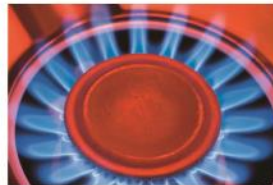


NISOURCE GAS DISTRIBUTION

OGA Technical Seminar Excess Flow Valves/Small Commercial & Multiple Meter Applications

Jerry Taggart
Compliance Specialist
Columbia Gas

March 22,, 2013



NiSource Gas Distribution

Columbia Gas of Ohio

- Largest Natural Gas Provider in Ohio
- 1.4 Million Customers
- 20,000+ Miles of Pipe

Columbia Gas of Kentucky

- 2nd Largest Gas-Only Provider in Kentucky
- 142,000 Customers
- 2,500+ Miles of Pipe

NIPSCO (Electric & Gas)

- Largest Natural Gas Provider in Indiana
- 785,000 Gas Customers
- 16,000+ Miles of Pipe

Columbia Gas of Massachusetts

- Largest Gas-Only Provider in Massachusetts
- 300,000 Customers
- 4,800+ Miles of Pipe

Columbia Gas of Pennsylvania

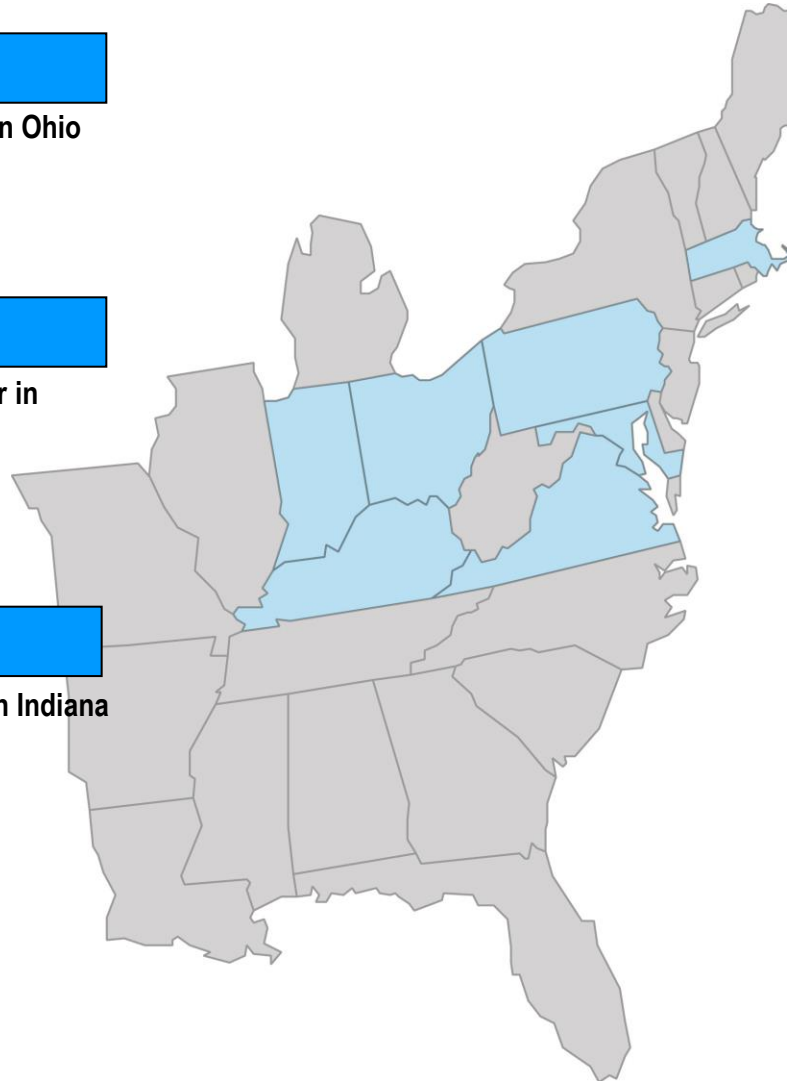
- 3rd Largest Natural Gas Provider in Pennsylvania
- 413,000 Customers
- 7400+ Miles of Pipe

Columbia Gas of Maryland

- Complementary to PA Operations
- 33,000 Customers
- 644 Miles of Pipe

Columbia Gas of Virginia

- 3rd Largest Natural Gas Provider in Virginia
- 240,000 Customers
- 4,900+ Miles of Pipe



NiSource Gas Distribution Summary

- **56,000+ miles of main**
- **3.3+ million service lines**
- **680,000+ Excess flow valves installed since 1980s**
- **2011 DOT Annual Report**

	Total Number Service Lines	SFR-EFV Installed	Total EFVs Installed
CGV	256031	4025	113143
CKY	138095	1113	26206
CMA	252989	2915	141255
CMD	35300	817	7263
COH	1390273	26270	202249
CPA	418848	8094	76865
NIPSCo	843626	5070	113560
Total	3,335,162	48,304	680,541

NiSource Gas Distribution Summary

Number of EFVS Installed In 2012			
	SFR	Multi-Family Residential	Commercial
CVA	5129	110	387
CKY	1353	53	91
CMD	661	40	68
COH	27778	2233	1582
CPA	8934	651	855
Total	43855	3087	2983

2011 – Revised Company Procedure for LV EFVs

NiSource		Gas Standard
Distribution Operations		
Effective Date: 07/01/2011	Installation of Excess Flow Valves	Standard Number: GS 3020.100
Supersedes: 04/01/2009		Page 4 of 18

2.2.2 Multi-Unit Residential

The EFV must be sized for all customers on the service line. A simple way to determine the EFV model is to choose the one with a trip flow rating that is greater than the sum of the meters' capacities. For instance, a duplex house with two domestic (Class 250) meters will need an EFV with a trip flow rating greater than 500 cfh. This will assure that the EFV will not trip with both loads at their maximum. While the meter-capacity sizing is a conservative guideline, services to larger numbers of smaller units, such as a four-unit apartment, could have meters with excess capacity so that the total connected load will probably be less than the sum of the meters' capacity.

Another consideration for installation on the service to a multi-unit dwelling is having to re-light customers if the EFV trips. The EFV activation could be as intended when the line is severed, but it could also be accidental if a serviceperson turns a meter on too quickly. All other in-service customers on the line would immediately have to be turned off and then re-lit after the EFV resets.

See Exhibit C for additional guidance.

2.2.3 Non-Residential

Many non-residential customers have the same service and meter setting as a single-family residential customer. An EFV could be installed on those service lines in the same manner.

Some non-residential customers are also in multi-unit buildings, such as a shopping plaza, and could be treated similar to the multi-unit residential situation.

A consideration for non-residential buildings is changing use of the building. When the service is installed, the use may only require a domestic meter and have an adequately sized EFV. A future change of use, such as converting to a restaurant, bakery, dry cleaners, or laundrette, may require a larger meter without a change to the service line. The larger load may then be greater than the EFV capacity, and it would have to be removed or replaced.

See Exhibit C for additional guidance.

2.2.4 Planned Upgrades

When service lines are replaced or installed on a pressure system operating at

NiSource		Gas Standard
Distribution Operations		
Effective Date: 07/01/2011	Installation of Excess Flow Valves	Standard Number: GS 3020.100
Supersedes: 04/01/2009		Page 12 of 18

EXHIBIT C (1 OF 7)

Follow the guidance on page 2 of this Exhibit to determine if the correct size of excess flow valve is available for installation on a service line serving a large volume residential or commercial customer with a single or multiple meters. The following general conditions should also be noted.

- The minimum operating pressure of the attached main is 10 psig or higher.
- EFV's may be installed on services on mains operating at less than 10 psig if an up rate of the system is planned and engineering is consulted for guidance.
- The entire service line is 2" IPS size or smaller.
- Meter type is diaphragm and rotary, no turbine meters allowed.
- For services with meter delivery pressures above 2 psig or for high pressure services contact engineering.

Excess flow valves used by the Company have a bleed-by feature that allows a small amount of gas to pass through a closed valve acting as a warning and allowing for resetting once repairs are completed. Time to reset an excess flow valve may be excessive on a longer service lines, particularly if the pipe size is 1-1/4" or larger. To reduce reset time a valve can be installed downstream of the EFV or plastic pipe can be squeezed-off. Once the EFV is reset the valve or squeezer can be opened slowly to pack the remainder of the service line.

Because there is no industry standard on EFV sizes and trip rates, the guidance provided in this Exhibit is based on NiSource's current EFV provider. This manufacturer provides for pipe sizes from ½ inch to 2 inch that have trip ratings from 400 to 10,000 cfh. See Table 1 of this Exhibit for standard EFV sizes, trip ratings and maximum length of service for each.

Table 2 of this Exhibit provides meter connection capacities listed by K&S (kind and size) number or meter code. The capacities in this table are based on a 2" w.c. pressure drop across the meter and should be used only for sizing excess flow valves.

Note that there are two versions of Table 1 and Table 2 in this Exhibit. One set each for CDC (excluding CMA) and NIPSCO.

Large Volume EFV Objectives

- **Minimize the consequence of a severed service line**
- **Install EFVs in small commercial and multi-meter situations (residential & small commercial)**
- **Avoid service disruption due to EFV trip due to inadequate capacity**
- **Provide the maximum flexibility for load changes**
- **Minimize the need to excavate and change EFV for load increases**
- **Provide a method of sizing EFVs in the field for each application**
 - Pipe Size
 - Meter Connection
 - Length from main to meter

CHALLENGES

- **Limited experience with EFV use in commercial and multi-meter applications**
- **Changes in commercial property use**
- **Unreported load increases**
- **Service lines with different pipe sizes**

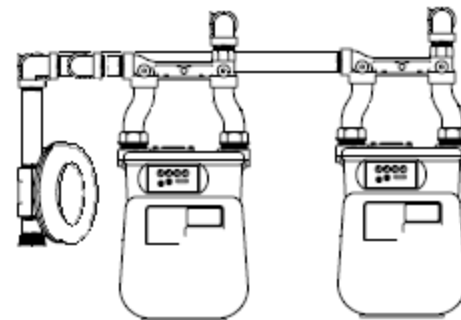
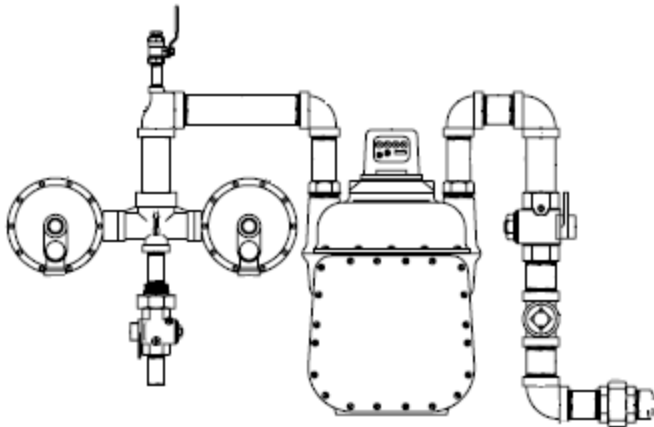
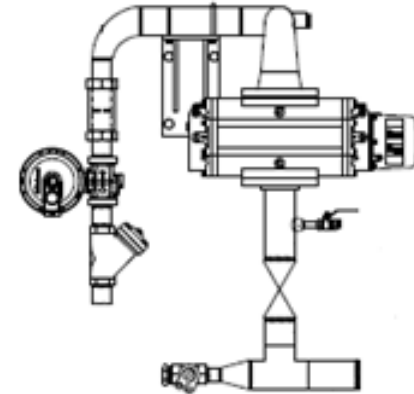
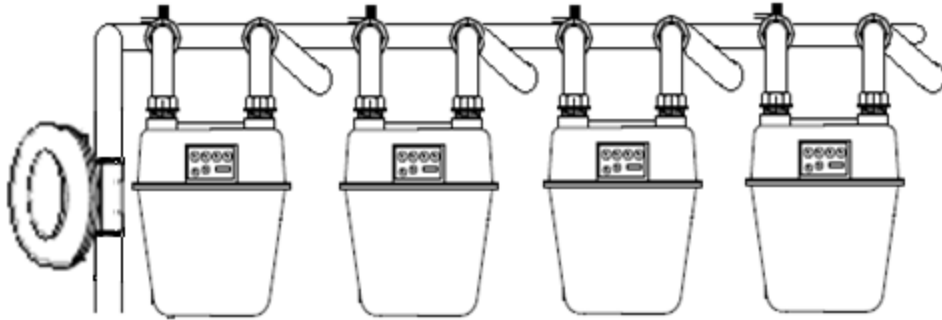
Large Volume EFV Installation Guidelines

- The minimum operating pressure of the attached main is 10 psig or higher.
 - EFV's may be installed on services on mains operating at less than 10 psig if an uprate of the system is planned and Engineering is consulted for guidance.
- The entire service line is 2" IPS size or smaller.
- Meter type is diaphragm and rotary, no turbine meters allowed.
- For services with meter delivery pressures above 2 psig or for high pressure services contact Engineering.

Large Volume EFV Installation Guidelines

- **Use “Meter Connection Capacity” for sizing**
 - The maximum capacity that can be provided by any meter that can be connected to the setting without physical changes
- **Where services contain different pipe sizes, use smallest for EFV sizing**
- **Install the largest capacity EFV that:**
 - Satisfies the meter connection capacity
 - Protects the longest length for a given pipe size

Various Meter Setting Configurations



EFV Sizing Tools

EFV SIZING FOR SERVICES SERVING MULTIPLE METERS AND COMMERCIAL SERVICES OFF MAINS THAT OPERATE AT 10 PSIG OR HIGHER

FOR SERVICES WITH METER DELIVERY PRESSURES GREATER THAN 2psig – CONTACT ENGINEERING

SERVICE LINES SERVING A SINGLE METER (Residential LV and Commercial)

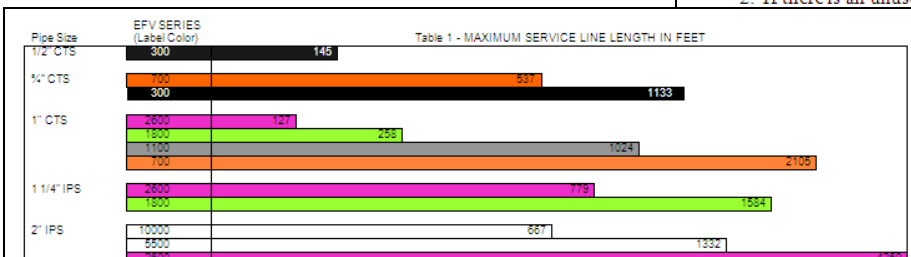
1. Determine the meter connection capacity using [Table 2]
2. Using [Table 1] determine the largest capacity EFV for the given pipe size and length
3. If the meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity
4. If the meter connection capacity in [Table 2] is shown as N/A or is larger than the maximum EFV capacity(Series) for the pipe size– STOP, do not install an EFV

SERVICE LINES SERVING MULTIPLE METERS (Residential and Commercial, including manifolds and split services)

1. Using [Table 2] determine the capacity of each meter setting served by the service line
2. If there is an unused space on a manifold or split use the capacity of the largest meter that can be

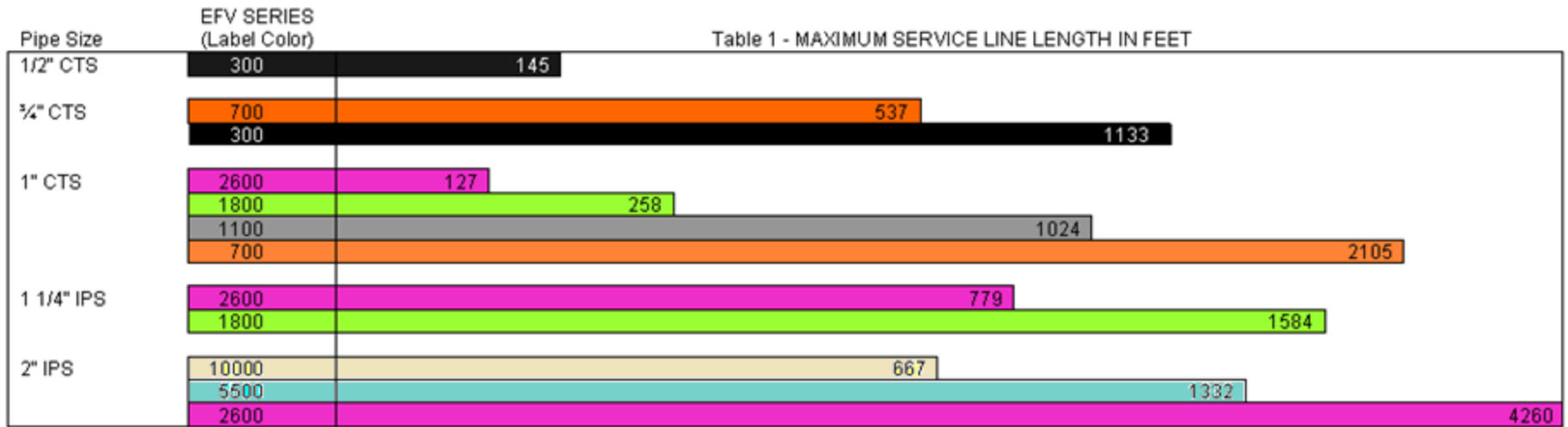
pace
for ALL meters and unused spaces
determine the largest capacity EFV for the given pipe size and length
nnection capacity cannot be met for the given pipe size and length use the EFV that
onnection capacity
tion capacity is listed as N/A or the total capacity is larger than the EFV
the pipe size– STOP, do not install an EFV

a service line use different pipe sizes, use the smallest pipe size for EFV sizing



K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP		
000	540	342	540	613	9000	675	1400	710	N/A	734	9000	760	540	791	N/A	815	540	842	N/A	959	N/A
001	2300	346	540	614	540	680	1400	711	N/A	735	9000	761	540	792	N/A	816	540	845	N/A	960	N/A
004	540	361	540	615	9000	681	2300	712	N/A	736	9000	762	N/A	793	N/A	817	540	846	N/A	962	N/A
008	540	384	540	616	1400	682	N/A	713	N/A	737	N/A	763	540	794	N/A	818	540	847	N/A	965	2300
012	540	388	540	617	9000	683	2300	714	N/A	738	1400	764	540	795	N/A	819	540	853	N/A		
020	540	402	540	618	540	684	9000	715	N/A	739	N/A	765	1400	796	N/A	820	1400	854	N/A		
031	540	416	540	619	1400	685	9000	716	N/A	740	N/A	766	2300	797	N/A	821	2300	860	N/A		
045	540	434	540	620	9000	686	9000	717	N/A	741	2300	767	2300	798	N/A	822	2300	863	N/A		
046	540	438	540	622	540	687	9000	718	540	742	N/A	768	540	799	N/A	823	540	869	540		
047	540	446	540	623	9000	688	9000	719	N/A	743	2300	772	540	800	9000	824	N/A	870	540		
054	540	502	540	624	9000	689	N/A	720	N/A	744	2300	775	N/A	801	N/A	825	2300	872	N/A		
062	540	600	2300	625	9000	690	2300	722	N/A	745	N/A	776	540	803	9000	826	9000	873	N/A		
064	540	602	540	626	N/A	692	N/A	723	1400	746	2300	777	N/A	804	9000	827	N/A	874	N/A		
066	540	603	540	627	N/A	695	N/A	724	2300	747	9000	778	N/A	805	9000	828	9000	877	N/A		
080	540	604	540	630	540	696	N/A	725	1400	748	9000	779	N/A	806	N/A	829	540	880	N/A		
144	540	605	2300	634	1400	698	N/A	726	540	749	N/A	780	1400	807	N/A	830	540	885	540		
175	540	606	540	638	1400	700	N/A	727	N/A	750	N/A	781	N/A	808	N/A	831	540	895	N/A		
178	540	607	540	646	1400	701	N/A	728	N/A	751	1400	783	N/A	809	N/A	833	540	900	N/A		
225	540	608	540	650	2300	705	9000	729	N/A	755	540	784	1400	810	N/A	834	N/A	903	2300		
240	540	609	2300	654	2300	706	9000	730	1400	756	540	786	N/A	811	N/A	835	N/A	938	2300		
250	540	610	9000	658	9000	707	9000	731	540	757	540	788	N/A	812	N/A	837	N/A	950	N/A		
315	540	611	2300	662	9000	708	N/A	732	N/A	758	540	789	N/A	813	N/A	840	540	954	N/A		
338	540	612	2300	672	N/A	709	N/A	733	2300	759	540	790	N/A	814	540	841	N/A	958	N/A		

Table 1 - EFV Maximum Trip length



* Maximum service line lengths determined using manufacturer's guidelines at 10psig

Table 2 - Meter Connection Capacities

Table 2 - Meter connection capacities by meter K&S for EFV Sizing Only

K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP	K&S	CAP
000	540	342	540	613	9000	675	1400	710	N/A	734	9000	760	540	791	N/A	815	540	842	N/A	959	N/A
001	2300	346	540	614	540	680	1400	711	N/A	735	9000	761	540	792	N/A	816	540	845	N/A	960	N/A
004	540	361	540	615	9000	681	2300	712	N/A	736	9000	762	N/A	793	N/A	817	540	846	N/A	962	N/A
008	540	384	540	616	1400	682	N/A	713	N/A	737	N/A	763	540	794	N/A	818	540	847	N/A	999	2300
012	540	388	540	617	9000	683	2300	714	N/A	738	1400	764	540	795	N/A	819	540	853	N/A		
020	540	402	540	618	540	684	9000	715	N/A	739	N/A	765	1400	796	N/A	820	1400	854	N/A		
031	540	416	540	619	1400	685	9000	716	N/A	740	N/A	766	2300	797	N/A	821	2300	860	N/A		
045	540	434	540	620	9000	686	9000	717	N/A	741	2300	767	2300	798	N/A	822	2300	863	N/A		
046	540	438	540	622	540	687	9000	718	540	742	N/A	768	540	799	N/A	823	540	869	540		
047	540	446	540	623	9000	688	9000	719	N/A	743	2300	772	540	800	9000	824	N/A	870	540		
054	540	502	540	624	9000	689	N/A	720	N/A	744	2300	775	N/A	801	N/A	825	2300	872	N/A		
062	540	600	2300	625	9000	690	2300	722	N/A	745	N/A	776	540	803	9000	826	9000	873	N/A		
064	540	602	540	626	N/A	692	N/A	723	1400	746	2300	777	N/A	804	9000	827	N/A	874	N/A		
066	540	603	540	627	N/A	695	N/A	724	2300	747	9000	778	N/A	805	9000	828	9000	877	N/A		
080	540	604	540	630	540	696	N/A	725	1400	748	9000	779	N/A	806	N/A	829	540	880	N/A		
144	540	605	2300	634	1400	698	N/A	726	540	749	N/A	780	1400	807	N/A	830	540	885	540		
175	540	606	540	638	1400	700	N/A	727	N/A	750	N/A	781	N/A	808	N/A	831	540	895	N/A		
178	540	607	540	646	1400	701	N/A	728	N/A	751	1400	783	N/A	809	N/A	833	540	900	N/A		
225	540	608	540	650	2300	705	9000	729	N/A	755	540	784	1400	810	N/A	834	N/A	908	2300		
240	540	609	2300	654	2300	706	9000	730	1400	756	540	786	N/A	811	N/A	835	N/A	938	2300		
250	540	610	9000	658	9000	707	9000	731	540	757	540	788	N/A	812	N/A	837	N/A	950	N/A		
315	540	611	2300	662	9000	708	N/A	732	N/A	758	540	789	N/A	813	N/A	840	540	954	N/A		
338	540	612	2300	672	N/A	709	N/A	733	2300	759	540	790	N/A	814	540	841	N/A	958	N/A		

Meter K&S (Kind and Size) codes are Columbia specific references

Field Instructions – Single Meter

Large Residential and Commercial

- Determine the meter connection capacity using [Table 2]
- Using [Table 1] determine the largest capacity EFV for the given pipe size and length
- If the meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity
- If the meter connection capacity in [Table 2] is shown as N/A or is larger than the maximum EFV capacity(Series) for the pipe size– STOP, do not install an EFV

Maximum EFV Capacity

- 1" cts service line
- Length 110'
- 1 x 630 meter (619)
 - Capacity = 1400cfh @ 2" drop

EFV = 1800cfh (max length 258')



EFV = 2600cfh (max length 127')



Field Instructions – Multi-Meter

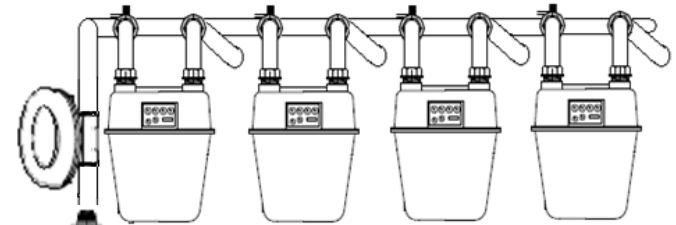
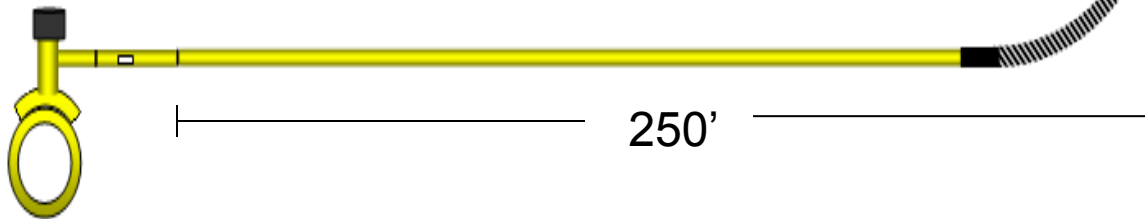
Residential and Commercial (including manifolds and split services)

- Using [Table 2] determine the capacity of each meter setting served by the service line
- If there is an unused space on a manifold or split use the capacity of the largest meter that can be connected for this space
- Total the capacities for ALL meters and unused spaces
- Using the [Table 1] determine the largest capacity EFV for the given pipe size and length
- If the total meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity
- If any meter connection capacity is listed as N/A or the total capacity is larger than the EFV capacity (Series) for the pipe size– STOP, do not install an EFV

Maximum EFV Capacity

- 1-1/4" IPS service line
- Length 250'
- 4 x 250 meter (608)
 - Capacity = 2160cfh @ 2" drop

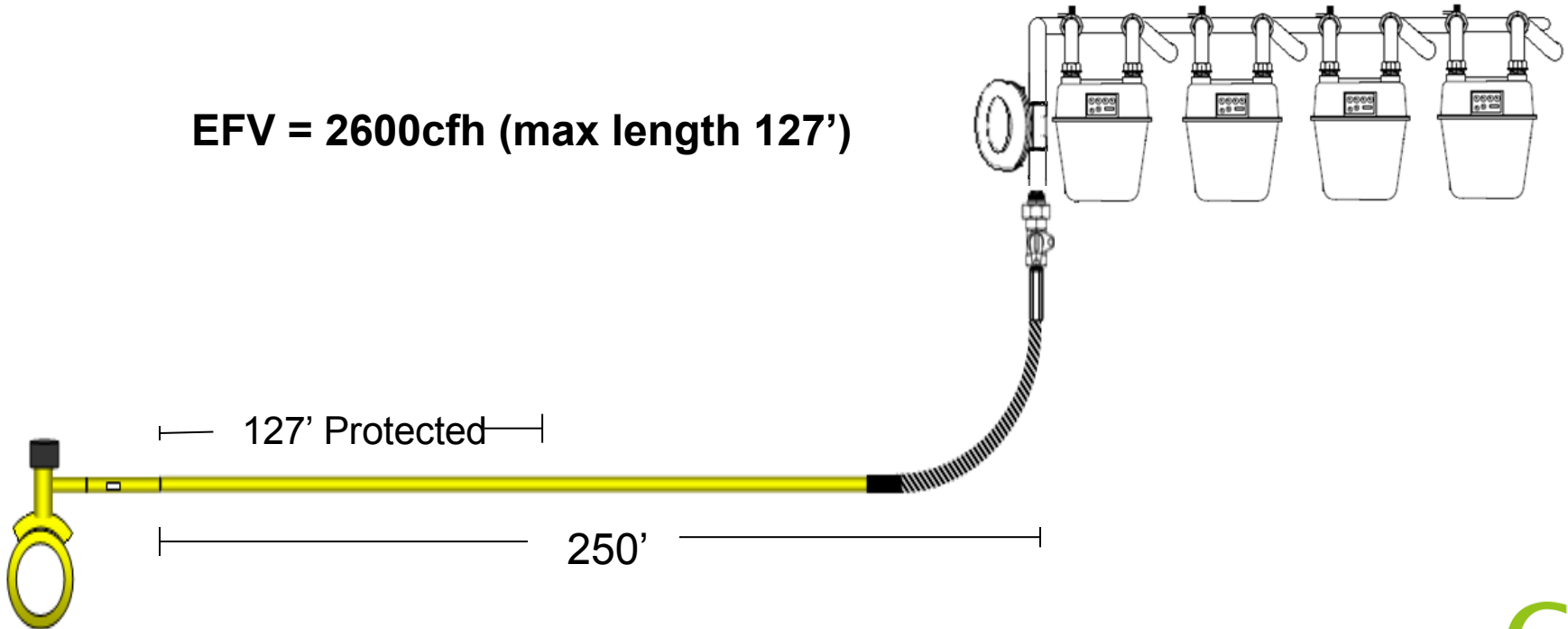
EFV = 2600cfh (max length 779')



Utilize Available Protection

- 1" cts service line
- Length 250'
- 4 x 250 meter (608)
 - Capacity = 2160cfh @ 2" drop

EFV = 2600cfh (max length 127')



Columbia's Perspective

- **Majority of damages occur within the road right of way**
- **Utilize EFVs meeting capacity to protect as much of the service line as we can even where lengths exceed max trip length**
- **Flexibility for changes in commercial property use**
- **Maximize EFVs while minimizing re-excavation and EFV trip issues**
- **Reverse the process for new installations to size the service line pipe size**

Experiences with LV EFV Failures

- **4 Failures Reported in 2012**
- **3 In-Service Failures**
 - 1 undersized
 - 1 with plastic shavings caught in spring
 - 1 unknown as valve was not presented to investigator
- **1 damaged prior to installation – end out of roundness**
- **Overall, good operating history to date**

Going forward

- **Re-evaluate after some experience is gained**
- **Additional services could be provided EFVs by upsizing the piping (construction cost increases)**
- **Flexibility required for commercial may not be necessary for multi-meter residential**

Damage Prevention

- **Improvements in our damage prevention efforts could help avoid the cuts to begin with**
 - **Eliminates the safety issue for us and our customers**
 - **Avoids disruption of service**
 - **Reduces interruptions of regular work activities**
 - **Reduces the incidence of emergency response and repair situations**
- **We would rather limit the risk of a catastrophic incident by having an effective damage prevention program and not rely on the EFV**

Summary

- **Increase EFV installations**
- **Simple Sizing method**
- **Provides flexibility for change**
- **Reduces re-excavation**
- **Protection from unintended trip**

NISOURCE GAS DISTRIBUTION

OGA Technical Seminar

Excess Flow Valves/Small Commercial
& Multiple Meter Applications

Questions

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March 22,, 2013

