V. Holubieva-Sudakina (PSACEA, Dnipro)
K. Kovtun (PSACEA, Dnipro)
Scientific supervisor: T. Kovtun-Horbachova, Cand. Sc. (Tech), Assoc. Prof.
Language consultant: N. Shashkina, Cand. Sc. (Phil), Assoc. Prof.

COMPARING THE RESULTS OF CALCULATION AND CROSS SECTION SELECTION OF CENTRALLY COMPRESSED FREESTANDING COLUMN ACCORDING TO UKRAINIAN AND EUROPEAN STANDARDS

Design of metal structures in Ukraine until 01.07.2013 was done according to national normative documents only. However, after this date, it became legal to design and calculate metal structures according to European norms - Eurocode 3 "Design of metal structures". [1]

In the realities of today, due to the processes of active European integration of Ukraine, there is a necessity to correct the current construction normative documents and adapt them to the European standard. To do this, it is important to identify the differences and details in the calculation algorithms of both normative documents, and to analyse the differences in the results of calculations. This is what determines the relevance of this research topic.

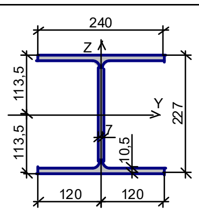
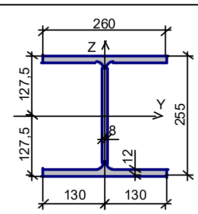
The topic of our investigation is to compare the results of calculation and cross section selection of a centrally compressed freestanding column according to DBN B.2.6-198:2014 "Steel structures. Design standards" and EN 1993-1-1 Eurocode 3: Design of steel structures - Part 1-1: General rules and regulations of buildings.

The purpose of the study is to calculate and select the section of a freestanding centrally compressed column according to DBN B.2.6-198:2014 and EN 1993-1-1 and to compare the results of the calculations and selected sections.

For the calculation the input data were taken as follows: Freestanding centrally compressed column with a height of 6 m, vertical constant force of 1000 kN, the force from its own weight is taken into account. The column is made of steel grade St3Gsp, which corresponds to steel C255 according to Ukrainian norms and S235 according to European norms.

The calculation was performed using SCAD Office Kristall 21.1.1.1.1 software. As a result of the calculation, we received the following results: [2,3]

- Results of cross section selection:

DBN B.2.6-198:2014	EN 1993-1-1
 Columnar I-beam 23K1	 Columnar I-beam 26K1

- Calculation results with selected cross sections:

According to DBN B.2.6-198:2014

Verification	Utilisation factor
Strength during combined action of longitudinal force and bending moments without considering plasticity	0,768
Stability in compression in the plane XOY (XOU)	0,884
Stability in compression in the plane XOZ (XOV)	0,813
Strength in central compression/tension	0,768
Ultimate flexibility in the plane XOY	0,265
Ultimate flexibility in the plane XOZ	0,163

Utilisation factor – 0,884

According to EN 1993-1-1

Verification	Utilisation factor
Plastically resistant to longitudinal compression	0,764
Total loss of stability about the axis Y	0,789
Total loss of stability about the axis Z	0,903
Shear strength about the axis Y	0,764
Resistance to bulging under the action of forces (N,My,Mz)	0,903
Stability of web	0,764

Utilisation factor – 0,903

According to the results of the work it can be seen that the calculations according to DBN B.2.6-198:2014 resulted in a smaller cross-section and utilisation factor, compared to the results of calculations according to EN 1993-1-1. This difference can be explained by the fact that in the process of inputting the initial data into the software, to perform the calculation according to the Ukrainian norms required more clarifying information about the responsibility level of the structure, the ultimate flexibility of the element, in contrast to the European ones.

Therefore, we can conclude that the calculation according to the European norms is more universal, giving a greater safety reserve in comparison with the Ukrainian norms. At the same time, the results of calculation according to DBN B.2.6-198:2014 are more favourable from the economic point of view.

REFERENCES

1.Білик А., Ковалевська Е. Розрахунок сталевих конструкцій будівель відповідно до Єврокоду 3 та Національних додатків України: практ. посіб. 2-ге вид. – К.: УЦСБ, 2019. – 232 с.

2.Державні будівельні норми України: Сталеві конструкції. Норми проектування. ДБН В.2.6-198:2014. – К.: Мінрегіон України, 2014. – 205с. Чинний з 1 січня 2015 р.

3. Національний стандарт України: Єврокод 3: Проектування сталевих конструкцій. Частина 1-1. Загальні правила і правила для споруд (EN 1993-1-1:2005, IDT). ДСТУ-Н Б EN 1993-1-1. – К.: Мінрегіон Уркаїни, 2010. – 154 с. Чинний з 1 липня 2013 р.

H. Ishutina Cand. Sc. (Tech), Assoc.Prof. (PSACEA, Dnipro)
Scientific supervisor: S. Biehichev, Cand. Sc. (Tech), Assoc.Prof.
Language consultant: S. Levytska, Senior lecturer

RELIABILITY OF GEODETIC GROUNDING AS A GUARANTEE OF QUALITY GEODETIC CONSTRUCTION SUPPORT

Engineering and geodetic works are an important and integral part of the complex of works in the search, design, construction and operation of engineering structures. They are a component of the technology of engineering and construction works. The intensive level of development of scientific and technical progress in construction requires the introduction of modern highly effective geodetic technologies, which should ensure the performance of engineering and geodetic works.

The quality of engineering and geodetic support of construction at all its stages depends on the reliability of the results of geodetic measurements. The reliability of the results of geodetic measurements depends on the complex influence of factors: the influence of the external environment (the influence of refraction, the curvature of the Earth), the accuracy of geodetic instruments (high-precision, precise and technical precision instruments), the personal physical properties of the observer and the reliability of the points of survey justification. If it is impossible to completely get rid of the influence of the external environment, then with regard to other constituent factors, their influence can be reduced to a minimum.