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THE CONDENSATION HOLDER – USEFULL PART OF GAS PIPPELINES SYSTEMS OR POTENTIAL ACCIDENT LOCATION

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ABSTRACT

The collectors of all impurities and liquids, so called condensation holders are proposed, by project documentation, for the natural gas safety transport through maingaspipelines. Nevertheless the natural gas preparation is ready for usage, it is not fully clean, and during transportation, it collects various impurities in solid and liquid condition. These ballasts have to be separated by gravitation, to condensation holders, in order to stop their flow to customers. Condensation holders are connected to gas pipeline on down side and their quantity depends on field configuration and pipeline length.

All that can be applied in keeping the integrity of natural gas pipelines (non-destructive testing,intelligence cracers, cleaning, cathodic protection etc) can be partially applied and not applied at all for the condensation holders integrity. Because of that, the condensation holders are potential accident locations.

Problems connected with the condensation holders and experience during testing and maintaining of the condensation holders in Company JP "Srbijagas" are described in this paper.

Keywords: Gaspipeline, natural gas, condensation holder, impurity-ballasts

1. THE CONDENSATION HOLDER

The condensation holder is a part of gaspipeline system for natural gas transpot and together with gas pipeline is under ground. It is located on down side of a gas pipe and proposed for impurities and condensation products collecting. The condensation holder body is the pipe with the same diameter and minimum the same steel quality but with bigger pipe wall thickness. Segregation of mechanical impurities and condensation products is connected with gas flowing, and because of gravitation, these ballasts , throw holes which connects gas piipeline and condensation hoder, drops into the condensation holder. Deposited impurities are dischared in the drain pipe - "blow-out pipe" . This procedure is "emptying of condensation holder" and it is necessary to do minimum once per month and after each gas pipeline cleaning. .

Two types of condenastion holder construction exist – one " bottle-type" holders and other " pipe-type" holders wich are on our gas pipelines - presented on the figures 1 and 2.

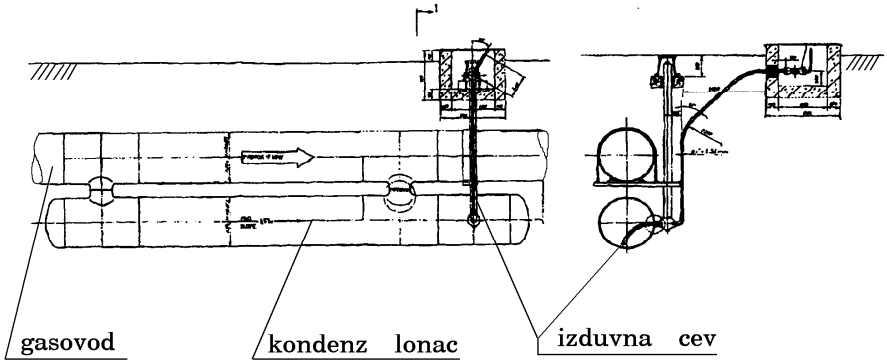

Figure l. The condensation holder – pipe type construction
* pipeline - gasovod
* "Pipe-type" holder - kondenz lonac
* blow out pipe – izduvna cev

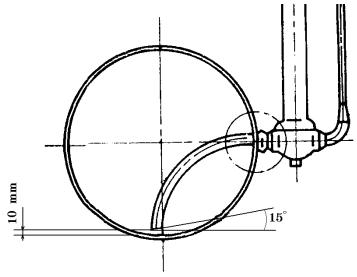

Figure 2. Detail of the blow out pipe inside of the condensation holder with discharge cock

On one gas pipeline may be suited more than one condesnsation holders depending on the field configuration and gas pipeline length. Minimum distance between condensation holders (C) is presented by formula:

$$C = (D \times P \times F) / 48.33 \ (mm) \qquad \text{..... (1)}$$

C – minimum distance between condesnsation holders , mm
D – external diameter of pipe of the condesnsation holder, mm
P – maximum allowed operating pressure , KPa
F – design factor, depending on gas pipeline location class

Gas pipeline is anti-corrossive protected and also with cathodic protection. The same situation is on condensation holders. External system of control, cathodic protection (current and voltage values) and internal pipes control of gas pipelines (with appropriate tools) is possible and acted. But, testing of the inside of condesnsation holders is not possible (because of construction and pipeline connection). Because of that, the composition of deposit is tested during exhausting (dust, condensation products, gas). After explosion of one condensation holder on the main (magistral) gas pipeline, testing of condensation holders started to be neccessary. At this moment, solid deposit which was not possible to go out during exhausting was found.

2. THE FIRST EXAMPLE :

When uncontrolled gas flowing from condensation holder on the main gas pipeline was found (dimensions of condensation holder are: diameter 762 mm, wall thickness, 8.7 mm length 7160 mm) it was planned to repair damage with welding pipe clip made of two parts on condensation holder body according to standard ANSI B 31.8. Wall thickness of condensation holder is measured by length and diameter on positions from 3 to 9 hours of cross section and concluded that loosing of wall thickness is remarkable (internal damages) in this zone and by length of longitudinal weld. External side of condensation holder pipe was not damaged by corrossion, reason is cathodic protection. The decision was to cut condensation holder and test in workshop.

During opening of condensation holder was found that 2/3 of volume is filled with solid deposit. The most of them were clay , earth mixed with clat, corrossion products mixed with water and on the surface fine balck powder.

Near to steel surface from internal side was formed solid phase of corrossion products. On the internal pipe surface of condensation holder, after cleaning, evident are crater corrosion damages, locatedon whole surface with deposit. Evidence of wall thickness loosing is shown on the figure 3. with macrostructure of pipe welded joint . The rest wall thickness is 2,4 mm.

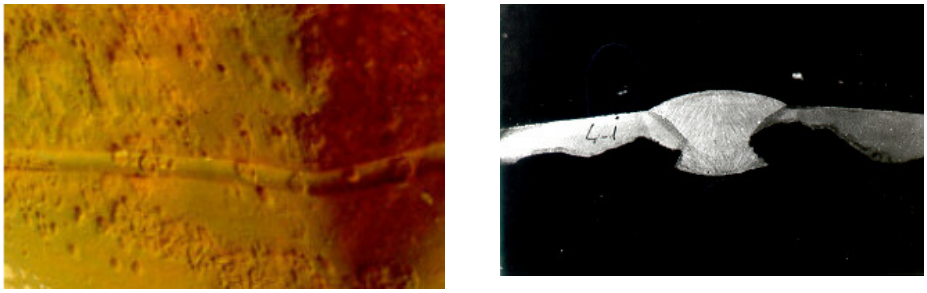

Figure 3. Longitudinal pipe welded joint of condensation holder body

Material degradation is more intensive in HAZ of welded joints and on the boundary of two phases (deposit - gas) connected to position of weld on longitudinally welded pipe (positon 6 h).

3. THE SECOND EXAMPLE :

The condensation holder with dimensions ∅711mm x 7.9 mm, the same length as in the first example. From the dischrage report during exhausting was clean gas without impurities. By radiographic testing it was founded that condensation holder was fullfilled with solid deposid which distribution is presented on the figure 4.

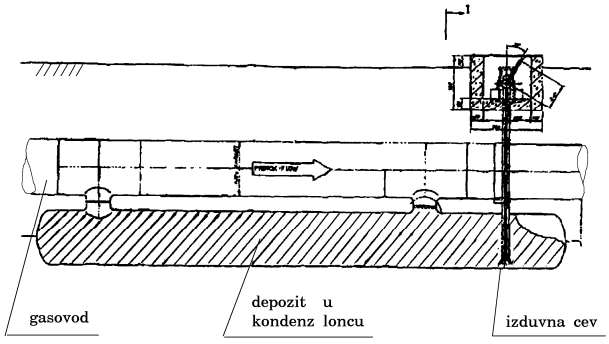

Figure 4. Condensation Pipeholder with deposit

* pipeline – gasovod,

*depozit on pipe-type holder - depozit u kondenz loncu,

*blow out pipe – izduvna cev

Measured wall thicknesses 5,9 – 6,0 mm showed evidence of internal corrossion on one part of pipe condensation holder surface on positions from 3,30 h to 5,30 h on right side nearly inner T piece. But, bigger problem was deposit quantity which was not ablle to remove. .
Revision was conducted on total 8 condensation holders of the main gas pipeline, where was found that all of them are less or more filled with deposit and that removing was impossible..

4. EXPERIENCE FACTS

By this revision of condensation holders it was found that quantities and compositions of deposit and corrossion damages were caused by following mistakes :

4.1 Project
4.2 Montage (during condensation holders and gas pipeline manufactirng) and
4.3 Exploatation

4.1. By project is proposed condensation holder "pipe type". Drain pipe with diameter 50 mm (∅2”), is reduced on condensation holder output to diameter 25 mm (∅1”) and in the case of liquid deposit it deals like siphon - figure 2. But it is shown that it is not appropriate for flow of all impurities, because projected pressure difference during exhausting is not enough (drainage) to suction deposited impurities.
4.2. Earth found inside of condensation holders is caused by unrespected tecnological sequence rules during montage and testing of gas pipeline. During hydraulic testing of gas pipeline, all impurities from pipes are collected to condensation holders , without possibilites to remove it. Also it was founded that during montage was not conducted strong control of the position longitudinally welded joints on pipes. So, this welded joints at the most cases, was located on down zone of condensation holders, which is more sesitive to corrosion caused by deposit. .
4.3. Control of the condensation holders status was able only indirectly by testing quantity and composition of deposit during exhausting. Electrochemical corrossion inside of condensation holders was progressive because condensation holders were not protected from inside.

5. CONCLUSION

Deposits analyses showed that deposit origin is in production also. Sand , minerals and black powder, show that gaspipeline system input is gas which is not enough clean. It shows that cleaning of natural gas is neccessary. Using of condensation holders – potential accident locations because it is not possible to apply appropriate testing or in the future they will be replaced wuth gas separators, that is the question. We think that this problem have to dissolve today with aim safely natural gas transport.

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