Department of consumer and corporate affairs / Ministère de la consommation et des corporations

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL

G - 63

OTTAWA September 14, 1970.

COMPAGNIE DES COMPTEURS DELTA N SERIES
ROTARY POSITIVE DISPLACEMENT GAS METER

Apparatus

Meter designation, Model No.	N1	N2	N3	N4*
Rated capacity, cu. ft. per hour at line conditions	7,000	14,000	28,000	56,000
Swept volume per rev. cu. ft.	0.048	0.11	0.33	0.98
Capacity per revolution of instrument drive shaft, cu. ft.	10	100	100	100
Register multiplier for volume units in cubic feet	x1	x10	x10	x10
Maximum approved pressure for billing measurement, psig	125	125	125	125
Meter connections, flange**	3"	4"	6"	8"

* This model has ductile iron impellers, other models carry aluminum impellers . All impellers are hollow.

** Flanges are part of the ductile iron body material and are rated ASA 150 R.F.

Description

The Delta N rotary, positive displacement gas meter utilizes the principle of two lobed, contra-rotating impellers which revolve in a measuring chamber. The chamber is closed at both ends by plates which carry all rotating parts. Two domed end covers, bolted to the metering housing, form chambers which contain the bearings and serve as oil sumps for splash, or oil ring lubrication.

Each end dome has six plugged holes. Four of these are used for oil filling, or draining, when meter is installed in horizontal or vertical position, and two smaller holes are for overflow oil level control in the domes, for the two meter positions.

COMPAGNIE DES COMPTEURS DELTA N SERIES ROTARY POSITIVE DISPLACEMENT GAS METERS

The larger of the two domes houses the timing gears, which maintain the relative position of the two impellers, and the magnetic coupling, which serves to drive a direct reading register, mounted externally to the meter. The magnetic coupling eliminates the need to use stuffing boxes.

The direct reading register is equipped with a mechanical drive outlet to which a flexible cable can be attached for connection to a suitable, and approved for billing measurement, volume correcting device. This mechanical drive output is coupled to the lowest volume number roller in the register and provides for either 10 or 100 cu. ft. per revolution, depending on the size of the meter.

The maximum length of approved cable for connection to the volume correcting device is six feet. The cable has a stamped designation C70 on the metal sleeve at the end which connects to the meter index. Special low temperature grease is used in this cable which has a P.V.C. covering on the outside. When in use for billing, this flexible cable should not have bends of smaller radius than 12 inches.

In operation, the flow of gas causes the impellers to rotate, thus measuring the volume by each rotor sweeping out the compartment formed by half the wall of the cylindrical housing and the surface of half the corresponding rotor. The rotational speed of the impeller is proportional to the flow of gas through the meter and the measured volume closely approximates the volume of the measuring chambers times the number of impeller revolutions, except at low speeds where the small amount of slippage of the gas begins to have a more appreciable effect.

The rated capacity of this meter indicates the maximum, continuous flow, however, the manufacturer permits this flow to be exceeded by 20% for short periods only.

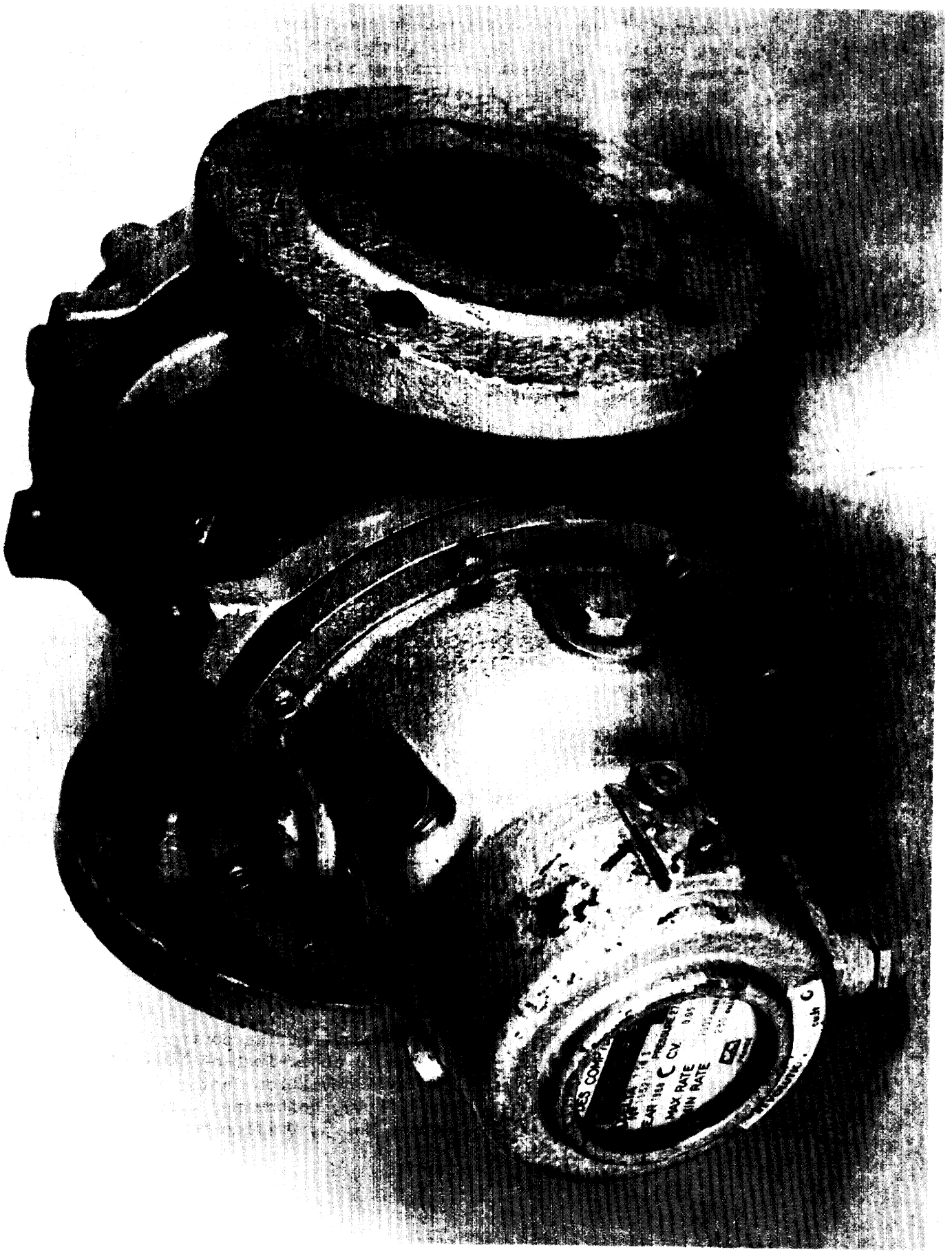
The Delta meters are not intended for measurement of volumes at flow rates below 4 percent of the rated capacity.

The Delta meter measures gas volume at line conditions and when these fluctuate and billing volume refers to other than meter conditions, suitable and approved volume correcting devices shall be used to account for changes in volume caused by the effects of temperature and pressure. The pressure connection to the correcting device shall be taken from a pipe fitting at the upstream side of the meter. The temperature probe may be located on the upstream or downstream side of the meter.

NOTE: The torque load of some volume correcting devices may adversely affect the rangeability of the meter.

The computation of the volume of a gas, at the contract temperature and pressure, which has been registered in cubic feet at line conditions is based on the ideal gas laws modified by a deviation factor available in the form of a Supercompressibility factor (Fpv), determined according to the A.G.A. Gas Measurement Committee Report No. 3, Orifice Metering of Natural Gas.

COMPAGNIE DES COMPTEURS DELTA N SERIES ROTARY POSITIVE DISPLACEMENT GAS METERS



The general equation for converting the meter readings at line conditions to a contract base pressure and temperature is

$$Qs = Qd\ Pm\ Tm\ (Fpv)^2$$

Qs = Quantity of gas at the contract base pressure and temperature, cu.ft.

Qd = Actual (displaced) volume of gas passed at existing meter conditions, cu. ft.

Pm = Pressure multiplier

$$= \frac{\text{Weighted average existing gauge pressure + barometric pressure}}{\text{Absolute pressure base}}$$

Tm = Temperature multiplier

$$= \frac{\text{Temperature base + 460}}{\text{Weighted average flowing gas temperature + 460}}$$

Fpv = Supercompressibility factor based upon the weighted average gas pressure and temperature and the normal composition of the gas. The composition is represented by its specific gravity, its content of nitrogen and carbon dioxide and its calorific value as used in the derivation of Fpv values.

The selection of the weighted average supercompressibility factor, Fpv, should be based on a record of the flowing gas volumes, pressures and temperatures. If no continuous record is available, the variations in pressure and temperature normally existing in the line must not introduce an error greater than ±0.5% in the selected $(Fpv)^2$ factor.

Installation

The Delta meter is designed to operate in a horizontal or vertical flow line, and the type of system in which the meter is used will depend on the application and customer practice, however, the following recommendations are made by the manufacturer:

METER

1. Position the meter away from the lowest point in the system to prevent contamination from liquids and other foreign matter.

2. Always install meter with the axis of rotation of the rotors in the horizontal plane. The index can be rotated about its own axis through 340° to facilitate easy reading.

3. Allow sufficient clearance to enable lubricating oil level to be checked and topped up when necessary.

4. For meter size N.3 and larger, provide plinth or similar means of supporting meter.

SYSTEM

1. Where there is a possibility of any dirt or other foreign matter being present in the gas, a gas filter must be fitted upstream of the meter to restrict the maximum particle size passed to less than 50 micron.

2. Filters should be fitted as close as possible to the meter as any particle larger than.0025" diameter can cause serious damage to the meter.

3. All meters should be fitted with a means of slowly pressurizing the meter line to ensure that the meter is never overspeeded particularly during commissioning.

4. Hydraulic pressure testing of the system must be carried out without the meter in position followed by a thorough cleaning and drying of the system before refitting the meter.

Each metering station must include a by-pass and test connections for testing and servicing the meter.

All meters accepted for service shall be effectively sealed to ensure that volume registration cannot be tampered with.

The meter nameplate, affixed to the meter body shall include the following information:

1. Canadian distributor's name.

2. Manufacturer's name.

3. Meter's model designation and serial number.

4. Rated capacity of the meter, cu. ft./hr.

5. Maximum working pressure, psi.

Approval granted to:

Parkinson Cowan (Canada) Ltd.
Chatham, Ontario.

J.S.T. Swanson, P. Eng.,
Chief, Standards Laboratory,
Standards Branch.

W.J.S. Fraser,
Chief, Electricity & Gas Division,
Standards Branch.

Ref: SL-100-947
SE-85-56