

Relative Merits of Wooden, Steel and Concrete Tanks

The first railway water tanks were built of wood and, while other materials are now being used, it is safe to say that the wooden tank will never be discarded entirely. The advantages of the wooden tank are manifold. In the first place, it is the cheapest form of construction. A wooden tank is easily constructed and a carpenter crew assigned to this work soon becomes skilled in its erection. As wood is a poor conductor of heat and cold, it is a desirable material for tanks in cold climates as the water can be kept from freezing more easily. It is not considered practicable to build a wooden tank of larger capacity than 100,000 gal. The wooden tank carries a certain fire risk and is likely to be damaged or destroyed by fire in the frost-proofing or by the burning of adjacent buildings.

Creosoted Tanks

The increasing scarcity of durable timber for the construction of tanks, together with the increased cost, has resulted in a number of railroads constructing creosoted tanks, this type of tank now being standard on at least four railroads. Creosoted tanks are now being built in sizes up to 100,000 gal. capacity. The Illinois Central has 31 creosoted tanks in service and seven more now under construction. The advantage of the creosoted tank over the untreated wooden tank is that any timber that will take treatment can be used, thus making the cheaper timbers available for tank construction. Where the entire structure is creosoted there should be considerable reduction in maintenance as the life of the structure will undoubtedly be much greater and there is no necessity for painting other than the hoops.

The need of larger reservoirs than could be made safely with wooden staves led to the construction of the sheet iron and steel tanks, beginning about 30 years ago. The steel tank can be made of almost any desired capacity and has the advantage that it can be built quickly and is not excessively expensive. It is subject to corrosion and for that reason must be kept well painted both outside and inside. If there should be any neglect in this respect much harm may result. Reports indicate that steel tanks pass through severe freezing winter weather successfully and only the usual precautions for keeping the water from freezing need be taken.

Reinforced Concrete

The first reinforced concrete tank was built in this country in 1899, but only 53 had been built in this country and abroad by 1910. Since then many more have been constructed but not as many as the general use of concrete in other lines of construction would lead one to believe. Concrete tanks for railroad purposes are not being given general consideration for various reasons. Very few railroad water stations can be considered permanent because experience has shown that operating conditions are constantly changing, requiring frequent and unexpected changes in yards and tracks. A concrete tank cannot be moved and therefore if the permanency of the location is at all doubtful, it ought not to be built. It is also the most expensive type of tank and as the item of initial cost is often the governing factor in a decision, other types are used instead.

The Problem of the Concrete Tank

The great problem of the concrete tank is to secure a perfectly water tight reservoir. The first tanks built, as a rule, developed cracks after the tank had been filled with water. While the cracks gradually filled up, especially where the water contained limestone in solution, many of the early tanks had to be coated on the inside with some water-proofing composition. As far as is known, no tanks built recently have been waterproofed by coating the inside.

Much speculation has always existed as to the effect of severe winter weather on concrete tanks. Many such tanks are in service in northern climates and seem to give no more trouble than tanks of other types. In fact, some claim that the concrete tank stands up better than the wooden tank.

The construction of the concrete tank requires good workmanship. Most difficulties with concrete tanks can be traced almost directly to faults in the construction and it is therefore necessary that the work must be watched carefully.

Conclusions

A concrete tank will invariably represent a greater first cost than either a steel or wooden tank, yet this first cost is offset to a large extent by a far lower maintenance cost as it is a permanent structure with a life of perhaps 100 years as compared with other tanks having a maximum life not to exceed 50 years. One great disadvantage of the concrete tank is that it cannot be moved after erection.

While the concrete tank is admittedly more expensive than the steel and wooden tank and its greater life and lower maintenance cost are firmly established the relative cost and durability of steel and wooden tanks is still a matter of controversy. An average life of 30 years may be expected of tanks constructed of white pine, cypress and redwood while the other untreated timbers used in the construction of tanks will have a life not to exceed 15 years. Properly treated timber will have a life of at least 30 years and probably more. Steel tanks for railway water service have only been constructed during the past 30 years and as some of the first steel tanks constructed are still in service the minimum life of a steel tank properly painted can be based upon this figure with a minimum life of 40 to 50 years, always dependent on proper painting and maintenance. Many of the old style flat bottom steel tanks have failed through the bottom rusting away, and the figures on the life of the steel tank are based upon the modern type of conical bottom steel tank.

A feature of primary importance in the selection and construction of a water tank, and one that cannot be emphasized too strongly, is material and workmanship. As previously stated most of the difficulties experienced with concrete tanks can be traced directly to faulty construction. The manufacture of steel tanks has been developed to such an extent that one is reasonably sure of good material and workmanship as the material furnished by most manufacturers is uniformly up to standard specifications and the construction is usually done by workmen skilled in that particular line of work. The construction of concrete and wooden tanks is sometimes performed by workmen who are no doubt skilled in ordinary concrete work and general carpentry and building but perhaps do not fully understand the requirements of tank construction. Conditions encountered on the average railroad vary to such an extent that it would be unwise to establish any particular type or kind of tank as standard without regard to local conditions.

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Discussion

The discussion following this report was not directed so much at the contents of the report as to the measures which must be taken to obtain good construction and satisfactory maintenance of the several classes of tanks. The greatest interest was manifested in the creosoted wood tanks, particularly as to methods of construction, framing before treatment and the kind of wood used. Favorable reports were given on a concrete tank in which the space underneath the tub is used as a pump house, this type having been found very successful in cold territory.