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HIGH-STRENGTH STEELS AND THEIR APPLICATION

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Abstract. This article discusses the main types of high-strength steels and their application in various sectors of the national economy.
Keywords. Steel, deformation, sulfuric acid environment, oxidizing environment, part, welding, structure, equipment, manual, electric arc welding.

Introduction. It is known that steels are used in all sectors of the national economy of the Republic of Uzbekistan. High-strength steels are used not only for the construction of buildings, but also for the construction of various structures and equipment: farms, gas and oil pipelines, boilers, bridges, etc. Accordingly, the set of requirements for this category of metals will differ, but perhaps the main one can be distinguished - weld ability, strength, etc.

Methodology. To study high-strength steels, educational materials and Internet data were analyzed. The information contains purely informative scientific material. Steel grade 10X17H13M2T is a durable, high-tech steel with a high level of deformation and corrosion resistance. Recommended by ГОСТ 5632-72 for the manufacture of welded structures and critical parts operating in special aggressive environments - in sulfuric acid environments, under high temperatures in oxidizing and chlorine-containing environments. Stainless alloy 10X17H13M2T is used in equipment and apparatus for the manufacture of synthetic rubber, isoprene, and synthetic acetic acid. Steel is well welded by different types of welding - electric arc, manual and gas-electric. A distinctive feature of stainless steel 10X17H13M2T is resistance to high and low temperatures, exposure to aggressive environments. Well suited for welding. The material has found wide application in various fields of activity: chemical and oil refining, metallurgy, food industry. This alloy can be used for the production of the following types of equipment: for the production of acetic acid; artificial synthesis and creation of polymers, isoprene, ethanolamine, rubber; production of urea; special units for artificial growth of crystals; production of industrial pipelines: seamless stainless steel pipe, with a seam and others; special containers that do not react with acids and other aggressive substances; for laboratories of the pharmaceutical and chemical industries; for food production and production of dishes that will withstand high temperatures, etc.

The alloy is also used to produce equipment that is used in aggressive conditions. The finished hardware is distinguished by a long service life and reliable technical properties.

The marking indicates only the components that determine the key properties of the alloy. The full composition contains a large number of different components and is regulated for this alloy by GOST 5632-2014:

1-table

Chemical component of steel

C	Si	Mn	S	P	Cr	Mo	Ni	Ti
≤0,10	≤0,8	≤2,0	≤0,020	≤0,035	16,0-18,0	2,0-3,0	12,0-14,0	5xC-0,70

Special stainless steel alloy 10X17H13M2T has improved properties and was developed for parts and equipment that operate in a highly aggressive environment. To improve the strength of steels, they are subjected to heat treatment. Heat treatment is carried out by residual stress, as well as eliminating the formation of micro cracks that can form under the influence of corrosion. When developing a project, it is imperative to have information on the tangible temperature range and type of thermal work. The use of hardening helps to increase the anti-corrosion quality of the material and its ductility. As a rule, a temperature of 1045-1110 degrees is used to carry out this temperature. Then the material is sharply cooled under natural conditions in the air. Given the minimum thickness of the element, you can determine the duration of heat treatment. So, for example, half an hour will be required for a thickness of 10 mm. With a subsequent increase in thickness, you need to add 1 minute for each 1 mm. If the thickness is more than 11 mm, then water is used for cooling. In the air, the product is cooled after welding. To increase the plasticity index, the material is heated to 11000C degrees. If there are no welds, the temperature range of 890-910 degrees can be used. For cooling in air, the time is maintained for up to 3 hours. When seams are created using unstable electrodes, there must be heating of 1020-1060 degrees, and there must also be an exposure of 2 hours.

Discussion. If austenitic electrodes are used, then for a similar procedure, the furnace must cool to 300 degrees, and heating in the range of 1110-1150 degrees. Then the result will meet the declared standards. All types of work can be used: bending, welding, forging or rolling. For forging, the temperature should be 1180 degrees and with a gradual decrease to 850 degrees. Then the structure is cooled in air. Heat treatment of welded joints is not required.

Conclusion: The use of high-strength steels in various industries makes it possible to produce high-quality products, as well as to ensure safe construction criteria.

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