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Maximum Allowable Operating Pressure for Natural Gas Pipelines

A key safety component for all pipelines is the determination of a pipeline's Maximum Allowable Operating Pressure (MAOP), the highest pressure at which a pipeline may be operated under Department of Transportation (DOT) regulations.

MAOP Determined by DOT Safety Regulations

DOT regulations specify the engineering-based criteria that must be used to determine the pipeline's MAOP. A pipeline's design characteristics, pipe strength, diameter and wall thickness are used to calculate the maximum pressure it can be subjected to without damage.

The MAOP is set significantly lower than the maximum pressure for which the pipe is engineered. Pipelines in densely populated areas have an even greater pressure safety buffer.

Pressure Testing of Newly Installed Pipelines

In 1970, federal regulations adopted an existing engineering consensus standard from the American Society of Mechanical Engineers requiring that newly installed natural gas transmission lines be pressure tested to confirm integrity before being placed into service.

This test is performed by filling the pipe segment with water or inert gas and pressurizing the pipe 10 to 50 percent higher than the proposed MAOP, depending on population density.

Any pipe defects or damage that could cause an in-service failure are identified during the test and remediated before the pipeline is placed in service.

Pipelines built prior to the enactment of DOT pipeline safety regulations had no standardized requirement for retaining original pipeline design and pressure testing records.

Regulations adopted by DOT in 1970 allowed the MAOP to be set at a pressure equal to the highest operating pressure during the five-year period prior to the enactment of the regulations. Operators using this method to establish MAOP were required to identify and retain actual operating pressure documentation for validation. These records are subject to review as part of regular Pipeline and Hazardous Materials Safety Administration (PHMSA) audits.

Secondary Pressure Relief Devices

DOT regulations require control systems to maintain pressure at or below MAOP, and that secondary pressure relief or pressure limiting devices be installed to restrict the operating pressure in case of a failure in the primary control system. These pressure control devices must be inspected and tested annually.

Key Points

- MAOP is determined by DOT pipeline safety regulations.
- A pipeline's MAOP considers:
  - design characteristics
  - diameter, wall thickness and strength
  - population density
- DOT regulations include a provision that allows pipelines built before 1970 to have MAOP equal to the highest operating pressure during the five-year period prior to the enactment of the regulations.
- DOT regulations require control systems to maintain pressure at or below MAOP, and that secondary pressure relief devices are installed to restrict pressure in case of primary control system failure