EVALUATION

Board staff contacted the Petitioner and representatives from the federal Mine Safety and Health Administration (MSHA) and the Division pressure vessel unit to discuss the Petition. Board staff conducted a review of pertinent regulations, consensus standards and the rulemaking record specific to section 462(m).

Relevant Standards

Federal Standards

Various federal OSHA regulations require piping, including plastic piping, to conform to and comply with American National Standards Institute (ANSI) B31.1 “Power Piping” and ANSI B31.3 “Process Piping”. The edition years range from 1955 to 1967 for the consensus standards, depending on which industry sector the regulation addresses. None of the federal OSHA piping regulations, however, apply to the Petitioner’s mining operation.

The MSHA, which has joint jurisdiction over mines in California, uses a generally applicable standard to regulate piping in mines. Title 30, CFR 57.14205 “Machinery, Equipment, and Tools” requires the piping to be designed by the manufacturer for the intended use as follows:

Machinery, equipment, and tools shall not be used beyond the design capacity intended by the manufacturer, where such use may create a hazard to persons.

California Standards

Section 462 “Field Inspections and Reports” largely includes requirements for air tanks. Subsection (m) addresses the use of plastic piping for compressed air service.

Section 462(m) reads as follows:

- (m)(1) Air piping shall be in accordance with ANSI B31.1 or B31.3.
- (2) All piping from the tank to the first shut-off valve shall be Schedule 80 metallic pipe.
- (3) Plastic piping systems may be used for compressed air conveyance above and below ground, when meeting all of the following requirements:
 - (A) Only ductile plastic materials shall be used.
 - (B) Only plastic pipe, valves and fittings recommended for use by the manufacturer to convey compressed air shall be used.
 - (C) Plastic pipe, valves and fittings shall not be used for compressed air systems over 150 psi or temperatures over 140°F.
 - (D) Plastic piping systems shall be designed, installed, maintained, and operated in full accordance with the manufacturer's specifications and instructions.
 - (E) All plastic pipe shall be permanently marked continuously, but not to exceed 5-foot intervals, with the following information:
 - 1. Size;
 - 2. Manufacturer's name;
 - 3. Pressure rating at 73°F and 140°F;

4. Material name, specification, ASTM cell classification, batch number, and the date of manufacture;
5. The words "For Compressed Air"; and
6. Either Schedule, "Sch Number", or Standard Dimension Ratio, "SDR Number".

(F) All plastic valves and fittings shall be permanently marked with the following:

1. Size;
2. Manufacturer's name or logo;
3. Pressure rating at 73°F; and
4. Material name.

(G) Plastic valves and fitting shall be of the same manufacturer and materials as the pipe.

(H) Only joining compounds meeting or exceeding manufacturer's specifications shall be used when assembling the plastic pipe.

(I) The employer shall use pipe that meets or exceeds the test requirements listed in Appendix C, and upon request, supply the Division written laboratory certification from the manufacturer that the pipe meets or exceeds all test requirements listed in Appendix C of these orders.

(J) The pipe system components, pipe, valves, fittings, and joining compounds shall be designed for the full working pressure of the system for its design life.

EXCEPTION: Pipe or tubing under 3/8-inch diameter need not meet these requirements.

(4) Plastic pipe and fittings that do not meet the requirements of subsection (m)(3) may be used in compressed air service, provided that all of the following conditions are satisfied:

(A) Pressure shall be limited to 150 psi, temperature to 120°F, size up to 2-inch diameter pipe size, and wall thickness to Schedule 40 or heavier;

(B) The piping system shall be protected from mechanical damage along its entire length by either location or actual guarding. The guarding shall be of sufficient strength to withstand any anticipated impact. It shall also be capable of containing exploding fragments; and

(C) The piping system shall be supported and secured by U bolts, conduit supports, rigid hangers or similar methods at intervals not to exceed five (5) feet.

Section 462(m)(3)(I) requires employers to obtain laboratory certification from the plastic pipe manufacturer that the pipe meets or exceeds the test requirements of Appendix C “Acceptance Tests for Plastic Piping”. Appendix C provides criteria for performing five tests to determine the impact resistance and strength of pipe used for the conveyance of compressed air at different temperatures and pressures.

Consensus Standards

The American Society of Mechanical Engineers (ASME) publishes ASME B31.1 “Power Piping” and ASME B31.3 “Process Piping”, which are well known industry standards covering materials and components, design, fabrication, assembly, erection, examination, inspection, and testing of piping. The first editions of the standards were published and maintained by ANSI starting as early as 1935 and have been updated regularly. Thus, early editions use the ANSI designation, while later editions use the ASME designation.

ASME B31.1-2020, the latest edition available, is 400 pages long and can be purchased for \$360 online¹. ASME B31.3-2020, the latest edition available, is 544 pages long and can be purchased online for \$585². Staff is unable to locate editions available for purchase online prior to the 2010 and 2006 versions of the respective standards. New editions of the standards appear to be available every two years. Interested parties who do not wish to purchase the standards can access current and past editions at libraries throughout the state, including the California State Library.

Although staff has not obtained the latest version of either standard for in-depth review, staff has learned that only portions of the standards are specific to plastic piping. In general, past editions of the standards require plastic piping to be used at pressures less than 150 pounds per square inch (psi) and 150 degrees Fahrenheit.

Staff Analysis

The current requirements in section 462(m) came in response to discussions over the use of plastic pipe for compressed air service, including a petition (Petition 184, Michael Potts, January 4, 1985), advisory committee meetings, and an April 24, 1989, “DOSH Hazard Alert”, according to the rulemaking history of the section. Poly-vinyl chloride (PVC) pipe use had become common in compressed air systems and reports of exploding plastic pipe came from Texas and Washington. Several states, including California, took measures to address the hazards posed by shrapnel from the exploding pipes.³

¹ <https://www.asme.org/codes-standards/find-codes-standards/b31-1-power-piping>. Accessed 7/15/2021.

² <https://www.asme.org/codes-standards/find-codes-standards/b31-3-process-piping>. Accessed 7/15/2021.

³ “Plastic Pipe for Compressed Air Service” rulemaking documents. Public hearing November 21, 1991.

The minutes of an October 3, 1989, advisory committee meeting indicate that section 462(m) was written as a performance standard because “most [polyethylene (PE)] and PVC pipe is not suitable for air, since it is not ductile.” The regulatory definition provided for ductile plastic materials reads “Ductile Plastic Materials: Plastic materials able to withstand external impact from both blunt and sharp objects, while charged with compressed gas under the full rated pressure of the piping system, without brittle failure.” The resulting regulation was intended to ensure that any plastic pipe used for compressed air service was ductile unless additional precautions were taken to prevent injury from exploding pipe fragments.

The Petitioner mentions a citation he received in which he claims that he was cited for using high density polyethylene (HDPE) pipe marked for use for up to 200 psi water. He asserts that such pipe should also be considered safe for use for up to 200 psi air. According to the citation information provided in the Petition, the Petitioner was cited for not providing the Division “written laboratory certification from the manufacturer” that the piping in use meets the requirements of Appendix C, which contains tests to ensure ductility. The Petitioner states that the plastic pipe manufacturer was unwilling to provide the required documentation.

Upon discussion, the Division pressure vessel unit stated that subsection 462(m)(3)(I) requires the employer to provide documentation from the plastic pipe manufacturer that the pipe meets or exceeds the tests for ductility contained in Appendix C. Without such documentation, the Division claims that there is no mechanism for verifying that the pipe is safe for use with compressed air.

Board staff contacted a representative from the MSHA to discuss the requirements for mines using plastic pipe in compressed air service. The representative confirmed that without evidence from the manufacturer, the inspectors are not able to verify that the pipe is safe as used.

Board staff was informed by a manufacturer of plastic pipe that the tests in Appendix C are still relevant, though updated testing standards likely exist. The American Society for Testing and Materials (ASTM) standards incorporated by reference in Appendix C are from 1986.

Board staff notes that requiring “written laboratory certification from the manufacturer” as the sole means for demonstrating that the plastic pipe is suitable for use with compressed air could pose an unnecessary burden to employers. If a manufacturer goes out of business or refuses to provide the required certification, the employer may be subject to enforcement liability without evidence that a hazard exists. A discussion on allowing the employer or a third party to perform the required testing should take place to ensure equivalent safety, while possibly posing less of a burden on employers.

Another element of the regulation that should be amended is the requirement in subsection 462(m)(1), which reads: “Air piping shall be in accordance with ANSI B31.1 or B31.3.” The requirement lacks the details of “what” shall be in accordance with the consensus standards (e.g. the installation, use, labelling, manufacture, etc.). The consensus standard edition year is also missing within the current regulation, which can lead to confusion over which version applies to an employer. As the consensus standards are lengthy, expensive, and only partially relevant to plastic piping, Board staff believes a discussion should take place to determine if specific requirements could be used to replace the references to the consensus standards.

Historically it has been the Division’s pressure vessel unit engineers who have worked with stakeholders to develop amendments to the highly specialized Pressure Vessel Safety Orders (PVS0). Pressure vessel unit engineers have specific expertise and experience that enables them to best review the PVS0 and relevant national consensus standards. The Board staff is willing to assist with the advisory committee process if requested.

STAFF RECOMMENDATION

Consistent with the foregoing discussion, Board staff recommends that Petition File No. 588 be GRANTED to the extent that the Board request the Division and its pressure vessel safety unit to convene an advisory committee meeting to review relevant consensus and testing standards and discuss any necessary updates to subsection 462(m), regarding the use of plastic piping for compressed air service. The review should also discuss the need to reference the ANSI B31.1 and ANSI B31.3 standards, or if specific requirements can be taken from the standards to aid employers in focusing on the most relevant information. Should the committee decide that references to the standards are necessary, a specific edition year should be identified and incorporated into the regulation. The Division should extend an invitation to the Petitioner to join in the advisory committee deliberations.