

Design of Universal clamp for PVC pipe

^{#1}Omkar P. Hiremath, ^{#2}Swapnil M. Chavan, ^{#3}Shripad D. Kshirsagar,
^{#4}Abhishek D. Fiske, ^{#5}O.L. Mahajan



¹hiremath.op@gmail.com
²swapnilc1995@gmail.com
³kshirsagar555shripad@gmail.com
⁴abhishekfiske7@gmail.com
⁵onkar.mahajan10@gmail.com

^{#12345}Mechanical Engineering Department,

N.B.Navale Sinhgad College of Engineering, Solapur.

ABSTRACT

In quality and control department to maintain the pipe accuracy, Hydrostatic Pressure Testing is carried out. Hydrostatic testing is the most common method employed for testing pipes and pressure vessels. Using this test helps maintain safety standards and durability of a vessel over time. For this test particular clamps are used called as universal clamp or multi-clamps. The various methodology used for clamping operation used in different application. Clamping is required in various industries according to their application. This can be achieved by selecting the optimal location of fixturing elements such as clamps. The setup of testing for pipe is done manually. For that minimum cycle time required for loading and unloading the Pipe. So, there will be scope of development system which can help in improving productivity and time. Universal clamp reduce operation time and increases productivity and high quality of operation is possible.

Keywords: Hydrostatic testing, multi-clamp, PVC pipes

ARTICLE INFO

Article History

Received: 24th March 2017

Received in revised form :

24th March 2017

Accepted: 26th March 2017

Published online :

31th March 2017

I. INTRODUCTION

The Project is sponsored by Kothari Agritech Pvt.Ltd. which is a plastic industry and they manufacture PVC pipes along with various pipe fittings and pipe Joints. As every company manufacturing PVC pipe has to carry out certain test so as to set up benchmark in the industrial world and also to control the Quality of the Product. There are various tests are carried out and one of them is Hydrostatic Pressure Test. The pipe sizes for which the test carried out are of 63mm, 75mm, 90mm, 110mm. As all pipes are provided with high pressure ranges while undergoing Hydrostatic test that too four times their value of thickness ranges mentioned in “kgf” (MKS unit).So it requires proper clamping which one will sustain the pressure range 16.76 psi to 17.76 psi. Pressure tightness can be tested by shutting off the supply valve and observing whether there is a pressure loss. The location of a leak can be visually identified more easily if the water contains a colorant. Strength is usually tested by measuring permanent deformation of the container. In the hydrostatic test, clamp is used during testing for restricting the flow of water from both the open ends and main purpose is to maintain the rated pressure as mentioned in the manufactures catalogue for the particular diameter pipe. Suppose if we have to carry out

hydrostatic testing on 110mm dia. Pipe, clamp of internal diameter 110mm is used, so main drawback is that to carry out test on different diameter pipes we have to have different diameter clamps available. So in our project we are going to design analysis and manufacture such a clamp that it will be at least used for four pipes of different diameter to carry out Hydrostatic Pressure Test. The name given to this clamp is “Universal Clamp”.

II. PROBLEM STATEMENT

When the pipes of different diameter are sustained to Hydrostatic test the clamps are of standard size for pipe so procedure is time consuming and hectic to adopt the operation. To overcome this the most possible solution is the multi-dimensional clamp which may adapt different diameter pipes.

III. ESTIMATE SOLUTION

To manufacture such a clamp which will have provision to mount the different diameter PVC Pipe in the single set up of the clamp. The clamps having the grip which is provided by

calibrating with Inner Diameter of the pipe and also it serves the purpose of providing the firm grip at the both the ends of the pipe which are going to be mounted on the clamp while undergoing Hydrostatic pressure test. The grooves formed because of I.D. and O.D. of pipes are provided with Rubber sealing so as to prevent the leakage of water to that effect it improves the efficiency of the Hydrostatic Pressure test. Following figure elaborates its design for pipe clamps. We are designed it in CATIA V5 R19 modelling software for better understanding. The whole assembly we are called Universal Clamp for PVC pipe.

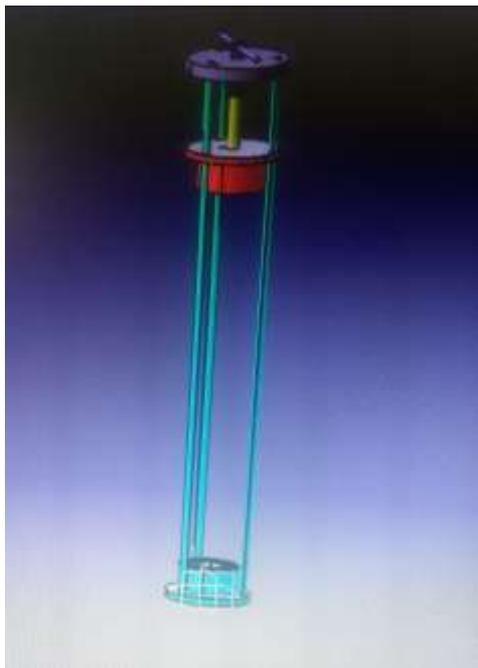


Fig.1. Universal clamp



Fig.2. Isometric view of Clamp

IV. REQUIRED PARTS

Sr.No.	Part Name	Material	Quantity
1	Plates(12mm thick)	M.S.	3
2	Pipes	M.S.	8
3	Rods	M.S.	3
4	Threaded Rod	M.S.	1
5	Bearings	S.S.	1

Table 1

V. DIMENSIONS

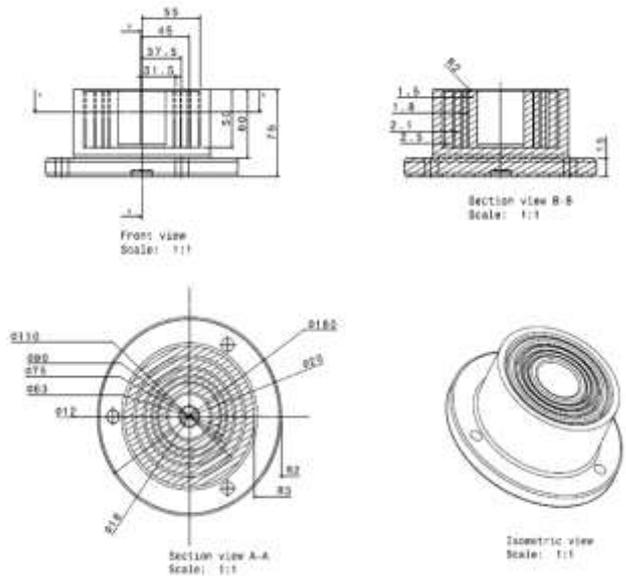


Fig. 3. Clamping set up Part A and Part B

VI. CONSTRUCTION AND WORKING

For carrying out hydrostatic pressure test on certain diameter PVC Pipe. Considering for example 63mm diameter of PVC Pipe having 1 meter (1000mm) length which has to undergo the test and chamfer its edges so as to fit in transition type of fit. Then clamp set up is to be arranged in a vertical position. Pipe is to be inserted in the bottom clamp which consists of plate and it is packed. So

water is filled in the pipe as per the requirement for the testing. Now the Top clamp is lowered by the three guide bar provided on the top and bottom plate and assembly provided upon it to function the movements of the top clamp in order to mantle and dismantle the pipe for testing. The top clamp is now tightened with the help of the nuts and bolts. The top clamp has provision for applying the pressure inside the pipe at its centre.

VII. ADVANTAGES

- Easy to operate
- Less effort required to clamping of pipe
- Easy to load and unload the pipe during testing
- Accommodate four pipe sizes in a single setup
- Less time consuming

VIII. CONCLUSION

Studying the methodology adopted by us in making the parametric model, they can implement it for other various pipes and hence can save time.

ACKNOWLEDGEMENT

It is indeed a great pleasure and proud privilege for me to present this in project. The training did at “Kothari Agritech Pvt Ltd.”, Solapur which provided me the first and best opportunity to put my engineering knowledge to practical use. I must be thankful to director of “Kothari Agritech Pvt Ltd.”, Mr.Sutar for giving me such opportunity. I express my sincere gratitude to Mr. Sutar (PVC Plant Incharge) for not only guiding me through the training period but also sharing his immense knowledge and technical experience with me at every stage.

REFERENCES

REFERENCES

[1] Janusz Juraszek, "The clamped joint-a survey and analysis of shapes and materials", journal of theoretical and applied mechanics, 44, 1, pp. 51-73, Warsaw 2006.

[2] Indian Standard specification for pipe vices IS:-6007-1971.

ONLINE LITERATURE

[3] https://www.ieee.org/publications_standards/publications

[4] <https://www.sciencedirect.com>

[5] <https://www.slideshare.com>

[6] http://www.thepetrostreet.com/article_0001.html