Steel Industry Gas Safety: Take Notice of NFPA 56

Hazards are ever-present in the steel plant environment, and a heightened awareness and emphasis on safety is a necessary priority for our industry. This monthly column, written by members of the AIST Safety & Health Technology Committee, focuses on procedures and practices to promote a safe working environment for everyone.

NFPA 56 was developed at the request of the U.S. Chemical Safety Board (CSB) after two horrific accidents involving natural gas just eight months apart. The National Fire Protection Association (NFPA) solicited a group of experts from across North America to convene at their headquarters in Boston, Mass., for a series of face-to-face meetings to develop this document. The document is a provisional standard. The term “provisional” in the NFPA world means that its development and subsequent publishing was deemed so urgent that it bypassed the normal process and was put on an expedited process. This, however, also means that the document will now be immediately submitted into the normal NFPA revision cycle process with a number of meetings scheduled for discussion of public and committee member comments. This article seeks to provide highlights of administrative and non-technical issues that will have a major impact on the way many industries do business in the future.

NFPA 56 Impact Analysis for Industrial Facilities

Applicability — All gases, including natural gas over 125 psig and coke oven gas, blast furnace gas and others, are now covered by a standard or code. Consideration and adoption of NFPA 56 by those that use natural gas over 125 psig and other flammable gases is already significant. Since NFPA 56 is now in effect, it is also subject to OSHA enforcement, which can apply to both new facilities (for cleaning and placing into service) and existing facilities for purging operations.

1.1.1 Applicability. This standard applies to fire and explosion prevention during cleaning and purging activities for new and existing flammable gas piping found in electric-generating plants, industrial, institutional and commercial applications.

Recommendation: Develop a plan for implementing the document’s requirements for both new and existing facilities.

Non-Application of Standard — The following are exempt from the standard. Hydrogen and propane are also important to many generation facilities. When one considers the possible hazard that exists with these possibly exempted gases, it is reasonable to believe that any program should also include them.

1.1.2 Non-application of Standard. This standard shall not apply to the following items:
1. Piping systems covered by NFPA 2 [Hydrogen Technologies Code].
4. LP-Gas (including refrigerated storage) at utility gas plants (see NFPA 59) [Utility LP-Gas Plant Code].
5. LNG facilities covered by NFPA 59A [Standard for the Production, Storage and Handling of Liquefied Natural Gas].
6. LP-Gas used with oxygen for cutting, welding or other hot work.
7. Vehicle fuel dispensers.
8. Commissioning and maintenance of appliances or equipment.
9. Vent lines from pressure-relief valves.

Recommendation: Include all of the facility’s gases in the scope of plans and programs that are created.

Retroactivity — The standard clearly applies to plants built before the standard was published.

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Comments are welcome. If you have questions about this topic or other safety issues, please contact safetyfirst@aist.org. Please include your full name, company name, mailing address and email in all correspondence.

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1.3.1 Unless otherwise specified, the provisions of this standard shall apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard.

1.3.2 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction and only where it is clearly evident that a reasonable degree of safety is provided.

New Construction and Possible Retrofit Issues — Most engineer, procure, construct (EPC) contractors would follow these codes. However, there could be instances where the requirements for the documentation portions of these, like pressure testing records, are not well conceived at this time.

4.1 Piping System Construction. Flammable gas piping systems shall be constructed in accordance with ASME B31.1 [Power Piping], ASME B31.3 [Process Piping] or NFPA 54 [National Fuel Gas Code], as applicable.

Recommendation: Review all of the requirements of these codes for new or major retrofits that occur, and be sure that important commissioning-related issues are being handled correctly and are well documented with regard to things like pressure testing of piping.

Extensive Cleaning and Purge Procedures Will Be Required — Detailed procedures will need to be developed for handling cleaning and purging procedures for new and existing facilities. There is an extensive list of considerations and requirements for these procedures, as indicated below.

4.3 Cleaning and Purging Procedures. Written cleaning and purging procedures shall be developed and implemented by a competent person.

4.3.1 The written procedure for each cleaning and purging activity shall address, as a minimum, the following items:

1. Scope of work and site-specific purge procedure development.
   a. Cleaning and purging method.
   b. Piping and instrument diagrams (PIDs).
   c. Chemical and physical properties of flammable gas, purge media and discharge gas.
   d. Determination of purge endpoint introducing flammable gas, inert gas or air.
   e. Assessment and control of purge inlet and discharge locations.
   f. Temporary piping system design.
   g. Personal protective equipment (PPE).
   h. Training and qualifications.
   i. Management review and approval.
   j. Restoration of service.
   k. Target design, launcher/receiver venting review for piping operations.
   l. Regulatory permits.
   m. Evaluation of engineering controls to limit potential unintended ignition of gases (controlled oxidation, “flaring”).
   n. Written stand-down instructions to stop activity in a controlled manner.
   o. Hazards.

2. Environmental conditions and work locations.
   a. Establish and clearly identify exclusion zones where flammable gas–air mixtures are likely to exist.
   b. Limit access for personnel not directly involved with purge operations.
   c. Assessment of potential for gas migration (building openings, adjacent structures).
   d. Prohibit hot work within exclusion zones.
   e. Lockout/tagout.
   f. Impact of environmental conditions (wind speed and direction, temperature, barometric pressure) on purge operations.
   g. Vehicular and air traffic, if applicable.
   h. Topography.
   i. Noise control/monitoring.

3. Communication plans.
   a. Pre-job briefings.
   b. Work permits.
   c. Roles and responsibilities.
   d. Emergency response plan.
   e. Facility alarm, alert and warning systems.
   f. General facility notification prior to start of purge operations.
   g. General facility notification at the conclusion of purge operations.
   h. Notification of regulatory authorities as required (local emergency responders, utility operators, community officials, environmental authorities, etc.).

4. Control of ignition sources.
   a. Bonding and grounding considerations.
   b. No smoking or spark-producing work within exclusion zones.
   c. Eliminate hot work within exclusion zone.
   d. Static electricity ignition sources at discharge point.

5. Pre-purge piping system assessment.
   a. Assessment of piping system for trapped liquids, pyrophoric solids, and other flammable or combustible deposits within the piping system.
   b. Ensure that the piping system is properly isolated.
   c. Limit site conditions that impact the safety of the activity.

6. Purge monitoring and instrumentation.
   a. Ensure monitoring instruments are appropriate for gas being purged.
   b. Training.
   c. Calibration.
   d. Monitoring frequency and reporting.
   e. Selection of appropriate sample point(s).
   f. General atmosphere checks in vicinity of purge gas release.

Recommendations: Develop a corporate-wide approach for implementing a “checklist” type of system that can document and account for cleaning and purge jobs as they occur.

Development of Detailed Cleaning and Purging Procedures — Detailed plans and procedures for cleaning and purging need to be written, well documented and made available on
the jobsite and shall include names of the primary developer and team members.

4.6 Documentation.

4.6.1 Cleaning and purging procedures shall be documented and available at the jobsite.

4.6.2 The safety validation documentation shall include the following items: Names, company names, and addresses of the primary developer and other principal team members responsible for the safety validation.

Recommendations: Develop a corporate-wide approach for implementing a checklist type of system that can document and account for cleaning and purge jobs as they occur.

Written Safety Validations of Procedures — Written safety validations of the plans referenced above will be required for each time the plans are used. The safety validation review will also need to document the persons who created it.

4.6.2 The safety validation documentation shall include the following:

1. Names, company names and addresses of the primary developer and other principal team members responsible for the safety validation.
2. Name, company name and address of the principal operational personnel representing the plant owner or operator.
3. Date of preparation and any applicable modification dates.
4. The completed safety validation in accordance with section 4.4.
5. Any procedures related to the safety validation and any limiting conditions identified in the management of change assessment required in section 4.5.

Recommendations: Develop a corporate-wide approach for implementing a checklist type of system that can document and account for cleaning and purge jobs as they occur.

Record Retention Issues — Purging cleaning and safety validation plans must be kept for two years. Training documentation must be kept for five years.

Recommendations: Consider a Web-based approach to having documents stored on a central server so that they can be easily referenced and immediately available on a sustainable basis.

Management of Change — Management-of-change issues which need to be integrated into gas and purging matters are indicated as follows:

4.5 Management of Change. Written procedures to manage change to process materials, technology, equipment, procedures, and facilities shall be established and implemented [654:4:3].

4.5.1 The management-of-change procedures shall ensure that the following issues are addressed prior to any change:

1. The technical basis for the proposed change.
2. The safety and health implications.
3. Whether the change is permanent or temporary.
4. Modifications to cleaning and purging procedures.
5. Employee training requirements.
6. Authorization requirements for the proposed change.

Recommendations: Review existing management-of-change procedures for how adequately they address gas line cleaning and purging issues.

Training — There are considerable training requirements for all staff. Sites should have a process for providing training and certification of competent persons related to this topic and for personnel who would be participating in purge operations.

5.1 Training. Persons whose duties fall within the scope of this standard shall be provided with training that is consistent with the scope of their job activities.

5.1.1 Such training shall include hazards of flammable gas, hazards of any compressed gas used for cleaning or purging, safe handling practices of flammable gas and compressed gas as applicable, emergency response procedures and equipment, and company policy.

5.1.2 Personnel training shall be conducted by a competent person knowledgeable in the subject matter and shall be documented.

5.1.3 Training records shall be maintained for a period not less than five years from the date of completion of the activity.

Recommendation: Develop in-house training and certification processes and designate a subject matter experts and staff that are qualified to participate in purge and reintroduction processes. Include elements of knowledge, transfer validation and hands-on skill transfer. Part of this program should also include general awareness training for all staff. Contractors will also need to be included on some level.

Conclusions

Compliance with this standard is not difficult. It is, however, a culture change. OSHA takes all public standards that are in effect very seriously — and this one is in effect. The information at www.nfpa.org will help to enhance safety and reduce risks.