

Scrutiny Water Penetration in Three-layer Polyethylene Coverage

Soroush Zarinabadi^{*1}, Amir Samimi²

1- Faculty member of Islamic Azad University, Ahvaz Branch

2- Member of young researchers club, Islamic Azad University Mahshahr

[1- zarinabadi@yahoo.com](mailto:1-zarinabadi@yahoo.com)

[2- amirsamimi1161@gmail.com](mailto:2-amirsamimi1161@gmail.com)

Abstract: Coverage in line pipes include of high costs. For this selecting cover and how apply is high important. Three fold polyethylenes include of epoxy layers, adhesive and polyethylene. Each other from layers having attributes that increasing its application for long term. Polyethylene layer is good shelter for prevent of physical damages. In attention to corrosion in lower temperature is a electrochemical reaction and rate of a electrochemical reaction is very impress of a element or very reactor from surface. This position occurred when influence of a element increasing of other cover controllers. A example of this issue that will be cause of outer corrosion in pipes under soil and this is very importance in work, this is leakage water into covers that can be measurable with coefficient of water leakage that can exchanging layers quality. This article has studied leakage water into three fold polyethylene cover.

[Soroush Zarinabadi, Amir Samimi. **Scrutiny Water Penetration in Three-layer Polyethylene Coverage**. Journal of American Science 2011; 7(1):1037-1039]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: leakage water; polyethylene cover; epoxy layer; outer corrosion.

1. Introduction

Pipe coverage technology improved contemporary with spanned of gas and oil liens. Today for cover using from synthesis rosin and in industries installing over pipes with high attention processes.

Cover is first defense line against corrosive background that pipes are under it. Second defense line is cathodic custody that is vital element for the pipes remained set. In the other hand custody current is taken corrosion cover then for sureance from custody we would increase efficiently of cover with good installing cover in metal surface in pipes.

Efficiently of cover very depend on its stick to pipe surface. Primitive scale of sticky depend on applying cover, wetting surface by it when covering, also clear and ready of pipe surfaces. Strength and survival in stick depend on cover properties, such as: strength against leakage wet also for cathodic disbandment.

2. Properties of cover

Properties that a cover need:

Strength with water and wet; even dry soil have a percent of wet and coverage line pipes. In most cases is wet, then for this cause cover shouldn't attracted wet, for because attraction. Water will be cause of increasing weight and also decrease electrical strength. Resistance to variable pressures; putting under soil lead to pressure on pipes. Also existence of soil particle of wet and other exist. Particle in soil is cause of creation this variable and uncoordinated pressure. In fact cover should be one physical cover and don't abruption from surface.

Resistance to bacteria, fungus: there are many bacteria in the soil that attacked to varied material and are caused of destroyed of materials. Of course attacked by fungus or molds not prevalent.

Resistance for water's capillary: water's influence because of capillary is a cause of analyze cover from steel and all cracks and tiny whole are this effect unless contact between cover and pipe are strength and very sticky. In fact primer color has such duty that product very sticky and cover, that preventing of water pervade and dissenting cover.

Prepare with temperature's cost: costing of temperature can be affecting because coal of steel's expansion and cover are difference. But usually this work is slowly and steady for this reason cover should have strength to charging temperature and with this work, don't release of pipes. Resistance with solution. Water is able to solved into some material but usually coverage unsolved to water and also it should be study that this is unsolvable. And it is resistance to other solvent particularly against of oil and its derivations. Resistance to attractive soil: soil may be attracted some material. Clay, silica gel, wood coal and other something have solvent nature, soil is quietly connecting to cover and attracting of some elements from cover by soil may do, brittle porosity soil or decreasing strength to corrosion.

3. Cover process

3.1. First layer:

Immediately after pipe a form create by a film from liquid or rosin from epoxy powder. Minimum of diameter (thick) of 4444 should be 20-60 micron (by ISO2808) [2].

3.2. Epoxy layer

Epoxy powders that are useable to three fold covers, divide two groups; first group that have primer nature and second group have cover's quality. This two units have noticeable differs in setup position and temperature and thickness.

Generally in industries, tendency for use of epoxies with cover quality. Epoxy layer should have been enough thickness that finally will have better properties for system.

Study mother list of UK Company Jotun Powder Coating showing that epoxy layer are over 150 micron thickness particular into greatest pipes Epoxy layer should have been enough thickness until avoiding from reveal of holiday. First experiments and test that setup in this place, revealing and increasing over 40 holding in 40 foot for level 150 micron. With attention to recommendation's Dennis Neal, master of Hording and Neal U.S.A Company that have a long history in coverage say that minimum of thickness for epoxy layer should be 250 micron.

Time for implementing adhesive layers and polyethylene on epoxy are a momentous and critical. First, adhesive establishing firm consociation chemical with chemically groups that still are uncured, but for this step epoxy shouldn't raised quietly. In other hand adhesive and polyethylene connect together physically, this work doing with pressure of roller and being sensible to time is for this reason that from one hand epoxy for connect to adhesive shouldn't be cure and other hand should be such gel until can be resistance to pressure of roller or all of these stages should be setup less than some second. Exalters of cover should be look for that use of a solution to three fold cover problems wouldn't be cause of existence of other problem.

For example, separate in frontier with decreasing temperature epoxy from 239.4 °C decrease to less than 232.2 °C however FBE release in lesser temperature don't allow to current of epoxy and wetting quietly. Surface's metal and this work have inverse effect to sticky cover for heat and wet situation and voltage will more than cathodic [1].

3.3. Second layer

Producing sticks between layer 1&3 and it should be compatible with each two layers. Min of thickness would be between 160-200 micron. Thick may be differ in its rage (decrease or increase) with agreement to client but min thickness should be study, safely

3.4. Third layer

Polyethylene cover would form in this level. Thickness would be steady in overall pipe and general min of thickness would be acceptable [4].

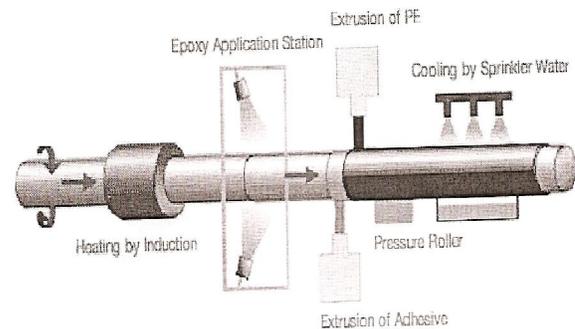
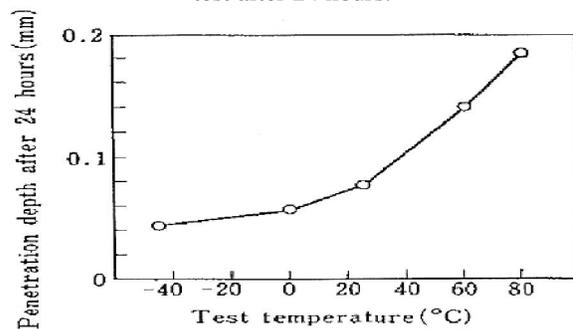


Figure 1: general view of covering

4. Leaking water test

Leakage test (style: DIN 30670) had done in basic of heavy particle test from coverage polyethylene pipes (three fold cover). Relation between leak of water after 24 hours and temperature is shown this follow [6].

Chart 1: Relation between temperature and leakage test after 24 hours.



Have seeing that with increasing temperature, also leakage increased.

5. Conclusion

Setup quality is engineer's way for notice to however owner of line wanted in shape of consumer. Outer covers pipes are good guidance of increasing quality for constructors. Under the corrosion begin in the present of water and oxygen. When water and oxygen are in surface of metal, occur corrosion of metal's dissolution (Anode effect).

This chemical process balanced with decrease oxygen. Under the corrosion scale depend on cover type, oxygen scale that available, and impurity scale into water, temperature and properties of transferring temperature for surface metal and dry and wet position. In absence of oxygen corrosion scale is consumer regardless.

Although carbon steels and low alloyed usually in alkaline environments have scale of corrosion, chloride ions (Cl⁻) are cause of local vesicular corrosion (localized pitting) under the cover: If sulfur acid and nitrogen, that have acid property, inter to insulator with impurities in water and air or if water have been acid property, sometime occurred general corrosion. Impurities of water and air, particularly nitrate ion (NO₃⁻) can be cause of tension fraction.

(SCC) for out and under covering in steel carbon or alloyed low that didn't de tension. current phenomenon, particularly when intermittent dry and wetting process of environment.

5.1. Cover effect

Corrosion occurred under each of covers. Types of this depend on rate and quality only. Most of cover effect in this type corrosion, doing safety convoluted place for aggregation and survive of water.

Water can aggregated from outer sources of rain or liquids of condense. Chemical syntax and also cover attributes have a role in corrosion. Cover can attracted water and have a good background for chemical reactions indeed chloride and sulfate into cover can acting like electrolyte and increasing corrosion surfaces.

5.2. Temperature effects

Temperature in surface of metal has a two fold role in corrosion cover. Controlling corrosion under very heat covers is difficulty from other cool cover. Because of vaporized water under cover and increasing density of impurities follow water. In closed systems high temperature, speeding up chemical reactions but in open systems high temperature, increasing corrosion also high temperature decreasing age of preservation covers.

Corresponding Author:

Soroush Zarinabadi

Faculty member of Islamic Azad University, Ahvaz Branch

Email: Zzarinabadi@yahoo.com

References

1. for more learning about article see: "how useful select for cover 's pipes with notice to acting situations and full cost " written by Mrs. Fereshteh Rezaei, Mr. Farhad Sharif ,Ali Asghar Saraei, Morteza Rahmanian, Ali Fazlinejad.
2. Article "external three layer extruded polyethylene based coatings for on-shore off-shore steel line pipes.
3. Same : "implicit article in number2"
4. Same: "implicit article in number2"

5. Samimi A, Zarinabadi S, Barazandeh A. "Studying water influence into 3 fold polyethylene covers". National conference of chemical engineer, Azad university of Eslamshahr, 2009.
6. Pipe Coating Method and Apparatus" Australia/ New Zealand Standard, External extruded high-density polyethylene coating system for pipes, 2002.
7. Manan.Z.A, Lim.C.S, Abd Rahman.N.S, Wan Alwi.S.R – [Modeling of a new supercritical fluid extraction process for Palm oil refining] , International Conference on science & Technology , 2008.

12/22/2010