Excess Flow Valve Rule Update 2017

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2017 Kansas Pipeline Safety Seminar

October 24th, 2017

Today's Agenda

- **April 14th Excess Flow Valve Rule**
- **Excess Flow Valve Basics**
  - Design Operation
  - Sizing For Residential Loads
  - Sizing for Commercial loads.

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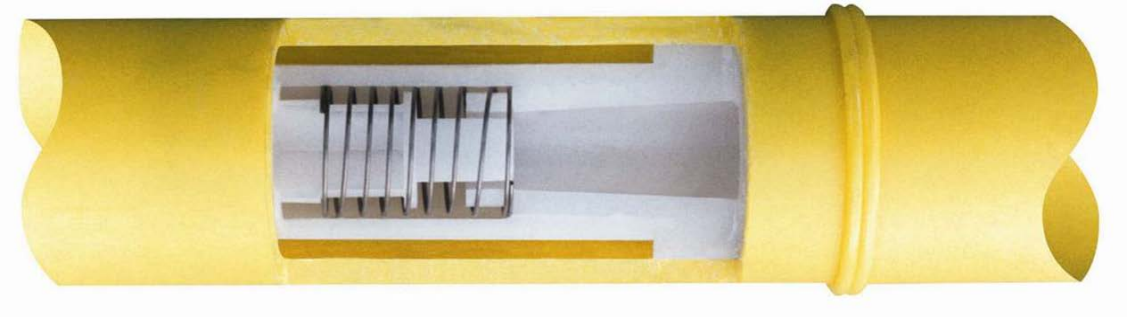
Excess Flow Valves (EFVs)

- **Automatically halts the flow of gas caused by damage to service lines that supply gas to buildings**
- **Significantly reduces the risk of accidents**



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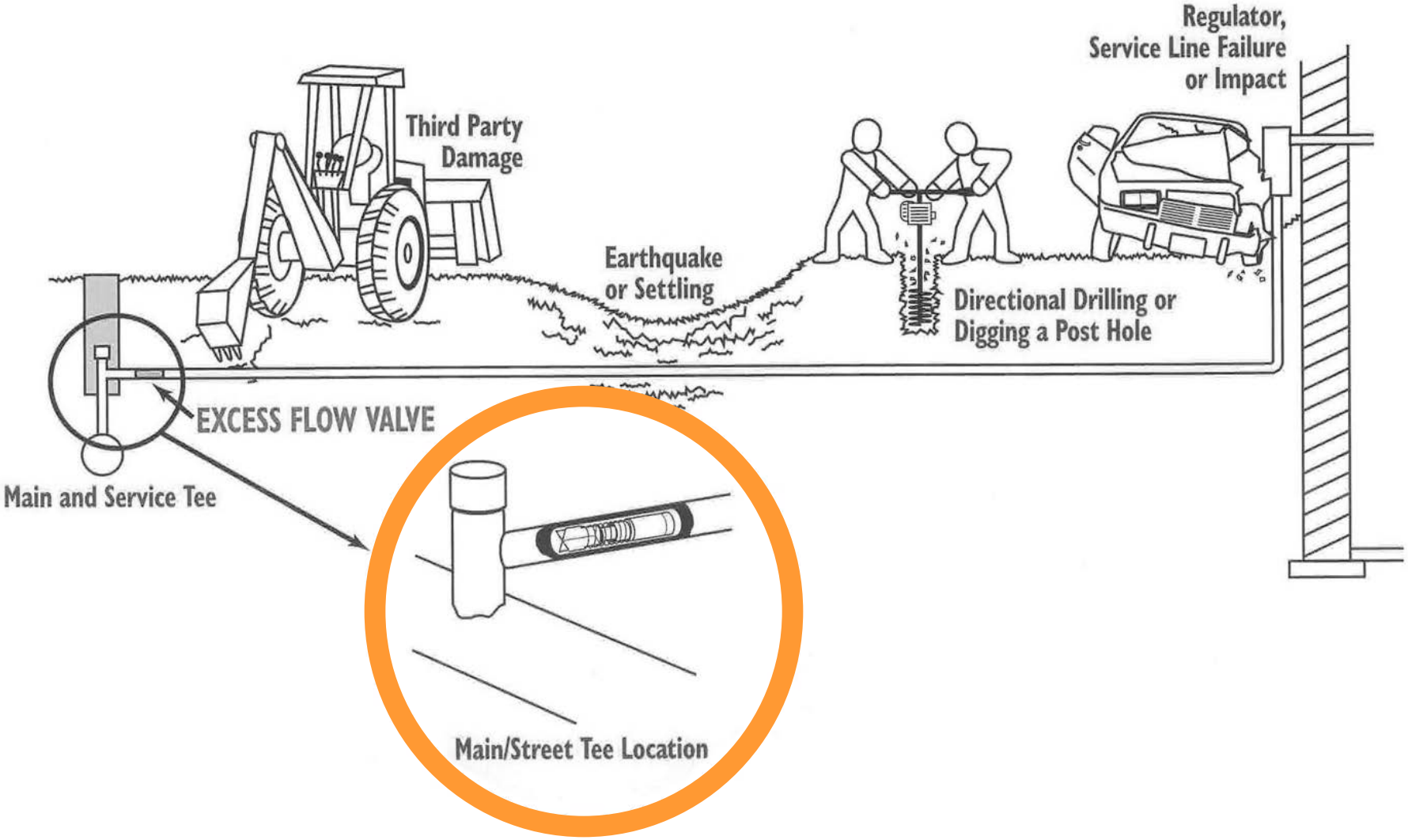
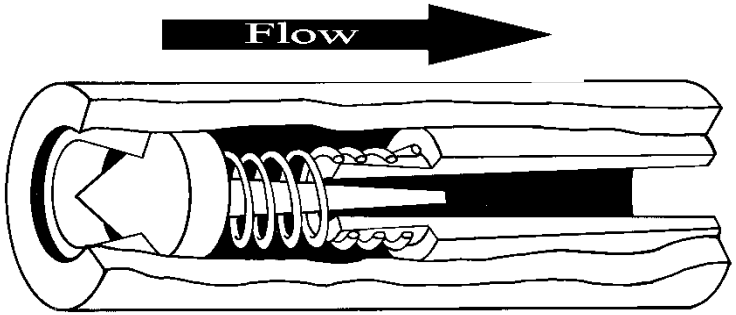
EFV Installation Location



EFV Operation



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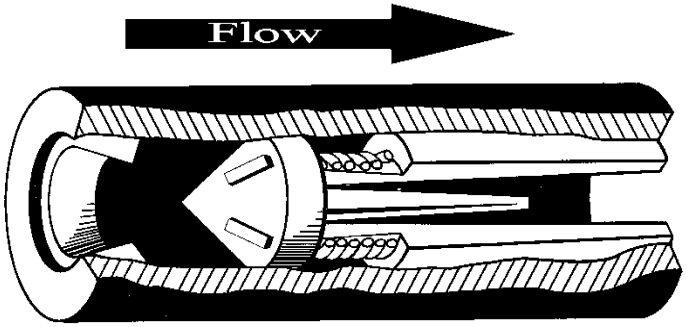

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EFV Rule Update

- **US DOT 192.381, 192.383, & 192.385**
- **Final rule signed: October 7, 2016**
- **Effective date: April 14, 2017**
- **Expands the use of excess flow valves in gas distribution systems**

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EFV Rule Update

In 192.381, the introductory text of paragraph (a) is revised to read as follows:

- **192.381 Service lines: Excess flow valve performance standards.**
  - (a) Excess flow valves (EFVs) to be used on service lines that operate continuously throughout the year at a pressure not less than 10 p.s.i. (69 kPa) gage must be manufactured and tested by the manufacturer according to an industry specification, or the manufacturer's written specification, to ensure that each valve will:

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EFV Rule Update

Section 192.383 is revised to read as follows:

- **192.383 Excess flow valve installation.**
  - (a) Definitions. As used in this section:
    - **Branched service** line means a gas service line that begins at the existing service line or is installed concurrently with the primary service line but serves a separate residence.
    - **Replaced service line** means a gas service line where the fitting that connects the service line to the main is replaced or the piping connected to this fitting is replaced.
    - **Service line serving single-family residence** means a gas service line that begins at the fitting that connects the service line to the main and serves only one single-family residence (SFR).

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EFV Rule Update

- (b) Installation required. An EFV installation must comply with the performance standards in § 192.381. After April 14, 2017, each operator must install an EFV on any new or replaced service line serving the following types of services before the line is activated:
  - (1) A single service line to one SFR;
  - (2) A branched service line to a SFR installed concurrently with the primary SFR service line (i.e., a single EFV may be installed to protect both service lines);
  - (3) A branched service line to a SFR installed off a previously installed SFR service line that does not contain an EFV;
  - (4) Multifamily residences with known customer loads not exceeding 1,000 SCFH per service, at time of service installation based on installed meter capacity, and
  - (5) A single, small commercial customer served by a single service line with a known customer load not exceeding 1,000 SCFH, at the time of meter installation, based on installed meter capacity.

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EFV Rule Update

- (c) Exceptions to excess flow valve installation requirement. An operator need not install an excess flow valve if one or more of the following conditions are present:
  - (1) The service line does not operate at a pressure of 10 psig or greater throughout the year;
  - (2) The operator has prior experience with contaminants in the gas stream that could interfere with the EFV's operation or cause loss of service to a customer;
  - (3) An EFV could interfere with necessary operation or maintenance activities, such as blowing liquids from the line; or
  - (4) An EFV meeting the performance standards in § 192.381 is not commercially available to the operator.

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EFV Rule Update

- (d) Customer's right to request an EFV. Existing service line customers who desire an EFV on service lines not exceeding 1,000 SCFH and who do not qualify for one of the exceptions in paragraph (c) of this section may request an EFV to be installed on their service lines. If an eligible service line customer requests an EFV installation, an operator must install the EFV at a mutually agreeable date. The operator's rate-setter determines how and to whom the costs of the requested EFVs are distributed.

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EFV Rule Update

- (e) Operator notification of customers concerning EFV installation. Operators must notify customers of their right to request an EFV in the following manner:
  - (1) Except as specified in paragraphs (c) and (e)(5) of this section, each operator must provide written or electronic notification to customers of their right to request the installation of an EFV. Electronic notification can include emails, website postings, and e-billing notices.
  - (2) The notification must include an explanation for the service line customer of the potential safety benefits that may be derived from installing an EFV. The explanation must include information that an EFV is designed to shut off the flow of natural gas automatically if the service line breaks.

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EFV Rule Update

- (3) The notification must include a description of EFV installation and replacement costs. The notice must alert the customer that the costs for maintaining and replacing an EFV may later be incurred, and what those costs will be to the extent known.
- (4) The notification must indicate that if a service line customer requests installation of an EFV and the load does not exceed 1,000 SCFH and the conditions of paragraph (c) are not present, the operator must install an EFV at a mutually agreeable date.
- (5) Operators of master-meter systems and liquefied petroleum gas (LPG) operators with fewer than 100 customers may continuously post a general notification in a prominent location frequented by customers.

EFV Rule Update

- (f) Operator evidence of customer notification. An operator must make a copy of the notice or notices currently in use available during PHMSA inspections or State inspections conducted under a pipeline safety program certified or approved by PHMSA under 49 U.S.C. 60105 or 60106.
- (g) Reporting. Except for operators of master-meter systems and LPG operators with fewer than 100 customers, each operator must report the EFV measures detailed in the annual report required by 191.11.

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EFV Rule Update

Section 192.385 is added to subpart H to read as follows:

- **192.385 Manual service line shut-off valve installation.**
  - (a) Definitions. As used in this section: Manual service line shut-off valve means a curb valve or other manually operated valve located near the service line that is safely accessible to operator personnel or other personnel authorized by the operator to manually shut off gas flow to the service line, if needed.

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EFV Rule Update

- (b) Installation requirement. The operator must install either a manual service line shut-off valve or, if possible, based on sound engineering analysis and availability, an EFV for any new or replaced service line with installed meter capacity exceeding 1,000 SCFH.
- (c) Accessibility and maintenance. Manual service line shut-off valves for any new or replaced service line must be installed in such a way as to allow accessibility during emergencies. Manual service shut-off valves installed under this section are subject to regular scheduled maintenance, as documented by the operator and consistent with the valve manufacturer's specification.

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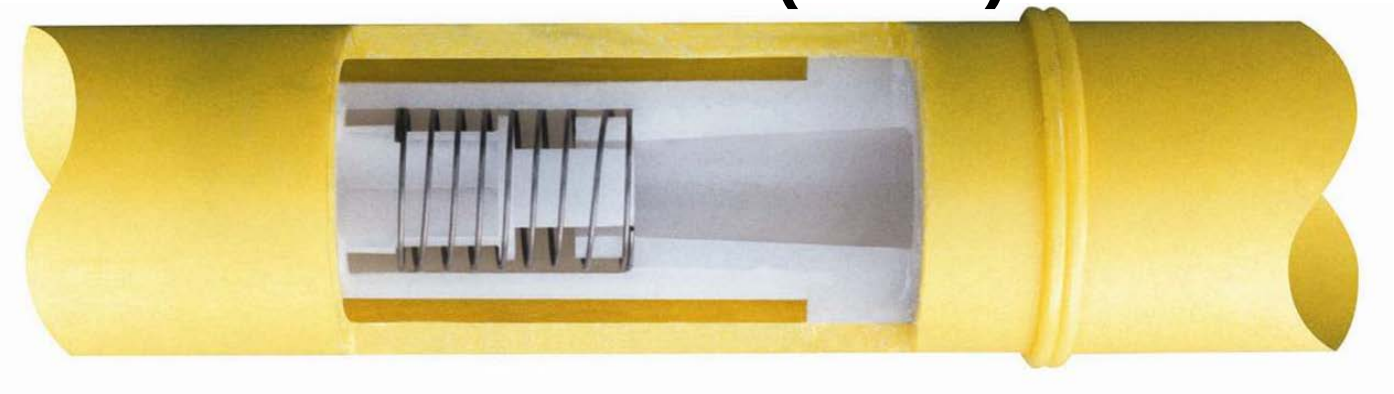
The Basics

Excess Flow Valves (EFVs)



GasBreaker™ provided PowerPoint content

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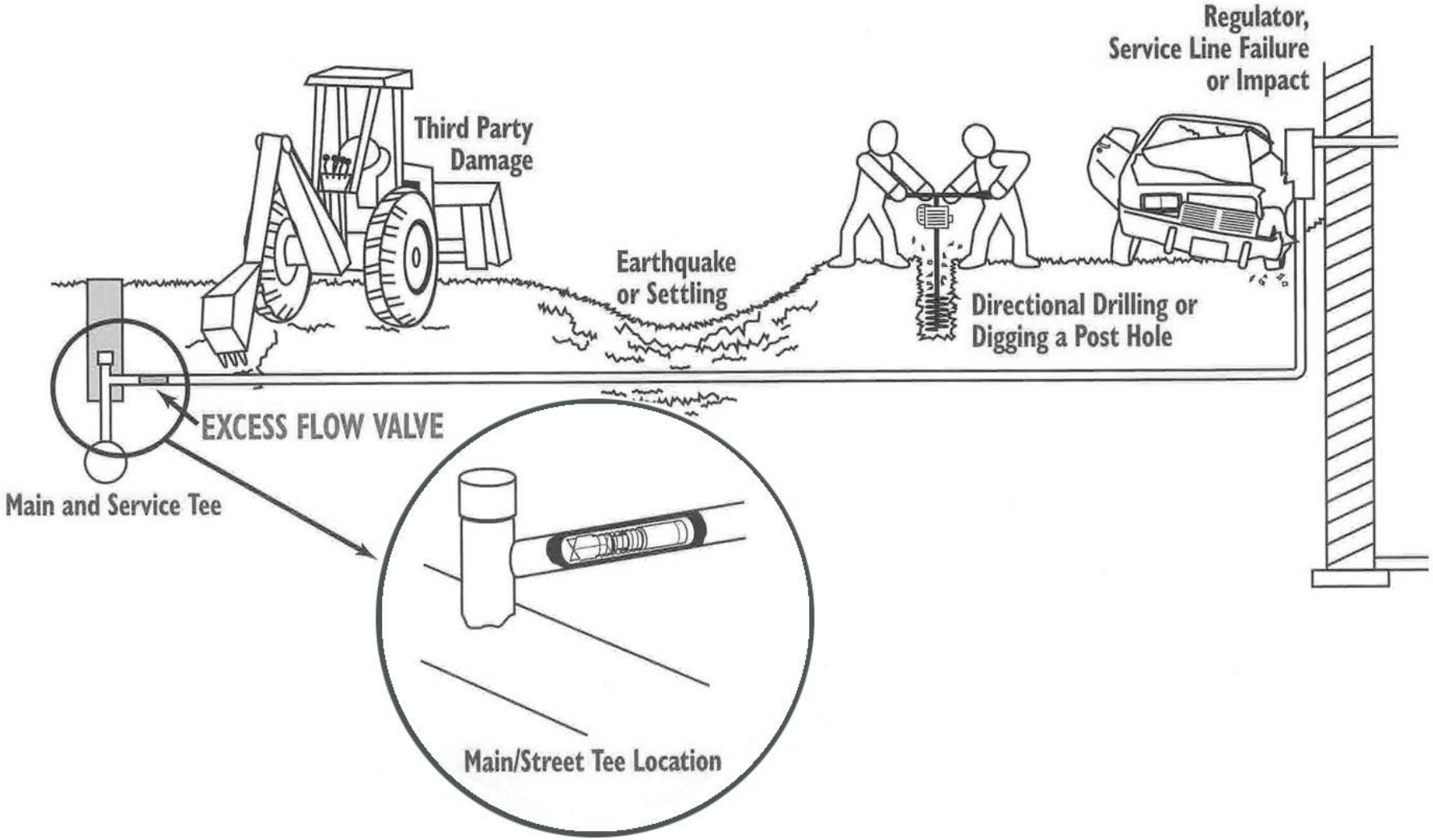
EFV Installation Location



GasBreaker Performance Standards

- **MSS SP-115 in 1995**
- **US DOT 192.381 in 1996, updated in 2017**
- **ASTM F1802 in 1997**
- **ASTM F2138 in 2001**
- **ASTM F2897 Bar Coding Standard**
  - For tracking and traceability

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Configurations

- **Sizes**
  - 1/2” CTS to 2” IPS
- **Inlet Pressures**
  - 7” w.c. to 1500 psi
- **Flow Capacity Range**
  - 90 SCFH to over 10,000 SCFH
  - 90,000 Btu/h to > 10,000,000 Btu/h

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EFV Assemblies

4 Factors Needed for EFV Sizing

1. **Maximum Load (typically meter size + 20%) ***
2. **System Pressure (typically minimum)**
3. **Service Line Pipe Size**
4. **Service Line Length**

** NOTE: always consider future load growth*

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Connected Load

- **Every EFV has a minimum trip flow which will fluctuate with the pressure in the line**
- **The minimum trip flow of the installed valve must be higher than the total load demand of whatever the line is supplying**
  - At least a 20% cushion above that demand is recommended

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Future Connected Load

- **If the potential for future load increases exists, it is prudent to install a higher capacity valve (if possible) to accommodate the future increased load demand**
  - Otherwise, the future load demand could be greater than the capacity of the valve and you would have to replace it with a larger capacity EFV

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System Pressure

- **Every EFV has a minimum pressure at which it can effectively operate**
  - Some valves can operate down to 5 psi while others should not be used below 10 psi, this usually is a function of the pressure drop across the valve
- **Size an Excess Flow Valve for the “lowest possible pressure” the line will ever see at the highest possible load demand**
  - As the pressure in the line drops, so will the minimum trip flow of the valve
  - Conversely as the pressure in the line increases, the minimum trip flow of the valve will increase as well

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System Pressure

- **An EFV can not be expected to function in two different pressure environments**
  - If you regulate the pressure downstream of an installed EFV, the EFV is unlikely to protect the line downstream of the regulator
  - A second EFV should be installed just downstream of the regulation point to protect the remaining downstream pipe
- **All EFV's are required to have a pressure rating**
  - DOT requires EFV's to be rated to whatever vessel they are installed in
  - The same Series EFV can be rated for 1000 psi installed in Schedule 40 steel pipe while having a rating of 89 psi if it is installed polyethylene pipe
  - All GasBreaker / UMAC EFV's rated for use in steel pipe have been tested to over 1500 psi (this includes the Series 300, 700, 1100, 1800, 2600, and 5500)

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Service Line Pipe Size

- **Chose an EFV designed for your service line pipe size**
- **Different Series EFV's are designed specifically for certain pipe sizes**
  - It makes no sense to install an EFV designed for 1/2" pipe in a 3/4" service line when an EFV designed for 3/4" pipe exists

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Service Line Length

- **Determine gas flow through pipe**
  - Diameter of the pipe
  - Pressure of the gas
- **The longer the pipe length, the less the gas flow at the end of the pipe at a given pressure**
  - Eventually, as you string pipe out, you will get to the point where you can not achieve enough flow to trip an EFV
- **Especially relevant in higher capacity EFV's where the pressure in the line is lower**
- **Difficult to size an EFV in pressures below 10 psi**

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Service Line Length

- **If after inspecting the sizing chart, you determine you can not protect your entire service line, it will be necessary to either:**
  - Increase the pipe diameter
    OR
  - Increase the pressure in the line to protect it with an EFV

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EFV Sizing Example #1 Residential

- Meter: 250 SCFH
- Sizing: 250 + 20% = at least 300 SCFH
- System Pressure: 10 psi
- Service: 1/2” CTS x 75’
- EFV: 400 SCFH Minimum

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Inlet Pressure		SERIES 350[1] Nom. Min. Trip Point 0.6 SG Gas		Bypass Flow After Trip (Nom. Max) 0.6 SG Gas	
psig	bar	SCFH	SCMH	SCFH	SCMH
5	0.34	350	9.91	18	0.51
10	0.69	400	11.33	20	0.57
15	1.03	430	12.18	23	0.65
20	1.38	460	13.03	25	0.71
30	2.07	530	15.01	28	0.79
40	2.76	600	16.99	32	0.91
50	3.45	650	18.41	35	0.99
60	4.14	700	19.82	37	1.05
70	4.83	730	20.67	39	1.10
80	5.52	780	22.09	41	1.16
90	6.21	820	23.22	46	1.30
100	6.90	860	24.35	50	1.42
150	10.34	1,000	28.32	75	2.12

1. For Pressures over 150 psig (10.34 bar) contact UMAC

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chart provided by GasBreaker

EFV Sizing Example #2 Residential

- **Meter: 425 SCFH**
- **Sizing: 425 + 20% = at least 510 SCFH**
- **System Pressure: 10 psi**
- **Service: 1” CTS x 150’**
- **EFV: 700 SCFH Minimum**

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Inlet Pressure		SERIES 700' Nom. Min. Trip Point 0.6 SG Gas		Bypass Flow After Trip (Nom. Max) 0.6 SG Gas	
psig	bar	SCFH	SCMH	SCFH	SCMH
5	0.34	600	16.99	18	0.51
10	0.69	700	19.82	20	0.57
15	1.03	760	21.52	23	0.65
20	1.38	830	23.50	25	0.71
30	2.07	960	27.18	28	0.79
40	2.76	1,060	30.02	32	0.91
50	3.45	1,200	33.98	35	0.99
60	4.14	1,300	36.81	37	1.05
70	4.83	1,410	39.93	39	1.10
80	5.52	1,480	41.91	41	1.16
90	6.21	1,540	43.61	46	1.30
100	6.90	1,600	45.31	50	1.42

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chart provided by GasBreaker

EFV Sizing Example #3 Commercial

- **Meter: 2 x 425 SCFH**
- **Sizing: 850 + 20% = at least 1020 SCFH**
- **System Pressure: 20 psi**
- **Service: 3/4” IPS x 80’**
- **EFV: 1310 SCFH Minimum**

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Inlet Pressure		SERIES 1100[1] Nom. Min. Trip Point 0.6 SG Gas		Bypass Flow After Trip (Nom. Max) 0.6 SG Gas	
psig	bar	SCFH	SCMH	SCFH	SCMH
5	0.34	1000	28.32	18	0.51
10	0.69	1100	31.15	20	0.57
15	1.03	1230	34.83	23	0.65
20	1.38	1310	37.09	25	0.71
30	2.07	1530	43.32	28	0.79
40	2.76	1670	47.29	32	0.91
50	3.45	1870	52.95	35	0.99
60	4.14	2030	57.18	37	1.05
70	4.83	2180	61.73	39	1.10
80	5.52	2300	65.13	41	1.16
90	6.21	2450	69.38	46	1.30
100	6.90	2550	72.21	50	1.42

1. For Pressures over 100 psig (6.90 bar) contact UMAC

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chart provided by GasBreaker

EFV Sizing Example #4 Commercial

- **Meter: 2 x 175 SCFH**
- **Sizing: 350 + 20% = at least 420 SCFH**
  - Future Load Considerations (double or triple)
- **System Pressure: 10 psi**
- **Service: 3/4” IPS x 90’**
- **EFV: 2600 SCFH Minimum**

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Inlet Pressure		SERIES 2600[1] Nom. Min. Trip Point 0.6 SG Gas		Bypass Flow After Trip (Nom. Max) 0.6 SG Gas	
psig	bar	SCFH	SCMH	SCFH	SCMH
10	0.69	2600	73.62	20	0.57
15	1.03	2700	76.45	23	0.65
20	1.38	3000	84.95	25	0.71
30	2.07	3600	101.94	28	0.79
40	2.76	4000	113.27	32	0.91
50	3.45	4400	124.59	35	0.99
60	4.14	4900	138.75	37	1.05
70	4.83	5300	150.08	39	1.10
80	5.52	5700	161.40	41	1.16
90	6.21	6000	169.90	46	1.30
100	6.90	6200	175.56	50	1.42

1. For Pressures over 100 psig (6.90 bar) contact UMAC

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chart provided by GasBreaker

EFV Sizing Summary

1. **Maximum Load (typically meter size + 20%) ***
2. **System Pressure (typically minimum)**
3. **Service Line Pipe Size**
4. **Service Line Length**

** NOTE: always consider future load growth*

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EFV Installation & Operation Considerations

- **Key thing to remember on a new service installation is to BE PATIENT**
  - Allow time for the service line to pressurize through the bleed-by in the EFV
  - Gauge Pressure at the riser
  - Only crack the meter valve to energize the home or the valve will trip and you will have to wait longer to try again

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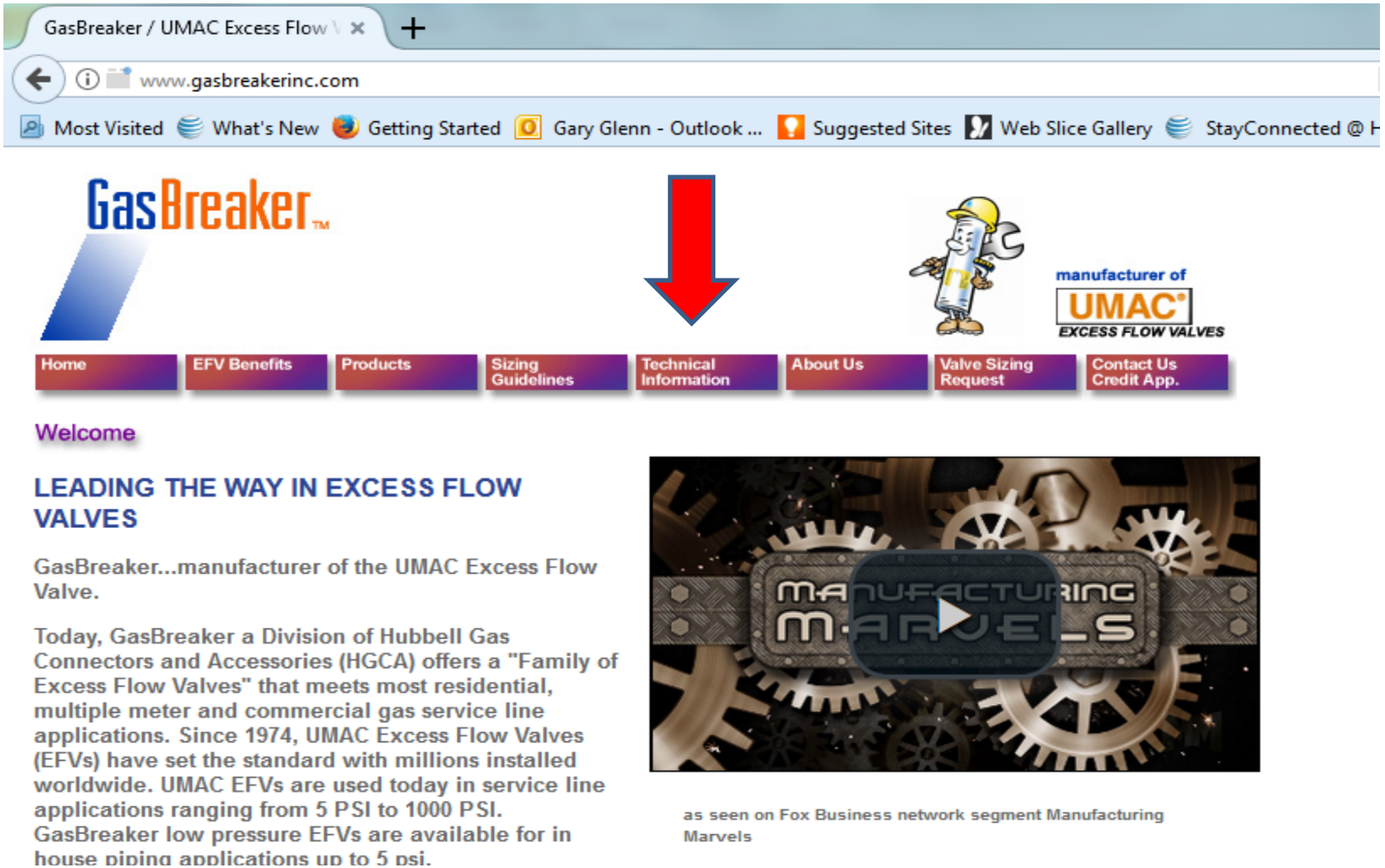
- **www.gasbreaker.com**



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- **Technical Information**

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Sizing Chart

To use our online sizing application, click here.

Performance Charts

Click a UMAC EFV Series from the menu below for pressure, flow, trip and reset characteristics of that series:

Series 300 	view	download
Series 350 	view	download
Series400 	view	download
Series550 	view	download
Series700 	view	download
Series800 	view	download
Series1100 	view	download
Series1800 	view	download
Series2600 	view	download
Series5500 	view	download
Series10000 	view	download
Propane (LPG)	view	download

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UMAC Excess Flow Valve Sizing A

www.gasbreakerinc.com/sizing.cfm

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Close Sizing Application

GasBreaker™

manufacturer of UMAC® EXCESS FLOW VALVES

UMAC Excess Flow Valve Sizing Application

Prefabricated - USCS | Straight Sticks - USCS | Prefabricated - Metric | Straight Sticks - Metric

Please Note:
The technical data contained herein are guides to the use of UMAC Valves. The advice contained herein is based upon tests and information believed to be reliable, but users should not rely upon it absolutely for specific applications. It is given and accepted at user's risk and confirmation of its validity and suitability in particular cases should be obtained independently. GasBreakerorporated makes no guarantee of results and assumes no obligation or liability in connection with its advice. This publication is not to be taken as a license to operate under or infringe any patents.

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Close Sizing Application

UMAC Excess Flow Valve Sizing Application

Prefabricated - USCS | **Straight Sticks - USCS** | Prefabricated - Metric | Straight Sticks - Metric

Select Pipe Diameter

1/2" CTS .090 (I.D. = .436")
1/2" IPS SDR 9.3 (I.D. = .634")
3/4" IPS SDR 11.0 (I.D. = .834")
1" CTS .099 (I.D. = .898")
1" IPS SDR 11.0 (I.D. = 1.044")
1-1/4" IPS SDR 11.0 (I.D. = 1.317")
1-1/2" IPS SDR 11.0 (I.D. = 1.506")
2" IPS SDR 11.0 (I.D. = 1.885")

Select Pressure (PSI)

5
10
15
20
30
40
50
60
70
80
90
100

Select Max Service Length (FEET)

27288
12923
6287
1584
779
243
122

Select Max Customer Flow (SCFH)

405
630
990
1800
2340
5500
9000

Results

Pipe Diameter:
1-1/4" IPS SDR 11.0 (I.D. = 1.317")

Pressure: 10 psi

Service Length: 6287 feet

Trip Flow: 990 SCFH

Recommended Valve: 1100

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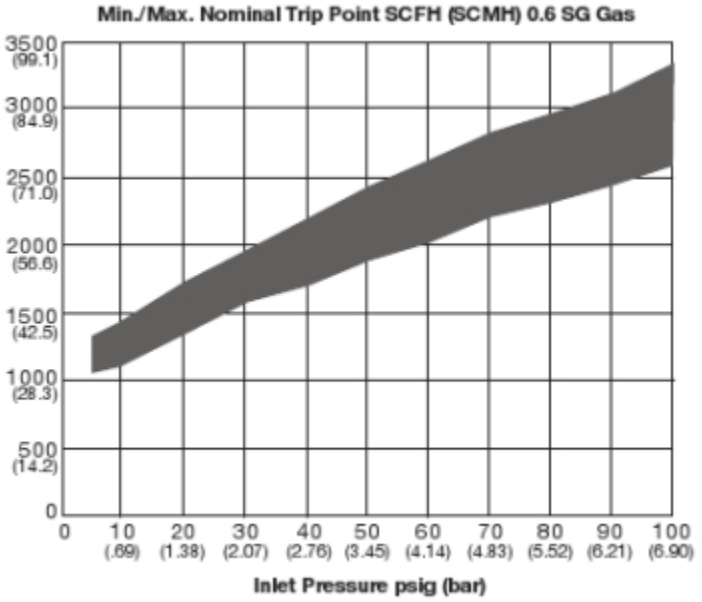
UMAC Series 1100
Gray Label Excess Flow Valves
5 psig to 1,000 psig (345 mbar to 69 bar)
- Inlet Pressure

TRIP RANGE CHART

Inlet Pressure		SERIES 1100 Nom. Min. Trip Point 0.6 SG Gas		Bypass Flow After Trip (Nom. Max) 0.6 SG Gas	
psig	bar	SCFH	SCMH	SCFH	SCMH
5	0.34	1,000	28.32	18	0.51
10	0.69	1,100	31.15	20	0.57
15	1.03	1,230	34.83	23	0.65
20	1.38	1,310	37.09	25	0.71
30	2.07	1,530	43.32	28	0.79
40	2.76	1,670	47.29	32	0.91
50	3.45	1,870	52.95	35	0.99
60	4.14	2,030	57.18	37	1.05
70	4.83	2,180	61.73	39	1.10
80	5.52	2,300	65.13	41	1.16
90	6.21	2,450	69.38	46	1.30
100	6.90	2,550	72.21	50	1.42
150	10.34	2,859	80.96	75	2.12
200	13.79	3,329	94.25	88	2.44
250	17.24	3,744	106.01	115	3.26
300	20.69	4,142	117.30	130	3.68
350	24.14	4,536	128.44	155	4.39
400	27.59	4,829	136.73	175	4.96
450	31.03	5,130	145.26	185	5.24
500	34.48	5,401	152.94	195	5.52
550	37.93	5,621	159.16	215	6.09
600	41.38	5,819	164.77	240	6.80
650	44.83	6,017	170.38	260	7.36
700	48.28	6,292	178.16	275	7.79
750	51.72	6,555	185.61	295	8.35
800	55.17	6,803	192.65	310	8.78
850	58.62	7,035	199.22	330	9.34
900	62.07	7,248	205.24	350	9.91
950	65.52	7,439	210.65	370	10.48
1,000	68.97	7,606	215.39	385	10.90



UMAC EFV	Typical Customer Gas Load (0.6 SG Gas)		Average Pressure Drop Across Valve	
	SCFH	SCMH	psi	mbar
Series 1100	800	22.65	0.30	20.69

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QUESTIONS?

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THANK YOU!

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