 **DEAS/ 783: 2019**

ICS 77.140

# DRAFT EAST AFRICAN STANDARD

**Stainless steel tanks ― Specification**

## EAST AFRICAN COMMUNITY

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### 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.

DEAS 783 was prepared by Technical Committee EASC/TC 035, *Steel and steel products*.

### 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 has been developed to address the quality issues and performance of the tanks.

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### Stainless steel tanks ― Specification

#### 1 Scope

This Draft 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.

ASTM A 751, *Standard test methods, practices, and terminology for chemical analysis of steel products*

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*

ISO 6892 -1, *Metallic materials — Tensile strength test*

#### 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

shining 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 aspects to comply with the appropriate requirements of this standard

##### 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 requirements

###### 4.1.1 Material

The stainless steel used under the specified chloride level of the foodstuff, shall be AISI/ASTM 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 304 and 316 are more preferable for food and surgical use.

###### Table 1 — Typical chemical composition of stainless steel

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AISI/ASTM Type number**\* | **Chemical composition,**  % | | | |
| **Chromium** | **Nickel** | **Carbon, max.** | **Molybdenum** |
| 304 | 17 – 20 | 8.0 – 10.5. | 0.08 | - |
| 316 | 16 – 18 | 10 – 14 | 0.08 | 2 – 3 |
| 304L | 10 – 20 | 8 – 12 | 0.03 | - |
| 316L | 16 –- 18 | 10 – 14 | 0.03 | 2 – 3 |
| \*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 Type 316L is more suitable when the chlorine level of the food stuff range between 200 ppm - 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 Table 2.

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###### Table 2 — Mechanical properties

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AISI Type number\*** | **Tensile strength,**  MPa | **Yield strength,**  MPa | **Elongation,**  % in 50 mm | **Rockwell hardness** |
| 304 | 560 | 210 | 55 | B76 |
| 316 | 595 | 245 | 55 | B80 |
| 304L | 560 | 210 | 55 | B76 |
| 316L | 595 | 245 | 55 | B80 |

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 Specific requirements

###### 4.2.1 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 in accordance with the purchaser and manufacturer agreement with respect to design requirements. The minimum thickness of the material used for manufacturing the tank shall be 0.3 mm. Normal tolerances of 0.0254 mm shall apply to the thickness of the material.

###### 4.2.2 Construction

The tank shall be grooved around the circumference with minimum number of five grooves. The tank shall consist of two holes at the top, one for the inlet and other for tank breathing, and two holes at the bottom, one for the outlet and the other for draining during cleaning.

**4.2.3 Leakage**

The tank shall not show any leakage when tested in accordance with 7.3.

**4.2.4 Hydrostatic pressure**

The tank shall withstand hydrostatic force when tested in accordance with 7.4.

#### 5 Marking

Each tank shall be legibly and indelibly marked with the following information on the surface of the tank: a) manufacturer's name and address;

1. capacity of the tank;
2. type of steel used,
3. batch number of the tank; and
4. thickness of the material.

#### 6 Sampling and compliance

##### 6.1 Sampling

###### 6.1.1 General

The sampling procedures in 6.1.2 and 6.1.3 shall be applied in determining whether a lot complies with the appropriate requirements of this standard. The samples so taken shall be deemed to represent the lot for the respective properties.

NOTE This clause 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.

**6.1.2 Sample for inspection**

From the lot, random sampling shall be done in accordance with Table 3.

###### Table 3 — Sample for testing and inspection

|  |  |  |  |
| --- | --- | --- | --- |
| **Lot size** |  | **Sample size** |  |
| **Sample for inspection** | **Sample for testing** | **Defective acceptance number** |
| Less than 20 | All | 1 | 0 |
| 20 – 100 | 20 | 2 | 1 |

6.1.3 Sample for testing

From each sample taken in accordance with 6.1.2, random sampling of the number of tanks relative to the appropriate lot size shall be done in accordance with Table 3.

##### 6.2 Compliance

The lot shall be deemed to comply with the requirements of this standard, if after inspection and testing

1. the number of defectives found in the sample taken in accordance with 6.1.2 does not exceed the appropriate acceptance number given in Table 3; and
2. no defective is found in the sample taken in accordance with 6.1.3.

#### 7 Inspection and methods of test

##### 7.1 Inspection

Inspection of samples shall be done in accordance with 6.1.2 for compliance with the appropriate requirements of clauses 4, 5, and 6 other than those given in 4.1.1.

##### 7.2 Chemical analysis of stainless steel

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 6.1.3.

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##### 7.3 Leakage test

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

##### 7.4 Pressure test

Fill water to the full capacity of the tank under room temperature and atmospheric pressure and leave it for 15 min.

The tank shall withstand the hydrostatic pressure calculated by the following formula:

*P* = ρ*hg*

where:

*P* is the hydrostatic pressure; ρ is the density of food stuff; *h* in the height of the tank; and *g* is the acceleration due to gravity.

Bibliography

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

Henkel and Pense, 2002, *Structure and properties of engineering materials*, fifth edition, published by Mc Graw – Hill, New York

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