

**Petroleum measurement systems -
Calibration - Temperature corrections for
use when calibrating volumetric proving
tanks**

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Temperature corrections for use when calibrating
volumetric proving tanks

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NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 8222:2003 sisaldab Euroopa standardi EN ISO 8222:2002 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.02.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 8222:2003 consists of the English text of the European standard EN ISO 8222:2002.</p> <p>This document is endorsed on 18.02.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This International Standard specifies multiplication factors for the correction of the volume of water transferred from a primary measure to a tank for changes arising from temperature differences during the determination of the capacity of the tank at reference temperature</p>	<p>Scope: This International Standard specifies multiplication factors for the correction of the volume of water transferred from a primary measure to a tank for changes arising from temperature differences during the determination of the capacity of the tank at reference temperature</p>
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Võtmesõnad: containers, correction : errors, e, freight containers, materials testing, measurement, measuring systems, mineral oils, petroleum products, reference systems, tanks, tanks (containers), temperature, temperature correction, volume measurement, volumetric meters

English version

Petroleum measurement systems

Calibration – Temperature corrections for use when calibrating
volumetric proving tanks
(ISO 8222 : 2002)

Systèmes de mesure du pétrole –
Étalonnage – Corrections de tempé-
rature à utiliser lors de l'étalonnage
des jauges étalons (ISO 8222 : 2002)

Messsysteme für Mineralölerzeug-
nisse – Kalibrierung – Temperatur-
korrekturen zur Anwendung auf
volumetrische Bezugsmessbehälter
(ISO 8222 : 2002)

This European Standard was approved by CEN on 2002-10-09.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Management Centre: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 8222 : 2002 Petroleum measurement systems – Calibration – Temperature corrections for use when calibrating volumetric proving tanks,

which was prepared by ISO/TC 28 'Petroleum products and lubricants' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 19 'Petroleum products, lubricants and related products', the Secretariat of which is held by NEN, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by May 2003 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 8222 : 2002 was approved by CEN as a European Standard without any modification.

Introduction

When meter proving tanks or other containers are calibrated with a primary measure using water, correction factors are required to make allowance for the effects of temperature during the calibration on the volume of water that is transferred and on the capacities of the primary measure and container.

The corrections take account of differences in the volume of water, and of the capacities of the measure and the tank, arising from the following temperature-related effects.

- a) The change in volume of the calibrating liquid (water) caused by any change in its temperature from the time it is measured in the measure to the time when the total volume has been transferred to or drawn from the tank being calibrated.

NOTE Although this International Standard is applicable to volumes transferred to, or drawn from, a tank, it has been written in terms of the volume transferred to the tank.

- b) Changes in the capacities of the measure and the tank being calibrated caused by any differences between the temperatures of their shells and their standard reference (calibration) temperature(s).

1 Scope

This International Standard specifies multiplication factors for the correction of the volume of water transferred from a primary measure to a tank for changes arising from temperature differences during the determination of the capacity of the tank at reference temperature.

NOTE This International Standard does not set out a calibration procedure nor consider the uncertainties in temperature measurement, for which reference should be made to other standards.

Equations are given in annex A for the determination of the density of air-free and air-saturated, pure water in the temperature range 1,0 °C to 40 °C for temperatures expressed in terms of the ITS-90 International Temperature Scale.

A calculation routine is also provided in annex B for the combined water and metal correction factor that is applied when determining the capacity of the tank at reference temperature.

2 Symbols and definitions

For the purposes of this International Standard, the symbols defined in Table 1 apply.

Table 1 — Symbols

Symbol	Quantity	Unit
C_c	Combined correction factor	1
C_{tdw}	Correction factor for expansion of the calibrating liquid (water) over the temperature range t_1 to t_2 where $C_{tdw} = \frac{\rho_1}{\rho_2}$	1
t_{sm}	Standard reference temperature of the measure	°C
t_{st}	Standard reference temperature of the tank being calibrated	°C
t_1	Temperature of the water in the measure and of its shell	°C
t_2	Temperature of the water in the tank being calibrated at the completion of the calibration and of the shell of the tank	°C
α_{V1}	Cubical expansion coefficient of the shell of the measure	°C ⁻¹
α_{V2}	Cubical expansion coefficient of the shell of the tank being calibrated	°C ⁻¹
ρ_1	Density of water at temperature t_1	kg/m ³
ρ_2	Density of water at temperature t_2	kg/m ³

3 Temperatures

3.1 The corrections apply for temperatures in the range 1,0 °C to 40 °C.

For practical reasons, the temperature difference between the temperature of the measure and that of the tank shall not exceed 5,0 °C.