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WORKING PARTY ON GAS

Meeting of Experts on the Transport
and Storage of Gas
Twenty-fifth session, 6-7 September 1994

MAINTENANCE OF THE GAS TRANSPORTATION PIPELINE SYSTEMS

(Transmitted by the Governments of Croatia, Germany,
Hungary and the Netherlands)*

Croatia

1. Regular pipeline maintenance

General part

1.1. Philosophy

1.1.1. Yes, pressure test, measurement the pipeline wall, measurement the pipeline insulation.

1.1.2. -

1.1.3. Yes

* In accordance with the decision of the Meeting of Experts at its twenty-fourth session, held in September 1993 (ENERGY/WP.3/GE.3/6 para. 5 (a)).

Part maintenance systems and intervals

1.2. Maintenance of pipeline

- 1.2.1.
 - 1. Yes, twice a year
 - 2. Yes, once a week
 - 3. -
 - 4. Yes, once in two years
 - 5. Yes, with detectors "SEVERIN"
- 1.2.2.
 - 1. Yes, sometimes, in case of need
 - 2. Yes, in case of need pressure test with water or inert gas
 - 3. Yes, by low
- 1.2.3. Yes, in case of need
- 1.2.4.
 - 1. Yes, once a week
 - 2. Yes, visually, when the water level is low
 - 3. Yes, once a year, with gas detector
- 1.2.5.
 - 1. Yes

1.3. Cathodic protection (CP) and insulation of the pipelines

- 1.3.1. Yes, four times a year, method RP 0189-92
- 1.3.2. Yes, Pearson's method and measurement alternation factor
- 1.3.3.
 - 1. -
 - 2. Yes
 - 3. Yes
 - 4. Yes
 - 5. Yes, criterion: damage > 100 m³

1.4. Maintenance of section and branch-off valves (SBV)

- 1.4.1.
 - 1. Yes, once a week
 - 2. Yes, once a month
 - 3. Yes, once a month

1.4.2. Yes, once a month

1.4.3. -

1.5. Special winter operations on distribution facilities

- 1.5.1. Yes, cooling method; tolerable limit -9°C
- 1.5.2. Yes, drying and inhibiting
- 1.5.3. Yes, inhibitor: methyl alcohol; glycol, silicagel

1.6. Maintenance of electric installations and grounding

1.6.1. Yes, once a year

1.6.2. Yes, once a year

1.6.3. Yes, once a year

2. Maintenance of technological equipment

2.1. Gas dehydration plant

2.1.1. Yes, twice a year

2.1.2. Yes, twice a year

2.1.3. Yes, once a year

2.1.4. Yes, once a year

2.1.5. Yes, once a year

2.2. Gas preparation and compressor plant

2.2.1. Yes, 1-2 a year

2.2.2. Yes, 1-2 a year

2.2.3. Yes, 1-2 a year

2.2.4. Yes, 1-2 a year

2.2.4. Yes, once in two years

2.2.5. Yes, once in two years

2.2.6. Yes, once a year

2.2.7. Yes, once a year

2.2.8. Yes once a year

2.3. Cooling system

2.3.1. Yes, once in two hours

2.3.2. Yes, once in two hours

2.3.3. Yes, once in two hours

- 2.3.4.
 - 1. Yes, once a year
 - 2. Yes, once a year
- 2.3.5. Yes, criteria: >25,000 working hours of compressor
- 2.4. Compressor units
- 2.4.1. -
- 2.4.2. Yes, every two hours
- 2.4.3.
 - 1. Yes, every two hours
 - 2. Working parameters (P,T..)
- 2.4.4. Yes, general repair after 25,000 working hours
- 2.4.5.
 - 1. Yes, on time ensure spare parts
 - 2. -
- 3. Regular maintenance on measurement and regulation system (MRS)
- 3.1. Maintenance of MRS
- 3.1.1. Yes, once a week
- 3.1.2. Yes, once a week
- 3.1.3. Yes, once a year
- 3.1.4.
 - 1. For whole paragraph 3.1.4.
 - 2. Visual control - once a week
 - 3. Functional control - once a month
 - 4. State official: calibration once in every five years
 - 5. -
 - 6. -
 - 7. -
 - 8. -
- 3.2. Intervals - once a year
- 3.3. Intervals - once a year
- 3.4.
 - 3.4.1. -
 - 3.4.2. -
 - 3.4.3. -
- 4. General information of system used for registration and statistics of maintenance and damages
- 4.1. -
- 4.2.
 - 1. -
 - 2. -

- 4.3.
 - 1. Yes
 - 2. Yes
 - 3. Yes
 - 4. -
- 4.4. Yes, in last few years
- 4.5. Elimination of disturbances and damage
 - 4.5.1. Yes
 - 4.5.2. Yes
 - 4.5.3. Yes
 - 4.5.4. Yes
 - 4.5.5. Yes
 - 4.5.6. Yes
 - 4.5.7. Yes
 - 4.5.8. Yes
- 4.6. Repairs on the pipelines under pressure - for temporary repair
- 5. Exchange of experiences
 - 5.1. Yes
 - 5.2. Yes
 - 5.3. -
 - 5.4. -

Germany

- 1. Regular pipeline maintenance
 - 1.1. Philosophy
 - 1.1.1. Yes, pipeline integrity management
 - 1.1.2. No
 - 1.1.3. Yes: DVGW-Richtlinien G463, G466/I, G468, G469, G491, G492/II, G497
 - CEN)
 - ISO 9000) EC standards in preparation

1.2. Maintenance of pipeline

1.2.1. Survey of the right of way (r.o.w.)

1. Walking: once a year
2. Driving: for risky points once in four months
3. Aerial control: yes, twice a month
4. Yes
5. Yes, remote controlled system, FID (flame ionized detectors)

1.2.2. Survey of landslides areas, how is it performed

1. -)
2. Yes) in Germany only in areas with coal mining of importance
3. -)

1.2.3. Survey of inundated areas

See 1.2.1.

1.2.4. Checking and maintenance of river and/or road crossing

1. Yes
2. Yes
3. Yes

1.2.5. Keeping of records on computers

1. Yes
2. Yes

1.3. Cathodic protection (CP) and insulation of the pipelines

1.3.1. Measurements of CP Potential

Cathodic potential measurements are made once per year. The potentials measured have to be within the following limits:

Minimum pipe-to-soil potential is - 0.85 Volt
Maximum pipe-to-soil potential is - 1.50 Volt

1.3.2. Survey of insulation status (indicate method used)

Isolations test with 10/20,000 Volt

1.3.3. Provisions made if error is found on:

1. Pipeline and casing in touch

Earth is evacuated above the pipe and contact of pipeline and casing is removed.

2. In case of an interference caused by a forcing plant the fault is deflated by connecting a drainage bond so that no potential difference or interference occurs.
3.) appropriate measures are
4.) taken to remove defect or
5.) repair damages

1.4. Maintenance of section and branch-off valves (SBV)

1.4.1. Regular checking of SBV operation

1. Yes, once per year
2. Yes, once per year
3. -

1.4.2. SBV instrumentation equipment checking

Yes

1.4.3. Checking of tightness (method used)

Yes, leakage spray

1.5. Special winter operations on distribution facilities

No

1.6. Maintenance of electric installations and grounding

1.6.1. Control of electric installations

Yes, once a year

1.6.2. Measurement of the grounding system of the above-ground installations

Yes

1.6.3. Check-up of the gas ramp in a boiler room and control of the pump drive

Yes, gas leak tests are performed by using foam

1.7. On-line inspection (pigging operation)

1.7.1. Regular/random system used

Yes, regular

1.7.2. If regular system is used, what is frequency and purpose

Yes, 5-10 years

Purpose is to detect corrosion and to detect differences in the condition of the line by comparing the results with previous inspections and/or with measurements of cathodic protection

1.7.3. Type of intelligent pig used

Mainly British Gas

2. Maintenance of technological equipment

2.1. Gas dehydration plant

2.1.2. Yes

2.2. Gas preparation and compressor plant

2.2.1.)
-) Yes, yearly
2.2.8)

2.3. Cooling system

2.3.1.)
-) Yes
2.3.5.)

2.4. Compressor units

2.4.1. Philosophy

No general philosophy, mainly producers instructions but different from company to company and from type of compressors used

2.4.2. Lubrication system check-up

Yes

2.4.3. System of check-up and maintenance if time based

Yes, intervals

2.4.4. Regular diagnostic system

Yes

2.4.5. Statistics of disturbances

1. Yes
2. Yes

3. Regular maintenance on measurement and regulation system (MRS/SCADA)

3.1. Maintenance of MRS

3.1.1.)

-) Yes

3.1.3.)

3.1.4. Measuring equipment control

1. Yes)

2. Yes)

3. Yes)

6. Yes) weekly, monthly and yearly check-up

7. Yes)

8. Yes)

3.2. Checking and adjustment of the station telemetry indicators

Measurement and alarms at every station are compared from the control panel and computers

3.3. Checking and adjustment of MRS of heating system and heat exchangers

Yes, when temperature is over the upper limit, the burner system should be closed

3.4. Border station control

3.4.1.)

-) Yes

3.4.3.)

4. General information system used for registration and statistics of maintenance and damages

Yes, company specific information systems in use

4.1. Do you use any system of planning and control of the maintenance works on PC with specially adapted software?

Yes, but company specific developments such as MES (Maintenance engineering system)

4.2. What is the frequency of damages on your pipeline system in a 1-year period/10-year period?

No statistical data are available for Germany. Only very few damages and hardly any line breaks occur

4.3. Sources of damage of high pressure main gas pipelines

- 2. Yes
- 3. Yes

4.4. Gradual improving of pipelines and MRS gravity of checking (with ageing of them - state the contents of modification of control system)

Yes, pipeline integrity management, which includes mainly intelligent pigging and intensive cathodic protection measurements

4.5. Elimination of disturbances and damage

- 4.5.1.)
-) Yes
- 4.5.4.)
- 4.5.5. No
- 4.5.6.)
-) Yes
- 4.5.8.)

4.6. Repairs on the pipeline under pressure (methods used for temporary and for stable repair)

The method used depends on the kind and extent of the damage. All state of the art methods are used.

5. Exchange of experiences

- 5.1.)
-) No
- 5.2.)
- 5.3. Yes

Hungary1.2. Maintenance of pipeline

1.2.1. Survey of right of way. (r.o.w.)

- 1. Two times a month. If there is checking from air the pipeline is checked monthly.
- 2. There's no.
- 3. Two times in a month.

4. The r.o.w. is cleared every year if necessary. Our practice shows that two years frequency is enough.
5. After every five years the r.o.w. is controlled by instrument. (Flame ionised detector, type Pastafid M2)

1.2.2. Survey of landslides areas.

There's no landslides in Hungary too often. If necessary the r.o.w. is stabilized in the potential dangerous area. Plastic net in combination grass is used for stabilization.

Because most of the cases the r.o.w. is fast in Hungary, till this time wasn't necessary to measure the stress of the pipeline or geodetically measure pipeline displacement.

1.2.3. Survey of inundated area.

Usually there's no pipeline r.o.w. in such area what is inundated for long period. We carry out any checking in the dry period.

1.2.4. Checking and maintenance of river and/or road crossings.

1. There's no trunk lines on bridges in Hungary.
2. After every five years are checked the river crossings. I except the authorities prescribe other frequency. We use divers to check the position of the pipeline and survey in the river bed by ultrasonic instrument.
3. After every five years each sleeve is checked. If there's short circuit or the carrier pipe touches the sleeve we plane the repair of the crossing.

1.2.5. Keeping of records on computers.

1. The data of the measurement of the cathodic protection level are stored on computer.
2. Typical work order are stored on computer only.

1.3. Cathodic protection (C.P) and insulation of the pipelines

1.3.1. We use cupric sulphate electrodes and voltmeters. The minus 0,85 Volt is accepted limit value.

1.3.2. Insulation status is controlled if the cathodic protection doesn't work well, or after every five years.

The first and most important checking of insulation is carried out under the construction of the pipeline.

After so-called intensive measurement will be carried out with the above-mentioned frequency.

For the intensive measurement of the insulation is used millivolt meter. On a certain place the wire is connected to the pipe, and the other electrode connected to the ground above the pipeline.

If somewhere the insulation is damaged this fault of insulation is compared temporary by the setting of the level of the cathodic protection.

If the insulation is damaged on a big surface of the pipe, the insulation will be replaced.

1.3.3. Provision made if error is found on:

1. In case of touch of pipeline and sleeve it will be repaired within two or one year.
2. If the interference of other facility is dangerous usually is planned additional protection for the certain pipeline section, or the facility will be removed that area.
3. In the case of interruption of C.P. current within a certain period the C.P. system will be checked and repaired. (Three days).
4. Same case than above.
5. There's no exact criterion. If the necessary level of the protection can not be reached by the new setting of the cathodic current or it isn't economic, necessary the replacement of the damaged insulation.

1.4. Maintenance of block valves

1.4.1. Regular checking of block valves.

1. Two times in a year are carried out laval control.
2. Yearly.
3. Yearly.

1.4.2. After every half year.

1.4.3. After every five years, but if there is certain reason.
(Method: The pipeline will be compressed up to the allowed operating pressure, next step the closing of block valves, and the control of the pressure drop.)

1.5. General winter operations:

1.5.1. Cleaning by pigs, frequency about two month.

1.5.2. Measurement of dew-point of water in gas

- There are built-in special Endress-Hensen dew-point meter instruments.
- Tolerable limit: 0,17 g water/m³ gas.

1.5.3. Control of hydrate formation: inhibition.

1.5.4. Inhibition: Dosage of methanol by special pumps.

1.6. Maintenance of electric installations and groundings

1.6.1. After every year.

1.6.2. After every five years.

1.6.3. Only explosion proof pump drive and other equipment are used in boiler rooms, or in the metering and regulating stations.

1.7. On-line inspection

1.7.1. Random system is used.

1.7.3. Magnetic flux type intelligent pig is used.

2. Maintenance of technological equipment

2.1. Gas hydration plant

2.1.1. Measurement of dew-point by special built-in dew-point meters or Penemetrius Model 250 instrument in laboratory.

2.1.2. Types of used chromatographs: Daniel, Crompack-Packard, Hitachi.

2.1.3. Check up the concentration of glycol by refractometer.

2.1.4. Every pump has a reserve unit and they're serviced by systematic control maintenance.

2.1.5. Each of important working parameters are controlled by the central computer. Primer instruments are controlled by the operations in every hours.

2.2. Gas preparation and compressor plant

- 2.2.1. Check-up of valves: according to necessity but at very standstill.
- 2.2.2. Lubrication of valves: according to necessity, but in every three month.
- 2.2.3. Regulation valves are checked up visually by the operators in every shift.
- 2.2.4. Vessels under pressure are checked up visually by the operations in every shift. On the other way there are accurate checking by a specialist in every five years.
- 2.2.5. Safety valves control: After every working out at least yearly.
- 2.2.6. Alarm equipment control: Weekly.
- 2.2.7. Five protection system check-up: Monthly.
- 2.2.8. The anti-pumping devices are pulsation-vessels. Checked up in every half year.

2.3. Cooling system

- 2.3.1. Visual investigation: In every shift by the operators.
- 2.3.2. Working parameters are controlled by the central computer and the operators check the instruments in every hour.
- 2.3.3. Defection and pressure transmission to the
- 2.3.4.1. External surface cleaning: every three month.
- 2.3.4.2. Internal surface cleaning: at every standstill and yearly.
- 2.3.5. General repair: according to necessity.

2.4. Compressor units

- 2.4.1. The maintenance of the compressors is based on producer's instructions. The producer's instructions based on control systems are used in Hungary in general.

There are different types of compressor units in Hungary.

Specification	Nuovo Pignone	Solar	Ingersoll Rand
Lubrication System	After 8 000 working hours	After 8 000 working hours	After 8 000 working hours
System check-up and maintenance	After 32 000 working hours	After 8 000 working hours	After 8 000 working hours
Combustion chambers	After 8 000 working hours	-	-
Cleaning with detergent	-	After 200 working hours	After 200 working hours
Vibration control	-	After 1 000 working hours	After 1 000 working hours

Generally comment:

In case of Nuovo Pignone compressor unit started the control of units by defectoscopy method is suggested by producer.

2.4.5. We have records about disturbances

2.4.5.1. Yes, when necessary the unit is repaired and spare parts are replaced.

2.4.5.2. Usually disturbances are reported for the producer.

3.1. Maintenance of MRS

3.1.1. In the main dispatching centre and in the local dispatching centres are controlled all the important parameters of MRS and SCADA. If there's any disturbances will be classified and depend on the classification the disturbances will be eliminated or repaired.

3.1.2. Yearly, and if necessary.

3.1.3. It's replaced if necessary.

3.1.4. Standard: MSZ 1709

Code: OMH HSZ 64

Issued by Hungarian Metering Authority.

3.1.4.1. Orifice: After every two years necessary calibration, except if any element of the metering circuit within this period will be damaged.

3.1.4.2. Turbine meter: The turbine itself is calibrated after 5 years, all the other elements of the metering circuit ho to be calibrated after two years.

3.1.4.3. Rotating piston meter

Only few rotating piston meters are working in Hungary. The Hungarian Metering Authority doesn't give calibration for the hole metering circuit, only for the elements of the metering circuit separately.

3.1.4.4. After two years are controlled.

3.2. There is a continuous checking from the dispatching centres, and regular local checking after every half year.

3.3. If necessary. They are controlled from the dispatching centre continue by. Regular local checking and/or adjustment are carried out after half year.

3.4.1. Yes, monthly.

3.4.2. After two years calibration and if necessary control and adjustment are carried out.

3.4.3. There are metering stations on both side of border, and the measured gas quantities are compared.

4. The quantities and types of equipment used for the maintenance and repairs are registered. All disturbances and faults are registered.

4.1. A special software is developed for the system planning and control of the maintenance works.

4.2. In general serious damages are observed twice a year.

4.3.2. The main source of the damage is the so-called third party damages.

4.4. There is no such kind of procedure in Hungary.

4.5.1. There are self made codes for the elimination of the damages.

4.5.2. Based on our practice are used regular maintenance activity only partly. In the last few years the metering and control system (SCADA) was developed quick along the Hungarian network. The operation staff able to collect all necessary measured data for the maintenance activity. This it means everything are repaired if necessary within a certain period.

4.5.3. There is a code for safety.

The title of the code is: Code for the safety of the gas industry.

4.5.4. The staff of the maintenance and operation activity are trained once a year.

- 4.5.5. On duty at home.

Approximately 100 person are for 6,000 km long pipeline network and about 260 MRS.
- 4.5.6. The responsibility of the chief is following: if there is a damage along the pipeline network to make the decision whether necessary to repair at once or later. If yes, they mobilize the other staff on duty.
- 4.5.7. It happened by public phone and fax.
- 4.5.8. The pipeline breakdown is reported for the police, and the local fire brigade, local municipality and regional Mining Authority and Environment Protection Authority.
- 4.6. In some cases small leaks are repaired under pressure with sleeves. There are two types of above-mentioned sleeves: welded and bolted ones.
- 5. In Hungary there is only one company, the MOL Plc, who has got experts in the field of the operation and maintenance of the gas trunk lines. This is why there is not too much possibilities for exchange experience with independent staffs or companies.

Netherlands

- 1. Regular pipeline maintenance
- 1.1. Philosophy
- 1.1.1. Do you have any system of checking and/or maintenance of pipelines based on the age of the line? If yes, which one?

Yes, but it isn't based on the age of the pipeline. The system is used for all pipelines, no matter what age. It's a system of instructions for regular checking and/or maintenance.
- 1.1.2. Is there any relationship between economical and technical factor in considering on operating life of pipeline?

No.
- 1.1.3. Is there any regulations (by law, by State-official order ...) for checking/maintaining/repairing/reconstructing system?

Yes: NEN 3650
CEN/TC 234, wg 3. In preparation
ISO TC 67, SC 2. In preparation

1.2. Maintenance of pipeline

1.2.1. Survey of the right of way (r.o.w.)

1. Once a year.
2. Main transmission system: The pipelines without helicopter survey once every two weeks.

Regional transmission system: The pipelines without helicopter survey once every two weeks.
3. Main transmission system: Once every two weeks. Regional transmission system: Once every two weeks for agreed parts of this system.
4. Yes.
5. -

1.2.2. Survey of landslide areas, how is it performed.

Not applicable. We have no landslide areas in the Netherlands.

1.2.3. Survey of inundated areas.

See 1.2.1.

1.2.4. Checking and maintenance of river and/or road crossings.

1. Yes
2. Yes
3. Yes

1.2.5. Keeping of records on computers.

1. Yes
2. Yes

1.3. Cathodic protection (CP) and insulation of the pipelines

1.3.1. Measurements of CP potential (method used).

- Volt measurement on rectifier installations. Regular visual check, six times a year and additional incidental check (for instance after thunderstorm).
- Volt measurement of railroad draining installations. Visual check, 12 times a year.
- On-potential measurement. Every measuring point is checked twice a year. Minimum pipe-to-soil potential is - 0.85 volt in aerobic ground, - 0.95 Volt in anaerobic ground.

- Potential recording device. Used in places with stray current.
- Pen-current measurement. Used for pipelines near electrified railroads. It is used to check for stray current interfection.
- Potential measurement of casings and sheet-pile wall. The frequency is twice a year.
- On-potential measurement on both sides of insulation coupling. The frequency is twice a year.
- Voltage drop (IR-drop) measurement. Used to locate metallic contact with third parties.
- Measurement of equipotential lines. Used to locate objects (for instance valves).

1.3.2. Survey of insulation status (method used)

- Current demand measurement. Used to determine the quality of the coating.
- Pearson measurement. Used to locate errors in the coating.
- DC potential gradient measurement. Used to locate errors in the coating.
- Line tester. Used for new pipelines.

1.3.3. Provision made if error is found on:

1. Earth is evacuated above the pipe and contact of pipeline and casing is removed.
2. Near railways the potential difference is taken away by using a draining installation. Interference caused by a high voltage cable is in study.
3.) Appropriate measurements are
4.) taken to remove defect or
5.) repair damage.

1.4. Maintenance of section and branch-off valves (SBV)

1.4.1. Regular checking of SBV operation

1. Yes
2. Yes
3. Yes

1.4.2. SBV instrumentation equipment checking

Yes, once a year. Telemetry is checked twice a year.

1.4.3. Checking of tightness (method used)

Yes, if possible depressurize the valve housing.

1.5. Special winter operations on distribution facilities

1.5.1. Cleaning (pigs, balls, ...) - frequency, purpose

Sometimes a pipeline is cleaned when the pressure drop is too big. The purpose is to improve the capacity of the pipeline.

1.5.2. Measurement of dew-point of water in gas (method used, tolerable limit)

On-line measurement at specific points in the transmission system. The Hygramat 1100 is used as measuring instrument. Incidentally a dewscope is used.

During the start-up the dewpoint of new pipelines is measured with a dewscope.

1.5.3. Control of hydrate formation (drying/inhibiting/other method)

1.5.4. Inhibition of hydrate formation (if is used - which system and inhibitor)

Methanol is injected when the measured dew point exceed the tolerable limit.

1.6. Maintenance of electric installations and grounding

1.6.1. Control of electric installations

Yes, once every five years. Office buildings are inspected once a year.

1.6.2. Measurements of the grounding system of the above-ground installations

See 1.6.1.

1.6.3. Check-up of the gas ramp in a boiler room and control of the pump drive

Yes, incidentally foam is used to check the gas release. In case of a pump failure there is an automatic switch over to the second pump.

- 1.7. On-line inspection (pigging operation)
- 1.7.1. Regular/random system used

 Random system.
- 1.7.2. If regular system is used, what is the frequency and purpose?

 Once every 5 years 100 kilometre is inspected. Purpose is integrity proving.
- 1.7.3. Type of intelligent pig used

 Magnetic flux pig from British Gas.
- 2. Maintenance of technological equipment
- 2.1. Gas dehydration plant

 Not applicable. Gasunie does not have dehydration plants.
- 2.2. Gas preparation and compressor plant
- 2.2.1.)
--) Yes
- 2.2.8.)
- 2.3. Cooling system
- 2.3.1. Visual investigation

 Yes
- 2.3.2. Working parameters control

 Yes
- 2.3.3. Pressure drop measurement

 Yes
- 2.3.4. Cooling system cleaning

 No, only if required.
- 2.3.5. General repair (criteria applied)

 Replacement after 20 years service, indicative.

2.4. Compressor units

2.4.1. Philosophy

The philosophy is based on running hours or starts/stops.

2.4.2. Lubrication system check-up

Yes

2.4.3. System of check-up and maintenance if time based

Yes, based on running hours or yearly till four years periods.

2.4.4. Regular diagnostic system (which type is used, intervals)

2.4.5. Statistics of disturbances

1. Yes, recording of alarms, trips and failures.
2. Yes.

3. Regular maintenance on measurement and regulation system (MRS)/SCADA

3.1. Maintenance of MRS

3.1.1. Check-up of MRS and telemetric lines, checking of interconnection with local MRS

Yes

3.1.2. Adjustment of regulation and protection system

Yes

3.1.3. Restoration of vital parts of MRS

Yes

3.1.4. Measuring equipment control (interval, range, is there any State-official order)

1. Yes, once a year.
2. Yes, twice a year.
7. Yes, twice a year.
8. Yes, twice a year.

State official order for point two, seven and eight.

3.2. Checking and adjustment of the station telemetry indicators

Yes, once or twice a year.

3.3. Checking and adjustment of MRS of heating system and heat exchangers

For the heating system monthly, yearly and four yearly inspections are used.

In every area two heat exchangers are inspected per annum.

3.4. Border station control

3.4.1. Visual check-up of installation

Yes

3.4.2. Control and adjustment of measuring equipment

Yes

3.4.3. Comparative control of the measured gas quantities

Yes, calibration with calibration gas and check-ups with test gas. At little border stations automatic gas sampling is used.

4. General information of system used for registration and statistics of maintenance and damages

We use a Maintenance Information System. These are specially designed in-house software applications. Also a registration system is used for compressor stations.

4.1. Do you use any system of planning and control of the maintenance works on PC with specially adapted software

Yes, the above-mentioned Maintenance Information System is used.

We don't use a software application for the planning of maintenance on compressor plants. Another system is used.

4.2. What is the frequency of damages on your pipeline system in a 1-year period/10-year period

No statistical data are available for the Netherlands. Only very few damages occur.

4.3. Sources of damage of high pressure main gas pipelines

2. Yes

3. Yes

4.4. Gradual improving of pipelines and MRS gravity of checking (with ageing of them - state the content of modification of control system)

Our maintenance system is used for all pipelines and MRS, no matter what age.

4.5. Elimination of disturbances and damage

4.5.1. Technological programmes for elimination of damages

Yes

4.5.2. Design system modification on operation and maintenance knowledge

Yes

4.5.3. Safety instruction for the gas pipeline systems

Yes

4.5.4. Training of damage repair team

Yes

4.5.5. On-duty at home

No, on-duty personnel are attainable by sematone in a limited area.

4.5.6. Responsibility of chief on-duty

Yes

4.5.7. Information system for the officials

Yes

4.5.8. Cooperation with public organizations in case of pipeline breakdown (police, firemen, etc.)

Yes

4.6. Repairs on the pipelines under pressure (method used for temporary and for stable repair)

The method used depends on the kind of damage.

5. Exchange of experiences

5.1. System of regular pipelines and MRS check-up

Yes

5.2. Causes and statistic frequency of damages affecting the pipelines

Yes

5.3. Hazard elimination programmes

Yes
