

**Zeitschrift:** IABSE structures = Constructions AIPC = IVBH Bauwerke  
**Band:** 13 (1989)  
**Heft:** C-49: Structures in sanitary engineering

**Artikel:** Egg-shaped digester tanks in Matsumoto City (Japan)  
**Autor:** Aeberhard, H.U.  
**DOI:** <https://doi.org/10.5169/seals-21566>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 14.03.2026

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**



## 6. Egg-Shaped Digester Tanks in Matsumoto City (Japan)

**Owner:** Municipality of Matsumoto City  
**Engineer:** Japan Sewage Works Agency  
**Contractor:** Joint Venture of Tobishima Construction Co., Ltd. and Matsumoto Doken Co., Ltd.  
**Post-tensioning:** Taisei Corporation, Tokyo  
**Construction period:** October 1987 – October 1988

### Introduction

At the Miyabuchi Sewage Disposal Centre in Matsumoto City (approx. 200 km north-west of Tokyo), two egg-shaped digester tanks, each of 2000 m<sup>3</sup> volume, have been constructed as part of the extension of the plant. The egg-shape for digester tanks becomes more and more popular since it has various advantages over a cylindrical tank. Probably the most important advantage is that the curved surface causes the deposits to sink to the bottom of the cone, where they can be easily and continuously removed. The light particles that are produced during the digestion process ascend to the surface of the sludge, where they form a crust. Since the surface area in an egg-shaped tank is smaller than in a cylindrical tank, the removal of the crust is less demanding. For the same reason, the heat losses are smaller. Finally, the egg-shape also contributes to a more efficient digestion process.

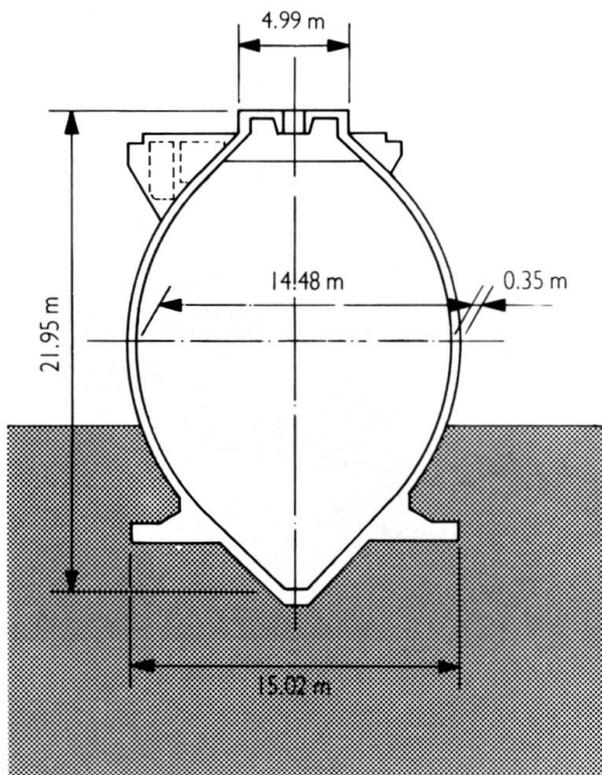


Fig. 1 Cross-section of the tanks

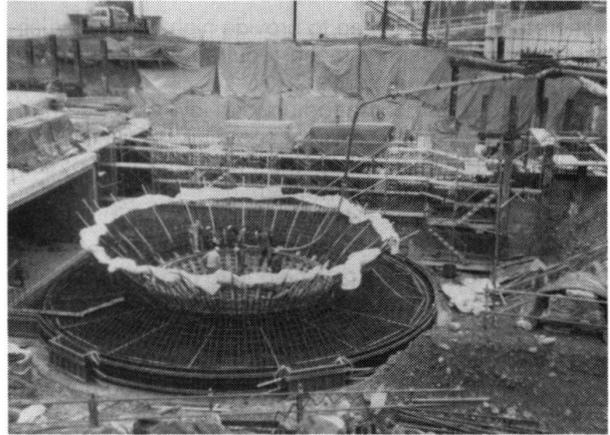


Fig. 2 Construction of the bottom cone, the foundation ring and the lower part of the shell



Fig. 3 View of the formwork; note the block-out forms for the horizontal post-tensioning

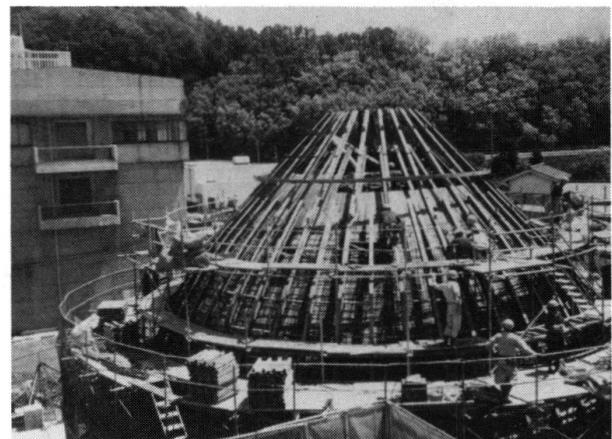
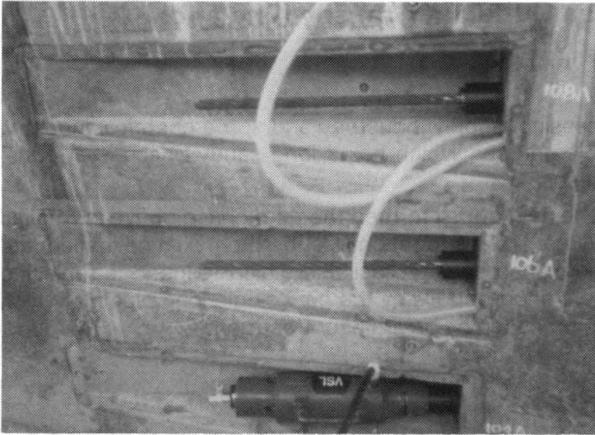


Fig. 4 Construction of the top part of the shell



*Fig. 5 Anchorages and stressing of horizontal shell tendons*

#### **Details of the tanks**

These are approx. 22 m high, with a maximum inside diameter of 14.48 m and a shell thickness of 350 mm at the level of the maximum diameter. This thickness is the same throughout the upper part of the tank shell while it increases continuously towards the foundation ring where it reaches 500 mm. This value also applies to the bottom cone. The flange-shaped footing, which bears directly on stable gravel, has an outside diameter of 15.02 m.

#### **Construction procedure**

The tanks were constructed one after the other. After excavation, a thin concrete layer was sprayed onto the soil in the area of the bottom cone and the foundation ring which were subsequently constructed. Then followed the execution of the lower hemisphere and stressing of the tendons of this part. The next stage was the construction and cable stressing of the upper hemisphere; finally the crown was added. Once completed the tanks were provided with a vertically structured cladding. Construction of the second tank followed that of the first one four months behind. Concrete cube strength required after 28 days was 35 N/mm<sup>2</sup>.

#### **Post-tensioning**

The tanks are horizontally and vertically post-tensioned. Whereas bars were used for the vertical tendons, the shells are horizontally post-tensioned with VSL  $\varnothing$  21.8 mm monostrand tendons. This type of monostrand, which consists of 19 wires as opposed to the 7 wires normal prestressing strand is made of, is a Japanese particularity and exclusively applied in Japan. These tendons, which are located at the outside of the vertical post-tensioning and which are spaced by 100 to 650 mm, were installed prior to concreting. Each tendon covers half the circumference and was anchored in block-outs which were subsequently filled with concrete. The block-outs of subsequent bands of tendons were staggered. Each foundation contains 4 hoops of VSL tendons EE 6-7 anchored in 4 buttresses. The tendons were prefabricated and placed into the formwork before concreting.

*(H. U. Aeberhard)*



*Fig. 6 View of the completed tanks*