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AN INTRODUCTION TO HOLIDAY DETECTION IN COATING USING CONTROLLER

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Abstract - In industrial or factory contains coating methods for the application of a thin layer of respective material consider to a substrate, like paper, fabric film, foil, plastic, or sheet stock , PVC material. If the substrate starts and ends the process wound up in a roll, the process may be called roll on roll or "web-based" coating. A roll of substrate is that when it is wound by the coating device, consider as a web.

The purpose of applying the coating to a pipe or object may be decorative, functional, or both. The coating itself may be cover all the area of substrate, or it may only cover some parts of the same.

1. INTRODUCTION

Holiday test is applied to find out holes, known as holidays or discontinuities, in a coating. Another testing method for the inspection of protective coatings is difficult for ensuring the integrity and durability of pipe coatings (such joint coatings) and the mitigation of pipe corrosion.

A major thing that have to take into the account as for most coating processes is that the coating is to be applied at a controlled thickness, and a number of different stages are in use to achieve this process as control from like a simple brush for painting a wall, to some very expensive devices requirements.

More holidays in the coating, if left for a more time, usually goes to a failure of the pipeline which can lead to a loss of product and which is dangerous or even catastrophic event, injurious to public safety area or the environment.

Pinholes are more prevalent for complex structures where it may be more difficult to access surfaces. Pinholes and holidays are of much greater concern when coating or lining performance cannot be easily observed, such as a buried pipe or the interior of a tank or vessel.

These voids and misses can be detected by performing holiday detection and then repaired before the coating system is put into service. This inspection process is typically done after application of the final coating of a performing detection of voids after each coat layer is not recommended as surface contamination may interfere with adhesion of subsequently applied to the coatings.

Also, pinhole detection is planned for use with new coatings applied to metal. Its use is on a coating previously exposed to an immersion condition can result in damage in coating or produce erroneous detection of discontinuities due to permeation or moisture absorption of the coating.

Deposits may also be present on the surface causing telegraphing (current traveling through a moisture path to a discontinuity, giving an erroneous indication) or leakage of current across the surface of the coating due to contamination. Supplying high voltage detection on previously exposed coatings can generate possible spark-through, which will damage an otherwise sound coating.

Holiday detection is used to detect& Search the voids in the applied coating. Holes are tiny voids, or pin-sized holes that penetrate through a coating, but may or may not penetrate to the substrate.

Pin holing can be caused by some numerous factors, but essentially is the inability of the coating to thoroughly wet-out the surface. Pinholes are skips or misses in a coating

Layer (like a pinholes miss or skips in calendar) and are typically perform a cause's error to the applicator at the time of coat itself.

These pinholes and misses can be founded by performing holiday detection and then repaired before the coating system is put into service environment. This Survey process is typically performed after application of the final coat of a system; performing holiday detection after each coat is not recommended as surface may interfere with adhesion of applied coatings.

2. LITERATURE SURVEY:

Now a day the field of a coating technology is very emerging a covering that is applied to the surface of an object, usually referred to as the substrate. A layer coating is that is applied to the surface of an object, knows as the substrate.

April 11, 1961 d. e. sterns holiday detector 2 sheets-sheet 1 filed Aug. 28, 1957 inventor holiday detector filed Aug. 28, Ser. No. 680,883 Claims. (Cl. 324-54) This relates in general to so-called holiday detectors adapted to observe electrically with high voltage given to the coating

such as customarily employed or checks on pipes and the like which are to be connected to the ground.

Specifically, it has to do with a means for moving a substantially continuous electrode over the surface of pipe or the like in check out the coating, and a means for applying the high voltage supply and connecting it to the moving electrode.

Therefore, continuous exploring electrodes have been moved by means of an device which is, in effect, a U-shaped yoke fitting over the electrode and terminating short to the object surface on either side of the electrode. There are two types of yokes as per there function which are some friction surface & anti friction surface against electrode. Both the yoke have bearing to move electrode or rolling electrode along the pipe.

Some such yokes have been connected to and carried by holder carrying high voltage sources and moving along the pipe. Others have been fitted on the ends of wands or handles carried by a quality inspector, the high voltage supply source in the latter instance being carried on a carriage moving along the ground adjacent the object or carried in a pack by the operator and then the yoke is connected using extended cable as per required with handle.

2001 Carmagen Engineering, Inc gives Example of holidays include burst air bubble pits as a coating dries, the edges formed by corners of plates and rolled steel sections causes the coating to thin at the tip and flux holes prevents the coating from contacting the metal surface.

An important evaluation of bottom linings after application comes to above ground storage tanks (AGST) is holiday (i.e., discontinuity, 'pin holes') detection. Linings are principally applied to ASTs to prevent internal corrosion that may be severe. Therefore, any pinhole must be detected and repaired prior to the newly lined tank being returned to service.

Generally, two types of holiday detection are employed. For another case thin bottom linings below 20 mils (that is 0.02 in, 0.5 mm)) dry film thickness (DFT), & low voltage/wet sponge detectors are specified. For those linings more than 20 mils DFT, HV spark detectors are employed.

Each of them has its own advantages and disadvantages; the subsequent paragraphs clear are that these for the low voltage wet sponge test. In a subsequent newsletter there are, the high voltage spark detector will be described.

Catholic Protection Close Interval Survey Previous investigation—including regular ILI performed as part of Enbridge's total integral management program, the Enbridge Line 5 Biota Investigation, the Enbridge Line 5 Screw Anchor observation, and all associated third-party reporting—have demonstrated that measures external corrosion on the Dual side Pipelines is non-existent, that the atmosphere in the Straits is minimum corrosive, that the it is not creating specially corrosive conditions on the pipe surface, and that CP on the pipeline which protecting the pipe from corrosion by, in part, doing protective calcareous deposits at areas where the coating is damage.

This investigation report uses input from a different data of different variety of sources (see Sources of Data) to uses of technologies which are capable of detecting of damages in the coating, and which gives recommendations about their potential to provide additive beneficial view to Enbridge's management of external corrosion on the Dual side Pipelines in the Straits.

From Christian Favennec of DCNS on April 23, 2014*:* High voltage spark Pinhole detector is used to evaluate if there are voids or misses in a coating. This test is generally performed only once on the total entire surface of the pipe coating and at the nominal voltage defined by the supplier or calculated with ASTM D5162 and corresponding to the nominal dry film thickness. The porosities or misses are then detected identified, located and repaired with proper care.

From Tom Swan of M-TEST on December 19, 2013: If the coating is having specific thickness and if the we gives the proper voltage , the number of times that you do a high voltage test should not be uses for in maintaining the structural area of the coating. If the voltage is set very high or the coating has tiny spots, then you may have a problem in a coating.

We have been in verity of situations where the testing has been done more than once and no problems occurred. Now, if the 1st investigator does the inspection at 10Kv and the second investigator decides that it may be above it like15Kv or 16Kv is better, you may come in a problem.

From William Slama of International Paint/Calcite Productson*December18,2013:*
The Uses of high voltage Pinhole detection (spark testing) is to detect holes through a lining or coating on pipe surface. The Pinholes (holidays) can then be corrected & identified so that a corrosion environment never or cannot find a free passage to the substrate.

This is done by supplying an high electrical stress loads across the pipeline to a conductive substrate (usually carbon steel) and using a high voltage such that an arc of spark is easily generated if a voids exists through the lining or surface.

An order to ensure that an arc will form, the most typical recommendation is to use approximately 100 volts per mil based on the nominal thickness of the lining. This noted that there will still be enough voltage present to cross through an air gap at the maximum pipelines thickness. Both alternating and direct current testers give the same result output.

It should be noted; however, that in some cases Alternating Current will gives more and may give erroneous observations, particularly if there is coating surface contamination.

JF Fletcher, Technical Support Manager Elcometer Limited1 [15]In certain protective coating applications, it's vital to check the finished system for flaws and pinholes, as these defects can cause premature coating failure in service.

This is particularly important when the coating is used in an immersion or partial immersion situation such as for tank or pipe linings. The main purpose of using this technique is for porosity testing of protective coatings is the high voltage test where a probe with a voltage, measured in kilovolts is applied to the coating and detections of a flaw results in a flow of current, which can be used to create an alarm.

The two ASTM documents for discontinuity detection, D 5162 for testing coatings on metal substrate and D 4787 for testing for coatings on concrete, both mention continuous DC and pulsed DC apparatus. The NACE recommended practice, SP 0188, also refers to these two test method to detect pinhole.

3. PROBLEM DEFINITION

Premature corrosion of a substrate is typically thanks to a coating failure.

Holiday test is used to detect or find holes, known as holidays or discontinuities, in a coating.

Holiday testing allows the detection of even smallest coating flaws invisible to the eye**.**

4. OBJECTIVE

Solving detection problem to machine To Detect Holiday inside the Pipe.

To Increase accuracy in Sensing Circuit.

Simple & low cost.

5. BLOCK DIAGRAM

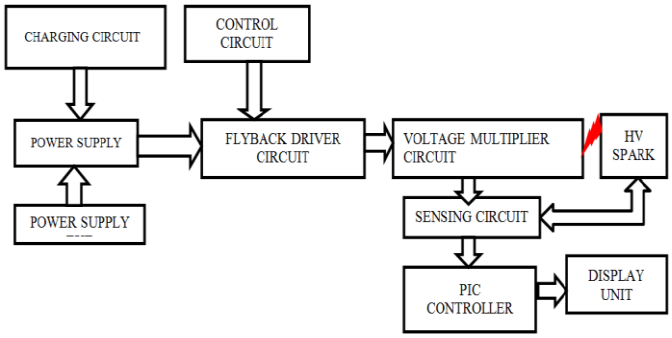

FIG-1: PROPOSED SYSTEM BLOCK DIAGRAM FOR HOLIDAY DETECTOR

6. CONCLUSION

Holiday testing is employed to seek out coating film discontinuities that aren't readily visible. Holiday testing is typically performed on tank interiors, chemical storage vessels, and buried structures due to the importance of maintaining adequate coating protection in aggressive service environments. Low-voltage holiday testing is employed when the coating system is a smaller amount than 500 microns (20 mils) thick. High-voltage holiday testing is employed when the coating system is thicker. High-voltage holiday testing requires special care to not damage the coating or cause personal injury to the operator.

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