



MO34 Project Weekly Theme

Week No. 38



AREA: Quality Control

THEME: BREAKAWAY TEST USING A MAGNET

- **Instruction PNM34484146**, this instruction describes the method of checking welds in terms of the proper use of filler materials in the root of welds.
- During the welding of the pipeline systems on the MO34 construction site, there may have been a substitution of filler material when welding the root part of the weld. The welder may have mistakenly or deliberately used a ferritic filler material instead of an austenitic type filler material.
- Simply put, **austenitic stainless steels are non-magnetic***. This means that when the weld metal material is examined by the magnet, there is little or no attraction of the magnet to the metal surface.
- A simple measuring assembly consisting of a magnet with a clamping mechanism and a force gauge is created to measure the breakaway force.
- **The principle of the measurement** consists in **breaking away/pulling away** the measuring assembly (magnet) perpendicularly from the weld surface, **reading** the value of the breaking force from the force gauge and **comparing/evaluating** the value with the reference value.



* - austenitic stainless steel weld metal also contains a certain amount of delta ferrite, which causes the weld metal to be slightly magnetic

An event happened:

There was a case of using unsuitable welding filler material when welding a 4GHC pipeline system. The welder used the wrong ferritic PM, probably OK Tigrod 12.60, instead of the prescribed austenitic PM OK Tigrod 316L when welding the root.



SAFETY statistics (as of 6 September 2022):

No. of man-hours:	3 402 529	No. of lost time injuries:	0	No. of near misses:	10
Frequency index:	0	No. of days without injury:	468	No. of first aid cases:	5



bezpečnosť a
životné prostredie



zodpovednosť



spolupráca



vedomosti a
skúsenosti



BREAKAWAY TEST USING A MAGNET

Daily topic

Monday – Where can the magnet breakaway test be used?

The magnet breakaway test can be used in cases of welding austenitic stainless steels or steels where secondary root protection is required and they have paramagnetic (non-magnetic) properties.

Tuesday – What is the advantage of the magnet breakaway test?

The biggest advantage of the test is that **it is non-destructive**, i.e. the component does not need to be destroyed in order to be measured, so it is classified as a non-destructive test.

It is inexpensive. Compared to other non-destructive methods, it is relatively inexpensive in terms of equipment, personnel and measurement time.

It is unique and simple. There is currently no other method for detecting the presence of a ferritic root in a weld that would not damage the component.

Wednesday – Cause of the use of unsuitable filler material

There can be two causes: mistake or intention. If it happens by mistake, the welder mistakenly takes unsuitable filler material from the filler material store. In case of the second option (intention), the welder wants to make his work easier. Since secondary root protection must be used when welding stainless steel, it is not always easy to implement this root protection when welding the root. In this case, when using ferritic filler material, the welder does simplify his work, but on the other hand it is a serious violation of technological discipline.

Thursday – Consequence of using unsuitable filler material

If a ferritic filler material was used to make the root part of the austenitic pipeline weld, the corrosion resistance of the weld root will be reduced.

Friday – How to prevent the use of unsuitable filler material

Quality control of weld root parts on pipeline systems made of austenitic stainless steel will be carried out when all new welds are made on the MO34 construction site.

Strong neodymium magnets with an ejected internal thread are used for the measurement of the magnet breakaway test for mounting the force gauge. The steel case protects the magnet from impact and concentrates the magnetic field in a small area in front of the magnet, giving the magnets greater holding power compared to magnets without a case.



Be careful – consider the consequences of a serious injury;
no job is so important that it cannot be done safely.