

24<sup>th</sup> World Gas Conference  
ARGENTINA | 2009  
5-9 October

The Global Energy Challenge:  
Reviewing the Strategies  
for Natural Gas

شركة  
الشركة الجزائرية لتسيير شبكة نقل الغاز  
Société Algérienne de Gestion du Réseau de Transport du Gaz  
GRTG

# SAFETY DEVICE TO STOP NATURAL GAS LEAKAGE


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## 1. INTRODUCTION

The natural gas odorization, constitutes an important step in gas leakage prevention.

Natural gas leakage is classified as major incident, because it suffocates the gas consumer or can cause explosion. Unfortunately the incident due to gas leakage makes constantly victims and important casualties all around the world.

Even if in nowadays we use the gas detectors, we still don't manage this situation, since the spatial detection and its imperatives: gas dispersal, cosmology's force and the time detection regarding to the lower limit of explosion, limits strongly their efficiency.


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As gas operator, we feel imperatively the use of the safety device system to stop Natural Gas leakage for the domestic customers.

We aspire also to ensure the safety of the gas consumers, and to reinforce the attribute of this energy, which will remain for the future century as the primary energy.

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## 2 .TECHNICAL CHARACTERISTICS OF THE SAFETY DEVICE:

**Electric pulse**

**Magneto dynamic's Central flow rate indicator**

**Central control**

**Electro valve**

**Magneto dynamic's flow rate indicators**

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## 3 - Safety device's operations

For the safety device's operations we'll see the following scenarios :


- ☞ Gas network system without security
- ☞ The Safety Device and the Gastightness's Test of the house's gas network
- ☞ Commissioning of the Household gas appliances and Safety Device to Stop Natural Gas Leakage
- ☞ Gas leakage simulation and the safety device response.
- ☞ Gas network and the Household gas appliances secured thanks to the safety device

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# Gas network system without security

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# The Safety Device and the Gastightness's Test of the house's gas network

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The diagram illustrates a gas safety device system. A central gas valve is connected to a gas supply line. This valve is linked to three household appliances: a water heater, a boiler, and a gas oven. Each appliance has a green indicator light labeled 'off'. The system is connected to an electrical circuit. Text annotations describe the operation: 'At the second electrical pulse the Central Gas tightness's Test of the household gas appliances is indicated by the green warning light after a scan in steady state the electro valve remains in open position'. A note also mentions 'Turbines 1, 2 and 3'.

At the second electrical pulse the Central Gas tightness's Test of the household gas appliances is indicated by the green warning light after a scan in steady state the electro valve remains in open position

Turbines 1, 2 and 3

Electrical circuit

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# Commissioning of the Household gas appliances and Safety Device To Stop Natural Gas Leakage

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**In the normal conditions when the Household gas appliances are working, the green warning light indicates the gas flowing across the turbines**

Gas

heater are turning on

Off

off

off

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# Gas leakage simulation and the safety device response.

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If this situation (the number of electrical pulses for the distribution flow, rate indicator will be greater than the total of electrical pulses coming from the network household gas appliances working at that moment) in the network .  
The electrovalve will be maintained in closed position until it will be engaged manually to the open position.

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# Gas network and the Household gas appliances secured thanks to the safety device

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Once the electro valve secured the network system thanks to the safety device, the warning lights will take the red color, indicating the presence of gas leakage in the gas network

The diagram illustrates a gas distribution system. On the left, a gas inlet pipe labeled 'Gas' with a blue arrow leads to a control panel containing an electro valve. From this panel, orange lines representing gas pipes branch out to three household appliances: a boiler, a water heater, and an oven. Each appliance has a red warning light on its top panel, and each light is labeled 'off'. The diagram shows the electrical wiring connecting the control panel to the warning lights on the appliances.




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#### 4 - Practical Case

A test ramp of 16 mm in diameter with 2,50 meter in length, has been set up including the electronic unit (electronic station and electromagnetic sensor), the electro valve (NF type) and the magneto dynamic's flow rate indicators



Central Control      The electro valve      The magneto dynamic's flow rate indicators.

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Over the ramp test, two gas burners were installed to simulate two gas consumption's point ( operating pressure : 21 mb).

Two gates of 14 mm in diameter were installed at upstream and back stream of the ramp test, in order to simulate the leakages.

When the upstream gate were opened, the gas leakage gave electrical pulses at the Magneto dynamic's Central flow rate indicator, which transmit them to the Central control. These electrical pulses having not be confirmed another electrical pulses ( feed back) from the household gas appliance's ( cooker, heater .....), the Central control will make the electro valve closing.

The same test has been done with the back stream gate, the obtained results were the same as the precedent test ( above one).

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**5- CONCLUSION.**

The results obtained from the ramp tests, show us that the safety device has an instantaneous response to the safety performance needed for the natural gas equipments. Its use will considerably reduce the fatal incidents.

The current laws oblige the household natural gas appliance's manufacturers, to add thermocouples for each burner in order to ensure the user's safety in case of the liquid manure spreading or flame blowing by the wind, as well as the case if the flame's heaters will extinguish. In our safety system we prepare the thermocouple if the household natural gas appliance's are not equipped with.

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**Thank You for your attention**  
**Your questions are welcome**

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