

Good Measurement & Regulation is NOT just about The Meter and Regulator

Meter & Regulator Station Design



OHIIO GAS ASSOCIATION 2014 TIECHINICAL SIEMIINAR



- ➢ Point of Delivery (POD)
- ➢ Power Plant
- >Industrial
- ➤ Commercial
- ➢ Residential



- Upstream pipeline MAOP
- > Inlet pressure
 - Maximum
 - Average
 - Minimum
- Downstream customer
 - ✤MAOP
 - Test pressure or lowest pressure component



Outlet pressure
Maximum
Minimum

Flow rate

- Maximum
- *Average
- ✤Minimum
- ✤Future
- ➤ Temperature

Distribution Utilization Capacity







Station Design



Meter selection

- **Ange** of meter(s)
- Capacity calculation
- Capacity tables
- Single vs. multiple meter runs
- Meter pressure rating

Station Design



Design pressure rating	
Upstream	
Downstream	
Fixed Factor	•
Meter type AGA design specifications	
○ AGA - 3	Orifice meters
○ AGA - 7	Turbine meters
○ AGA - 8	Supercompressibility
○ AGA - 9	Ultrasonic meters
○ AGA - 11	Coriolis meters



Government regulations

- Code of Federal Regulations title CFR Part 192 Natural Gas
- American National Standards Institute ASME / ANSI B-31.8 "Gas Transmission and Distribution Piping Systems" used around the world



Critical Components for Measurement & Regulation Design



ANSI Iron Class (ASTM 126)

- ➢ <u>Class</u> <u>Pressure</u>
 - ✤ 25 45 Psig Class A
 - 125 175 Psig Class A & 200 Psig Class B
 - 250 400 Psig Class A & 500 Psig Class B
 - ✤ 800 800 Psig Class B

Operating Temperatures @ -20°F to 150 °F (No derating required)



> ANSI Steel Class

<u>Class</u>	Pressure
* 150	285 Psig
* 300	740 Psig
* 400	990 Psig
* 600	1480 Psig
* 900	2220 Psig
* 1500	3705 Psig
* 2500	6170 Psig

Operating Temperatures @ -20°F to 100 °F (No derating required)



Pressure

- At the meter for volumetric correction
- System monitoring
 - Upstream of M & R settings
 - Downstream of M & R settings



Temperature

- Temperature for volumetric correction generally downstream of the meter (one to five pipe diameters)
- Temperature wells
 - o Length
 - o Size
- Gas temperature control (downstream of regulation)



Calculation Methods ≻ NX – 19

- Nitrogen
- Carbon Dioxide CO₂
- ≻ AGA 8
 - Detail Characterization Method uses gas analysis
 - Gross Characterization Method Aggregate or gross knowledge of natural gases











- Blow off sizing
- > Multiple meter runs vs. single run
- Run switching
- Flow balance through multiple meter runs



- ➢ Sizing
- Configuration
- Welker gas turbulence paper
- Gas velocity
 - Equations
 - ✤ Noise
 - Erosion



- Fixed pressure factor by:
 - Computer
 - Meter index
- Regulator types
 - Self operated
 - Pilot operated
 - Instrument operated



- > Doors
- > Height
- Space between settings & BLDG walls
- Valve hand wheels
- Foundations
- Electrical classification for gas facilities

(AGA XF0277 Classification of Gas Utility Areas for Electrical Installation Guide)

- Class I, Division 1, Group D
- Class I, Division 2, Group D



- Gates
 - Man
 - Vehicular
- Vehicular barriers
- Drive ways
- Lot surface

- Filters
- Heaters
- Regulation
- Measurement
- Auxiliary equipment
- Odorizers



Questions ?