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ON THE QUESTION OF CHANGES TO THE GENERAL RULES FOR THE DEVELOPMENT AND EXECUTION OF DESIGN DOCUMENTATION

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Abstract *– After Ukraine joined the World Trade Organization, the task of its integration into the international community arose. One of the priority areas in resolving these issues is the harmonization of standardization systems. This is solved by introducing international and European standards through the national standards of Ukraine. In this regard, the standard DSTU 1.7:2015 (ISO/IEC Guide 21-1:2005, NEQ; ISO/IEC Guide 21-2:2005, NEQ) National standardization was developed. Rules and methods for adopting international and regional regulatory documents, which regulates the procedure for performing this work. That is, significant changes are taking place in the modern national standardization of Ukraine. This article provides a brief overview of the first group of standards relating to the general provisions for the development and execution of design documentation. Familiarization of students with the provisions of these standards at the beginning of studying the course of engineering graphics lays the foundations of their engineering education.*

Keywords – *national standards of Ukraine, international standardization system, design documentation, professional competencies of students.*

Statement of the problem. One of the main links in the creation of technical products is the development of design documentation. The level of execution of design documents is significantly reflected in the terms and labor intensity of the production of designed technical objects, their quality, reliability of operation and other characteristics of the product. The quality of execution of technical documentation largely depends on the standards that regulate this activity. The use of standards in the development of design documentation allows the use of a single technical language and terminology, which ensures mutual exchange between enterprises both within the country and between partner countries without its re-registration. Therefore, it is important to reflect in the educational process changes in the modern system of standardization

when studying by students of educational institutions of the technical direction of courses in engineering and graphic disciplines, which form the professional competencies of students starting from the first years of their studies.

Analysis of recent research. The International Organization for Standardization has developed international standards (ISO), which are not mandatory for use in the development of design documentation in any country in the world. They often operate on an alternative basis. The level of application of international standards in the development of design documentation in a country depends on the solution of the issue of its integration and cooperation with international organizations.

Formulation of goals. Since Ukraine has become a member of the World Trade Organization, the issue of its integration into the international community is quite relevant. It is also being addressed in the area of the creation and formatting of technical documentation. Largely, the quality of creating this documentation is influenced by the use of relevant standards. Currently, the transition and harmonization of state standards of Ukraine with the international standardization system is underway. Therefore, it is advisable to consider this issue in terms of standards that relate to the general rules for formatting design documentation, which are studied in courses of engineering and graphic disciplines.

Main Part. Currently, the standards GOST 2.301, GOST 2.302, GOST 2.303, DSTU GOST 2.305, GOST 2.109, etc. are no longer valid. Instead, the DSTU ISO standards [1 - 8] are valid, which have been in effect in Ukraine on an alternative basis since 2005. That is, current recommendations on the use of sizes of drawing sheets for use in design documentation are regulated by the DSTU ISO 5457:2006 standard [1]). Compared to the DSTU GOST 2.305:2013 standard, the sizes of drawing sheets have remained the same, but the margins have changed (left 20 mm, top, right and bottom - 10 mm). The location of drawing sheets should be only landscape (A4 drawing sheets is located portrait). The current standards for basic inscriptions are DSTU GOST 2.104:2006 and DSTU EN ISO 7200:2005. The DSTU ISO 5455:2005 standard [2] regulates a number of scales (see Table 1).

Table 1

Scale series

Category	Recommended scale ranges		
Enlargement scales	50:1 5:1	20:1 2:1	10:1
Full size scale			1:1
Reduction scale	1:2 1:20 1:200 1:2000	1:5 1:50 1:500 1:5000	1:10 1:100 1:1000 1:10000

The DSTU ISO 128-24:2005 standard establishes the types of lines used on drawings [3]. The DSTU ISO 3098-6:2007 standard establishes the recommended font for technical drawings [4]. According to the DSTU ISO 5456-2:2005 standard [5], two methods of orthogonal projection are used – first angle projection and third angle projection. In this case, it is recommended to use a graphic symbol on technical drawings to indicate the method of projection (Fig. 1)..

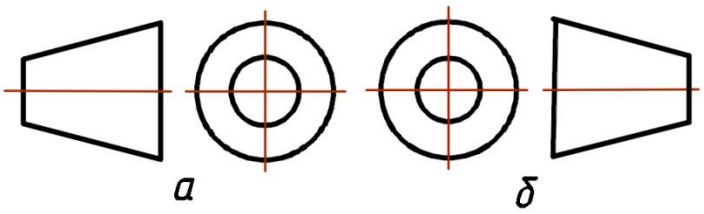


Fig. 1 Image of graphic symbols of the projection method

The graphic symbol indicates the use of the selected projection method (a – first angle projection, b – third angle projection), which is indicated in the corresponding column of the main inscription (above its upper right corner). The first angle projection method is used in the vast majority of countries and is considered European. The depiction of species is regulated by the standards DSTU ISO 128 - 30:2005 [6] and DSTU ISO 128 - 34:2005 [7]. The requirements for the location of the main views are the same as in the canceled standard DSTU GOST 2.305:2013. According to the specified DSTU ISO standards the views:

- *views that are determined by the chosen projection method;*
- *extended views;*
- *partial views;*
- *special position of views;*
- *local views.*

Extended views are views that are not placed in direct projection relation with the main image. In this case, the direction of projection is indicated by a reference arrow on the corresponding image and is indicated by a capital letter of the Latin alphabet. The size of this letter should be 1.4 times larger than the height of the dimension number on this drawing. In this case, it is recommended to give preference to the font type B without inclination in accordance with DSTU ISO 3098:2005 [4]. Other fonts of this standard can be used.

Partial views are used when it is necessary to show the design features of the part, but the image of the full view is impractical. The partial view is limited by a thin solid line with zigzags (type 01.1.19 in accordance with DSTU ISO 128 – 24:2005 [3]). If the image of the view is symmetrical, it can be limited to

parts of the axes of symmetry (Fig. 2). In this case, the long-dashed line of symmetry is denoted by a special graphic symbol of symmetry (thin parallel lines). The length of these lines is h, and the distance between them is 0.3 h (h is the height of the inscription).

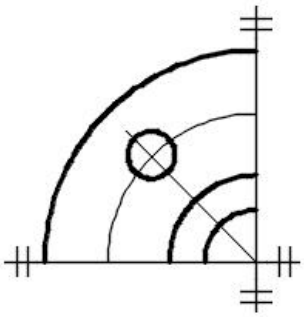


Fig. 2 Using a graphic symbol indicating image symmetry

Special position of views are views obtained in positions other than the selected orthogonal projection method to obtain the main views. If necessary, they can be rotated on the drawing. In this case an arc arrow is used in the view designation and the angle of rotation is indicated (Fig. 3). The height and radius of the arc arrow are shown in Fig. 3 (h is the height of the inscription*)*.

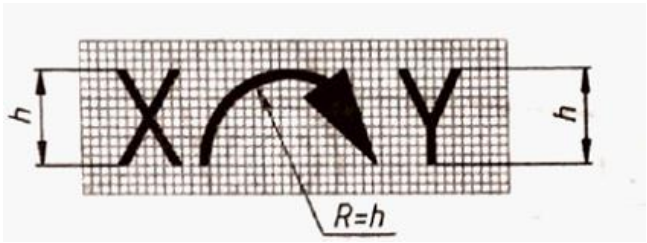


Fig.3 Arc-shaped arrow indicating image rotation

Local views are images of a separate type of symmetrical parts. They are performed by projection in the third angle projection, regardless of the method selected on the drawing for obtaining other images. The image of the local view is performed with a solid thick line of type 01.2. The local view is placed next to the main view and connected to it with a thin long-dashed-dotted line of type 04.1.

General rules for sections and cross-sections are regulated by the standards DSTU ISO 128 – 40:2005 and DSTU ISO 128 – 44:2005 [8]. When applying sections and cross-sections an imaginary plane is used, which is called a section. The positions of the cutting planes on the images are shown with a long-dashed-dotted thick line (according to DSTU ISO 128 – 24:2005 [3]) of type 04.2. If necessary, the line of the cutting plane can be additionally shown completely with a long-dashed thin line of type 04.1. The direction of view is indicated by section arrows. For mechanical engineering drawings, arrows with an angle of 30° are mainly used. A capital letter of the Latin alphabet is placed next to the

arrow parallel to the main inscription of the drawing. Its size should be 1.4 times larger than the height of the dimensional number on this drawing. Above the image of the section or cross-section, its designation is placed, consisting of two letters that denote the cutting plane, written through a hyphen. Sections are divided into:

- *sections made with one cutting plane;*
- *sections made with two (or more) cutting planes:*
  - *the cutting planes are parallel (Fig. 4);*
  - *intersecting secant planes (then the planes not parallel to the main projection planes are returned to coincide with the position of the projection planes selected by the main projection method) (Fig. 5);*
- *local sections.*

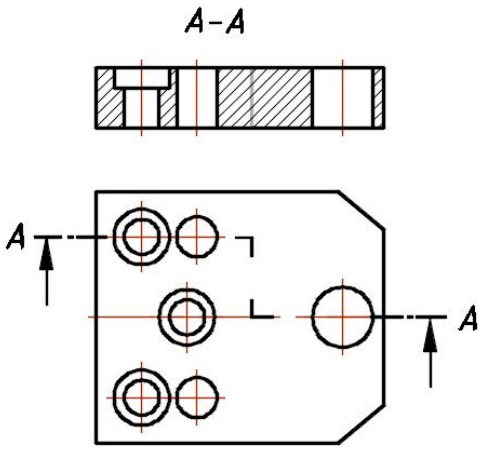
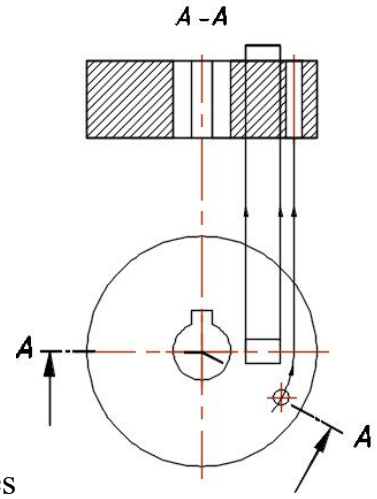


Fig. 4 The section is made by two intersecting parallel



planes

Fig. 5 The section is made by two intersecting cutting planes

Sections are used revolver in the relevant view and extended. Sections and extended sections may not be in a projection relationship with the main image. In that case, they are marked. If they are rotated, then the marking must be supplemented with an arc arrow and the angle of rotation must be indicated.

Conclusions. This article briefly presents material on changes in the design of design documentation in relation to the first group of standards. Changes in standards relating to other sections of design documentation and used in the educational process are planned to be covered in subsequent publications. Changes to the national standardization system relating to the rules for design documentation require constant attention as the process continues. Teachers of technical educational institutions are faced with the task of familiarizing themselves with the changes taking place in the national standardization system and timely introducing them into the educational process [9, 10]. Timely implementation of innovations in the educational process allows students to obtain knowledge that meets the modern requirements of society and be successful in their chosen profession.

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