NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 50251-2015

Replacing GB 50251-2003

Design code for gas transmission pipeline engineering

输气管道工程设计规范

Issued on: February 2, 2015 **Implemented on: October 1, 2015**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

2.0.1 pipeline gas pipeline gas Natural gas, coal bed methane and coal-to-natural gas transported by pipeline.

2.0.2 gas transmission pipeline project Projects that use pipelines to transport natural gas, coal bed methane and coal to natural gas. It generally includes engineering content such as gas transmission pipelines, gas transmission stations, pipeline crossing (crossing) and auxiliary production facilities.

2.0.3 Gas transmission station The general term for various process stations in gas pipeline engineering. Generally, it includes the first station of gas transmission, the last station of gas transmission, gas compressor station, gas receiving station, gas distribution station, pigging station, etc.

2.0.4 gas transmission initial station The starting point of the gas pipeline. Generally, it has the functions of separation, pressure regulation, metering and pigging.

2.0.5 gas transmission terminal station The terminus of a gas pipeline. Generally, it has the functions of separation, pressure regulation, metering, pigging, and gas distribution.

2.0.6 gas receiving station gas receiving station Along the gas transmission pipeline, the stations set up to receive gas from the gas transmission branch line generally have the functions of separation, pressure regulation, metering, and pigging.

2.0.7 Gas distributing station Along the gas pipeline, the stations set up to distribute and transport gas to users generally have the functions of separation, pressure regulation, metering, and pigging.

2.0.8 compressor station Along the gas pipeline, a station is set up to pressurize the pipeline gas with a compressor.

2.0.9 underground gas storage Geological structures, gas wells and ground facilities that store natural gas in a certain underground space. Geological structure types include salt cavern type, depleted oil and gas reservoir type, aquifer type, etc.

2.0.10 gas injection station gas injection station A station for injecting natural gas into an underground gas storage.

2.0.11 gas withdrawal station A station set up to extract natural gas from underground gas storage.

2.0.12 Pipe accessories pipe auxiliaries Pipe fittings, flanges, valves, pig receivers, headers, assemblies, insulating flanges or insulating joints and other special pressure-bearing parts of pipelines.

2.0.13 Pipe fittings Elbows, elbows, tees, reducers and pipe heads.

2.0.14 Pipe laying with elastic bending It is a pipeline laying method that uses elastic bending deformation of the pipeline under the action of external force or self-weight to change the direction of the pipeline or adapt to changes in elevation.

3.1 General provisions

3.1.1 The designed delivery capacity of the gas pipeline shall be calculated according to the annual or daily maximum gas delivery specified in the design commission or contract. When the annual gas transmission volume is adopted, the design annual working days shall be calculated as 350d.

3.1.2 The gas entering the gas pipeline should meet the indicators of the second-class gas in the current national standard "Natural Gas"

GB 17820, and should meet the following regulations.

1 Mechanical impurities should be removed;

2 The water dew point should be 5°C lower than the lowest ambient temperature under the delivery conditions;

3 The hydrocarbon dew point should be lower than the minimum ambient temperature;

4 The content of hydrogen sulfide in the gas should not exceed 20mg/m3;

5 The carbon dioxide content should not exceed 3%.

3.1.3 The design pressure of gas pipelines should be determined after technical and economic comparisons based on gas source conditions, user needs, pipe quality and safety factors near the pipelines.

3.1.4 When the gas pipeline and its accessories have taken anti-corrosion measures in accordance with the requirements of the current national standards "Code for External Corrosion Control of Steel Pipelines"

GB/T 21447 and "Technical Specifications for Cathodic Protection of Buried Steel Pipelines"

GB/T 21448, the corrosion allowance of the pipe wall should not be increased.

3.1.5 Gas transmission pipelines should be equipped with pigging facilities, and the pigging facilities should be constructed in combination with the gas transmission station.

3.1.6 When the inner wall drag-reducing coating is used for the pipeline, it shall be determined by technical and economic comparison.

3.2 Process design

3.2.1 Process design should be based on gas source conditions, transmission distance, transmission volume, characteristics and requirements of users, and the relationship with the capacity and distribution of the established pipeline network and underground gas storage. Determined after technical and economic comparison.

3.2.2 Process design should determine the following contents.

1 The overall technological process of gas transmission;

2 Process parameters and flow of the gas transmission station;

3.The number and station spacing of gas transmission stations;

4 The diameter, design pressure and station pressure ratio of the compressor station of the gas pipeline.

3.2.3 The gas source pressure should be used reasonably in process design. When pressurized transportation is adopted, multi-plan technical and economic comparisons should be carried out in combination with the factors of transportation volume, pipe diameter, transportation pressure, power supply and operation management, and the station pressure ratio of the compressor station should be reasonably selected and the station spacing should be determined according to the principles of economy and energy saving.

3.2.4 The characteristics of the compressor station and the pipeline should match and meet the requirements of process design parameters and changes in operating conditions. Under normal gas transmission conditions, the compressor unit should work in the high-efficiency zone.

3.2.5 The gas transmission station with the function of distribution or distribution should be equipped with gas limit and pressure limiting facilities.

3.2.6 When the gas source of the gas pipeline comes from an oil and gas field natural gas processing plant, an underground gas storage, a coal-to-natural gas plant, or a coalbed methane processing plant, gas quality monitoring facilities should be installed on the intake pipeline of the gas pipeline receiving station.

3.2.7 The strength design of gas pipelines shall meet the requirements of changing operating conditions.

3.2.8 The gas transmission station should be provided with an over-station bypass.

3.2.9 The gas transmission pipelines entering and exiting the gas transmission station must be equipped with shut-off valves. And should comply with the relevant provisions of the current national standard "Code for Fire Protection of Petroleum and Natural Gas Engineering Design" GB 50183.

3.3 Process calculation and analysis

3.3.1 The technical design of the gas pipeline shall at least have the following information.

1 Composition of pipeline gas;

2 The quantity, location, gas supply volume and variable range of gas sources;

3 The pressure, temperature and variation range of the gas source;

4 Requirements of users along the line for gas supply pressure, gas supply volume and their changes. When it is required to use pipeline gas storage for peak regulation, the user's gas consumption characteristic curve and data shall be available;

5 The natural environment conditions along the line and the ground temperature at the place where the pipeline is buried.

3.3.2 The hydraulic calculation of the gas pipeline shall meet the following requirements.

1 When the relative height difference h<=200m of the longitudinal section of the gas pipeline and the influence of the height difference is not considered, it shall be calculated according to the following formula. In the formula. qv--the flow rate (m3/d) of gas (P0=0.101325MPa, T=293K); P1--the starting pressure (absolute) (MPa) of the calculation section of the gas pipeline; P2--The end pressure of the calculated section of the gas pipeline (absolute) (MPa); d--inner diameter of gas pipeline (cm); lambda-hydraulic friction coefficient; Z-compressibility factor of gas; --relative density of gas; T - the average temperature of the gas in the gas pipeline (K); L--The length of the calculation section of the gas pipeline (km).

2 When considering the influence of the relative height difference of the longitudinal section of the gas pipeline, it shall be calculated according to the following formula. In the formula. alpha-coefficient (m-1); h--Elevation difference between the end point of the calculation section of the gas pipeline and the start point of the calculation section (m); n--the number