

COLUMBIA GAS TRANSMISSION, LLC

**SPECIFICATIONS AND GUIDELINES
FOR RECEIPT
MEASUREMENT FACILITIES**

February, 2011

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I. PURPOSE

Columbia Gas Transmission, LLC (Columbia) requires Customers to provide and install certain measurement facilities for receipt of natural gas into a Columbia pipeline subject to the requirements set forth in this document. The purpose of these specifications and guidelines is to provide information which can be used by the Customer to provide materials and install facilities in a manner that will be acceptable to Columbia.

II. SCOPE

This document is intended to cover the material, fabrication, construction and installation of "typical" production receipt measurement facilities. Generally, this document covers situations requiring single run meter settings with working pressures up to and including 1480 psig with expected daily volumes up to 100,000 Dth/day.

If anticipated station volumes exceed approximately 100,000 Dth/day, the required working pressure is greater than 1480 psig, or in certain unusual situations beyond the scope of this document, a custom station design will be required. Columbia utilizes a third party contractor – "POR Coordinator" to provide oversight services for the receipt meter installation process.

The requirements set forth in this document apply to new measuring stations and to rebuilding, relocation or replacement of existing measuring stations.

III. PROCEDURE

The Customer must make a formal request for a new measuring station. Columbia's Meter Analyst will coordinate the execution of a Meter Set Agreement (MSA, see sample) with the Customer which will include the prepayment of the cost for the pipeline tap and valve on Columbia's pipeline. The Customer will reimburse Columbia for its actual costs associated with the facility. These costs include, but are not limited to, the cost of the pipeline tap and valve, miscellaneous material, inspection of facilities, commissioning, reviewing material lists and construction drawings, labor overheads, gross up for taxes, etc. The estimated cost of the tap and valve and other costs are included on the Tap Sizing and Approximate Costs table. The tap on Columbia's pipeline should be sized for the anticipated future flow requirements of the facility.

It is the Customer's responsibility for material acquisition, fabrication, construction and installation of the measurement facilities using Columbia approved vendors and contractors. It is the Customer's responsibility for the total cost of the measurement facilities. See the Approximate Costs for Measurement Facilities table.

The Meter Set Agreement between the Customer and Columbia specifies responsibility for design, material acquisition, installation, ownership and operation and maintenance of the measurement facilities. These responsibilities are identified on Attachment A of the MSA.

1. SITE REQUIREMENTS

Upon receipt of the executed Meter Set Agreement and prepayment in full, Columbia will notify our

POR Coordinator who will make arrangements with the Customer to select a site for the measuring station. To shorten the timeframe required for installing the new measurement facilities, the Customer should select a preferred site as well as an alternate site, prior to making arrangements with Columbia. Site requirements are as follows:

- a. Year round vehicle access must be provided to the site. The measuring station should be located adjacent to a public road or other all weather road. The Customer is responsible for purchasing or leasing the measuring station lot as well as obtaining the necessary rights of way for any pipeline access roads and utility access. The measuring station is to be located immediately adjacent to the Columbia pipeline right of way. Measuring stations will not be located on the Columbia pipeline right of way. The measuring station should not be located where it will be subject to flooding or where standing water may collect. The site must be of sufficient size to locate the required measurement and auxiliary equipment, buildings, customer equipment, etc. and to provide access for the operation and maintenance of the facilities. The site must meet all applicable local zoning requirements.
- b. Electronic Measurement (EM) is required for all new or revamped stations. The station site must be chosen to provide for easy installation of EM including communications. Depending on the type of EM to be installed, this may require locating near existing phone or electric lines or in a site with good southern exposure to permit the use of solar power systems. Cell phone and satellite communications may also be a consideration. Service availability, signal strength, power requirements and line of sight (72 degrees west longitude for satellite) are among items that must be analyzed when determining the communications method.

As part of the site selection process, the Customer, Columbia's POR Coordinator and local Columbia personnel will jointly determine the need for a building, security fencing, vehicle protection, etc.

2. THE PROPOSED MEASURING STATION DETAIL

The Customer will provide Columbia's POR Coordinator with the POR station proposal. This information will be reviewed by Columbia's POR Coordinator and Columbia technical personnel as required to verify that the equipment the Customer intends to install is described by a Columbia approved standard drawing and is appropriate for the station operating conditions.

The Customer must provide the following information to Columbia's POR Coordinator prior to purchasing the meter, electronic measurement equipment, overpressure protection equipment, settings, etc. in order to avoid problems should the equipment be found inappropriate for the application.

- a. The Customer may select the size and type of meter setting. Columbia's POR Coordinator will review and approve the meter selection.
- b. The Customer may select the type of overpressure protection equipment and setting design. Columbia's POR Coordinator will review and approve the overpressure protection selection. Customer will include noise calculations for monitor regulation and flow control settings with proposed facility design.
- c. The Customer may solicit bids from any of the Columbia approved meter fabrication shops. These fabricators have Columbia approved skid mounted standard meter drawings. These drawings cannot be modified without written permission of Columbia. The Customer shall provide overpressure protection setting drawings to Columbia's POR Coordinator for review and approval before fabrication at Columbia approved fabrication shops.
- d. The name of the shop that will fabricate the meter setting and other fabricated assemblies such as liquid shut-off devices, regulator settings, etc. Approved fabrication shops are shown on the Approved Fabrication Shops list.

- e. The name of the contractor who will install the meter and overpressure protection settings. Approved contractors can be found in the Approved Contractor List for M&R Construction document.
- f. Columbia's POR Coordinator and local Columbia personnel cannot approve contractors or fabrication shops not found on these approved lists.

3. INSTALLATION ARRANGEMENTS

Once a meter site has been agreed upon and meter site land rights have been secured by the Customer, Columbia will proceed with the appropriate FERC clearance and land owner notification for its tap construction. When these are received, Columbia's POR Coordinator will notify the Customer of the approval to construct and install the measurement facilities. The Customer and Columbia's POR Coordinator will agree on a date at which time Columbia will have installed the tap and shut-off valve, and to arrange inspection of the meter setting and witnessing of the installation process. Only Columbia or a contractor working for Columbia is permitted to perform the hot tap on a Columbia operated pipeline. Customer is responsible for obtaining all necessary permits for its construction.

In order to provide Columbia's POR Coordinator the opportunity to inspect or witness the installation, the Customer will provide timely notification to Columbia's POR Coordinator as to when their contractor will be constructing or installing the measuring station. The Customer will work with Columbia's POR Coordinator to arrange for pre-commissioning inspection of the facilities. When the facilities are determined to be installed per the requirements of the MSA and Columbia's standards, Columbia's POR Coordinator will notify the appropriate Columbia M&R team leader to arrange for final commissioning and placing the facilities in service. Only Columbia personnel can perform the final commissioning and placing the facilities in service.

IV. GENERAL REQUIREMENTS

- 1. The measuring station shall conform to all local or state zoning requirements, ordinances and regulations pertaining to noise, aesthetics, location, etc.
- 2. The Customer is responsible for obtaining all necessary permits and clearances required by applicable local, state or federal statutes, ordinances, rules and regulations, including but not limited to, state historic preservation organizations, Army Corp of Engineers, fish and wildlife agencies and soil conservation districts, as well as building and electrical permits.
- 3. Columbia's requirements concerning qualification of fabrication shop and installation welders and welding procedures, pressure testing and radiographic test inspection shall be strictly enforced. These requirements have been provided to the Approved Fabricators and are available upon request. Columbia reserves the right to reject non-conforming or non-documented welds.
- 4. All natural gas pipeline related facilities must be designed and constructed according to Columbia Gas Transmission's Policy and Procedures. Columbia's POR Coordinator will ensure that facility designs comply with all applicable codes and regulations. Company policies, procedures and standard drawings have been developed in order to ensure compliance. Columbia's POR Coordinator and local Columbia personnel must acquire approval of Technical Services to deviate from an approved policy and procedure or standard drawing if the deviation might compromise the safety, material strength or integrity of the facility.

V. METER SELECTION

The following criteria shall apply when selecting meters:

1. The meter selected must be properly sized for the expected flowing conditions and have a manufacturer/fabricator stamped working pressure that is equal to or higher than the Maximum Allowable Operating Pressure (MAOP) of the Columbia pipeline on which it will be installed.

IN NO CASE WILL THE CUSTOMER INSTALL A METER SETTING HAVING A WORKING PRESSURE (METER OR METER SETTING COMPONENTS) THAT IS LESS THAN THE MAOP OF THE COLUMBIA PIPELINE ON WHICH IT IS TO BE INSTALLED.

2. Orifice meter tubes shall be sized so that during normal flowing conditions, the differential pressure is between 10 and 90% of the calibrated differential span up to a maximum of 200 inches water column when using an orifice plate having a beta ratio of 0.20 to 0.60. Orifice meter sizing should be based on maximum expected flow rates at the minimum expected pressure, and on minimum expected flow rate at the maximum pressure.

Orifice meters should not be used on wells with automatic plunger lift devices (rabbit wells).

3. The Meter Capacities at Various Pressures section contains information on the minimum and maximum capacities of various meters over a wide range of operating pressures. The Customer will use this information to initially determine the size of the meter and meter type. Columbia's POR Coordinator will review and approve the Customer's meter selection prior to the Customer purchasing the meter setting. Columbia reserves the right to disallow the use of a Customer selected meter and to recommend a different type if the meter selected is inappropriate for anticipated pressure and flow conditions.

VI. METER SETTING DESIGN

Meter settings shall be fabricated from Columbia Standard Drawings. Columbia's standard drawings have been provided to Approved Fabricators and are available upon request. Any deviation from the Columbia Standard Drawings requires prior approval by Columbia, except that:

1. Like kind and size components having a higher working pressure than those shown may be substituted without prior approval.
2. Threaded connections larger than 1" may be replaced with welded connections without prior approval.
3. Socket weld components may be replaced with like kind and size weld neck components without prior approval.

Note that some of the drawings do not show dimensions. With the exception of minimum required lengths for orifice and turbine meter upstream and downstream piping, dimensions are generally not critical.

Specific meter requirements are as follows:

1. ORIFICE METERS

All orifice meters shall be fabricated per approved Columbia skid mounted standard drawings. Fabricators cannot modify these meter runs without prior written approval from Columbia.

All orifice meter tubes shall be fabricated to current API 14.3/A.G.A. Report No.3 specifications for an allowable beta ratio of 0.75 (Note: Columbia will not permit the use of orifice plates having Beta ratios greater than 0.70.). Flow conditioners such as CPA 50 E plates or tube bundle straightening vanes are required in 4" and larger orifice meters. An "Orifice Meter Inspection Report" or a similar form containing the dimensions (lengths, internal micrometer measurements, etc.) of the meter tube,

fitting, tap holes, etc. must be provided with each orifice meter. This report must be filled out completely and accurately, and the person completing the form must sign and date it. Orifice meters may be remiked by Columbia to verify the accuracy of the measurements shown on the Orifice Meter Inspection Report. Approved Fabrication Shops will supply a completed Orifice Meter Inspection Report with the meter. The use of orifice measurement downstream of a customer compressor may require the customer to install additional equipment to dampen pulsation that may impact orifice meter accuracy.

2. ROTARY METERS

All rotary meters shall be fabricated per approved Columbia skid mounted standard drawings. Fabricators cannot modify these meter runs without prior written approval from Columbia.

Columbia personnel will accuracy test all rotary meters prior to meter turn on. The required field accuracy of rotary meters is 99.0 to 101.0% at 50 and 100% of meter capacity; and 98.5 to 101.0% at 10% of meter capacity.

3. DIAPHRAGM METERS

Due to relatively high operating costs and limited working pressure ranges, the use of diaphragm meters at new measuring stations is discouraged if the expected flow and pressure conditions allow the use of a rotary meter. If the customer wishes to provide a diaphragm meter for use at a new station, a fabrication drawing of the meter setting must be provided to Columbia for engineering approval prior to installation.

4. TURBINE METERS

All turbine meters shall be fabricated per approved Columbia skid mounted standard drawings. Fabricators cannot modify these meter runs without prior written approval from Columbia.

All turbine meter settings shall be fabricated to current A.G.A. Report No.7 specifications. Fabrication drawings for 4" and larger meters adhere to A.G.A. Report No.7, Figure 2 which provides for 10 pipe diameters of straight pipe with straightening vanes upstream of the meter and 5 pipe diameters of straight pipe downstream. Welds on the meter inlet and outlet piping must be ground flush with the meter tube pipe ID. Short coupled 4" and larger settings are not permitted. A reduced length of inlet piping is permitted (12" without straightening vanes) on 2 and 3 inch TPL-9 production measurement settings.

If the customer supplied turbine meter setting contains a new turbine meter (one that has not been used and has a serial number indicating that it was manufactured not more than 1 calendar year earlier), then the meter manufacturer's accuracy data sheet must be provided to Columbia prior to meter turn on. The manufacturer's accuracy data sheet will be acceptable provided the meter was found to have an original accuracy of 99.0 to 101.0% at flow rates of 10, 50 and 100% of meter capacity. The turbine meter shall be subjected to the high pressure test per Columbia turbine meter specifications if the meter is to be installed on a pipeline that operates above 200 psig.

Selection of a turbine meter downstream of a customer compressor may require the customer to install additional equipment to dampen pressure pulsation that may impact turbine meter accuracy.

Customer shall supply one spare turbine meter module with each new turbine meter installation. Customer shall supply one Welker automatic oiler with each turbine meter installation per the following specification: Welker OIP-2BK Oil injection pump with 250CC oil reservoir, 10" x 8" x 6" Nema 4 enclosure, 0.25CC / stroke, internal check valve, 6 VDC solenoid, 20-1440 psi operating range, complete with instrument supply regulation package, 6 VDC Welker 6Tc timer with 15 second - 60 hour rangeability

NOTE: The Approved Fabrication Shops have Columbia's performance requirements for new rotary, diaphragm and turbine meters.

5. ULTRASONIC METERS

All ultrasonic meters (USM) shall be fabricated per approved Columbia skid mounted standard drawings. Fabricators cannot modify these meter runs without prior written approval from Columbia.

All USMs shall be fabricated to current A.G.A. Report No. 9 specifications and Columbia Design Specification DS-4004. A gas chromatograph shall be installed at each location with ultrasonic measurement. The design operating velocity range for ultrasonic meters is between 5 fps and 75 fps. USM run pipe may be fabricated with seamless line pipe, but the fabricator must inspect the pipe for no greater than 1% out-of-roundness and internal diameter deviation no greater than 1%. Furthermore, the internal surface roughness of pipe used in USM measurement shall be in the range of 50 to 250 micro-inches. These parameters shall be documented in NGT&S approved MIC sheets. Once the meter setting is fabricated and bolted together, it shall be sent to an approved USM testing facility for "wet calibration". At no time after calibration shall the meter setting be disassembled for shipping or installation as per Columbia policy.

All ultrasonic meters shall be ordered with the latest diagnostic software. Daniel USM diagnostic software is called "keys" and this software will be ordered with the meter.

A canopy or cover shall be installed over the USM runs to keep sunlight off the meter runs to prevent thermal currents in the meter tube. At a minimum, the area shaded shall extend from the upstream flow conditioning plate to the downstream block valve protecting the run from direct sunlight thru the entire day. However, the canopy or cover should not restrict access to the meter run or preclude the removal of any one meter run in a multi-run station. Finally, the canopy or cover shall meet or exceed all applicable building or zoning codes. Carport covers securely fastened to concrete foundations may be used with Columbia review and approval. Electrical conduit, other than that conduit necessary for lighting under the canopy, shall not be attached to the canopy or its support structure.

6. SECONDARY ELEMENTS

Electronic measurement is required for all new or revamped receipt stations. The Customer is responsible for procurement and installation of Columbia approved EM equipment, including manifolds and associated tubing, power supply and communications equipment. Approved contractors are listed in the Approved Contractor List for M&R Construction.

Orifice meter differential pressure transmitters shall be direct mounted using a 5 valve manifold.

All meter runs will include a sampler probe for use in obtaining spot samples. This is in addition to any continuous sample equipment or gas chromatograph sample points.

VII. REQUIREMENTS FOR LIQUID REMOVAL

A liquid removal device is required for all new receipt stations. Either a positive liquid shut-off device or a filter separator will be installed immediately upstream of the measurement facility. Filter separators will be required for stations flowing greater than 1,000 Dth/day. A positive liquid shut-off device and filter may be installed in place of a filter separator. All filter elements shall be designed to remove 99.5% of all liquid and solid particles three microns and larger from the gas stream. Filter separators must include a sump and drain to remove liquids. At the discretion of the Columbia Technical Services Engineer, an automatic drain and liquid holding vessel will be required.

The Customer is responsible for the operation of the positive liquid shut-off device or filter separator including collection of fluid, filter element replacement and disposal of liquids and elements in accordance with all applicable laws and regulations.

Rotary meter settings and the TPL-9 turbine meter settings incorporate integral 2" by 6" liquid shut-off devices. All other meters require separate liquid shut-off devices.

VIII. GAS QUALITY REQUIREMENTS and EQUIPMENT

Receipt of gas into Columbia's pipeline system shall satisfy and be subject to the Gas Quality provisions as set forth in the General Terms and Conditions of Columbia's FERC Gas Tariff, Section 25, which are incorporated herein by reference and as set forth in the Meter Set Agreement. It is the Customer's responsibility to assure that the Gas Quality requirements are met.

When any gas quality parameter (excluding H₂S) for a proposed receipt meter does not meet the requirements, the Customer will initiate a request for gas quality waiver. See the Gas Quality Waiver Request Form. The request is submitted as part of the meter request process. Submitting this request along with the gas sample analysis results will enable Columbia to determine if the gas can be accepted into its pipeline system and if additional processing or monitoring equipment is required or if volumetric limitations are required. Submitting the waiver request with the meter request will help to ensure that the measurement facilities are appropriately designed and installed to meet the anticipated requirements. Failure to request a waiver for non conforming gas may result in additional equipment requirements, delays in placing the measurement facilities in service and potential shut in after the measurement facilities are installed.

Gas Quality Monitoring Equipment

Receipt meters require gas quality monitoring equipment to ensure that gas quantities are accurately determined and to ensure compliance to Columbia's gas quality tariff requirements. Here is an outline of requirements:

1. **Heating value, specific gravity, carbon dioxide and nitrogen determination:** Determination of heating value, specific gravity, mole % CO₂ and mole % N₂ is required for the calculation of volume and energy quantities delivered into Columbia's pipeline. These gas quality parameters will be determined by: obtaining a periodic spot sample; installing a continuous gas sampler or installing a gas chromatograph. When a receipt station is anticipated to flow less than 1,000 Dth/day a periodic spot sample will be obtained. The frequency will be determined by Columbia. When a receipt station is anticipated to flow more than 1,000 Dth/day but less than 10,000 Dth/day, a continuous gas sampler will be required at the station. When the anticipated flow exceeds 10,000 Dth/day, a gas chromatograph is required. A gas chromatograph may also be required if there is a hydrocarbon processing facility upstream of the receipt meter on the customer's system. When the gas source is from known coal bed methane or landfill gas production, a chromatograph is to be installed. A gas chromatograph is also required at any station using ultrasonic measurement. Chromatographs shall be installed in a Columbia approved climate controlled chromatograph building unless Columbia provides a written exception. An insertion probe or insertion probe regulator must be installed in the gas stream for acceptable gas samples. Care must be taken to prevent hydrocarbon dropout in the gas sample line. Consequently, the gas sample line shall be heat traced with moisture barrier to prevent liquid contamination of the chromatograph. Automatic samplers shall be installed in a heated enclosure provided by the manufacturer.
2. **Moisture monitoring equipment:** Moisture levels will be periodically monitored by Columbia to ensure compliance with the tariff requirement. Additionally, a Columbia approved permanently installed moisture monitoring device will be required at some receipt stations. When the gas source is known to contain elevated water levels, a monitor is required. A monitor is required when the

upstream customer facilities include dehydration equipment and when the anticipated flow is more than 10,000 Dth/day. Lower flow stations that are connected to Columbia's high pressure transmission pipeline system may also require moisture monitoring equipment. This will be determined during the station design review.

3. **Oxygen monitoring equipment:** When the gas source is from known coal bed methane or landfill gas production, a Columbia approved oxygen monitor will be required.
4. **H2S monitoring equipment:** When the gas source is from a known H2S producing area, a Columbia approved hydrogen sulfide monitoring device and automatic shut off valve will be installed. The monitoring device will be set to alarm and close the automatic shut off valve when the H2S level of the flowing gas is at 4 PPM. Columbia will set the trigger level for the shut off valve. A monitor and shut off valve will be required at receipt meters where the customer has upstream treatment facilities to remove H2S. A gas sample will be obtained prior to placing the meter in service to verify the H2S level in the gas received into Columbia's pipeline system. A gas sample may also be required prior to the installation of the tap.
5. **Approved devices:** A list of Columbia approved gas quality monitoring devices is available upon request.

IX. OVERPRESSURE PROTECTION REQUIREMENTS

General Information

All stations will be equipped with acceptable overpressure protection. The Customer may specify only Columbia approved types of overpressure equipment listed in this document. A monitored regulator setting consisting of a control regulator and an overpressure monitor regulator or Customer pressure control plus an automatic security shut-off valve is the only acceptable means of overpressure protection allowed on receipt meter settings. Columbia reserves the right not to accept gas until the Customer provides: A) production maximum capacity and maximum gas pressure information and B) an acceptable means of overpressure protection of Columbia's pipeline system.

Overpressure Protection Requirements

Overpressure protection requirements are as follows:

1. If the rock pressure or the flowing pressure of the Customer's well(s) exceeds the Maximum Allowable Operating Pressure (MAOP) of the liquid removal device or the meter setting, overpressure protection shall be installed on the meter setting or at a point immediately upstream of the meter inlet valve. Relief valves installed to protect the Customer's upstream pipeline system shall not be installed on liquid shut-off devices due to the possibility of blowing pipeline fluids to atmosphere.
2. The Customer will be responsible for the operation and maintenance of overpressure protection devices installed solely to protect the liquid removal device and/or meter setting.
3. The inlet of the overpressure protection equipment must be designed for the maximum upstream pressure on the Customer's pipeline system but shall not be designed for less than Columbia's Maximum Allowable Operating Pressure (MAOP).
4. Columbia's POR Coordinator will approve overpressure protection equipment selection and setting design prior to fabrication for each situation requiring overpressure protection to protect Columbia facilities downstream of measurement.
5. Columbia will be responsible for the operation and maintenance of overpressure protection devices

installed to protect Columbia facilities downstream of measurement.

6. Generally, security valve OPP is installed on low flow stations where the interruption of flow is not a concern. Security valves are only to be considered in 4" and smaller sizes with flows below 10,000 Dth/d. Security valves will be reset by Columbia personnel only. When a security valve has closed, Columbia personnel will schedule a visit to the station during normal work hours to manually reset the security valve. Monitored regulation setting OPP is initially more expensive than a security valve but monitored regulation settings typically create no flow interruption and are conducive to installation of remote flow control when required.
7. Noise level of all regulation equipment must be less than 95 dbA at maximum flow and maximum pressure drop conditions and meet local community standards.

Approved Types of Overpressure Protection (OPP)

The following types of overpressure protection are acceptable:

1. Security Valve (DOT 192.197)

- a. The slam shut security valve shall be designed to automatically shut if the pressure setpoint is met and must be manually reset by Columbia personnel when the overpressure condition is abated.
- b. The security valve must be on the Columbia approved vendor list or assembled of components on the Columbia approved vendor list.
- c. The security valve will be located upstream of the meter on the Customer side of the meter. The sense line will be located on the meter run typically on the Columbia side of the setting.
- d. At the discretion of Columbia's Technical Services Engineer, the security valve will be set at the transmission line's Maximum Allowable Operating Pressure (MAOP).
- e. The security valve will be tested at the time of the meter installation and yearly thereafter.
- f. A security valve can be assembled using a ball valve (to shut off the gas flow), a pneumatic valve operator (to drive the ball valve closed) and a pilot (that opens when the setpoint is met, providing the gas supply to the pneumatic operator that closes the ball valve). Certain fabrication shops will build these settings per application. Consult Columbia's Technical Services Engineer for the approved fabrication shops.
- g. Installation of a security valve is generally less expensive than the installation of a monitored set of regulation but the Customer will be shut in until the security valve can be manually reset by Columbia personnel.
- h. Typical PID drawings are available upon request.

2. Monitored Regulation Setting (DOT 192.197)

- a. The monitored regulation setting shall be designed to automatically reduce (throttle) the line pressure until the pressure setpoint is met.
- b. The monitored regulation setting must be built with regulators or control valves on the Columbia approved vendor list.
- c. The monitored regulation setting may be located downstream of the meter on the transmission side of the meter at the discretion of Columbia's Technical Services Engineer. Typically regulation is located downstream of ultrasonic meter settings and upstream of turbine or orifice meter settings.
- d. At the discretion of the Columbia's Technical Services Engineer, the control valve (primary regulator) will be set at the transmission line's Maximum Allowable Operating Pressure (MAOP). The monitor valve (secondary regulator) will be set at 105% of the primary setpoint.
- e. The individual regulators constituting the monitored regulation setting will be tested at the time of the meter installation and yearly thereafter.
- f. A monitored regulation setting should include line size inlet and outlet valves, an appropriate sized plug valve bypass valve with locking device, blow off valves and taps for gage connections, pressure sense, catalytic heaters, etc. Certain fabrication shops will build these settings per application. Consult Columbia's Technical Services Engineer for the approved

fabrication shops and for guidance in the selection of an appropriately sized monitored regulation setting.

- g. Typical PID drawings are available upon request.

X. FLOW CONTROL

Remote flow control equipment shall be required when the measuring station is connected to a capacity constrained pipeline system. This requirement will be determined by Columbia on a case by case basis. Remote flow control is required to insure that contractual daily or hourly maximum allowable flow is not exceeded. Remote flow control will consist of an actuated valve that receives a setpoint from Columbia Gas Control. Columbia will provide specifications for remote flow equipment and shall have approval of the equipment before the Customer installs the equipment. Remote flow control equipment can be combined with monitored sets of pressure control but must be separate from security valve type overpressure protection (OPP) valves. Remote flow control will also require continuous communication circuits and commercial power sufficient to operate the facilities. Typical drawings are available upon request.

XI. ODORIZATION

If the receipt meter is delivering gas into an odorized Columbia pipeline, odorization equipment will be required at the receipt meter. Columbia's Technical Services Engineer will determine specific odorization requirements on a site specific basis. All odorant storage tanks and odorizer panels/controls used at receipt meters must meet Columbia's specifications. Customers shall install the odorization facilities with prior review by Columbia. Site access for odorant delivery trucks must be considered when designing the physical layout of the measurement stations.

XII. INSTALLATION REQUIREMENTS

The following installation requirements apply to all installations:

1. A blowoff shall be installed between the meter and Columbia's tap valve. The blow-off on some prefabricated settings may fulfill these requirements.
2. All piping and pipeline components between the meter setting and Columbia's tap valve shall be welded and tested in accordance with Columbia's procedures. These procedures have been provided to the Approved Fabricators and Contractors and are available upon request.
3. Customer's facilities must be electrically isolated from Columbia's pipeline. An above ground flange with an insulating gasket set, flange protector and flange filler shall be installed at the edge of the Columbia pipeline right of way. Meter runs are to be insulated at both meter riser valves. Pipe stand brackets, braces, conduit and tubing must be electrically isolated from the meter setting when necessary to preserve the integrity of the cathodic protection system.
4. Pressure control and or flow control valves and associated instrumentation will be selected, installed and operated so that they do not adversely affect measurement. Columbia will specify the location of pressure and flow control devices relative to measurement.
5. All buried piping between the meter setting and Columbia's tap valve must be:
 - a. Coated/wrapped per Columbia specifications.
 - b. Buried to a depth of 30 inches. Threaded fittings are not to be buried. Plastic pipe may be used when Columbia's pipeline MAOP is 100 psig or less and when approved by Columbia personnel.
 - c. Cathodically protected per Columbia's requirements.

6. All tie-in welds shall be visually inspected by a Columbia Welding Inspector. Additionally, 4" NPS and larger tie-in welds are to be radiographed by a Columbia approved service company prior to being placed into service.
7. Customer owned and operated heaters, dehydration equipment, compressors, filters, separators, etc. must be located upstream of measurement. These devices must be located, designed, operated and maintained so as to not present a hazard to Columbia personnel or to the general public or negatively impact the performance of the measurement equipment. Compressor Agreements are required for the addition of compression equipment. Additional requirements for gas temperature reduction and pulsation will be evaluated on a case by case basis.
8. The fuel supply for Customer owned gas heaters, dehydration equipment, compressors, instrument supply systems, etc. will be taken from the Customer's side of measurement.
9. Buried tubing for control, sensing or supply lines must be PVC coated stainless steel. Tube fittings may not be buried.
10. Hex head plugs wrapped with Teflon tape will be installed in all unused pressure taps, gauge taps, blowoffs, etc.
11. Pipestands, brackets, braces, etc. SHALL NOT be welded directly to any gas piping. Pipe supports must be designed with the provision to easily inspect and maintain the pipe at the support area.
12. During shipping and installation, the meter and setting must be handled carefully to avoid damage. Dents in an orifice meter tube may make it unfit for use until repaired by replacing the damaged section. Instruments shall not be installed on meter settings until the meter set has been installed.
13. All measurement and regulation installations shall conform to NEC NFPA Standard 10, and "Classification of Locations for Electrical Installations in Gas Utility Areas", by A.G.A. Catalog #XL1001. All measurement and regulation (M&R) buildings will be classified Class I, Division 2. Pneumatic equipment installed in M&R buildings shall be vented to the outside.
14. Columbia's building and equipment grounding requirements shall be observed. Customers planning to install a building can obtain a copy of these requirements from their local Columbia contact.
15. The local contact may require the Customer to install up to 20' of steel pipe immediately upstream of receipt measuring stations when the Customer pipeline is plastic. At a minimum, all plastic pipe must be buried.
16. Skid mounted meter settings must be adequately supported to prevent settling, tilting or undue piping stress. The meter run is to be level. Skid mounted regulation settings must be adequately supported to prevent settling, tilting or undue piping stress. Regulator runs shall be designed such that the regulators or control valves are physically located at waist level to allow operators to work on the valves, actuators and associated controls. Adequate support means reinforced concrete piers, foundations, and sonotubes are installed on undisturbed soil to below the freeze line. These foundations must be designed to support the weight of the fabricated assemblies/skids based on soil conditions (soil bearing) at the meter site.
17. Rotary meter settings and the TPL-9 turbine meter settings which incorporate an integral positive liquid shut-off must be adequately supported to prevent settling, tilting or undue piping stress. The liquid shut-off device must be buried to an acceptable depth to support the setting.
18. A check valve must be installed at all measuring stations except for those designed specifically for two way measurement. Check valves shall not be buried. Check valves installed in a union or flange shall be identified by a tag affixed to the union or flange.

19. To minimize atmospheric corrosion, all above grade piping, fittings, vessels, etc. shall be coated with Columbia approved coatings. All coatings will be applied according to the manufacturer's instructions. In order to preserve readability, all tags, gauges, sight glasses, etc. shall be protected from the coating. Coating shall not be applied to stainless steel tubing and fittings.

XIII. TEST AND INSPECTION AT START UP

Columbia personnel will inspect the measuring station prior to placing the facility into service. Columbia's POR Coordinator will make an initial inspection of the measuring station to assure the requirements of the MSA are met. Customer will provide a complete documentation package including meter test data, welding, pressure test documentation, etc to Columbia's POR Coordinator. When complete, Columbia's POR Coordinator will notify Columbia that the measuring station is ready to be commissioned and placed in service.

1. Columbia personnel will review meter accuracy, welding and pressure test documentation. A meter setting or other fabrication lacking the required documentation shall not be placed in service. The Columbia inspector may require additional testing at the Customer's expense.
2. All meter runs will be inspected internally prior to turn on.
3. Rotary meters will be accuracy tested prior to or within one month of turn on. Diaphragm meters will be accuracy tested prior to turn on.
4. If the customer pipeline was hydrostatic tested, it must be thoroughly dried out before the meter is turned on. The meter setting will be thoroughly purged prior to turn on. Moisture content of the flowing gas must meet Columbia's FERC tariff requirements.
5. Insulated joints will be tested to insure electrical isolation between the customer's pipeline and Columbia's.
6. Columbia personnel will test and calibrate the electronic measurement equipment.
7. A gas sample will be taken at start up to verify the gas quality meets the requirements of Columbia's FERC tariff. The analysis will include oxygen, H₂S, total sulfur and gas composition. The cost will be the responsibility of the Customer.

XIV. DEVIATIONS FROM THIS STANDARD

Customers may request that they be permitted to deviate from the standards contained in this document. This specification is not "cast in stone", so Customer suggestions and recommendations are welcome and will be duly considered. Suggestions or recommendations which simplify fabrication, installation, or reduce costs may be incorporated into the specifications.

Columbia may permit deviation from this specification under the following conditions:

1. Customers may request Columbia to permit the use of a meter setting fabricated to a drawing other than one contained in this document. To be considered, the drawings must: a) conform to accepted industry standards; b) must identify each component and its working pressure in the Bill of Materials; c) detail hydrostatic and radiographic test requirements; d) provide welding details; and e) must be signed and stamped by a registered professional engineer. Such drawings must be submitted for approval before Columbia will permit the meter setting to be installed.
2. Customers may wish to obtain meter sets and other fabrications from shops not on Columbia's

approved lists. Columbia will approve fabrication shops and add them to the approved list when they have demonstrated the ability to conform to Columbia specifications for material selection, welding procedures, pressure documentation and assembly.

3. The Bill of Materials accompanying Columbia Standard Drawings do not always identify manufacturer and model/part number for all materials. Where not specified, Customer may use industry approved materials. Customers must use material on the Columbia Approved Vendor List. Columbia approved fabrication shops have the approved vendor list. Customers wishing to use components in place of those specifically identified must obtain prior approval from Columbia.
4. The Customer will reimburse Columbia for the actual cost of investigating, testing, inspection, etc. associated with Customer's request to deviate from this specification.
5. Requests for deviation from Columbia's approved standards may not be approved and may create delays in approval of measuring station designs, equipment selection, installation and fabrication and thus may delay the flow of gas at the station.