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

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL G-64-3

OTTAWA February 22, 1972.

CANADIAN METER COMPANY, SERIES GT, GAS TURBINE METERS

This approval supersedes Circular G-64, dated March 11, 1970. Circulars G-64-1 and G-64-2 remain in force.

APPARATUS

	Models		
	GT-4	GT-6	GT-8
Rated capacity, cu. ft. per hour at line conditions	16,000	30,000	60,000
Capacity per revolution of meter output shaft, cu. ft.	100	100	1,000
Maximum, approved working pressure, psi	125	125	125
Meter connections, flange	4"	6"	8"

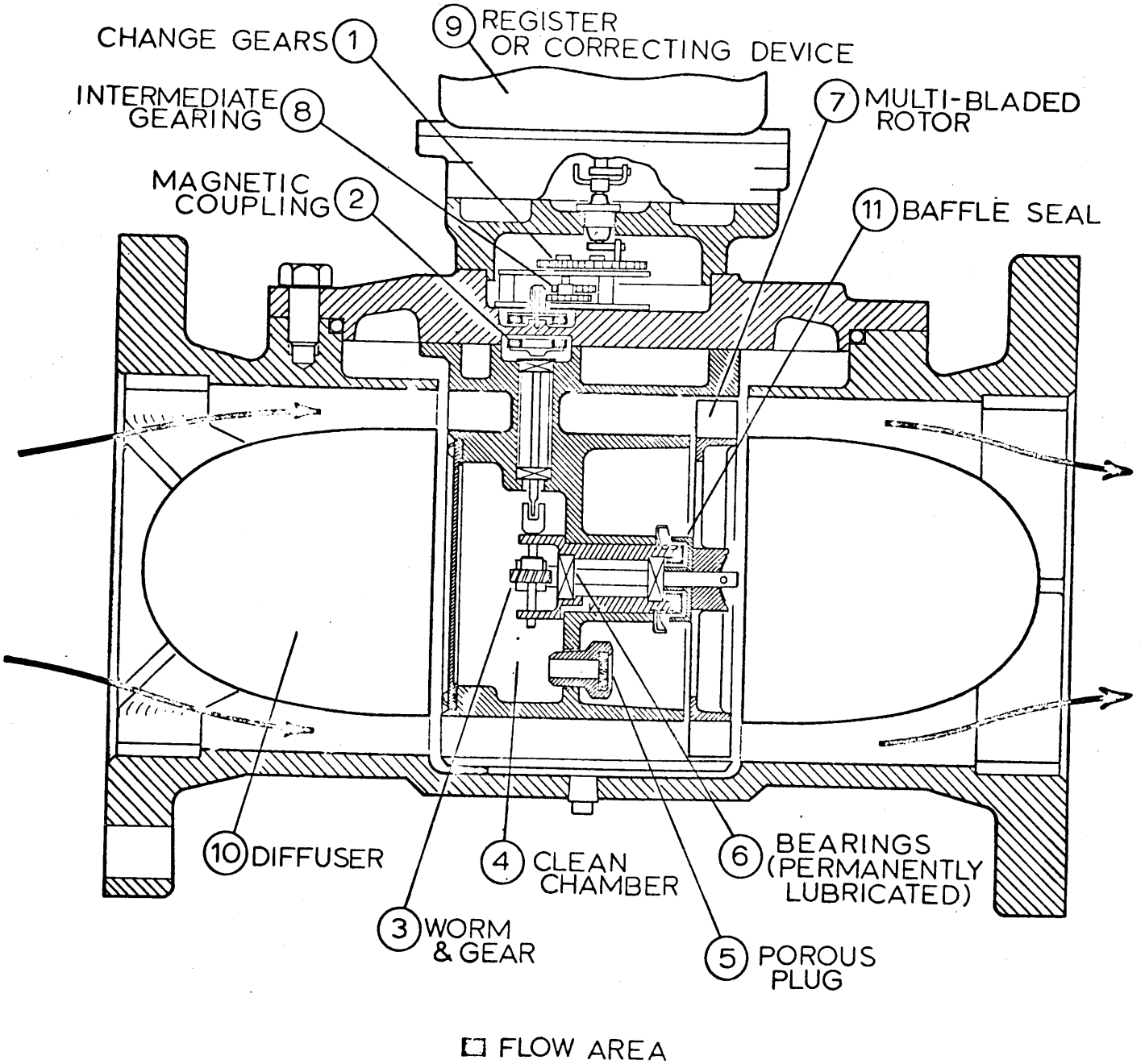
DESCRIPTION

The Canadian Series GT meter measures gas by utilizing the basic principle of a turbine.

This, in-line mounted, meter consists of two main assemblies, (1) the meter body, and (11) the removable measuring assembly, or cartridge.

The meter body contains two finned diffusers held by snap rings at each end of the body shell. The measuring cartridge assembly is attached to the top cover which is bolted to the main meter body. The mechanism contains a one-piece molded multi-bladed rotor, worm and gear drive and a lower half of the magnetic coupling which transmits the turbine wheel rotation to the outside of the top cover. On the other side of the

CANADIAN METER COMPANY, SERIES GT, GAS TURBINE METERS



pressure barrier the upper half of the magnetic coupling drives in turn the intermediate gearing, change gears and the meter register or volume correcting device. The rotation of the output shaft in the meter is in the clock-wise direction. Pressure tap holes are located on the top cover for measuring static and differential pressures.

In operation the gas which enters the meter is deflected around the inlet diffuser thus increasing its velocity prior to impinging on the rotor. The passage of the gas stream over the rotor blades exerts a force that causes the rotor to revolve with a speed directly proportional to the rate of flow of the gas. However, should the gas stream enter the meter with a swirling motion, or have a non-uniform velocity distribution (sometimes referred to as jetting) the proportionality of the rotor speed to the flow rate may be upset and meter accuracy affected.

The rated capacity of the turbine meter indicated the maximum permissible flow rate in cubic feet per hour at actual line conditions (maximum dial rate) and this rate governs for all meter operating pressures. The minimum registration of the flow at line conditions depends on the density of the gas and decreases as the line pressure increases. The actual flow, in standard cubic feet, increases due to the pressure factor.

The turbine 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 the fitting provided on the upstream side of the meter cover.

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.

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

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

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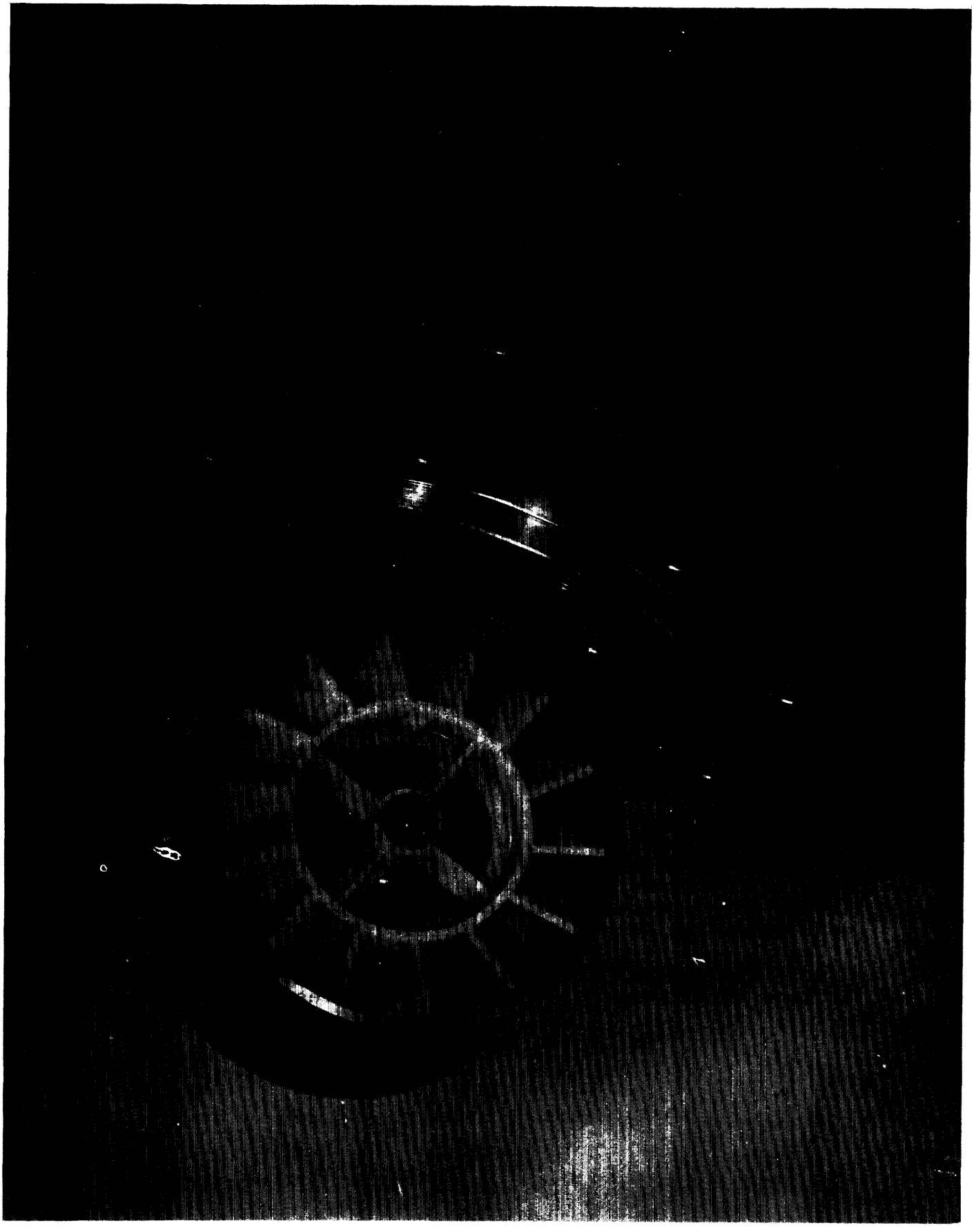

Qs = Quantity of gas at the contract base pressure and temperature, cu. ft.

Qd = Actual (displaced) 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.

All meters accepted for service shall be effectively sealed by the field inspector to ensure that no part of the measuring unit may be tampered with. The intermediate gear train cover will be sealed separately from the seal on the internal mechanism assembly.

INSTALLATION

The turbine meter is designed to operate in a horizontal line with its top plate level. Gas streams must be conditioned for cleanliness with a filter and for flow pattern with straightening vanes. The upstream piping shall have a minimum straight run of meter size pipe, four diameters long, with standard straightening vanes in the upstream end. The straightening vanes must conform to the requirements of the AGA Gas Measurement Committee Report No. 3. This upstream straight run may be preceded by a reducing coupling, a full radius elbow or a tee. At the downstream side of the meter a flanged tee or full radius elbow may be used in place of a straight run of meter size pipe.

Attached illustration shows a typical arrangement of the components which has been approved.

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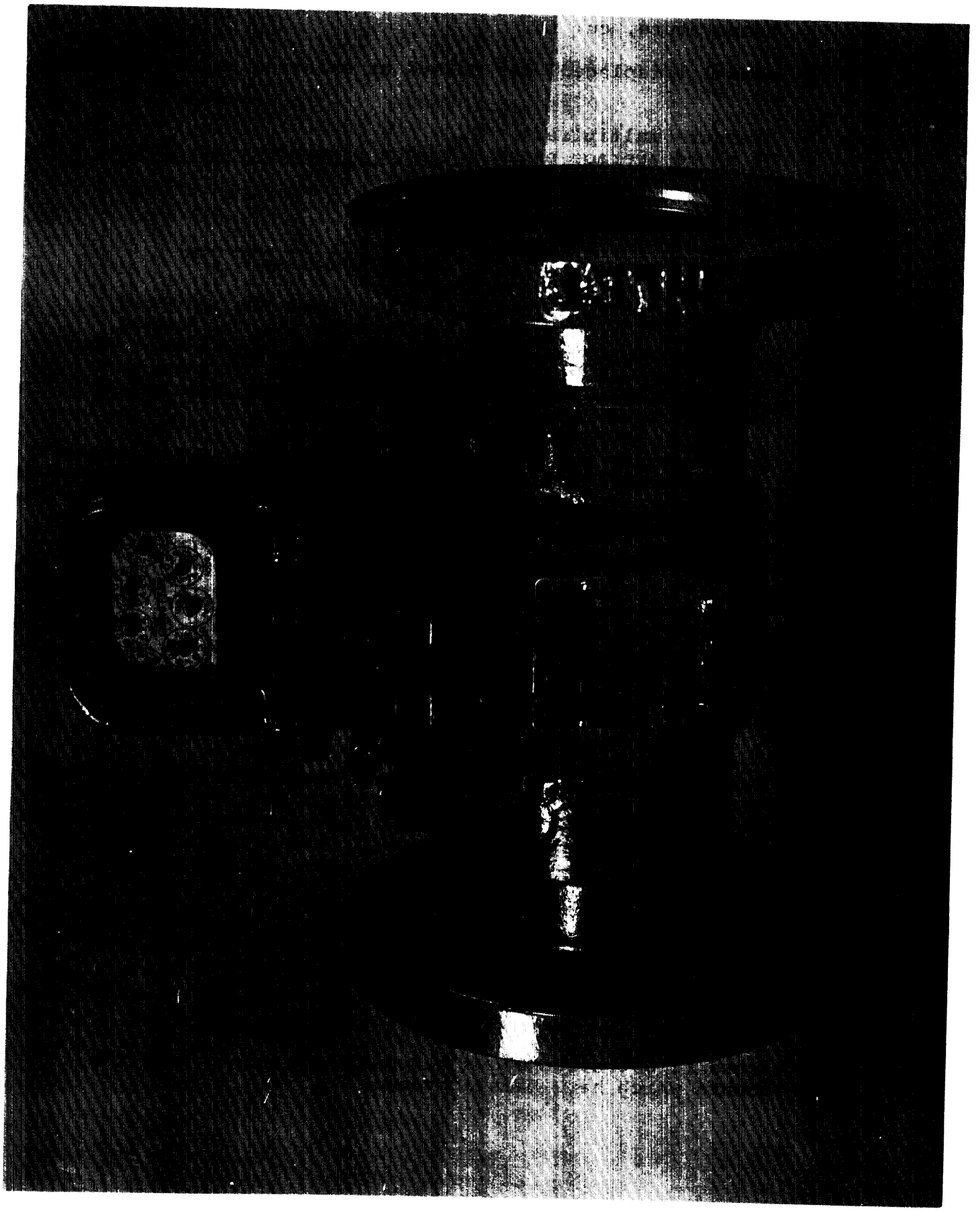


The temperature probe for the auxiliary device should not interfere with the symmetry of flow through the turbine and may be located upstream of the meter preceding the straightening vanes or downstream in a position that does not interfere with the discharge of the meter, usually about two pipe diameters downstream.

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

NOTE: The rangeability of the turbine meter may be adversely affected by a torque load imposed by some volume correcting devices.

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

(1) Manufacturer's name or trade mark.

(2) Model Designation.

(3) Capacity of meter.

(4) Maximum Working Pressure.

(5) Manufacturer's meter case number.*

* NOTE: (1) The number appearing on the meter case is to be disregarded as far as the inspection process is concerned.
(2) The manufacturer's serial number of the meter cartridge shall be regarded as the serial number of the turbine meter.

An additional badge, affixed to the top plate shall have the following information:

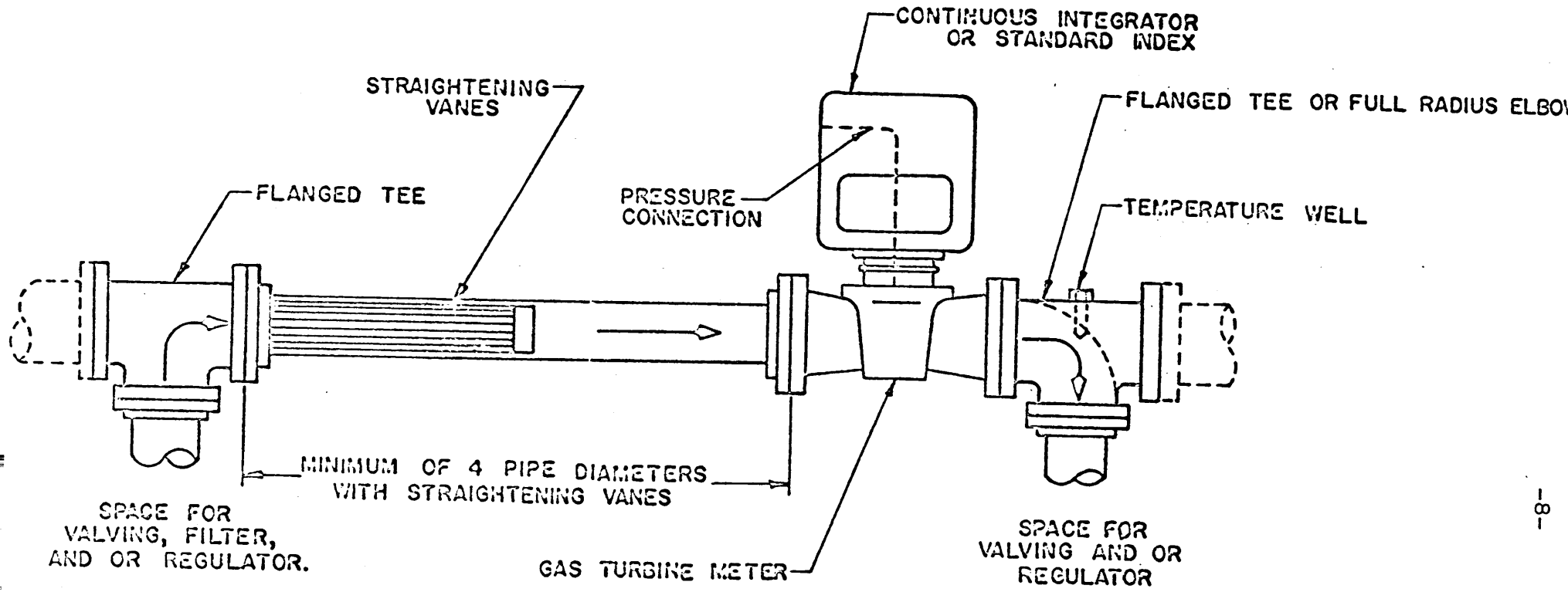
(1) Manufacturer's name or trade mark.

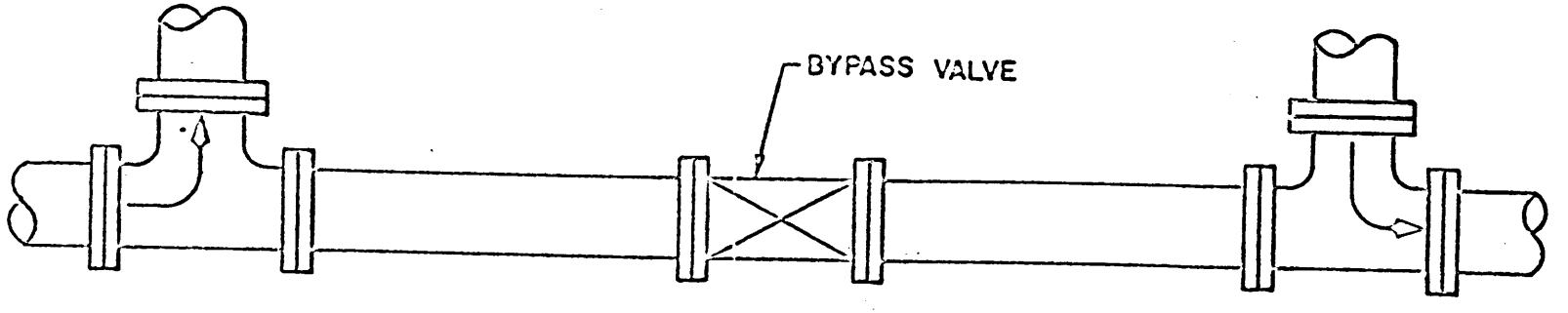
(2) Manufacturer's Serial Number of meter cartridge.

(3) Model Designation.

(4) Maximum Working Pressure.

The meter inspection number will be affixed to the top of the meter cartridge.


CONTINUOUS INTEGRATOR
OR STANDARD INDEX
STRAIGHTENING
VANES
FLANGED TEE OR FULL RADIUS ELBOW
FLANGED TEE
PRESSURE
CONNECTION
TEMPERATURE WELL
MINIMUM OF 4 PIPE DIAMETERS
WITH STRAIGHTENING VANES
SPACE FOR
VALVING, FILTER,
AND OR REGULATOR.
GAS TURBINE METER
SPACE FOR
VALVING AND OR
REGULATOR


BYPASS VALVE

The information pertinent to each meter installation shall be recorded by the Utility on a Standards Branch Gas Metering Installation Data Sheet, No. SG-1, and filed with the District Inspector of Electricity and Gas Divison prior to the initial verification of the meter in the field.

Approval granted to: Canadian Meter Company Ltd.,
Milton, Ontario and
Edmonton, Alberta.

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