



## Criteria of settlement in small and large steel tanks

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### Abstract:

This paper investigates the criteria of settlement in steel tanks that are used for storage of oil or gasoline. The steel tank considered is representative of many steel tanks constructed in Mahshahr in south of I.R.Iran, that has a ratio between the diameter and the height of order 4 with slenderness ratio (radius to thickness) of the order of 1000 (first course of shell) to 3750 (last course of shell). Weakness of the soil of site makes settlement to be more than usual so the most economical solution is to find how much the settlement can be.

**Keywords:** Steel tank, Settlement, Tilt, Shell

### 1. Introduction

The settlement of the foundation in large, thin walled shells has been of great concern in the past and there are some codes and articles about it that are so useful. This paper discusses what are the Criteria of allowable settlement of a large and small steel tank. So the paper considered some large and small steel tanks that are representative of many steel tanks constructed in Mahshahr in south of I.R.Iran.

According to D'Orazio and Duncan examination of the settlement measured for the tanks shows one fact clearly: Steel tank bottoms can undergo a wide variety of types of distortion as they settle. However, most analytical studies concentrate on just one type of distortion: a vertical displacement pattern at the base of the shell that follows a harmonic shape. In another paper, the same authors state: "Because their walls have significant stiffness and ability to span local soft spots, the settlement profiles of tank walls tend to be smooth and free of sharp variations."

Here is one of the disasters that happen because of a tank failure that have been reported in the literature notably is the report of the failure of a 26.15 m radius shell storing hot-oil in Japan in 1974. The consequences of this failure were manifold: "The contents flooded much of the refinery property and flowed into the adjacent inland sea causing severe damage to the fishing industry. As a result, the 270,000 bbl/day refinery was shut down for about nine months, largely because of public reaction. By the time the refinery was permitted to resume operation. The accident had cost the refinery more than 150,000,000\$. This shows how important and dangerous can be the damage of steel tank especially large steel tank. The proposed tank has a ratio between the diameter and the height of order 4 with slenderness ratio (radius to thickness) of the order of 1000 (first course of shell) to 3750 (last course of shell). The paper is organized as follows: section 2 contains the most usual settlement that would happen, section 3 is the case studies and review of literature section 4 is about the comparison of cited allowable settlement and section 5 wanted to refer recommended settlement.

### 2. POSSIBLE SETTLEMENT IN STEEL STORAGE TANKS

Various forms of settlements could take place so it is crucial to define all required variables at the beginning of this chapter as follows in figure 1: