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## **Welding Defects**

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Defect is individual non-compliance of a product according to Technical Regulatory-Legal Acts (TRLA). The presence of defects in a product can lead to the appearance of areas with high internal stresses, which is very likely to cause its destruction and even an emergency situation during the operation of the product. The article tells about what the classifications of defects on various grounds are and provides some of them with names.

The whole set of defects by their origin can be conditionally divided into three groups: constructive, production-technological and operational. Structural defects occur when their appearance is caused by the design of the product itself. Technological defects occur during the manufacture or processing of the product in violation of the technological process. This group of defects is very diverse, as defects occur in a variety of technological processes. Operational defects occur during the operation of the product, due to wear, corrosion and erosion processes, as well as improper maintenance or operation.

According to the degree of influence on the performance of the product, defects are divided into: insignificant, significant and critical. Minor defects do not impair the mechanical and operational properties of the product and are allowed by the TRLA. Significant defects essentially affect the operation of the product, its durability, but do not cause its destruction. Critical defects are such defects, the presence of

which is strictly prohibited by the TRLA. In practice, during the control or diagnostics of the product, defects are assessed as permissible or unacceptable.

According to the depth of occurrence, defects are divided into surface (depth less than 0.3 mm), subsurface (0.3 - 1 mm) and deep (more than 1 mm). A similar classification is more often used, according to which defects are divided into: obvious (external) - superficial, visible to the eye and hidden (internal).

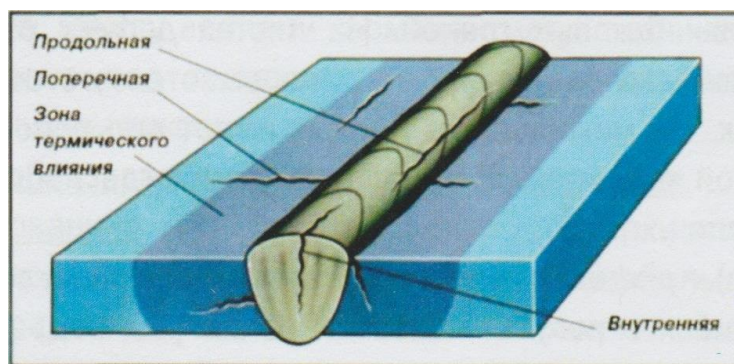


Fig.1 – Cracks

In shape, defects are divided into volumetric (all geometric dimensions have approximately the same values) and planar (the height of the defect is very small in relation to its length or width).

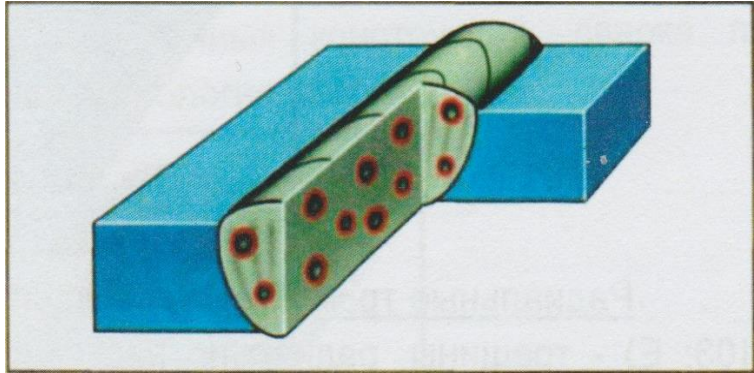


Fig.2 – Uniformly distributed porosity

In accordance with the ability of correction, defects can be: correctable (repair of the defect is possible) or incorrigible (repair of the defect is excluded).

Welding defects may occur in violation of the requirements of the TRLA for welding materials, preparation, assembly and welding of the connected elements, thermal and mechanical processing of welded joints and structures in general. In accordance with STB ISO 6520-1-2009 “Classification of defects by geometric parameters in metallic materials. Fusion welding” defects are classified into six groups:

- I - cracks;
- II - pore, gas cavity;
- III – solid inclusion;
- IV – lack of fusion and lack of penetration;
- V – imperfect shape;
- VI – miscellaneous imperfections.

Thus, using the division into these groups in the assessment, we can understand at what point in the production of works the defect was produced. Whether the product needs to be rejected. Whether it is necessary to change the production process of this product. Is it worth reviewing the operating

conditions of the product? Is it possible to fix the product without replacing it.

References:

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3. SAUS 14806-80 Arc welding of aluminium alloys in inert gases. Welded joints. Main types, design elements and dimensions
4. SAUS 27580-88 Arc welding of aluminium and aluminium alloys in inert gases. Acute and blunt weld joints. Main types, design elements and dimensions
5. STB ISO 5817-2009 Welding. Joints of steel, nickel, titanium and their alloys made by fusion welding (except beam welding). Seam quality levels depending on defects.
6. SAUS 15164-78 Electroslag welding. Welded joints. Main types, design elements and dimensions
7. SAUS 15878-79 Resistance welding. Welded joints. Design elements and dimensions
8. STB ISO 3834-1-2011 Requirements for the quality of fusion welding of metal materials. Part 1: Criteria for selecting the appropriate level of quality requirements.
9. STB ISO 3834-2-2011 Requirements for the quality of fusion welding of metal materials. Part 2: Comprehensive quality requirements.
10. STB ISO 3834-3-2011 Requirements for the quality of fusion welding of metal materials. Part 3: Standard quality requirements.
11. STB ISO 3834-4-2011 Requirements for the quality of fusion welding of metal materials. Part 4: Basic quality requirements.