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### **Development of technology for applying a protective coating for steel pipes**

The subject considered in this article, belongs to pipeline transport and ways of protection of pipes and pipelines from corrosion, and also to production of pipes with internal and external coverings.

As an example of the lengthy hollow products made of metals and alloys, in this article steel pipes were chosen.

The most widespread way of protection of surfaces of pipes from aggressive influence of transported environments is drawing on internal and external surfaces of pipes of a layer of a protective corrosion-resistant coating.

The way of complex protection against corrosion of steel pipelines is known.

It is possible to carry to shortcomings of this way: the increased technological complexity and labor input, big costs of drawing additional protective layers, not effective use of a protective material, receiving at the exit of the low-quality sheeting which service life is reduced many times because before drawing a covering cleaning of surfaces of a pipe (pipeline) of oil inclusions wasn't provided that sheeting destruction is promoted, forming a film between a surface of a pipe and a sheeting, and by cleaning of salt deposits and other corrosion and active environments that promotes intensive corrosion of a surface of a pipe (pipelines) at interaction with water, forming the acid environment, bringing to emergency destructions of steel pipelines.

The main objective of this method is production of reliable and durable pipes in the operation, having external and internal protective coverings. And also effective use of a protective material.

The objective is solved because step by step carry out a package of measures on preparation of surfaces of pipes, drawing and sheeting quality control.

We will consider each stage separately.

1 . Removal of frost from surfaces of pipes:

When transporting pipes during the winter period of time on external and internal surfaces remains layers of frost (ice). Removal of this layer make in the furnace at a temperature 40-60zs.

2 . Entrance control of pipe preparation:

At this stage make check of geometrical parameters of pipes, definition and elimination of visible defects on surfaces of pipes, check on compliance to normative documents.

3 . Calibration and deformation of the ends of pipes under known connections.

4 . Cleaning of surfaces of pipes of salt deposits and other corrosion and active environments:

Thus salt deposits and other corrosion and active environments high-pressure streams of the water which is forming thanks to special nozzle nozzles collapse, crushed and removed.

5 . Thermal degreasing of surfaces of pipes in the furnace:

Pipes heat to temperature 390-420zs, allowing to avoid structural changes in metal, and maintain in this temperature about one hour, thus from an external and internal surface of a pipe are removed the remains of the water used at hydrodynamic cleaning, oil inclusions and other substances (for example, an old covering), reducing adhesive durability between surfaces of a pipe and a sheeting (evaporate).

6 . Mechanical cleaning of surfaces of pipes:

After roasting external and internal surfaces of a pipe are exposed to mechanical cleaning by one of known ways (for example, No. 2353506 patent Russian Federation). The surface after jet ways of processing (fraction, sand) turns out opaque, developed that is very important for further drawing a covering, parameters of a roughness change depending on modes of processing and granularity of a working material. Demanded roughness of surfaces of pipes for this technological process of  $Rz = 40. 90$  microns.

7 . Preliminary heating of a pipe:

At this stage of a pipe heat to temperature 180-250zs for the subsequent drawing on external and internal surfaces of pipes of a layer of a primer. During heating to pipes betray a rotary motion for more uniform heating on all surface area of pipes. After heating of a pipe pass heating quality control. As check use the temperature sensor showing temperature on surfaces of pipes.

8 . Drawings a layer of a primer on a surface of pipes:

Further on the heated, cleared and rough external and internal surfaces of pipes put a primer layer, from 5 to 30 microns, the dispersion, one of known ways. During drawing (dispersion) to pipes betray a rotary motion for more uniform distributed on all surface area of pipes of drawing a layer of a primer.

9 . Polymerization of a layer of a primer.

Then make polymerization of a layer of the primer put on external and internal surfaces of pipes, leaving pipes indoors at the room temperature. During polymerization to pipes betray a rotary motion, for more uniform polymerization of a layer of a primer on all surface area of pipes.

10 . Drawing layer (layers) of a powder sheeting:

Further on a layer of the primer put on external and internal surfaces of pipes, put a layer (layers) of a powder sheeting to one of known ways, for example using a tribostaticesky way of drawing a powder covering (No. 16833), thus when drawing sprays of a powder sheeting have a flat arrangement of rather external surface of pipes and a spiral arrangement of rather internal surface of pipes that promotes effective use of a powder protective material and high-quality drawing it on a surface of pipes as the material after drawing uniform is distributed on all surface area of a pipe.

11 . Polymerization of a layer (layers) of a powder sheeting:

Then make polymerization of a layer (layers) of the powder sheeting put on a layer of a primer on external and internal surfaces of pipes, leaving pipes indoors at the room temperature. During polymerization to pipes betray a rotary motion, for more uniform polymerization of a layer (layers) of a powder sheeting on all surface area of pipes.

12 . Control of thickness and covering sploshnost:

Further make control on a sploshnost and thickness of the put layer (layers) of a powder sheeting one of known ways (for example, No. 2188414 patent Russian Federation). At detection of defects on surfaces of pipes, namely not compliance of thickness and/or a covering sploshnost, stages 7, 8, 9, 10, 11 make repeatedly.

Offered way of drawing a sheeting on steel pipes in comparison with analogs:

1 . Raises a korrozionostoykost of external and internal surfaces of a pipe, for the account:

- removals from external and internal surfaces of a pipe of oil inclusions, salt deposits and other environments reducing adhesive durability between a surface of a pipe and a sheeting, and increasing corrosion activity on surfaces of pipes (formation of acid environments);

- drawings on rough surfaces of a pipe of a layer of a primer, thus increasing adhesive durability between a surface of a pipe and a sheeting, at the expense of increase in surface area of a pipe

2 . Increases efficiency of a protective material because the protective material is put on external and internal surfaces of a pipe with the dispersion, one of known ways, that is the used volume of the protective swore at the uniform is distributed on all areas of a covered surface that promotes economy of a protective material;

3 . Excludes application of expensive materials as additional layers of a sheeting;

4 . Puts sheetings on different types of the pipes which ends are deformed under known types of connection that does a way to more technological.

List of references:

1 . Bogdanov Yu.G. "Adhesion and its role in ensuring durability of polymeric composites" – 2010.