

# **F A R E G A Z**

**Maintenance Document July 2004**

***GUIDELINES FOR MAINTENANCE OF PRESSURE REGULATORS TO prEN 334 AND OF SAFETY DEVICES TO prEN 14382 BEARING THE CE MARKING in accordance with the PED and installed in stations according to EN 12279 or EN 12186.***

## **Foreword**

A generic standard dealing only with the maintenance of pressure regulators and associated safety devices may not be appropriate for all types of equipment.

To minimize the risk of equipment failure which may result in overpressure or underpressure in the downstream network minimum maintenance requirements at site after installation shall be considered.

Some critical parts of regulators and associated safety devices and specifically those made of non metallic materials may deteriorate as a result of quality/cleanliness/operating conditions of gases, therefore it is necessary to carry out some maintenance to maximize the continued safe operation of the equipment and to minimize the probability of cessation of supply.

This guideline should be considered when preparing a standard or procedure dealing with the maintenance of pressure regulators or safety devices, which are, manufactured in accordance with prEN 334 and prEN 14382.

Manufacturers of equipment are able to provide maintenance recommendations, which allow operators with limited experience of assets to initiate a maintenance programme suitable to ensure the above aims are met. However many operators have significant experience and history of operating assets under a wide range of conditions and they are more able to determine maintenance requirements that best suit their particular operating context. In this case manufacturers maintenance recommendations may be considered but could be inappropriate in some circumstances.

## **1. Scope**

This document provides guidance for maintenance activities to be undertaken on pressure regulators according to EN 334 and on associated safety devices according to prEN 14382 bearing the CE marking and installed in stations in accordance with EN 12186 or EN 12279 in order to maximize the continued safe operation and to minimize the probability of any interruption of the gas supply.

## **2. Normative references**

EN 334 – Gas pressure regulators for inlet pressure up to 100 bar.

prEN 14382 – Safety devices for gas pressure regulating stations and installations – Gas safety shut-off devices for inlet pressure up to 100 bar.

EN 12186 – Gas supply system – Gas pressure regulating stations for transmission and distribution – Functional requirements.

EN 12279 – Gas supply system – Gas pressure regulating installations on service lines – Functional requirements.

### **3. Definitions**

#### **Periodic routine checks including pressure checks.**

A visual inspection to check the integrity and security of the equipment and to record correct operation by checking pressure settings of operating devices and status of safety devices.

#### **Periodic functional check to prove operation of all protective devices.**

A functional check is required to ensure that the "working" and "standby" equipment is performing at the desired level and is in satisfactory condition, particularly the protective devices.

#### **Periodic preventive maintenance of pressure regulators and of associated safety devices.**

This may include routine overhauls and/or scheduled replacement of parts.

Preventive maintenance is intended to restore the equipment to full operational condition by replacing worn parts together with cleaning and lubricating where necessary.

#### **Corrective maintenance of pressure regulators required as a result of breakdown.**

This is intended to restore the equipment to full operational condition following a failure, malfunction or following the results of a functional check.

### **4. Maintenance**

The maintenance of pressure regulators and of associated safety devices may include some or all of the following:

- Periodic routine check of the installation including pressure checks.
- Periodic functional check to prove operation of all protective devices.
- Periodic preventive maintenance of pressure regulators and of associated safety devices. This may include routine overhauls and/or scheduled replacement of parts.
- Corrective maintenance of pressure regulators and associated safety devices required as a result of breakdown.

#### **4.1 Periodic routine check of the installation including pressure checks.**

The periodic routine check shall include, at least, the following activities:

- Visual inspection: no visible damage,  
condition of external protection.
- Recording of significant functional data (inlet pressure, controlled pressure, motorization pressure etc.)
- Check that the correct regulator stream is working and set at the correct pressure (visually).
- Check that safety device indicators show that the safety devices are open.
- Where readings are outside acceptable operating limits reports should be made and appropriate action taken.

- Report on the activities carried out.

Some of the above activities may be carried out remotely.

#### **4.2 Periodic functional check to prove operation of all protective devices.**

The functional check is designed to enable the verification of all standby and protective devices that are not normally operating but available in case of the failure of a working device. These checks can be carried out manually or by diagnostic methods, which can provide electronic records automatically and a greater level of confidence.

The functional check may include the following:

- Simulation of the proper operation of protective devices at the set pressure i. e. safety devices, relief valves, monitor regulators etc.
- Simulation of the proper operation of devices in stand-by mode at the set pressure i. e. stand-by streams

#### **4.3 Periodic preventive maintenance of pressure regulators and of associated safety devices. This may include routine overhauls and/or scheduled replacement of parts.**

The purpose of periodic preventive maintenance is to restore the equipment to full operational condition by replacing worn parts together with cleaning and lubricating where necessary. In general, only components which, have known life expectancy, will be subject to this maintenance activity.

- Dismantling and reassembly should be carried out in accordance with manufacturers instructions
- A functional check as above should be carried out on completion.
- Report details of work undertaken and record parts used.

#### **4.4 Corrective maintenance of pressure regulators required as a result of breakdown.**

The purpose of corrective maintenance is to restore the equipment to full operating condition following failure, malfunction or following the results of a functional check. The following activities should be included:

- Tracing the cause of the failure
- Replacement of the parts failed in accordance with the manufacturers instructions.
- Verification of the operating settings.
- Completion of a functional check following restoration.
- Report details of faults detected, work undertaken and record parts used.

### **5 Requirements for Operators**

Any person engaged in the commissioning, inspection, operation, maintenance of a pressure reduction station must be competent to manage and carry out such work. This may be achieved by appropriate combination of education, training and practical experience.

## **6 Frequencies**

Maintenance frequencies can be determined by a number of different approaches. The optimum approach uses recorded plant history, fault data, operator knowledge and experience together with network knowledge to apply a methodology to determine the appropriate frequency and task. However where the above is not available in sufficient quantity and quality, a minimum frequency should be set until such time adequate data and knowledge is available.

### **6.1 Periodic routine check including pressure checks**

This frequency can be determined locally by:

- Site location
- Security arrangements
- Level of remote monitoring
- Vulnerability to damage
- Environmental considerations
- Strategic importance

However frequencies can be determined in accordance with National or Industry regulations/recommendations where they are in place.

### **6.2 Periodic functional check to prove operation of all protective devices**

The frequency of functional checks can be determined by:

- Strategic importance
- Plant records
- Station operating context
- Equipment reliability
- Level of remote monitoring

However frequencies can be determined in accordance with National or Industry regulations/recommendations where they are in place.

It is recommended that in the absence of any of the above information, a functional check should be undertaken at a frequency of one of the valid regulations of an European member state (see "Attachment" with examples of valid current regulations of some European member states)

### **6.3 Periodic preventive maintenance of pressure regulators and of associated safety devices. This may include routine overhauls and/or scheduled replacement of parts.**

The frequency of preventive maintenance is determined by:

- Known life of a component or system
- Trend of performance drift
- Ageing of the elastomeric parts

However frequencies can be determined in accordance with National or Industry regulations/recommendations where they are in place.

It is recommended that in the absence of any of the above information, a periodic preventive maintenance should be undertaken at a frequency of one of the valid regulations of an European member state (see "Attachment" with examples of valid current regulations of some European member states).

## **7 Spare parts used during maintenances activities**

Spare parts shall comply at least with the original specification.

Following general requirements for spare parts, particularly for elastomeric parts, shall be complied with:

- Storage conditions specified by the manufacturer of the equipment;
- Use of spare parts within the life time under specified storage conditions;
- Tracing of the proper spare part to be assembled in the equipment at site.

**Attachment  
to  
Maintenance Paper**

**Examples  
of  
recommendations / guidelines  
for service intervals**

**(if other national or industrial regulations  
are not available)**

## Germany

inlet pressure $p_e$ [bar]	standard volume in maximum load times [m <sup>3</sup> /h]	Maintenance for regulating stations according to DVGW - G 495			
		surveillance			maintenance*
		visual inspection	inspection	functional checks	
up to 0,1	-	as need arises	as need arises	as need arises	as need arises
0,1 to 1	< 100	as need arises	as need arises	1/twelve years	as need arises
	> 100	as need arises	as need arises	1/four years	1/eight years
1 to 4	< 100	as need arises	as need arises	1/six years	as need arises
	> 100	as need arises	as need arises	1/two years	4/year
4 to 16		4/year	2/year	1/year	1/two years
16 to 100		monthly	4/year	2/year	2/year

\* maintenance includes functional checks and inspection

Specific activities on gas pressure regulator and associated safety devices with $p_{\text{emax}} > 12 \text{ bar}$ according to Italian national standard (1) and Italian regulations (2)			
Equipment	Activity	Type of activity	Frequency
Pressure regulating lines	Change over the lines	Periodic functional check	Half yearly
	Verification of settings		At every inspection
	Settings		According to the need
	Check of internal sealing of the line		Half yearly
	Check of internal sealing of each equipment		yearly
	preventive scheduled maintenance	Periodic preventive maintenance	Every three years

(1) - national standard: CIG UNI 9571 (applicable to pressure reduction stations connected to transportation system)  
(2) - proposal 2004 for new national regulations dealing with "Technical regulation on the minimum requirements for the design, construction and operation of distribution works and direct lines for natural gas density no greater than 0,8". (<http://europa.eu.int/comm/enterprise/tris/>)

Specific activities on gas pressure regulator and associated safety devices according to Italian national standard (1) and Italian regulations (2)						
$P_{\text{emax}}$ bar	Q in kW					
	Q > 1200			600 < Q ≤ 1200		Q ≤ 600
	visual inspection	periodic functional check	periodic preventive maintenance	periodic functional checks	periodic preventive maintenance	periodic preventive maintenance
0,04 to 0,5	°)	1/two years	1/eight years	1/three years	According to the need °°°)	According to the need °°°)
0,5 to 5	°)	1/year °°)	1/seven years	1/two years		
5 to 12	°)	1/year °°)	1/five years	1/year		

°) – in the interval between two subsequent functional checks  
°°) – but at least within 18 months  
°°°) – to be understood as corrective maintenance or replacement of the failed equipment  
(1) - national standard: UNI 10702 (pressure reduction stations of the distribution system with inlet pressures from 0,04 bar to 12 bar)  
(2) - proposal 2004 for new national regulations dealing with "Technical regulation on the minimum requirements for the design, construction and operation of distribution works and direct lines for natural gas density no greater than 0,8". (<http://europa.eu.int/comm/enterprise/tris/>)

**Verification of mechanical integrity of metallic pressure containing parts of regulators and of associated safety devices:**

- Frequency: to be defined (for similar equipment 1/ten years)

Italian regulations: proposal 2004 for new national regulations dealing with "Technical regulation on the minimum requirements for the design, construction and operation of distribution works and direct lines for natural gas density no greater than 0,8". (<http://europa.eu.int/comm/enterprise/tris/>)