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Comparison Between Circular And Intze Elevated Storage Water Tank Base By Using Staadpro Software

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Abstract *-The aim of the present study is, to compare Circular and Intze elevated storage water tank and construct model by using the STAAD PRO. Village of Bamani, is the part of Latur division of Maharashtra, having current population 2152 Water plays a variety of roles in the livelihoods of rural households of which domestic use drinking, washing, cleaning, preparing food and agriculture, watering plants, etc. From past few years the village experience a several drinking water scarcity with depleting water resource people are face so many difficulties due to lack of water. To overcome with this issue we decided to design the water tank for current population. In this study the aim is to investigate the safe, effective and economical structure of water tank. To develop this project has been design with the help of STAAD principles. The design involves load calculations manually and analytically. In circular and Intze water tank for study of base, we will find bottom analysis and stresses. Then construct model by using STAAD PRO. Design and Analysis of circular and Intze elevated storage water tank. And the last compare the Results of base of both tanks. The results are compare and summarize on the basis of different parameters like population, capacity of tank type of soil. From all final graphs we conclude that as compared to circular water tank the Intze water tank have less values of moment so that it is more economical as compared to circular water tank.*

Keywords **- Water tanks, Circular and Intze water tank, Component, Design.**

I. INTRODUCTION

No matter how much science and tech.evolve with time,the dependency of humans on water is never likely to change.The same was true in the reverse end of time line as well.Today,we store water mostly in the plastic water storage tanks,of vari- ous materials or choice and availability,predominantly the plas- tic water storage tanks.In future,the materials like to evolve a lot,for further convenience of humans,without a doubt.Apart from these advantages,Due to lack of owning personal space,most people prefer the overload tank over its counterpart. Different types of structural systems are used to store the effect of lat- eral loads on the tanks.They are Gravity load and minor Wind load.Live load is also acting,but its amount of load is very less.The tanks in elevated structures are to be widely used in huge amount of population.Elevating the water high above the pipes that distribute it throughout the surrounding building or community ensures that hydro static pressure,driven by grav- ity,forces the water down and through the system.And the type of water stored in different methods like reservoir,dams,rivers,etc. water tanks are high rated for village areas.Generally a water tank is a container for storing water. Water tanks are used to provide storage of water for use in many applications,drinking water,irrigation agriculture,agricultural farming,both for plants and livestock,chemical manufacturing,food preparation as well as any other uses.The main function of storing water is to smooth out variations in quantity and quality of water in a water supply.Plastic water tanks can last up to 10 years or more,given the durable materials used to manufacture them.In other hand the concrete tanks need very minimal maintenance and can last up to 50 years.Alternative tanks systems avail- able in the market to be repaired and have strict maintenance cycles,which means a lot of money is invested for their maintenance. Water tanks are eco-friendly because they store rainwa- ter providing an alternative water supply for drinking, washing and outdoor use using rainwater can also reduce water bills and take the pressure off mains water supplies .Hence the study on various types of structure or methods are very important to know which type of structure or methods gives better performance.

Following points are important

1. Water is human basic need for daily life generally water is stored in underground as well as elevated water tank for distribution purpose. Water tanks for daily public utility, drinking water, irrigation agriculture, fire suppression, agricultural farming, both for plant and livestock chemical manufacturing, food preparation as well as other uses.
2. Water tansy teems and in many industrial facilities for storage of water.
3. Many different ways are there for the storage of liquid such as underground tank, ground supported tank, elevated water tank etc.
4. Water tank are important element in municipal water supply, firefighting.

Circular tank-

The simplest form of water tank is circular tank for the same amount of storage the circular tank requires lesser amount of material .It is very economical for a smaller storage of water Up to 200 lac liter sand with diameter in the range of 5-10 m. The depth of storage is between 3 to 4 m. the side walls are designed for hoop tension and bending moment.

Intze tank

For large storage capacity overhead tanks, circular tanks are found economical however in, in flat bottom the thickness and reinforcement is found to be heavy.

Every design comes out when there is a problem .A design is created to solve the existing problems. people in region where there is scarcity of water don't get enough flow or speed or discharge especially those living on the upper floors in a multi storied building as a consequence people suffer from lack of water due to insufficient supply for compensating their daily needs. As a first solution of this problem, one needs to develop a water storage project as has been designed with the help of STAAD principles, known as overhead water Reservoir. The present study report the analysis and of an elevated circular water tank using STAAD Pro V8i.The design involves load calculation manually and analysing the whole structure by staad Pro V8i The design method used in staad Pro analysis is limit state design and the water tank is subjected to wind load, dead load, self – weight and hydrostatic load due to water.

Objectives:-

1. To study the base of elevated circular and Intze water tank.
2. To study of bottom analysis and find the stresses
3. To construct the model by using STAAD PRO.
4. To analyse and design the circular and Intze elevated storage tank and Compare it with a base of the water tank.
5 .Compare with shape, strength, economy, capacity, dynamic forces, base shear, base moment and deflection.

II.LITERATURE REVIEW AND SUMMARY

In this literature review, an effort has been record a design of circular overhead water tank which is more economical, simple and having a better life span with the help of 3370-2009 in LIMIT STATE METHOD. Design of water tank manually is tedious job, in this project circular INTZE WATER TANK is designed using membrane analysis separate continuity analysis is not done calculations for continuity effect can be done by stiffness method.

III.METHODOLOGY

Village of Bamani, is the part of Latur division of Maharashtra, having current population 2152.Water plays a variety of roles in the livelihoods of rural households of which domestic use drinking, washing, cleaning, preparing food, for agriculture, watering plants etc. From past few years the village experience a several drinking water scarcity with depleting water resource people are face so many difficulties due to lack of water .To overcome this issue we decided to design the water tank for current population .

Image no.1. Bamani Gaon Map (http://www.onefivenine.com)

Methods of population forecasting

- Incremental increase method
- Arithmetical increase method
- Geometric increase method
- Logistic curve method
- Decrease rate of growth method
- Simple graphical method
- Comparative study graphical method

Past year population data of Bamani village

Year	Population
1990	1,261
1995	1,252
2000	1,956
2005	1,866
2010	1,956
2015	1,956
2020	1,897

Incremental increase method

In this method rate of growth is not constant it may increase or it may decrease

$$P_n = p0 + n\bar{x} + \frac{n(n+1)\bar{y}}{2}$$

Pn =final population

P0= last known population

N= no. of decade

$\bar{x}$ =avg. increase of population of known decade.

1) Domestic water demand-(as per is 1172-1993)-

Drinking -5 cleaning utensils-10

Cooking -5 cleaning home-10

Bathing -55 flushing- 30

Washing cloths -20 Total= 135 lpcd

2) Institutional and commercial water demand -

Assume 10,000lit

Total water demand –

1. Domestic -135 lpcd
2. Institutional and commercial - 10,000 lit

Circular tank

Diameter = 8m

Radius =4m

Height =6.2m

Volume =311.05m3

Height of top dome =1.5m

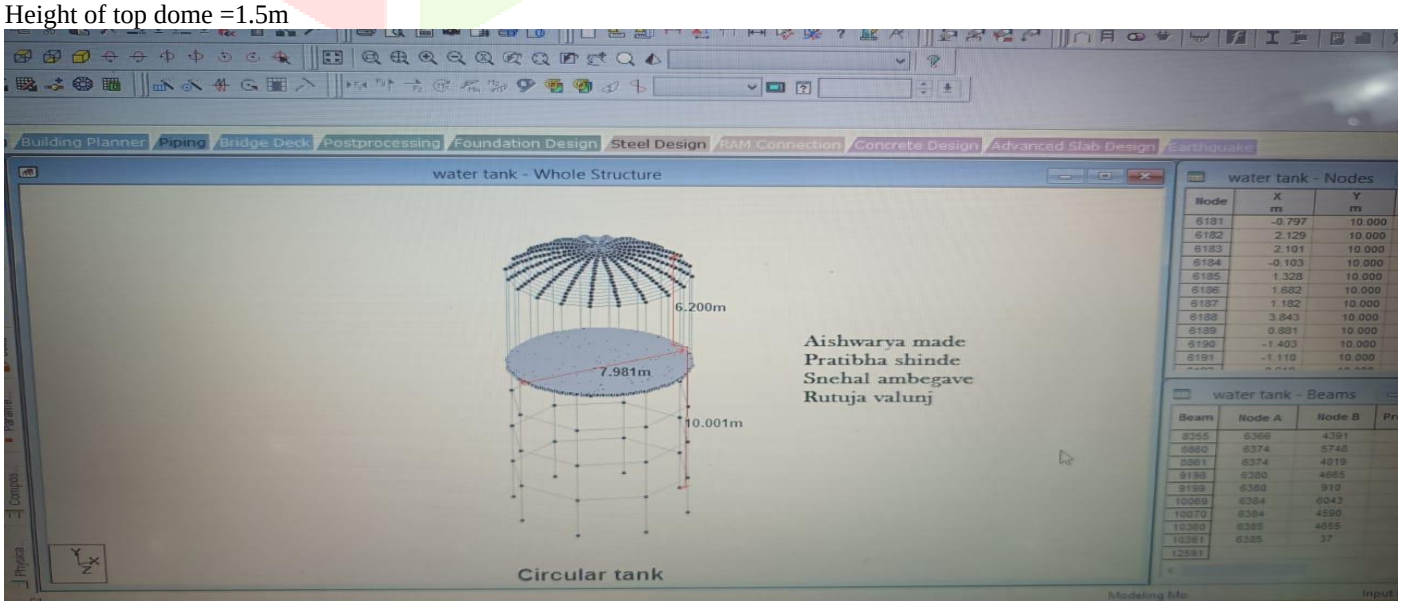


Photo no.1 Circular Water Tank Model

Intze tank
Diameter of tank = 8m
Diameter of lower R.B = 5m
Rise of top dome = 1.5m
Rise of bottom dome = 1m
Height of conical dome = 1.5m
Height of cylindrical portion = 4.882m

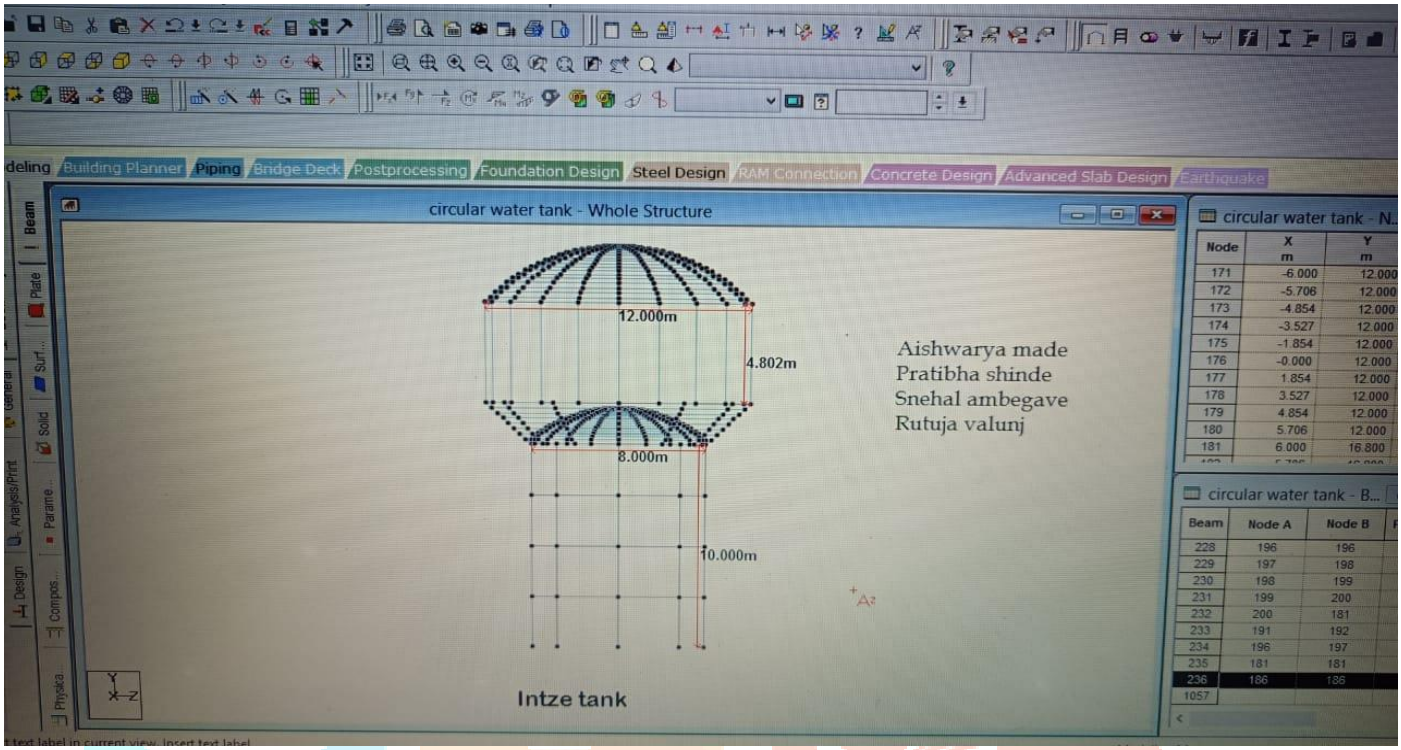
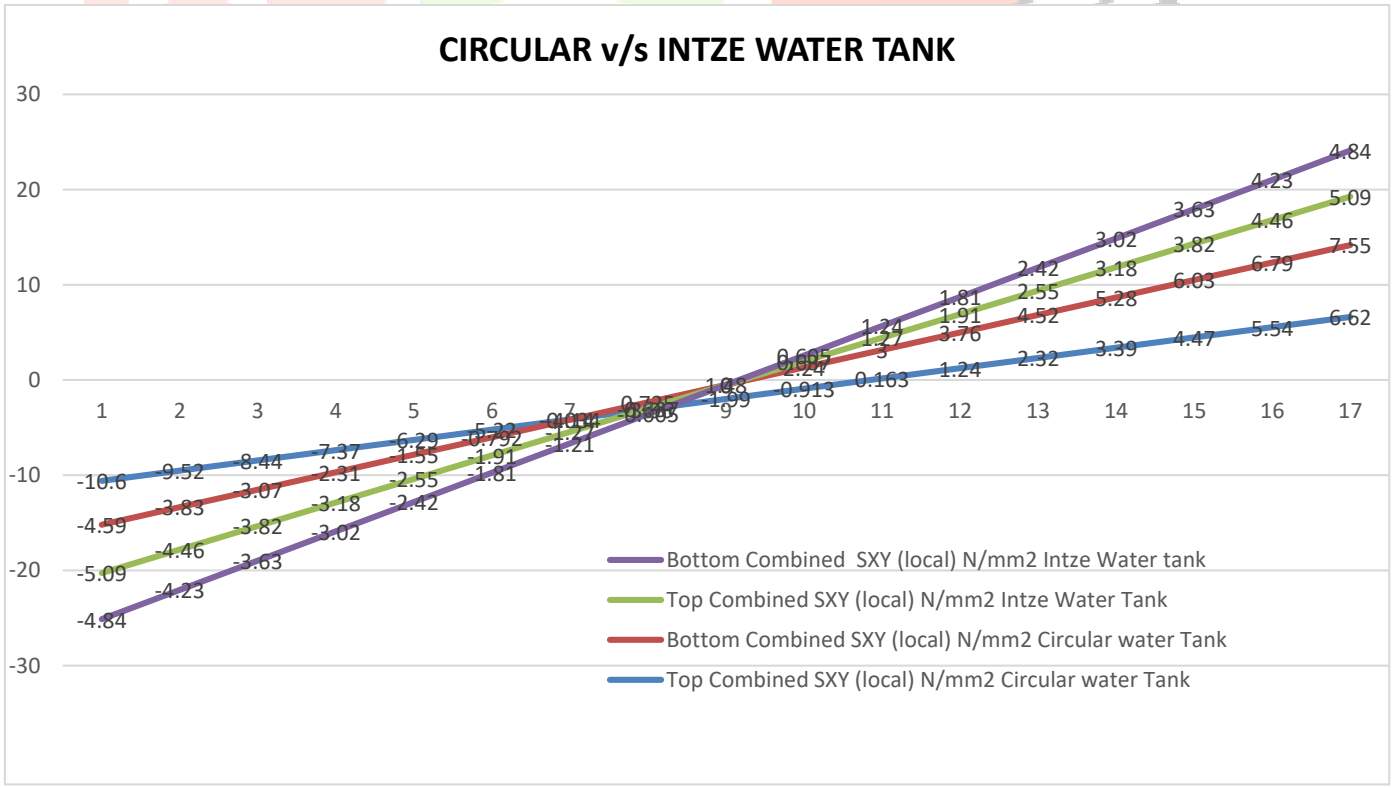


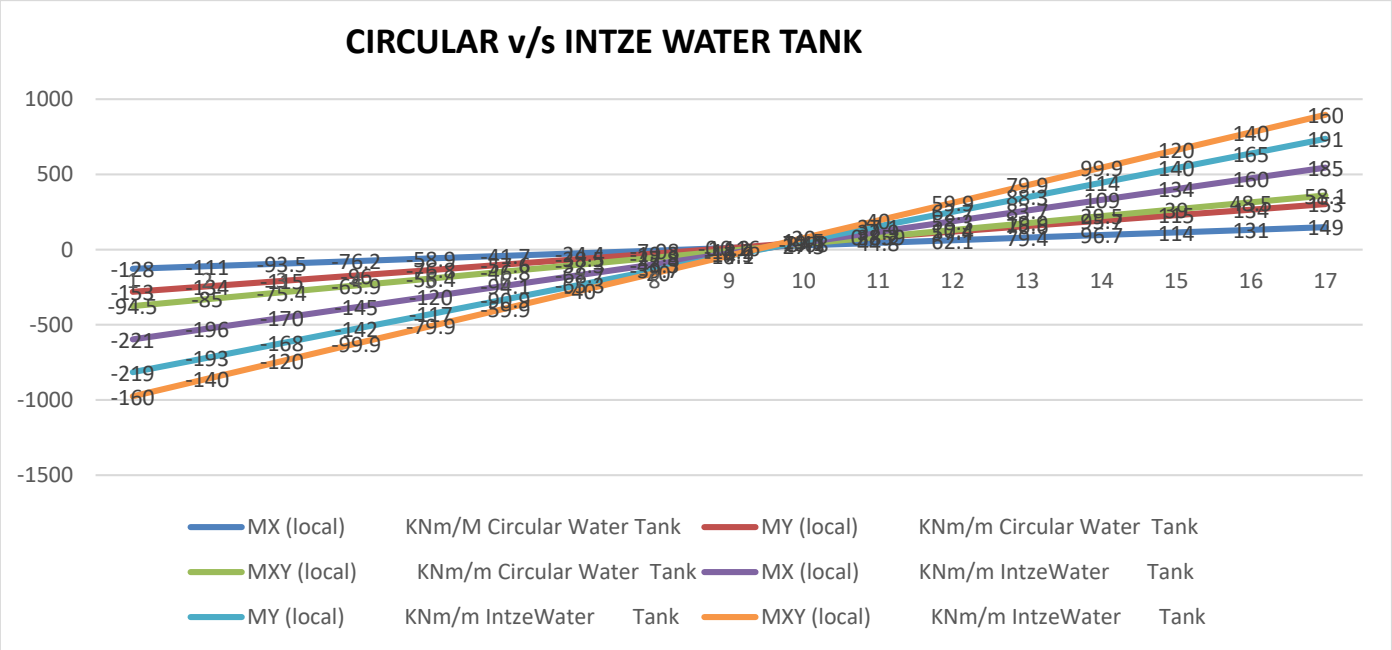
Photo no.2 Intze Water Tank Model

IV. RESULTS AND DISCUSSION

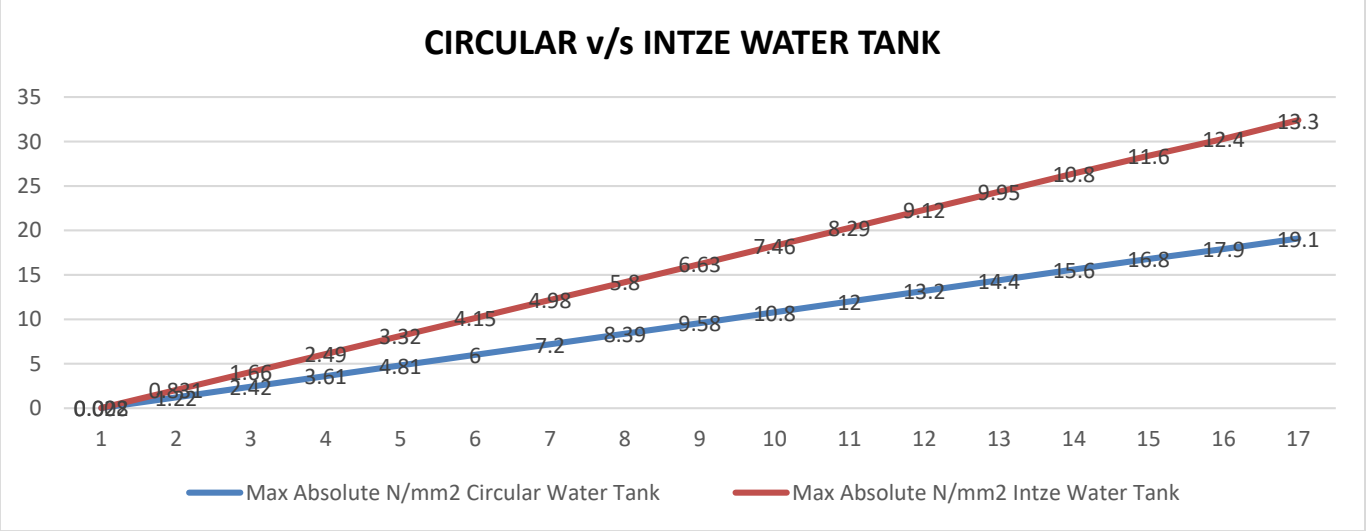
After comparing Circular & Intze water tank, we have got the following results



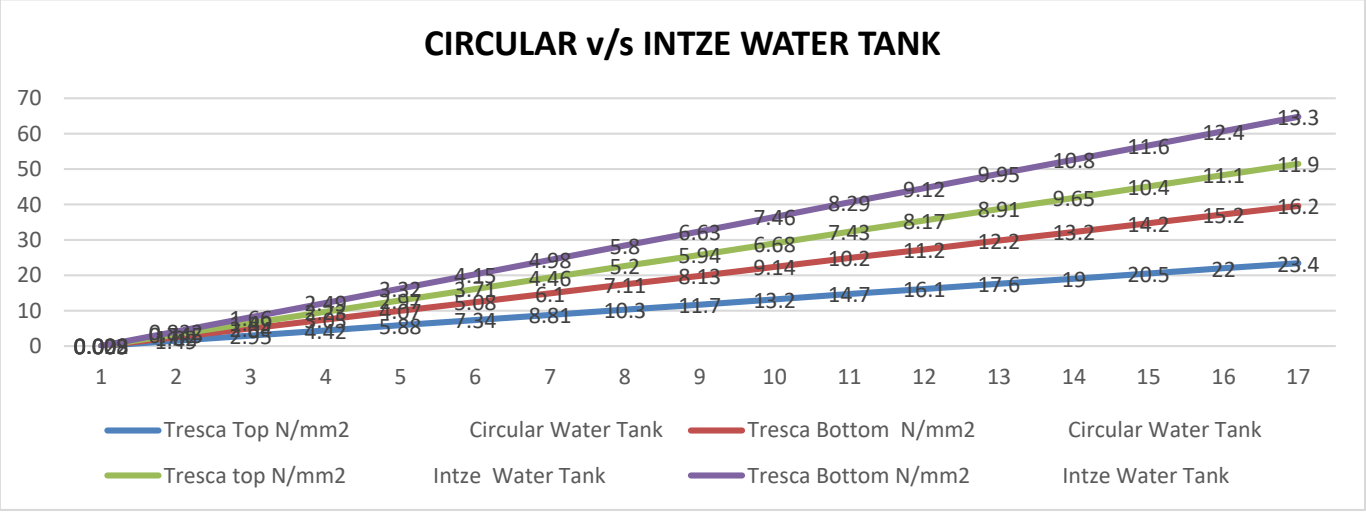
Graph 1. Top & Bottom Combined SXY (Local)



Graph 2. BENDING MOMENT MX, MY & MXY (Local)



Graph 3. Maximum Absolute



Graph 4. Tresca Top & Bottom

CONCLUSION

- From all final graphs we conclude that as compared to circular water tank the Intze water tank have less values of moment so that it is more economical as compared to circular water tank.
- For Bamani village having the water tank of 3, 00,000 lit. The Intze tank is more suitable and economical.

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