

Valve Tag Importance and its Application in Standard Operating Procedures

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While preparing to write your own standard operating procedures (SOPs) or sitting down to perform the annual review of your SOPs in compliance with OSHA's Process Safety Management Program (PSM), and EPA's Risk Management Program (RMP), or under General Duty Clause, it is important to determine if all key compliance requirements are addressed and listed. SOPs are critical to use as guidance in operating your facility's ammonia system, as well as ensuring operator safety.

Employers shall provide to employees and their representatives access to process hazard analyses (PHA) and to all other information (29 CFR §1910.119(c)(3)), such as operating procedures. While operating procedures are accessible for those who work near or on the ammonia system, the owner or operator shall ensure employees are provided proper training on operating procedures and on the facility's emergency action/response plan (29 CFR §1910.38(f)(1-3)). Operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, equipment, and changes to facilities (29 CFR §1910.119(f)(3)). The employer shall certify annually that these operating procedures are current and accurate (40 CFR § 68.69(4)(c)).

The following procedures are to be addressed and outlined within a facility's operating procedures as required by 40 CFR §68.69(a) and 29 CFR §1910.119(f)(1):

- initial start-up;
- normal operation;
- temporary operations;
- emergency shutdown;
- emergency operations;
- normal shutdown;
- start-up following a turnaround, or after an emergency shutdown;
- operating limits;
- consequences of deviation;
- steps required to correct and/or avoid deviation; and
- safety and health considerations.

You are probably thinking "Great, I'm done!". But have you considered factoring into your SOPs what is best practice from the International Institute of Ammonia Refrigeration (IIAR)? IIAR has Bulletins and Standards. But what

is the real difference between a Bulletin and a Standard, and what is required? An IIAR "Standard" is a normative document, which undergoes a rigorous public review and comment process before it can be published. The standards are meant to be adopted as required practice (as stated on IIAR's website). While an IIAR "Bulletin" is intended to be an informative document which is meant to be advisory, voluntary, and not binding (as stated on IIAR's website). ANSI/IIAR Standard 7-2013 states the same operating procedure requirements as 40 CFR §68.69(a) and 29 CFR §1910.119(f)(1), but also has additional items for developing your SOPs to make them better.

ANSI/IIAR Standard 7-2013 states SOPs shall include:

- procedures for non-routine tasks;
- safety data sheets (SDS), also known as material safety data sheets (MSDS);
- refrigerating system flow drawings (such as block flow diagrams) and piping & instrument diagrams (P&IDs);
- equipment lists;
- installation, operation and maintenance (IOM) manuals;
- manufacturer or vendor provided instructions;
- control system documentation;
- operating parameters; and
- application data.

Consider direct input of system operators or mechanics when documenting the procedures followed to operate the refrigerating system.

"Operating procedures shall include steps where appropriate to prevent trapping liquid ammonia when closing valves to isolate system components. Hydrostatic pressure can develop when liquids become trapped with no gases present. Whenever this is a possibility the sequence of steps shall assure that liquid has been removed from the system component to be isolated before the last isolation valve is closed."

Reference: ANSI/IIAR Standard 7-2013, Developing Operating Procedures for Closed-Circuit Ammonia Mechanical Refrigerating Systems: *Developing and Maintaining Operating Procedures*,

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Valve Tag Importance

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Section 5.1 Operating Procedure Contents.

Operating procedures within your facility’s PSM program should address this concern by providing a warning of the consequences of trapping liquid ammonia. While this is a serious concern, having detailed in-depth operating procedures that include the facility’s valve tags/numbers (matching the facility’s valve index), can prevent this highly dangerous scenario. The purpose and function of valve tags are to ensure that valves are easy to identify and to provide a marker for valves shown on P&ID. Valve tags serve as a major resource when performing the Process Hazard Analysis (PHA) where human errors and consequences of deviations can be recognized and potentially prevented. Properly tagging of valves that match the facility’s documentation of piping diagrams and SOPs reflect current operating practice and implementation of safe working practices as required by Federal Code Title 40 §68.69(c)(d).


OSHA’s PSM Program, EPA’s RMP, and General Duty Clause currently have no legal code specifically referencing that valve tag indication is required within a facility’s SOPs. Inclusion of a valve index might be considered sufficient. However ANSI/IIAR Standard 7-2013, Section 5.2: Development of Operating Procedures, includes a detailed note regarding how SOPs should “supplement manufacturer provided instructions with site specific references such as valve numbers where necessary”. In addition to having the valve index included within each equipment-specific SOP, having the type of valve (e.g. hand expansion) with the valve number referenced in each instruction step can prevent human error and confusion regarding a referenced valve within the SOP.

While it is not specifically required by OSHA or EPA to include valve numbers within step by step instruction in SOPs, it would be considered best practice to do so by following the IIAR 7-2013 standard. Site specific reference of valve tag numbering within SOPs and P&IDs provides accuracy in Lock Out/Tag Out procedures [29 CFR § 1910.147(a)(3)(iii)] by verifying the correct valve is locked out and tagged out from the system process. Following ANSI/IIAR 7-2013 standard for best practice can be included within your facility’s “Recognized And Generally Accepted Good Engineering Practices”, known as RAGAGEP [29 CFR § 1910.119(d)(3)(iii)]. A facility with a strong RAGAGEP strengthens the implementation and understanding of the facility’s PSM Program.

SOPs are required to be certified annually to ensure procedures are current and accurate [40 CFR §68.69(4)(c)]. During an annual SOP review, verification of valve tags and numbering on the SOPs should match the physical valve tags on the ammonia system. This includes valve numbering on the current version of the facility’s P&IDs. Performing a quality assurance check (other than the required annual SOP review) on SOPs and P&ID documents regarding valve tag/numbering is important in regards to operator training of SOPs, understanding of equipment valves and location, and verification that information within the SOPs and PSM Program stands correct. A periodic review

of these documents (SOPs, P&IDs, valve index) verifying they match the physical ammonia system valve tags is important. An EPA inspector may ask to view these documents during an inspection or audit to verify their accuracy and use at the facility. Also, these documents may be requested by EPA or other authorities having jurisdiction. This can include (but not limited to) a request to view the last annual SOP review documentation that was certified by the owner or operator. Note that they usually want to see the last five-years of annual certification meeting documents.


Operator and employee safety is the priority when it comes to running and operating an ammonia system. While SOPs for your facility may be adequate, consider any other additional improvements that can be included to save lives and prevent accidents. Implementation of training on the PSM Program and operating procedures can minimize worker accidents and maximize safety. An ammonia system that has accurate valve tags, gives detail within facility documentation of SOPs, verifies the accuracy of facility P&IDs, and provides safety measures for operators and contractors for exercising the appropriate valves on the system. Standard operating procedures with proper valve tag placement also helps prevent human error. Remember, you have the potential to improve safety and minimize risk. A strong training program and accurate operating procedures makes a positive impact on worker safety and system operations.



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