DRAFT EAST AFRICAN STANDARD

Stainless steel tank - Specification

EAST AFRICAN COMMUNITY
Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

CD/T/99/2012 was prepared by Technical Committee EAS/TC 000, TC035.
Introduction

Stainless steel tanks are fast becoming popular in several areas in East Africa especially in urban areas where the issue of clean water is critical. East Africa has experienced introduction of this type of tanks in the market. These tanks are manufactured locally and some are imported from different countries. They are being available at different qualities, sizes and capabilities.

This standard is being prepared in order to address the quality issues and performance of the tanks.

During the preparation of this standard, assistance was derived from the following publications;

SANS 906:2006 – Stainless steel wash-hand basins Published by South Africa Bureau of Standards

Stainless steel tanks - Specification

1 Scope

This East African Standard specifies material, dimensional, and constructional requirements for stainless steel tanks.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.


ISO 6892-1 *Metallic materials – Tensile strength test*

ASTM A 240/A 240M – 07 *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*”

3 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply

3.1 acceptable

acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.2 bright polished finish

bright reflective finish obtained by polishing the surface without complete obliteration of previously existing grinding marks or other surface texture

3.3 defective

tank that fails in one or more respects to comply with the appropriate requirements of the specification

3.4 directional satin finish
finish obtained by so grinding the surface with fine abrasives (without subsequent polishing) as to leave a silky appearance, with the abrasive marks running in the same general direction.

4 CONSTRUCTIONAL REQUIREMENTS

4.1 General

4.1.1 Material

The stainless steel used under the specified chloride level of the food staff, shall be AISI/ASTM S type 304L, type 316L, type 304, or type 316, as specified by the purchaser, and of the relevant composition given in table 1. AISI/ASTM S 304 and 316 are more preferable for the food and surgical use.

Table 1 — typical Chemical composition of stainless steel.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI/ASTM S Type number*</td>
<td>Chemical composition (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chromium</td>
<td>Nickel</td>
<td>Carbon, Max.</td>
<td>Molybdenum %</td>
<td></td>
</tr>
<tr>
<td>304</td>
<td>17 – 20</td>
<td>8.0–10.5</td>
<td>0.08</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>316</td>
<td>16 – 18</td>
<td>10 – 14</td>
<td>0.08</td>
<td>2 - 3</td>
<td></td>
</tr>
<tr>
<td>304L</td>
<td>10 - 20</td>
<td>8 - 12</td>
<td>0.03</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>316L</td>
<td>16 - 18</td>
<td>10 – 14</td>
<td>0.03</td>
<td>2 - 3</td>
<td></td>
</tr>
</tbody>
</table>

*Type 304 is an austenitic stainless steel (commonly known as 18/8) having superior resistance to corrosion and to staining. Type 316 is an austenitic stainless steel suitable for severe conditions such as those in photographic laboratories. These two grades are suitable for chlorine less than 200 ppm. When it is necessary to handle hot water or when conservative guideline is necessary, type 304L and type 316L are more suitable. The type numbers are those given by the American Iron and Steel Institute.

Note: Grade type 316L is more suitable when the chlorine level of the food stuff range between 200 - 250 ppm

4.1.2 Construction

Tanks shall be made by stamping, pressing, or fabricating, or by a combination of two or more of these methods.

4.1.3 Joints

All joints shall fit closely, and the whole length of each joint shall be welded. The welded joints shall be ground flush with the working face. No solder shall be used on joints.

4.1.4 Welds

Welds shall be fusion welds done by the seaming process or by any other welding process that produces a weld having mechanical properties and corrosion resistance of at least the same order as those of the parent metal. When tested in accordance with ISO 6892 -1, the strength of the welded point, shall be similar to the strength of parent material, as shown in the table 2,
Table 2– Mechanical properties

<table>
<thead>
<tr>
<th>AISI Type number*</th>
<th>Tensile strength (MPa)</th>
<th>Yield strength (MPa)</th>
<th>Elongation (% in 50 mm)</th>
<th>Rockwell hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>304</td>
<td>560</td>
<td>210</td>
<td>55</td>
<td>B76</td>
</tr>
<tr>
<td>316</td>
<td>595</td>
<td>245</td>
<td>55</td>
<td>B80</td>
</tr>
<tr>
<td>304L</td>
<td>560</td>
<td>210</td>
<td>55</td>
<td>B76</td>
</tr>
<tr>
<td>316L</td>
<td>595</td>
<td>245</td>
<td>55</td>
<td>B80</td>
</tr>
</tbody>
</table>

4.1.5 Finish

All exposed surfaces shall be free from buckles, dents, pits, deep scratches, and other defects, and shall have a medium directional satin or a bright polished finish, as specified by the purchaser. The tanks shall be free from dirt, grease, graphite, and other foreign matter.

4.2.0 SPECIFIC REQUIREMENTS

4.2.1 Design, dimensions and construction

4.2.1.1 Design and dimensions

The design of the tank shall either be square, round, rectangle or cylindrical or as may be agreed between the purchaser and the manufacturer. The dimensions shall be as per purchaser and manufacturer agreement with respect to design requirements. The minimum thickness of the material used for manufacturing the tank shall have of 0.3 mm. Normal mill tolerances shall apply to the thickness of the material.

4.2.1.2 Construction

The tank shall be grooved around the circumference with minimum number of 5 grooves. The tank shall consist of two inlet holes at the top, one for water in and other for tank breathing. Two outlet holes at the bottom of the tank so as to allow water out and other for draining during cleaning.

4.2.1.3 Leakage

The Tank shall not show any leakage when tested in accordance with 8.2.2.

4.2.1.4 Hydrostatic pressure

The Tank shall withstand hydrostatic force when tested in accordance with 8.2.3.
5.0 MARKING

5.1 Marking

Each tank shall be legibly and indelibly marked with the following information on the surface of the tank:

i) Manufacturer's name or trade name or trade mark,

ii) capacity, of the tank

iii) Grade of steel used,

iv) Batch number of the tank,

v) thickness of the material

6.0 SAMPLING AND COMPLIANCE WITH THE SPECIFICATION

6.1 Sampling

The following sampling procedure shall be applied in determining whether a lot complies with the appropriate requirements of the specification. The samples so taken shall be deemed to represent the lot for the respective properties.

NOTE: This section applies to the sampling for inspection and testing before acceptance or rejection of single lots (consignments) in cases where no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of the lot. It is also used as the procedure for adjudications in cases of dispute.

6.1.1 Sample for inspection

From the lot, take at random the number of tanks shown in column 2 of Table 3 relative to the appropriate lot size shown in column 1.

6.1.2 Sample for testing

From each sample taken in accordance with 7.1.1 take at random the number of tank(s) shown in column 3 of table 3 relative to the appropriate lot size shown in column 1.

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Sample for inspection</th>
<th>Sample for testing</th>
<th>Defective acceptance No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>All</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20 – 100</td>
<td>20</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

6.2 Compliance with the specification

The lot shall be deemed to comply with the requirements of the specification if after inspection and testing
a) the number of defectives found in the sample taken in accordance with 7.1.1 does not exceed the appropriate acceptance number given in column 4 of Table 3; and

b) no defective is found in the sample taken in accordance with 7.1.2

7.0 INSPECTION AND METHODS OF TEST

7.1 Inspection

Inspect and check the dimensions of the sample taken in accordance with 7.1.1 for compliance with the appropriate requirements of sections 4, 5, and 6 other than those given in 4.1.

7.2 Chemical analysis of stainless steel

7.2.1 Use the method described in ASTM A 751, or any other approved method, to determine the chemical composition of the steel used in the manufacture of each tank in the sample taken in accordance with 7.1.2.

7.2.2 Fill water to the full capacity of the tank under room temperature and atmospheric pressure and leave it for 15 minutes. Observe if there is any leakage.

7.2.3 Fill water to the full capacity of the tank under room temperature and atmospheric pressure and leave it for 15 minutes the tank shall withstand the hydrostatic pressure calculated by the following formulae.

Pressure = \( \rho hg \)

Where \( \rho \) = Density of food stuff

\( h \) = Height of the tank

\( g \) = Acceleration due to gravity