

DESIGN OF PRESTRESSED CONCRETE TANKS

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SYNOPSIS

In the past, the safe design of circular structures has been extremely difficult, mostly because exact knowledge concerning shrinkage and plastic flow of concrete has been lacking. But with the passage of time, more and more knowledge was achieved about those factors and thus it has become possible to go for large size circular structures, with the use of the high strength of cold-drawn steel wire. These developments have made it possible to design tanks and other large circular structures on a rational basis, with the assurance that an adequate prestress will be maintained to eliminate cracking of the concrete. This has further helped us in availing a great amount of saving in the quantity of materials required.

INTRODUCTION

In an effort to find suitable subdivisions in the expanding literature on prestressed concrete a distinction is drawn between post-tensioning and pre-tensioning of the reinforcing, although pre-tensioning is confined to a small category of work where only small prestressing forces are required. Actually, a far more general subdivision exists as between the prestressing of linear and circular structures. The first includes structures such as bridges, building frames and small pre-cast elements; the second includes tanks, pressure pipes and domes.

So much has been published during recent years about the work in linear prestressing that we tend to forget that by far the largest use of prestressed concrete up to this time has been in the construction of circular structures, notably tanks and silos, for which the methods of design and construction have been developed almost exclusively by American engineers. In the early times engineers could not design large size tanks with reinforced concrete. Even later the safe design of circular structures has been difficult, mostly because exact knowledge concerning shrinkage and plastic flow of concrete has been lacking. With time new data for evaluating these phenomena, and methods that make practicable the use of high strength cold-drawn steel wire were available. Such developments have made it