

RESTRICTED

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COMMITTEE ON ENERGY
WORKING PARTY ON GAS

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MAINTENANCE OF THE GAS TRANSPORTATION PIPELINE SYSTEMS

(Transmitted by the Government of Turkey)*

1.2 Maintenance of pipeline:

1.2.1 Survey of the right of way (r.o.w.), how it is performed:

1. Walking.
Once in a year, by using leak detectors.
2. Driving.
For risky points (river crossing, railway, highway etc.), once a month. During rainy seasons, more frequent for river crossing.
3. Using of helicopters.
No aerial control.
4. Clearing of the r.o.w. and accesses to the plants.
Only seasonal agricultural activities on r.o.w. are permitted.
Weeds are cleared in case of necessity.

* In accordance with the decision of the Meeting of Experts at its twenty-third session, held in September 1993 (ENERGY/WP.3/GE.3/4 para. 4(b)).

5. Detection of leakages, e.g. instruments used.
For the control of r.o.w. flame ionized detectors and for general purposes sniffers are used.

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

1. Bridges.
No bridge crossing.
2. Underwater crossing.
3. Casings.
Checking with detectors and taking cathodic protection readings for such places.

1.2.5 Keeping of records on computers (working orders).

After programmed maintenance works executed, these works are recorded on computer. If required, computer lists information for each instruments for up to one year.

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

1.3.1 Measurements of CP potential (indicate method used).

Cathodic protection potential measurements are taken with respect to a copper-copper sulphate electrode placed on the ground surface above the pipeline by means of a voltmeter. If the values read are greater than -0,85 volt, the cathodic protection system will be accepted as satisfactory. These measurements are made four times per year. According to the Turkish Standards, the potentials measured have to be in the following limits:

Minimum pipe-to-soil potential is -0,85 volt
Maximum pipe-to-soil potential is -1,5 volt

1.3.2 Survey of insulation status (indicate method used).

At ampermetric test points first, U is measured by means of a voltmeter then, R is measured by means of a megger which measures resistivity.

Finally, I_p is calculated from the following equation and these values are recorded. ($I_p = U/R$).

If the value of I_{p2} is greater than the value of I_{p1} , it means:

They might be:

- (a) Insulating joint is defective;
- (b) Insulation damage;
- (c) Environmental conditions are changed

(Ip2 is measured three months later than Ip1).

1.3.3 Provision made if error is found on:

1. Pipeline and casing in touch:

First earth is excavated above the pipe, then the electrical contact occurred between the pipe and the casing is defeated.

2. Influence or interference of another facility:

In case of an interference caused of a forcing plant the fault is defeated by connecting a drainage bond (resistor) so no potential difference or interference occurs.

3. Interruption or reduction of CP Current:

The reason for this problem is surveyed.

For example: Is the transformer rectifier on?

Is the groundbed cable alright?

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

1.4.1 Regular control of SBV operation:

1. Local control:

A performance test is applied to the section valve by means of the actuator system drive. (Four times per year).

2. Remote control:

A performance test is applied to the section valve by means of the signals which are sent from the dispatch centre. (Four times per year).

3. Line damage automatic shut-off system check-up:

An automatic shut-off test is applied by changing the sensor gas pressure values. (Four times per year).

1.5 Special winter operations on distribution facilities:

1.5.1 Measurement of dew-point of water in gas (method used, tolerable limit):

Dew-point of water in gas is measured at metering stations of Botas pipeline system by means of hygrometers and mobile dew-point testing devices.

Tolerable limit is 50 mgH₂O/m³.

1.5.2 Controls of hydrate formation (drying/inhibiting/other method).

1.5.3 Inhibition of hydrate formation:

Gas heaters are installed to avoid the formation of liquid hydrocarbons and water as a result of pressure reduction. The gas heaters are designed to raise the temperature of the gas such that after pressure reduction, the temperature of the gas is at least 10° C above the dew-point temperature at operating conditions and maximum flow. For severe winter conditions, controlled methanol injection is performed to the pipeline.

1.6 Maintenance of electric installations and grounding:

1.6.1 Electrical installations are controlled monthly.

1.6.2 The grounding system of the above-ground installations are measured twice a year. If the values read are greater than the values indicated in the original project the fault is defeated.

1.6.3 Check-up of the gas ramp in a boiler room and control of the pump device:

Gas leak tests are performed by using foam devices every six months.

2. Maintenance of technological equipment. (Two times per year):

2.1.1 Measurement of dew-point:

Temperature and pressure sensors are calibrated. Moisture probe is cleaned and controlled.

2.1.2 Chromatographic analysis. (Two times per year):

Salenoid valves are cleaned. Filters are changed. Test points are measured.

2.2 Gas preparation and compressor plant:

2.2.1 Check-up of valves:

These valves are checked-up in every three months by the following methods:

- Visual inspection
- Sealing control

2.2.2 Lubrication of valves:

- If the valve has got a gear system, this system is lubricated every three months.

- If the valve has got a sealing problem, it is lubricated by the sealing-grease.

2.2.5 Safety valves control:

A performance test is applied to the safety valves and their set values are changed if it is necessary. (Four times per year).

2.2.6 Alarm equipment control. (Two times per year):

It is controlled if proper alarms are produced when the related instruments are calibrated. (Related unit is shutdown).

2.2.7 Fire system check-up. (Two times per year):

Before controlling, the station is done to shutdown and extinguishing system is disconnected. Applying smoke and gas to sensors, levels and produced alarms are controlled. If necessary they are calibrated on the boards.

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

3.1 Maintenance of MRS:

3.1.1 Check-up of MRS and lines adjustment:

MRS's are checked-up every three months.

3.1.2 Adjustment of regulation and protection system:

The regulators set values and the protection systems are checked-up every three months.

3.1.3 Restoration of vital parts of MRS:

The vital parts of MRS that completed their service hours are substituted by the spare ones.

3.1.4 Measuring equipment control. (Two times per year):

On flow measurements on MRS are used either venturimetric (orifice, DP, pressure, temperature, chromatograph, flow computer) or volumetric (turbine meter, pressure, temperature, corrector) method.

Pressure transmitters are calibrated by dead weight tester and multimeter. Temperature transmitters are calibrated using resistance box and multimeter. Temperature sensors are controlled by temperature bath. Differential pressure transmitters are calibrated using small air pump and multimeter.

3.2 Control and adjustment of the station telemetry indicators:

Measurements and alarms at every station are compared from control panel and computers. If there is difference it is corrected and/or repaired.

3.3 Control and adjustments of MRS of heating system and heat exchangers.
(Two times per year):

First time heating system is controlled when it is running. When temperature is under the lower limit, the burner system should be opened.

When temperature is over the upper limit, the burner system should be closed.

Mixing valve is controlled by station controller.

Instruments on the heating system are controlled by proper equipment simulating temperature and pressure.

3.4.2 Control and adjustment of measuring equipment:

As 3.1 and 3.2

3.4.3 Comparative control of the measured gas quantities:

Electronical measurements and Chart recorder is compared.

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

4.1 We are using our own programming for maintenance records.

4.2 For one year period, some equipment had failed once.

4.3 Sources of damage of high pressure main gas pipelines:

4.3.1 There has never been any damage to the pipeline because of the C.P. system.

4.3.4 Natural causes (landslides, earthquakes, etc.):

Our natural gas pipeline is damaged two times because of the landscapes in 1989 and in 1990.

4.4 Gradual change of pipeline and MRS gravity control.

4.5 Elimination of disturbances and damage:

4.5.3 Safety instructions for the gas pipelines systems.

Botas has a "General Gas Pipeline Safety Instructions" which is covering:

- Usage of personal protective equipment.
- Organization of safety staff and pipeline operations in normal and emergency cases.

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

Botas is a relatively new gas transmission company, and has not yet faced a pipeline emergency where it is necessary to mobilize personnel and equipment in order to effect repairs on a severely damaged pipeline section or compressor. Botas has "Emergency Notification Process" in which relations with public organizations are defined.
