WELDING OF HIGH PRESSURE PIPES

Golousenko M.A.
Tomsk Polytechnic University, Tomsk
Scientific supervisor M.V. Kuimova, PhD in Methods of TFL,
Associate Professor of TPU

Today our country experiences a serious economic crisis. To improve the economy, the government invests in the development of domestic production and technology. Enterprises need to increase the production volumes to meet the needs of the country. In this paper I am going to research the welding of high pressure pipes. This type of pipes is widely used in the industry. Welding is necessary to join these pipes.

Welding is one of the greatest inventions of Russian scientists. Now it is the largest independent kind of production and its processes increasingly penetrate in different types of metallurgy and engineering.

Welding of metals is the process of combining them with the help of interaction of atoms. To weld two or more metal bodies, their welding surfaces must be cleaned to bring them into contact providing a spacing of about $2–5\times10^{-7}$ mm [1]. This implies that real objects are not welded because they do not have a flat surface and are always under a layer of various oxides. However, in vacuum where oxygen is absent, metals can be welded by connecting them if the desired flatness of the metals is achieved. In space it happened with the American space shuttle when well-processed surfaces welded in several points. It brought a lot of unpleasant moments to American astronauts.

On the whole, welding has two main problems: contamination of the surface and a small area of contact. To solve these problems, two main methods are used: heat and pressure.

There are additional requirements for welding of high pressure pipes. The pipes must have a sufficiently large wall thickness and a small diameter [2]. To transport various substances (their temperature can be both low and very high), the joint weld must be very strong, have a perfect geometry and corrosion resistance.

Electric arc welding, gas or submerged-arc types of welding are effective for tubes of high pressure depending on the diameter of the pipe.

It should be added to Table 1 that in semi-automatic or automatic submerged arc welding, the trunk joint is always welded manually.

In pipe with the diameter greater than 40 mm, it is better to use a traditional joint weld and apply V-shaped grooving. But with a diameter of more than 60 mm, it is more appropriate to use backing rings [3].

Diameter of the pipe	Type of welding
d= from 6 mm to 25 mm	Gas welding
d= from 25 mm to 100 mm	Manual arc welding
d= from 100 mm	Semi-automatic or automatic submerged-arc welding

Table 1. Welding depending on the diameter of the pipe.

A distinctive feature of welding of high pressure pipes is that welding must be done in several layers of the joint weld. The number of layers depends on the characteristics provided by the types of metal pipes and on the metal from which they are made. It may vary from 2 to 10.

In my work I used electric arc welding and semi-automatic submerged arc welding. Both types of welding are well-suited for pipes welding. The have:

- high performance;
- durability of joints;
- easiness of operation;
- economy.

Nevertheless, I came to the conclusion that electric arc welding is more suitable for pipes with a small diameter because it provides a button heat of the metal. It is very important while working with samples of a small thickness. Submerged-arc welding requires high temperatures and it may change the geometry of the tube. Moreover, manual arc welding is much faster than automatic submerged arc welding because the machine needs time to melt the flux.

Image 1. Submerged-arc welding

There are several errors that occur in the joints of high pressure pipes. For example, if we weld pipes at high currents, it can form a hole through which the metal will simply flow out [4]. To avoid this it is necessary to stabilize the value of the current so that the metal is cooled almost instantly after the progress of the electrode.

In conclusion it should be noted that today pipes of high pressure are irreplaceable in manufacture and their installation requires welding.

References

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ADVANTAGES OF USING THE INTELLIGENT LIGHTING SYSTEM «SMARTLIGHT»

Golotsevich Y.A.
Tomsk Polytechnic University, Tomsk
Scientific advisors: Siemens E., PhD, Associate Prof. of Anhalt University of Applied Sciences;
Yurchenko A.V., PhD, Associate Prof. of Department of Physical Methods of Non-Destructive Testing, TPU

Nowadays, when the situation with natural resources is extremely important, there arises a question about the expediency of electricity consumption for permanent illumination of little used streets in night time.

There is two ways to improve this situation: to replace mercury arc metal halide light bulbs with new low-electricity-consumption diode ones, or to design the intelligent lighting system for the case of time-dividing usage of switching the lamps. The first way doesn't resolve the problem in a root. The second way is totally different, it is based on the principle of control the street lighting units' behavior depending on movement direction and speed.