

NORSOK STANDARD

SYSTEM REQUIREMENTS

FISCAL METERING SYSTEM FOR CRUDE OIL AND CONDENSATE

I-SR-105

Rev. 1, January 1995

Please note that whilst every effort has been made to ensure the accuracy of the NORSOK standards neither OLF nor TBL or any of their members will assume liability for any use thereof.

1 FOREWORD

This standard has been developed by the NORSOK standardisation work group and agreed by the Norwegian industry for the widest possible national and international application.

2 SCOPE

This standard describes the functional requirements for a fiscal hydrocarbon liquid metering system.

3 NORMATIVE REFERENCES

API MPMS	Ch. 4, 5, also ch. 11-13, if applicable.
IEC 751	Industrial Platinum Resistance Thermometer sensors
ISO 1000	SI units and recommendations for use of their multiples and of certain other units.
ISO 5024	Measurement - Standard reference conditions
ISO 6551	Petroleum liquids and gases - Fidelity and security of dynamic, measurement - Cabled transmission of electric and/or electronic pulsed data.
ISO 7278 Part 3	Liquid hydrocarbons - Dynamic measurement - Proving systems for volumetric meters"
ISO DP 9857	Continuous Density Measurement
IP PMM Part VII	Continuous Density Measurement
IP PMP No. 2	Guidelines for users of Petroleum Measurement Tables
NORSOK standards	In particular
I-CR-100	"Fiscal measurement systems"

4 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

None.

4.2 Abbreviations

CEN/TC	The European Committee for Standardization/ Technical Committee
IP PMP	Institute of Petroleum, Petroleum Measurement Paper
IP PMM	Institute of Petroleum, Petroleum Measurement Manual
ISO DP	The International Organization of Standardization Draft Proposal
IEC	International Electrotechnical Commission
SAS	Safety and Unified Automatic System

5 FUNCTIONAL REQUIREMENTS

5.1 General

The metering system shall measure crude oil or condensate quantities for fiscal purposes.

Optionally the metering system shall also control an automatic oil sampler system, i.e.

- provide a flow proportional pacing signal (and a fall back signal).
- monitor the sample volume collected and status of the sampling system.

Two classes of systems are specified according to degree of accuracy, see clause 5.4 Performance.

The following apply for all systems:

Pressure loss	Max. 2,0 bar, no meter calibration in progress
	Max. 2,5 bar, with meter calibration in progress

5.2 Products/Services

Not applicable

5.3 Equipment/Schematic

The system shall consist of:

- A mechanical part, including the flow element.
- An instrument part.
- A computer part performing calculations for quantity, reporting and control functions. The computer part shall be dedicated computer(s). Optionally the computer part can be (partially or wholly) a part of SAS.

Reference is made to NORSOK I-CR-100 for:

- Common technical requirements to all fiscal metering systems for liquid hydrocarbon.
- Additional requirements for a conventional class A system based on turbine- or positive displacement meter with permanent prover.

5.4 Performance

5.4.1 Capacity

The flowrate in each meter run shall not exceed limits resulting in total uncertainty of standard volume as specified below. Exception for class A, conventional fiscal metering systems (turbine/Positive Displacement & prover), which are given in NORSOK I-CR-100 .

5.4.2 Accuracy

The table below specifies maximum uncertainty (95 % conf. level) in % of standard volume.

Class A	Class B
+/- 0.30 %	xx *)

*)Any other uncertainty value than Class A based on cost benefit analysis. Ref. NORSOK I-CR-100

5.4.3 Lifetime

The lifetime is application specific.

5.5 Regularity

99.9 %.

5.6 Process/Ambient Conditions

Process and environment details (project specific) shall be specified on data sheet.

5.7 Operational Requirements

5.7.1 For all metering systems

- The system shall automatically perform all line/ valve control as required during normal operation (delivery to pipeline and tanker loading) and during the proving phase. There shall also be a manual mode (performed from the computer part) for such operations.
- The system shall be operated from the computer part. Optionally the system shall be operable from SAS (if the system has a dedicated computer part).
- It shall be possible to operate all valves locally.
- The opening and closing of the station with oil flowing through, shall always be done in manual mode (from the computer part).
- It shall be possible to start a proving sequence both manually from the control room and automatically on specified criteria. During normal operation the actual proving sequence shall be automatically performed. It shall also be possible to perform a proving sequence manually from the control room in a step-by-step manner.
- In a tanker loading metering system the different phases in a loading sequence such as start-up, loading, topping off and termination shall be pre-programmed in the computer. The computer shall automatically calculate and set the sampling rate when given the size of the oil tanker.

The following options shall be considered (project specific):

Option a) Advisory load rate control instead of active control.

Option b) Batch retroactive meter factor (for first meter calibration only).

- Continuity in measurement of the oil flow shall be maintained for class A & B (e.g. by using a spare meter run) for different operating conditions as shown in the table below:

Operation condition	Class A	Class B
During regular calibration of the field instruments	Yes	Application specific
When a field instrument of any type fails	Yes	Application specific

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5.7.2 For metering systems with multiple meter runs and prover or master meter

- In automatic mode the system shall open or close meter runs as required by the amount of oil flow being measured.
- The meter run inlet valves and the prover/master meter outlet valve shall be manually operated from the control room (i.e. shall not be part of the automatic operation). Optionally these valves shall only be locally operated (project specific).

5.8 Maintenance Requirements

Ref. to NORSOK I-CR-100 .

5.9 Isolating and sectioning

Is shall be possible to isolate the calibration unit for uninterrupted metering during prover or master meter calibration.

5.10 Layout Requirements

Application specific.

5.11 Interface Requirements

Computer part interfaces:

- If dedicated computer: SAS (The data transfer content are application specific).
- Optional: Flow proportional sampling system.

5.12 Commissioning Requirements

None.
