IJDPP
International Journal of Development and Public Policy
| e-ISSN: 2792-3991 | www.openaccessjournals.eu | Volume: 1 Issue: 6

Laboratory Equipment of Overpressure Determination on Standard

Qutlimurodov Ulugbek Masharipovich
Senior Lecturer «Jizzakh Polytechnic Institute» Jizzak city, Republic of Uzbekistan

ABSTRACT

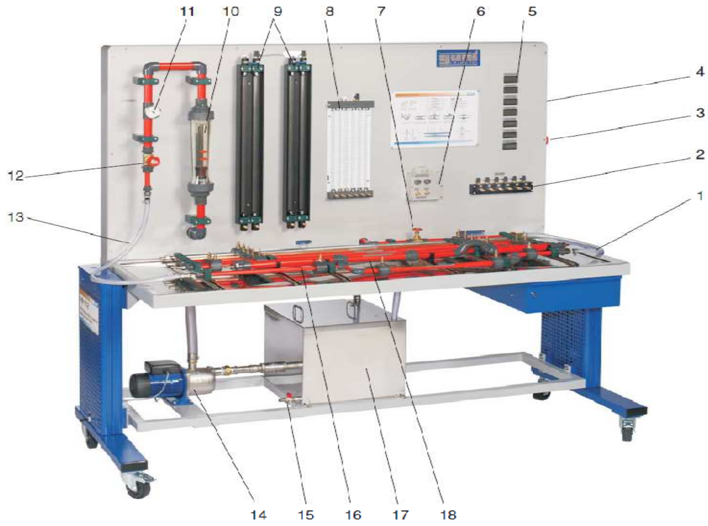
This paper presents experimental research on standard laboratory equipment in the field of hydromechanics, and has developed a method for calculating overpressure that occurs in water supply networks. If the overpressure in the specified section is less than 1 atmospheric pressure, i.e. P_{atm}=101.325 kPa, no adverse events will occur in the system and the water supply network will start up. If the pressures in the specified section are higher than P_{atm}=101.325 kPa, adverse events in the water supply network may occur. The results of our research show that the pressure exerted by the flow of water passing through pipes of different diameters on the pipe walls will be different. To avoid accidents and water losses in the network, correct overpressure calculations must necessarily be made during the test inspection.

KEY WORDS: Drinking water, water supply system, negative impact, overpressure, Venturi nozzle, safe operation, service life.

In practice, the main problems of pipeline networks of water supply systems are: premature failure of water supply networks, a significant increase in water losses in the network, mechanical damage to individual elements and accidents in the lines. Aimed at creating normative loads in water supply networks, the developed design measures will increase the efficiency of water supply networks, save energy and material resources. In order to determine the overpressure in the course of experimental studies, work on standard laboratory equipment was carried out and the method of testing the overpressure was given. The objectives of the study include the development of a methodology for calculating the wear of water supply networks from excess pressure and recommendations for the selection of rational modes of operation, taking into account the minimum wear of water supply networks. The value of water implies reforming and developing in the world practice of water supply as the most important component. The value of water implies reforming and developing the water supply sector as a major component of the water sector. In Uzbekistan, the main problem of the water supply system is limited water reserves and its uneven distribution. This means that scientific research related to ensuring reliable operation and uninterrupted supply is directly related to the efficiency of the water supply system. The way of correct calculation of overpressure, we will conduct with the help of laboratory equipment, which will be presented below.

Device for the study of fluid mechanics:-

Laboratory device for studying fluid mechanics **G.U.N.T. HM 112** (Germany) allowsto conduct flow and pressure measurement experiments, experiments to determine flow velocity loss and properties of different pipe sections.



Picture 1. G.U.N.T HM 112 appearance of the experimental block

1. Reverse hose
2. Electronic pressure relay
3. Basic eraser
4. Key of pump
5. Digital pressure indicator
6. Reduction of differential pressure
7. Check valve
8. Six-pipe pressure gauge
9. Two-pipe manometer
10. Volumetric-Rotameter
11. Thermometer
12. Reducing valve
13. Supplier hose
14. Pump
15. Drain valves
16. Pipes of different sizes
17. Resirvoir for water
18. Interchangeable measuring objects

Technical information:

Length-2220 mm; width-820 mm; height-1980 mm; approximate weight - 250 kg; power supply - 230 V, 50Hz; nominal flow (force) - 0.75 kw. Centrifugal pump: max.napor-24m; max production - 7 m^3/s; Tank capacity - 75 l.

The pressure of the pump installed in this laboratory device is H = 24 meters. The pressure supplied by the pump is determined as follows.

P_{pump}= H × 9.8 Pa = 24 m × 9.8 Pa = 24 000 mm × 9.8 Pa = 235 200 Pa = 235.2 kPa (1)

This means that the pump pressure in this equipment is P_{pump} = 235.2 kPa. The temperature of the water in the water tank is indicated by the thermometer t = 15°C. We adjust the water flow through the control valve, that is rotameter reading to Q_w = 0.5 m^3/h.

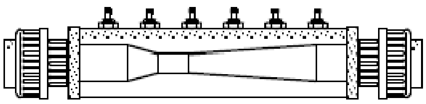
IJDPP
International Journal of
Development and Public Policy
| e-ISSN: 2792-3991 | www.openaccessjournals.eu | Volume: 1 Issue: 6

Picture 2. Thermometer and rotameter indicators

We determine the flow rate while the pump is running by the following formula.

$$= \qquad v = \frac{Q_w}{3600\pi(\frac{d}{2})^2} \qquad \frac{0.5m^3/h}{3600 \bullet 3.14 \bullet (\frac{0.02\,m}{2})^2} = \frac{0.5m^3/h}{1.13m^2} = 0.44\,m/sek \qquad (2)$$

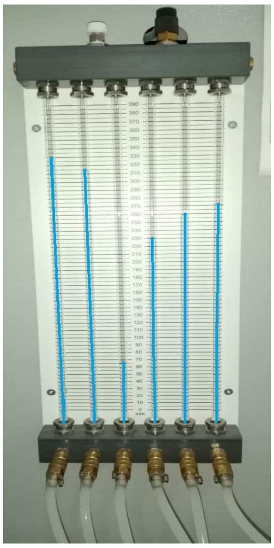
Hence the velocity of water flow in the system is υ = 0.44 m/sec. To measure the overpressure that forms inside the Venturi nozzle, we install the venturi nozzle on the pipe of measuring objects (18), which replace each other, and connect one end of the hoses to the nozzle, we connect one end to a six-tube monometer.



Picture 3. Venturi soplosi scheme

Picture 4. Venturi nozzle working condition

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021



Picture 5. Experimental indicators of a six-pipe pressure gauge

Six-tube monometer - consists of six equal glass tubes mounted on a millimeter scale at the back. Height 390 mm forms a column of water. All tubes are connected to each other from above and have a common discharge valve. The liquid inflow points are located below. Once the air bubbles in the system have been expelled, the common discharge valve closes and the pump shuts off. The common discharge valve opens and an airbag is formed inside the glass tubes. The pump is started and the water column readings on the tubes are recorded.

The results of this laboratory work are tabulated.

Table 1 Laboratory work calculations

№ Glass tubes	Water column indicators of glass tubes, h (mm)	Converting water column readings in glass tubes to pressure (h x 9.8 Pa)	Results P (kPa)
1	330	330 x 9.8	3.234
2	320	320 x 9.8	3.136
3	20	20 x 9.8	0.196
4	240	240 x 9.8	2.352
5	270	270 x 9.8	2.646
6	280	280 x 9.8	2.744
	Total		14.308

Now to calculate the overpressure that will occur exactly inside the Venturi nozzle, we divide the calculated pressure readings on the six tubes in total into six.

$$P_{ex.pr} = \frac{\sum P_{pr}}{6} = \frac{14.308 \ \text{kPa}}{6} = 2.385 \ \text{kPa} \quad (3)$$

The overpressure in the system under test shall not exceed 1 atmospheric pressure, that is $P_{atm.}$ = 101.325 kPa. According to the results of this laboratory work, the excess pressure inside the Venturi nozzle is $P_{ex.pr.}$ = 2.285 kPa. This means that the Venturri nozzle can easily withstand the pressure P_{pump} = 235.2 kPa supplied by the pump and accidents never occur due to overpressure in systems operating at such rates.

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021

CONCLUSIONS

1. Any water supply systems should be inspected and tested before commissioning. To do this, depending on the type of pipe materials installed in the system, they are divided into separate sections and sealed. The pressure required for the system is then created using air compressors.

2. Monometers are required to be installed to measure the pressure at the most important points of the selected sections, where the pipe diameters change, where they rise and turn, and where they separate and connect. The readings of the monometers in the inspection area are recorded and the total is calculated by adding up the total readings. The calculated total is divided by the total number of monometers and the average value of the total pressure in the system is determined.

3. The average value of a pressure is 1 atmospheric pressure, that is, only if P_{atm} less than 101,325 kPa, no overpressure is generated in the system and the water supply system is allowed to start. If the average pressure value is higher than $P_{atm.}$ = 101,325 kPa, in which case adverse events in the system may occur due to the formation of overpressure. To prevent accidents and water losses in the system, it is imperative that the correct calculation of the overpressure is carried out during the test.

BIBLIOGRAPHY (REFERENCES):

1. Кутлимуродов У. М. Решения для эффективного использования водных ресурсов в регионах Республики Узбекистан //Символ науки. – 2021. – №. 3.
2. Seydullaev, Etc. The R. (2020). Application of Information Systems in effective use of water. Science and Education, 1(7).
3. Кутлимуродов У. М. Решения проблемы очистки сточных вод г. Джизака от ионов тяжелых металлов // conf2021@tstu.uz. 2021/4/23. Том-1. с. 92-95.
4. Khazhimatova, M. M. (2021). Some hydrodynamic effects exhibited by bubble and projectile modes of gas-liquid mixture flow. *Science and Education*, 2(4), 257-264.
5. Qutlimurodov U.M. Ko'cha va avtomobil yo'llarini atmosfera-yog'ingarchilik oqava suvlaridan tozalash usullari. // conf2021@tstu.uz. 2021/4/25. Том-1. с. 55-58.
6. Кутлимуродов У. М. Загрязнение атмосферы вредными веществами и меро прияти по его сокращению // Экология: вчера, сегодня, завтра.–2019. с.-249-252.
7. Saydullaev, S. R. (2020). Decision-making system for the rational use of water resources. *Journal of Central Asian Social Studies*, *1*(01), 56-65.
8. Кутлимуродов У. М. Некоторые аспекты экологических проблем, связанные с автомобильными транспортами // European Scientific Conference.–2020.– с. 50-52.
9. Obidovich, S.A. (2020). The use of Modern Automated Information Systems as the Most Important Mechanism for the use of Water Resources in the Region. *Test Engineering and Management*, 83, 1897-1901.
10. Ergashev, R., Azimov, A., Kholbutaev, B., & Mavlonov, L. (2021). Influence of cavitation on pressure pulsation through impeller of large pumps. In *E3S Web of Conferences* (Vol. 264, p. 03004). EDP Sciences.
11. Султонов А.О. Методы рационального использования воды в орошении сельскохозяйственных культур //Современная экономика: актуальные вопросы, достижения и инновации. – 2019. – С. 207-209..
12. Хажиматова М. М. Некоторые гидродинамические эффекты, проявляемые при пузырьковом и снарядном режимах течения газожидкостной смеси //Science and Education. – 2021. – Т. 2. – №. 4. – С. 257-264.

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021

IJDPP
International Journal of
Development and Public Policy
| e-ISSN: 2792-3991 | www.openaccessjournals.eu | Volume: 1 Issue: 6

13. Хажиматова М. М. Сооружение для забора подземных вод //Символ науки. – 2021. – №. 4. – С. 21-24.

14. Хажиматова М. М., Саттаров А. Экологик таълимни ривожлантиришда инновация жараёнлари //Me′ morchilik va qurilish muammolari. – 2019. – С. 48.

15. Мусаев Ш. М. Ишлаб чиқариш корхоналаридан чиқадиган оқова сувларни механик услублар билан тозалаш самарадорлигини ошириш тўғрисида //Science and Education. – 2021. – Т. 2. – №. 5. – С. 343-354.

16. Мусаев Ш. М. и др. Насос агрегатларини ҳосил бўладиган гидравлик зарблардан ҳимоялаш усуллари тадқиқ этиш //Science and Education. – 2021. – Т. 2. – №. 3. – С. 211-220.

17. Махмудова Д. Э., Мусаев Ш. М. Воздействие промышленных загрязнителей на окружающую среду //Академическая публицистика. – 2020. – №. 12. – С. 76-83.

18. Мусаев Ш. М., Саттаров А. Умягчение состав воды с помощью реагентов //Me′ morchilik va qurilish muammolari. – 2019. – Т. 23.

19. Сайдуллаев С. Р., Сатторов А. Б. Ананавий қозонхона ўчоқларида ёқилғи сарфини таҳлил қилиш ва камчиликларини бартараф этиш //Научно-методический журнал "Uz Akademia. – 2020. – С. 198-204.

20. Сайдуллаев С.Р. Система принятия решений по рациональному использованию водных ресурсов // Вестник центральноазиатских социальных исследований. - 2020. - Т. 1. - №. 01. - С. 56-65.

21. Сайдуллаев С. Р. Сувдан самарали фойдаланишда ахборот тизимларини қўллаш //Science and Education. – 2020. – Т. 1. – №. 7.

22. Сатторов А., Сайдуллаев С. Эски турдаги қозонхона ўчоқларида ёқилғи сарфини таҳлил қилиш //Меъморчилик ва қурилиш муаммолари" ОАК тасаррўфидаги илмий-техник журнал Самарқанд. – 2020.

23. Мусаев Ш. и др. Свойства кристаллов кварца //Science and Education. – 2021. – Т. 2. – №. 10. – С. 201-215.

24. Бобомуродов, У.С., & Султонов, А.О. (2016). Методы улучшения реагентного умягчения воды в осветлителях. Молодой ученый, (7-2), 51-53.

25. Султанов А.О. Информационная система водных ресурсов сельского хозяйства //Проблемы научно-практической деятельности. Перспективы внедрения. – 2019. – С. 197.

26. Sultonov A.O. Problems of optimal use of water resources for crop irrigation //Journal of Central Asian Social Studies. – 2020. – Т. 1. – №. 01. – С. 26-33.

27. Sultonov A. Water use planning: a functional diagram of a decision-making system and its mathematical model //International Finance and Accounting. – 2019. – Т. 2019. – №. 5. – С. 19.

28. Назиров, С.Ў.Ў., & Султонов, А.О. (2021). Саноат корхоналари оқова сувларини тозалашнинг долзарблиги. *Science and Education*, *2*(6), 299-306.

29. Karimovich, T. M., & Obidovich, S. A. (2021). To increase the effectiveness of the use of Information Systems in the use of water. *Development issues of innovative economy in the agricultural sector*, 222-225.

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021