

In amending the technical criteria (Type Approval Criteria, Authorisation Criteria and Regular Test Criteria) of the entire quantity of graduated tanks, which is entrusted to the Head of the Korean Agency of Technology and Standards according to Articles 6, 12, and 17 of the Measures Act, ordinance Article 18 of the same Act, and the enforcement regulation of the same Act, we give public notice of the objective and major contents of the amendment according to the regulations of Article 41, clause 1 of the Administration Procedures Act in order to get feedback from concerned industries and individuals as follows:

December 18th, 2004

Head of Korean Agency of Technology and Standards

Advance Notice of Amendment to Technical Criteria of the entire quantity of Graduated Tanks

#### 1. Objective of Amendment

This amendment intends to improve the quality of the entire quantity of graduated tanks, domestic legal gauges, and other elements in order to prevent leaking due to deformations and/or shocks, etc.

#### 2. Major Contents

A. Amendment (Plan) of technical criteria for the entire quantity of graduated tanks: As attached (if posted on Official Gazette, no attachment).

- Type Approvals Criteria, Authorisation Criteria.

\* Should you require further information on the contents of the fuel meter technical criteria amendment, please refer to the notice section of the Korean Agency of Technology and Standards web site ([www.ats.go.kr](http://www.ats.go.kr)), or read the contents at the Agency's office in the Gauge and Measure Standards Section.

B. Major Contents of amendment technical criteria for the entire quantity of graduated tanks

Test	Current	Amended	Rationale
Handle Deformation	Check if deformation occurs when pulling the handle with the force of 3 times the weight of water fully contained in the tank	Put pressure of 35 kPa on the tank after filling it fully with water and then dropping it from a height of 1 - 2m	To clarify the changes in the test method
Anti-shock	Drop the tank 3 times from a height of 1m after completely filling the tank with water	Put pressure of 0.049 Mpa on the tank after filling it fully and then dropping it from a height of 1.2m.	To prevent accidents from occurring due to leakage of fuels as a result of shocks during delivery
Anti-Corrosion	N/A	Spray salted water for 48 hours	To prevent leaks due to corrosion of metal tanks

#### C. Supplementary Provisions

a) Proposed Date of Enforcement

- The authorisation criteria for the entire quantity of graduated tanks will become effective on 1<sup>st</sup> July 2005. However, the authorisation of products which receive type approvals according to this criterion can be made using this criterion.

- The type approvals criteria for the entire quantity of graduated tanks will become effective as of the notice date.

b) Intermediate Action

- The regular test for products which have received authorisations or tests according to the previous criteria before the new criteria are applied will be made with the previous criteria.

### 3. Presentation of Feedback

If any individual, company or organisation has an opinion on the attached data regarding the above mentioned amendment, please provide the Gauge and Measure Standard Section of the Agency with the opinion in written form as follows:

- A. Deadline: February 17<sup>th</sup>, 2005 (Thursday)
- B. Opinion on the amendment (pros or cons and the reason)
- C. Personal Information of the Presenter (name, address and telephone number)
- D. In the case of an organisation, please provide information about the organisation (name of organisation, name of representative, address and telephone number)
- E. For more details, please contact us at the Gauge and Measure Standard Section of the Agency (2bunji, Jungang-dong, Gwachon-shi, Kyonggi-do Tel: 02) 509-722931, Fax: 02) 507-6875).

Amendment (Plan) of Technical Criteria for the entire quantity of graduated tanks

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## Section 1 Type approvals criteria for the entire quantity of graduated tanks

These criteria define technical requirements, test methods, and test procedures for type approvals for the entire quantity of graduated tanks based on the regulations of article 6 of the Measures Act and ordinance article 18 of the same Act.

### 1. Scope

These criteria are applied to the entire quantity of graduated tanks (hereafter referred to as “graduated tanks”) regulated under article 8 of the enforcement regulation of the Measures Act. However, these criteria are applied to those with capacities under 20 l that are used for gauging oil.

### 2. Quoted Specification

The specifications quoted below constitute the regulation of parts. These specifications are the latest versions.

2.1 KS D 3512 Cold rolled steel sheet and frame

2.2 KS D 3698 Cold rolled stainless steel sheet and frame

2.3 KS D 9502 Method of salt water spray test (NSS, ASS, CASS tests)

### 3. Gauging Scale

The international scale system (SI system) is applied to the capacity of graduated tanks. The measurements, symbols and scales used for these criteria are in Table 1 below:

Table 1

Scale	Symbol	Use
Litre	L or l	For displaying tanks’ whole quantity capacities
Decilitre	dL or dl	For displaying the volume of the graduation section
Millilitre	mL or ml	For displaying the volume of the graduation section

### 4. Types and capacities

Types and capacities of graduated tanks are defined in Table 2:

Table 2

Type	Capacities (L)
Synthetic resin	1,2,5,10,15,20
Metal	1,2,5,10,15,20

### 5. Structure

The structure of graduated tanks is as below:

5.1 All symbols, marks, inscriptions, and scales of graduated tanks should not be easily erasable, free from misunderstanding as a result of miswriting and non-detachable during use.

5.2 The whole quantity graduation part should be transparent so that the liquid level inside can be seen and not easily detachable from the main body.

5.3. Metal graduated tanks above 5L should have a structure that can prevent their main body

from directly contacting the surface when being used in this manner.

5.4 All materials and tools of each part of the graduated tanks should not be easily detachable or easily separated and every joint should be accurate and strong.

5.5 The graduation part of graduated tanks can display a maximum tolerance scale as well as a whole quantity scale. The maximum tolerance scale interval should be above 2mm and the thickness of scale should be between 0.3mm and 0.7mm.

5.6 The line of graduation should not be double, divided, severed and/or cut.

5.7 The materials of metal graduated tanks should be of KS D 3698 (Cold rolled stainless steel sheet and frame) or KS D 3512 (Cold rolled steel sheet and frame) and their thickness should be above 0.1mm. Also, anti-rust treatment should be applied to the inside and outside.

5.8 Any solder with a melting point under 450 should not be used for making metal tanks.

5.9 When adding any accessory to metal graduated tanks, the structure should not have any electrical corrosion between different metals.

## 6. Performance

### 6.1 Common requirements

#### 6.1.1 Change of meniscus and graduation line

When being tested according to 7.1, the meniscus of graduated tanks should not deviate from the graduation line by more than 2 degrees.

#### 6.1.2 Change of graduation line

If tested according to 7.2., the liquid height inside graduated tanks should change by more than 1mm. However, this requirement is limited to graduated tanks below 5L.

#### 6.1.4 Anti-shock of handle

When tested according to 7.3, graduated tanks should be free from breakage, leakage, etc. However, this requirement is limited to graduated tanks with carrying handles.

#### 6.1.5 Leakage

When tested according to 7.4, graduated tanks should have no leakage.

### 6.2 Metal materials

#### 6.2.1 Shock-proof at low temperatures

When tested according to 7.5, graduated tanks should have no leakage, deformation, or damage to their caps and main bodies.

#### 6.2.2 Pressure-proof

When tested according to 7.6, graduated tanks have no leakage and their volume changes should not exceed 1/2 of the maximum tolerance.

#### 6.2.3 Corrosion-proof

When tested according to 7.7, graduated tanks have no irregularities such as rust, etc.

### 6.3 Synthetic resin materials

#### 6.3.1 Shock-proof

When tested according to 7.8, graduated tanks should have no leakage, deformation or damage to their caps and main bodies. Also, their volume changes should not exceed 1/2 of the maximum tolerance.

#### 6.3.2 Stress-proof

When tested according to 7.9, the number of cracked graduated tanks should be less than 50% of all tested graduated tanks.

#### 6.3.3 Vibration-proof

When tested according to 7.10, volume changes of graduated tanks (including swelling changes

resulting from vibration) should not exceed 1/2 of the maximum tolerance.

#### 6.3.4 Temperature change

When tested according to 7.11, graduated tanks' volume changes due to temperature changes should not exceed 1/50 of the displayed whole quantity.

#### 6.3.5 Temperature-proof

When tested according to 7.12, graduated tanks should have no swelling or deformation and their volume changes should not exceed 1/2 of the maximum tolerance.

#### 6.3.6 Oil-proof

When tested according to 7.13, graduated tanks should have no leakage due to deformations of caps or bodies.

### 6.4 Maximum tolerances

When tested according to 7.14, the maximum tolerances of graduated tanks should be 1/100 of the displayed quantities.

## 7. Test methods

### 7.1 Meniscus and graduation line change test

After placing graduated tanks on a level test board, check the degree of meniscus on the graduation line.

### 7.2 Graduation line change test

Add or subtract the maximum tolerances on the whole quantities displayed on the graduated tanks.

### 7.3 Handle shock-proof test

The handle shock-proof test is performed as follows:

7.3.1 Arrange the graduated tank as shown in Figure 1 and Table 1.

7.3.2 Fill the graduated tank with water and seal the cap securely.

7.3.3 After dropping it from a height of 1 - 2 m, check if the handle is damaged, then check for leakages of air or water when the tank is pressed with an air pressure of 35 kPa.

7.3.4 Materials used for the test are listed in Table 3, below:

Table 3

1. Wire rope	A steel rope, 6mm in diameter and 1-2m in length with no ductility
2. Triangle iron <sup>1)</sup>	A steel bar with a 10mm diameter
3. Simple rope <sup>2)</sup>	8mm PP
4. Graduated tank's handle	Synthetic resin or metal
5. Graduated tank	Synthetic resin or metal
Note	
1) A steel bar 20mm in diameter and 100mm in length is used for joining handles and triangle irons	
2) When using simple ropes for fixing the handles and triangle irons, the fixing part should be longer than 75mm in order to disperse weight.	

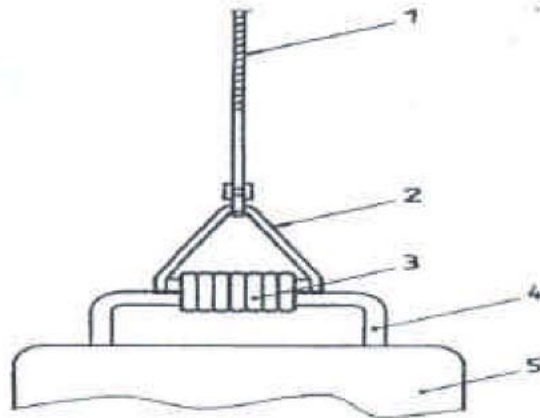


Figure 1

#### 7.4 Water leakage test

This test checks if water leaks after filling water up to the whole quantity scale, then closing the cap and placing the tank upside down for 12 hours.

#### 7.5 Shock-proof at low temperatures test

This test is performed as follows:

7.5.1 Add 50% water and 50% glycol up to the whole quantity displayed on the tank.

7.5.2 Keep tank and its contents at  $-18^{\circ}\text{C}$  ( $\pm 2^{\circ}$ )

7.5.3 Seal the screw-type cap with a 5 N.m torque.

7.5.4. Drop the tank on a level concrete floor three times from a height of about 120 cm so that the edges collide against the floor.

#### 7.6 Pressure-proof test

This test is performed by keeping a water pressure of 0.196 MPa for 5 minutes.

#### 7.7. Corrosion-proof test

This test is performed as follows:

7.7.1 Make 2 test samples by severing a graduated tank by 4 and taking adequate size samples.

7.7.2

Keep the test samples in contact with salt water as described in 7. of KS D 9502 (salt water spray test method) for 48 hours in a room with the temperature of  $35^{\circ}$  ( $\pm 5^{\circ}$ ). Then, immediately rub off the contacted surface of the test samples and check to see if there is any rust remaining on the surface.

#### 7.8 Shock-proof test

Add  $20^{\circ}$  ( $\pm 2^{\circ}$ ) water up to the whole quantity and close the cap. Then, drop the tank on a level concrete floor three times from a height of about 120 cm so that the base collides against the floor. Then check to see if there is any leakage in the cap and body while keeping a water pressure of 0.049 MPa inside the tank for 5 minutes.

#### 7.9 Stress-proof test

This test is implemented as follows:

7.9.1 Use a 0.5% solution of nonyphenoxy-polyethanol or its equivalent as a reagent.

7.9.2 Put the reagent (20°C +/- 2°) into more than 5 graduated tanks. The quantity should be 10% of the whole quantity inscribed on the tanks while keeping the tanks sealed. Then keep the tanks at 60°C (+/- 2°) for 72 hours and check to see if there is any leakage.

7.10 Vibration-proof test

Fill water up to the whole quantity of the tank and follow the condition described in Table 4.

Table 4

Amplitude	Vibration numbers	Test period
10mm	13.7 Hz	30 minutes

7.11 Temperature change test

Add 30°C kerosene up to the whole quantity and drop the temperature of the kerosene to – 15° while keeping the cap open. Then, measure the change of volume. When doing this test, 0.0009/° is applied as the thermal expansion coefficient of kerosene.

7.12 Temperature-proof test

Add oil up to whole quantity and keep the tank at 30°C (+/- 2°) for 48 hours.

7.13 Oil-proof test

Add oil up to the whole quantity and keep the tank at 30°C (+/- 2°) for 30 days. Then, exchange oil with water and execute the shock-proof test as described in 7.8.

7.14 Maximum tolerance test

This test is done as follows:

7.14.1 Use water at normal temperature for this test. However, if other materials are currently used, use them.

7.14.2 For this test, place the tank on a level floor.

7.14.3 The comparative method using a reference tank or the volume check method using a weighing machine can be used for this test.

7.14.4 Calculate maximum tolerance by subtracting actual volume from nominal volume. If using the volume checks method, follow the formula below:

$$Q = \frac{W}{d - 1.1} \times 1\ 000$$

where:

$Q$  = actual volume (L)

$W$  = the value a weighing machine shows (kg)

$d$  = density of water or other liquid (kg/m<sup>3</sup>)

## 8. Inscriptions

The following items should be inscribed in an easily visible position on the graduated tanks.

However, any item doubled with those regulated under article 15 (Inscription of accuracy rate, etc.) is excluded.

8.1.1 Name of instrument

8.1.2 Type of measured object

8.1.3 Whole quantity (maximum volume to be measured)



8.1.4 Production year, month, & Instrument No.

8.1.5 Production symbol or Name of Production Company

8.1.6 Type Approvals No. (If applicable)

9. Judgment

The size of graduated tank test materials judgment criterion is specified as in Table 5.

Table 5

Item	Size of test material (n)	Judgment Criterion	
		Ac(accepted)	Re(rejected)
Whole quantity graduated tank	3	0	1

## Section 2 Authorisation Criteria

These criteria define the authorisation and regular test for the entire quantity of graduated tanks according to the regulations of article 12 and article 17 of the Measures Act.

### 2 – 1 Authorisation

#### 1. Scope

These criteria are applied to whole quantity graduated tanks regulated under article 11 of the enforcement ordinance of the Measures Act.

#### 2. Types of authorisation

The types are categorised as initial authorisations for both tanks manufactured and those imported.

#### 3. Test methods and procedures

3.1 Authorisations on measuring instruments are divided into structure tests and tolerance tests.

3.2 For any test method not specified in these criteria, refer to those specified in Section 1 (Type approval criteria for the entire quantity of graduated tanks)

#### 3.3 Structure test

3.3.1 This test, in principle, is based on sampling. However, in case the applied numbers per lot are the same as or less than the minimum sample numbers, the test is given to total numbers.

3.3.2 When the test is performed based on sampling, the one-time sampling method of KS A ISO 2859-1 attached-table 1 sample (size) letter and attached-table 2-A ordinary tests are applied. The test level is set as a special test level (S-2). AQL is set as 4.0%.

3.3.3 Any measuring instrument applicable to the regulations of article 18 of the enforcement regulation of the Measures Act can be exempted from this test.

#### 3.4 Tolerance test

3.4.1 This test, in principle, is based on sampling. However, in case the applied numbers per lot is the same as or less than the minimum sample numbers, test is given to total numbers.

3.4.2 When the test is performed based on sampling, the one-time sampling method of KS A ISO 2859-1 attached-table 1 sample (size) letter and attached-table 2-A ordinary tests are applied. The test level is set as a normal test level (II). AQL is set as 0.65%.

#### 4. Authorisation items

##### 4.1 Structure

##### 4.1.1 Initial authorisation

This authorisation is given to all items except 6.14 (maximum tolerance) among 5 (Structure) and 6 (Performance) of Section 1 (Type approvals criteria for the entire quantity of graduated tanks) as well as 9 (Inscription item). However, 6.3.6 (Oil-proof) should be performed 1 time every 6 months, yet can be replaced with test score paper of an authorisation organisation.

##### 4.2 Tolerance

##### 4.2.1 Initial authorisation

This is given to 6.14 (Maximum tolerance) of Section 1 (Type approvals criteria for the entire quantity of graduated tanks).

## 5. Authorisation Seals

According to the regulations of the attached table 8 of the enforcement regulation of the Measures Act, a round seal 10mm in diameter that is either beaten, pressed, or burnt must be displayed in an easily visible position on top of graduated tanks.

## 2 – 2 Regular tests

### 1. Scope

These criteria are applied to whole quantity graduated tanks regulated under article 29 of the enforcement regulation of the Measures Act.

### 2. Classification of regular tests

Regular tests are classified and implemented as structure tests and tolerance tests.

### 3. Regular tests methods and procedures

3.1 For any test method not specified in these criteria, refer to those specified in Section 1 (Type approvals criteria for the entire quantity of graduated tanks).

#### 3.2 Structure tests

These tests are given on a total-inspection basis

#### 3.3 Tolerance tests

These tests are given on a total-inspection basis

### 4. Regular tests items

#### 4.1 Structure

These tests are given to 9 (Inscription item) of Section 1 (Type approvals criteria for the entire quantity of graduated tanks).

#### 4.2 Tolerance

These tests are given to 6.14 (Maximum tolerance) of Section 1 (Type approvals criteria for the entire quantity of graduated tanks). In this case, the tolerance regulated under the article of the enforcement ordinance of the Measures Act is applied as maximum tolerance.