

## LG NOZZLE FLOW METERS

### Summary

The LG type flow measurement flow element is the oldest and most widely used flow measurement instrument. It has the advantages of simple structure, easy installation, stable performance, and high accuracy. It can be used for liquid, vapor and gas flow measurement in modern industry. The LG type flow measurement flow element produced by our company adopting advanced calculation methods and precise processing methods has a wide range of varieties (in line with GB/T2624-2006, ISO5167-1-2003, BS1042-1989, American Mechanical Engineering Association standards, etc.), With complete specifications, it is widely used in petroleum, chemical, electric power, light industry, water supply, gas transmission and other fields.



### Operating Principle

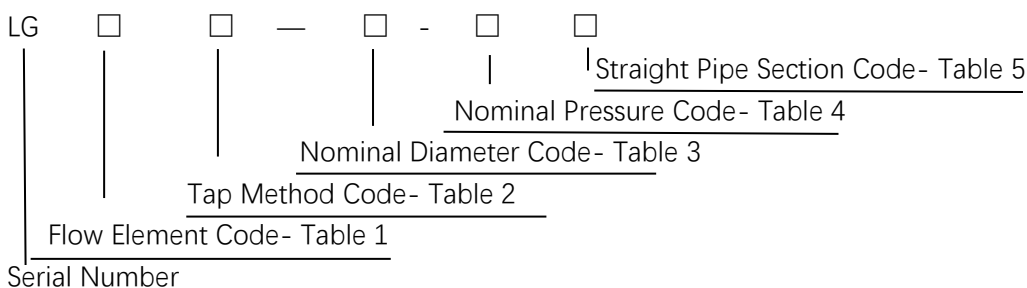
In the pipeline filled with single-phase continuous fluid, install a flow element (such as a nozzle). When the fluid passes through the orifice of the flow element, the vapor forms a local contraction, the flow velocity increases, the kinetic energy increases, and the static pressure decreases. There is a static pressure difference between the front and back of the flow element, that is,  $\Delta P = P_1 - P_2$ . If the area of the orifice is  $F$ , the mass flow of the fluid is  $q_m$ , the volume flow is  $q_v$ , and the density is  $\rho$ , according to the principle of flow continuity and Bernoulli equation can derive the relationship between pressure difference and fluid flow:

$$q_m = \alpha F \sqrt{\Delta p \rho} \text{ or } Q_v = \alpha F \sqrt{\Delta p / \rho}$$

In the formula,  $\alpha$  is the flow coefficient. It can be seen from the above relationship that if the orifice area and fluid density are constant, the flow rate is proportional to the square root of the pressure difference, that is, as long as the pressure difference is measured, the flow rate can be calculated. The flow element measures the fluid flow rate based on this principle.

### Model Selection Table

#### 1. Model



**Table 1 Flow Element Code and Meaning**

Code	Meaning	Code	Meaning
M	ISA1932 Nozzle	C	Long Diameter Nozzle

**Table 2 Tap Method and Meaning**

Code	H	D
Meaning	Corner Ring Tap	Diameter Tap

**Table 3 Nominal Diameter Code and Meaning**

Code	1	2/11	3/12	4/13	5/14	6/15	7/16	8/17	9/18	10/19	
DN	mm	10	15	20	25	32	40	50	65	80	100
	in		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
Code	20/51	21/52	22/53	23/54	24/55	25/56	26/57	27/58	28/59	30/61	
DN	mm	125	150	200	250	300	350	400	450	500	600
	in	5	6	8	10	12	14	16	18	20	24
Code	32/63	34/65	36/67	38/69	40/71	42/73					
DN	mm	700	800	900	1000	1100	1200				
	in	28	32	36	40	44	48				

**Table 4 Nominal Pressure Code and Meaning**

Code	3	4	5	6	7	8	9	10	11	12	
PN	MPa	1.6	2.0	2.5	4.0	5.0	6.3	10.0	11.0	15.0	16.0
	Class		150			300			600	900	
Code	13	14	15/16								
PN	MPa	25.0	26.0	42.0							
	Class		1500	2500							

**Table 5 Straight Pipe Section Code and Meaning**

Code		A	B	C	D	E	F
Meaning	Flow Element	Flow Element, Mounting Flange	Flow Element, Mounting Flange, Upstream and downstream straight pipe section	Flow Element, Mounting Flange, Upstream and downstream straight pipe section, Upstream and downstream connection flange	Flow Element, Mounting Flange, Upstream and downstream straight pipe section, Upstream connection flange	Flow Element, Mounting Flange, Upstream and downstream straight pipe section, Downstream connection flange	Welding Structure

## 2. Executive Standard

### 2.1 Flow Element Executive Standard

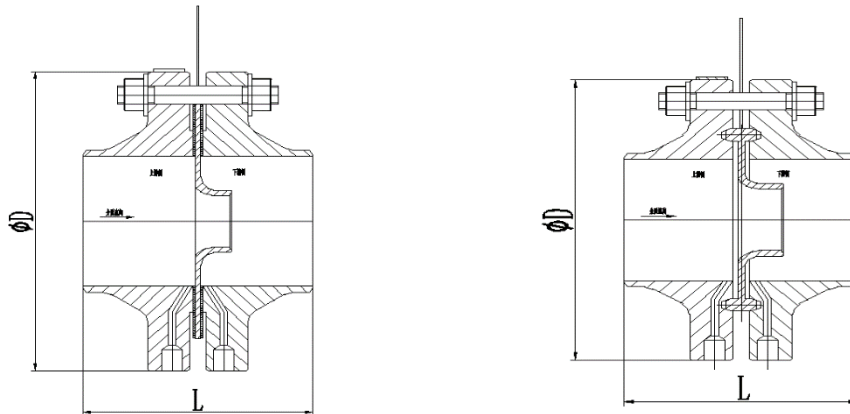
Code	Meaning	Standard Code
M	ISA1932 Nozzle	GB/T2624—2006 (ISO5167—1—2003)
C	Long Diameter Nozzle	GB/T2624—2006 (ISO5167—1—2003)

### 2.2 Flange and Gasket Executive Standard

Flange and gasket standards can be selected from HG/T20592 ~ 20614-09 (European system) or HG/T20615 ~ 20635-09 (American system) or other standards.

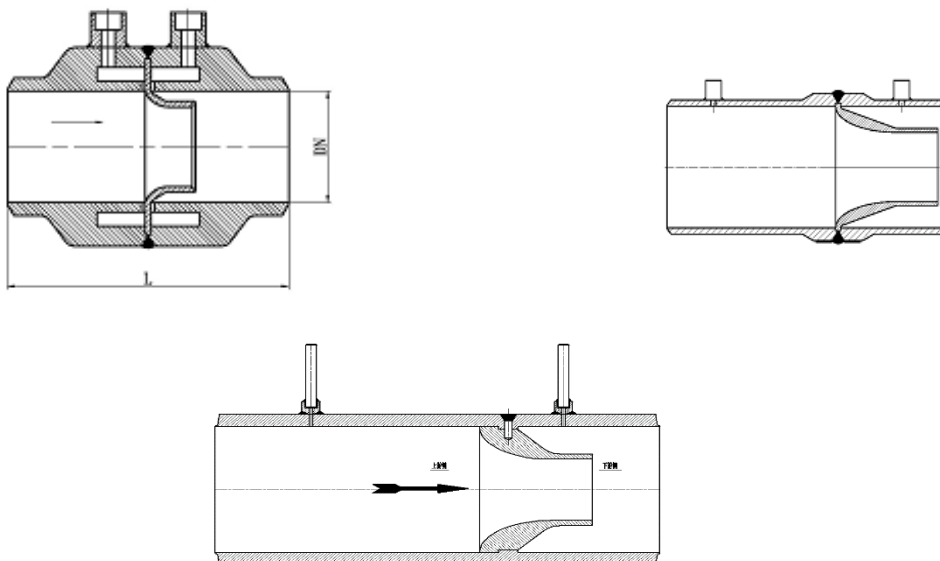
## 3. Basic Structure

### 3.1 Flange to Clamp Type



### 3.2 Welding Flow Element

This is a kind of flow element. It has the characteristics of simple structure, cost saving, short production cycle and no leakage. It is especially suitable for industrial high temperature and high pressure pipeline medium flow and vapor flow measurement.

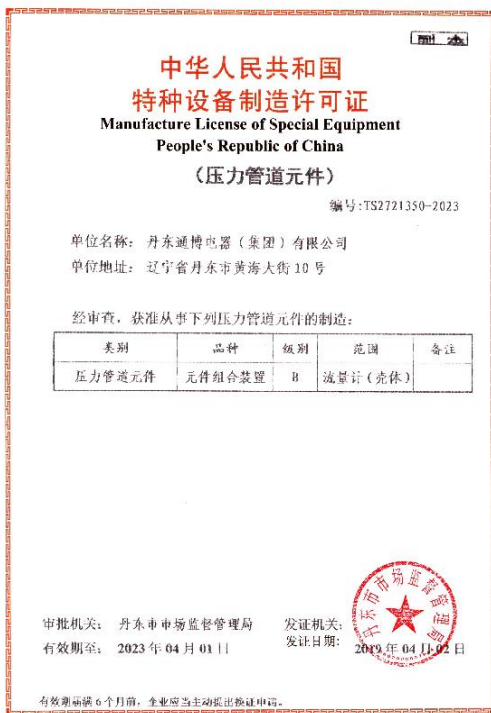


#### 4 Document No.515

The notice of the General Office of the General Administration of Market Supervision on the Special Investigation and Repair of Potential Hazards within the Range of Power Station Boilers (Document No.515) stipulates that the pipelines within the range of power station boilers shall be in accordance with the "Boiler Safety Technical Supervision Regulations", "Boiler Supervision and Inspection Rules", and "Regular Boiler Inspection" Design, manufacture, installation, use management, inspection and testing according to regulations and related standards.

Standard nozzles and long-diameter nozzles are all standard flow elements, and there is no need for real flow calibration during processing. The flow element has the characteristics of low pressure loss and wear resistance, which is suitable for the measurement of high-pressure vapor flow of power station boilers. According to the requirements of the AQSIQ 2018 No.515 document for flow meters for power station boilers, our company is the first enterprise in Northeast to obtain the qualification for the production of pressure piping components for flow meter housings. All links are supervised and inspected by the local boiler inspection institute to ensure product quality.

The long-diameter nozzle adopts an embedded structure, and the flow meter (housing) is made of a whole section of seamless steel pipe, without large welds, and there is no welding of dissimilar steels, and the strength of the pipeline is calculated and checked. It is more reliable in the measurement of high pressure vapor flow in power station boilers.



#### Order Requirements

1. When ordering flow element, please fill in the flow element specification table (Refer to the table below)

		Flow Element Order Parameters Table		Project No.		
				Document No.		
				Page No.		
Data			Calculation			
Operating Conditions	Medium Name		Flow Element Type			
	Process Temperature °C		Tap Method			
	Operation Pressure MPa		Instrument Scale			
			Instrument Differential Pressure kPa			
	Flow	Liquid kg/h	Max	Limitation of Min Flow		
		Vapor kg/h	Normal	Reynolds number(normal flow) Re		
		Gas Nm3/h	Min	Area of Expansion Correction Coefficient Fa		
				Expansion Coefficient ε		
				Flow Coefficient α		
				Uncertainty %		
				Permanent Pressure Loss Pa		
	Operating Density kg/m <sup>3</sup>		Diameter Ratio βt			
	Dynamic Viscosity mPa·s		Flow Element Hole Diameter or Round Height mm			
	Kinematic Viscosity mm <sup>2</sup> /s		1/4 Arc Radius Or Eccentricity mm			
	Relative Humidity (φ) %					
Compression Factor (Z)		Flow Element Standard				
Isentropic Index (cp/cv)						
Allowable Pressure Loss Pa		Specification				
Pipe	Nominal Diameter(DN)		Model			
	Pipeline No.		Nominal Diameter(DN)			
	Outer Diameter/Inner Diameter		Nominal Pressure(PN) MPa			
	Material		Flange Standard			
		Flange Inner Diameter mm				
		Structure Length mm				
		Tap Dimension mm				
		Tap Position				
		Material	Flow Element			
			Flange			
			Bolt			
			Nut			
			Gasket			
Notes						

2. Our company can provide users with the following services

2.1 Provide a complete set of the above-mentioned various specifications of flow element.

2.2 Provide flow element calculation for users, including:

- 1) Knowing the aperture diameter  $d_{20}$  of the flow element and the meter scale flow rate, under the new working conditions, find the new upper limit of the differential pressure  $H_{max}$  of instrument;
- 2) Knowing the aperture diameter  $d_{20}$  of the flow element, the upper limit  $H_{max}$  of the instrument differential pressure and the scale flow rate of the original design instrument, under the new working conditions, find the new scale flow rate of instrument.

2.3 According to user requirements or drawings to manufacture the flow element.