WATERHAMMER

James Stratton w/ Schimberg Co.

SCHIMBERG CO.

PIPE, VALVES, AND FITTINGS SINCE 1918

WATERHAMMER IS DANGEROUS

AND CAN BE DEADLY!!

University of Northern Iowa worker dies in steam tunnel

Monday morning 'major' leak caused death, officials say

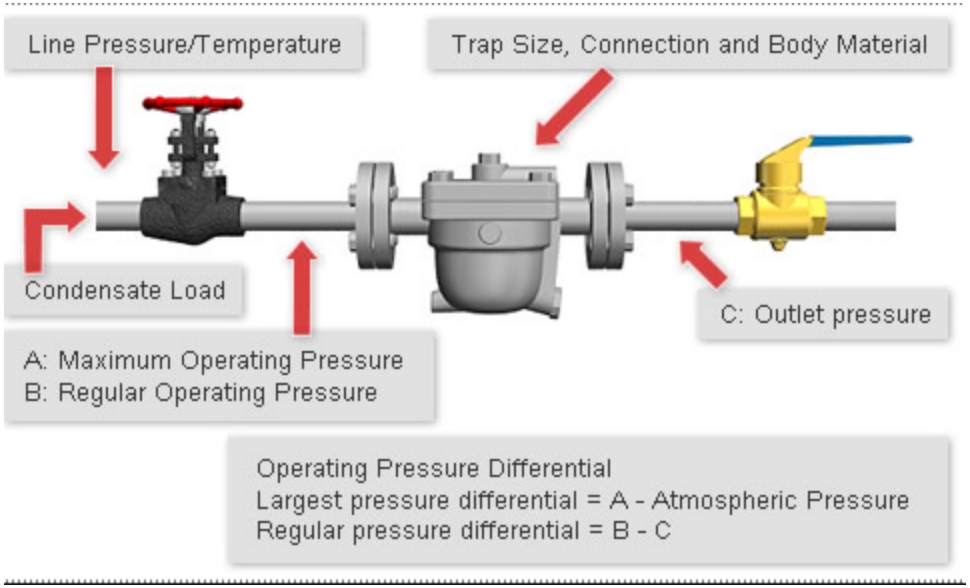
Water Hammer Ingredients

- **2 Phase Flow with UNWANTED condensate in steam lines**

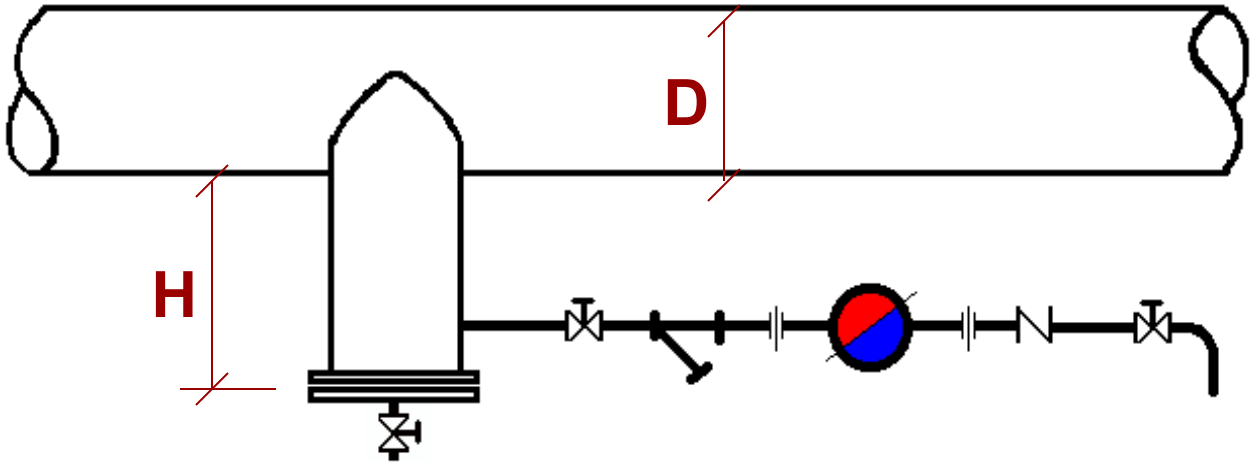
- **How these close relatives don't get along in the piping system**

Accumulating Condensate

- We must remove condensate from the steam lines
- Working steam traps are essential



Typical Steam Main Drip Station



Size of Main ‘D’	Collection Leg Diameter
1/2” to 4”	Same dia. as main ‘D’
5” & larger	2 to 3 Pipe Sizes Smaller than Main, But Never Smaller than 4”

Length of Collection Leg ‘H’
Automatic Start up: ‘H’ to be 28” or More
Supervised Start up: Length to be1.1/2 times steam Main Diameter, but never shorter than 8”

Steam Main Drip Stations

Required Locations

- Elevation Changes
- Changes of Direction
- Expansion Loops-Leading Edge
- End of Main
- In Front of Control Valves
- In Front of Isolation Valves
- In Horizontal Runs- 150 to 300 foot intervals

Failed Steam Main Drip Stations

Condensate continues to accumulate

Velocity of Steam = SPEED

How many feet in a mile? 5280

One mile per minute = MPH?

60 MPH

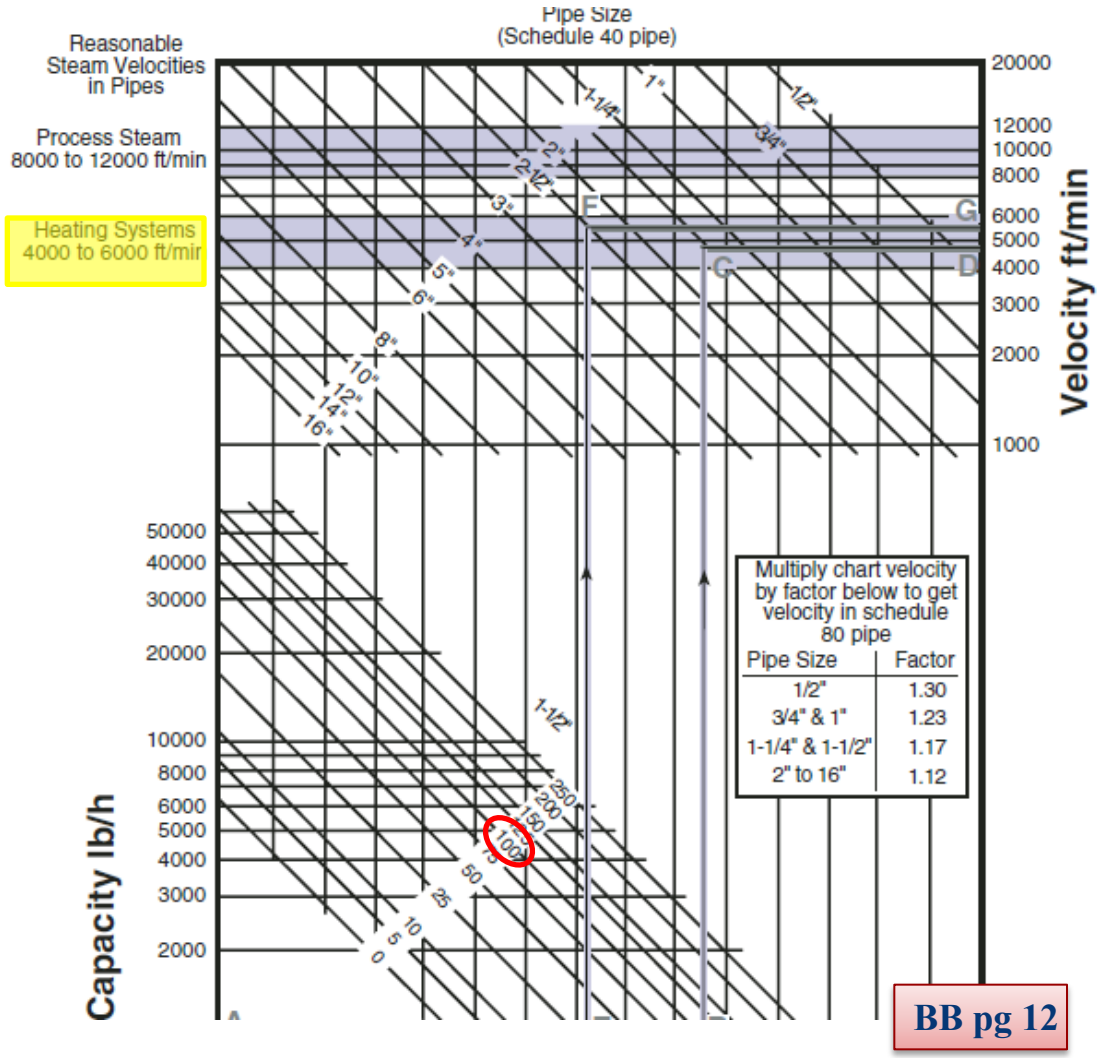
Pipeline Sizing Example

Mass flowrate or capacity at

- **1000 #/HR**
- **100 psig**
- **25 PSI**

Heating system application

- **1-1/2” Pipe 100PSI**
- **3” Pipe @ 25 PSI**



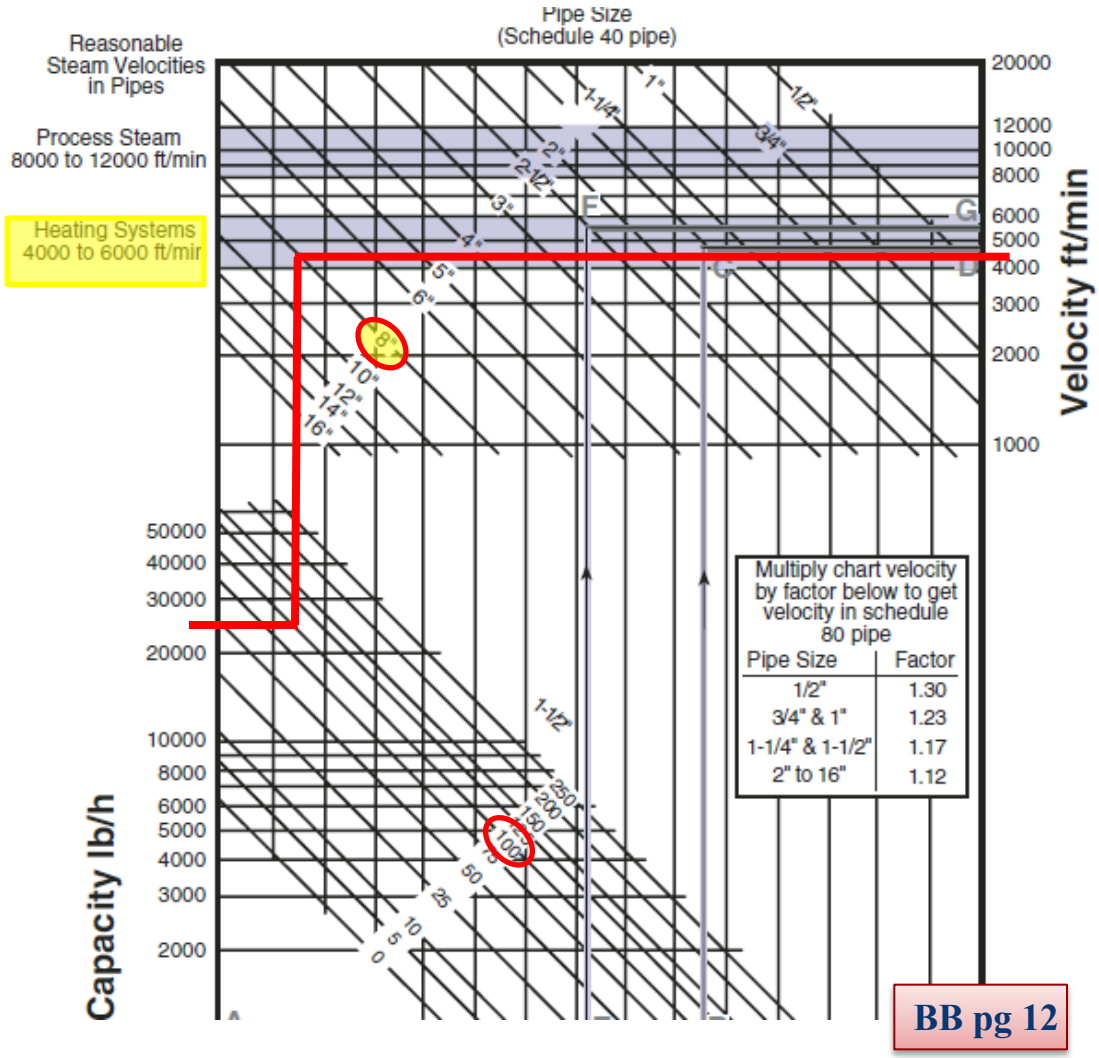
Pipeline Sizing Example

Mass flowrate or capacity at

- **26,000 lb/h**
- **100 psig**

Heating system application

- **8” Pipe**
- **Velocity 4,850 fpm**



BB pg 12

Failed Steam Main Drip Stations

Condensate continues to accumulate

If the excess condensate is unable to drain, doesn't that make the pipe size virtually smaller? Now the steam increases velocity!!!

3” PIPE = 60 MPH = PERFECT!!

Calculator: Steam Velocity through Piping

TLV ToolBox - For iOS and Android

Input Data

Units: Imperial

Pipe Grade	ANSI Sch40	
Pipe Size	NPS3	
Steam Pressure	150	psig
Steam Flow Rate	6000	lb/h

Show Advanced Options

Calculate Clear

Result

Steam Velocity	61.031	mile/h

2” PIPE = 134 MPH

Calculator: Steam Velocity through Piping

TLV ToolBox - For iOS and Android

Input Data

Units: Imperial

Pipe Grade	ANSI Sch40	
Pipe Size	NPS2	
Steam Pressure	150	psig
Steam Flow Rate	6000	lb/h

Show Advanced Options

Calculate Clear

Result

Steam Velocity	134.456	mile/h

1-1/2” PIPE = 221 MPH

Calculator: Steam Velocity through Piping

TLV ToolBox - For iOS and Android

Input Data

Units: Imperial

Pipe Grade	ANSI Sch40	
Pipe Size	NPS1 1/2	
Steam Pressure	150	psig
Steam Flow Rate	6000	lb/h

Show Advanced Options

Calculate Clear

Result

Steam Velocity	221.62	mile/h

1” PIPE = 522 MPH!!!!!!

Calculator: Steam Velocity through Piping

TLV ToolBox - For iOS and Android

Input Data

Units: Imperial

Pipe Grade	ANSI Sch40	
Pipe Size	NPS1	
Steam Pressure	150	psig
Steam Flow Rate	6000	lb/h

Show Advanced Options

Calculate Clear

Result

Steam Velocity	522.048	mile/h

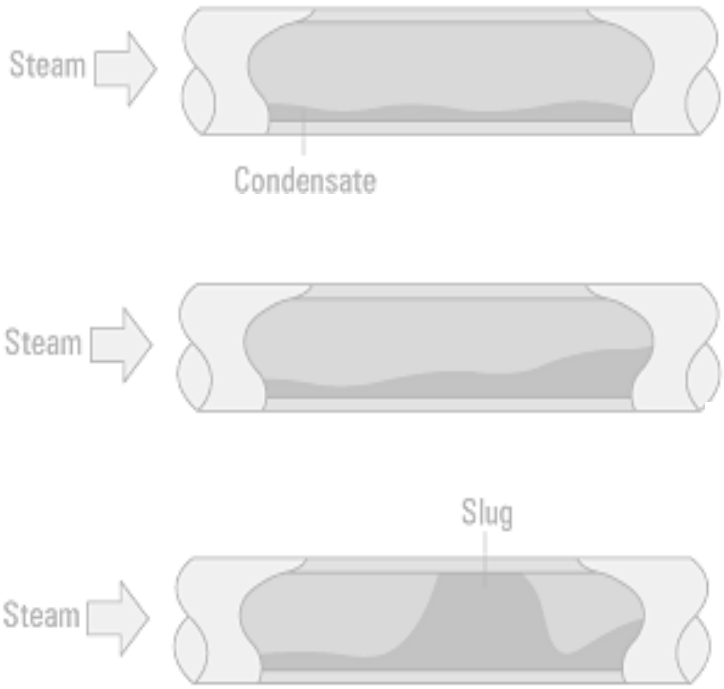
Failed Steam Main Drip Stations

Condensate continues to accumulate

Wind Speed determines the size of the waves on water = the velocity of steam in the piping system determines the wave size of the condensate

Now Add Inadequate Drainage

2.1



60 mph… ☺

120 MPH??? ☹

Slug of water now at 200 MPH??

Higher???????? OUCH!!

BB pg 15

THE CRASH!!

Waterhammer

Slug of water from condensate

Waterhammer causes noise, vibration, and damage

Let’s Watch a Video 17:00 SCHIMBERG STEAM LAB CEDAR RAPIDS IOWA

Emergency Contact

SCHIMBERG CO.
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Training

Training and education of new technology and materials is an ongoing commitment at Schimberg Co. We provide educational programs to professional contractors in the plumbing and industrial PVF industry.

Our highly-trained and industry experienced facilitators host training in our own training facility or, for certain trainings, at the customer facility or job site for hands on experience. In addition to our training courses, we can facilitate training offered by our vendors on new and existing products and materials.

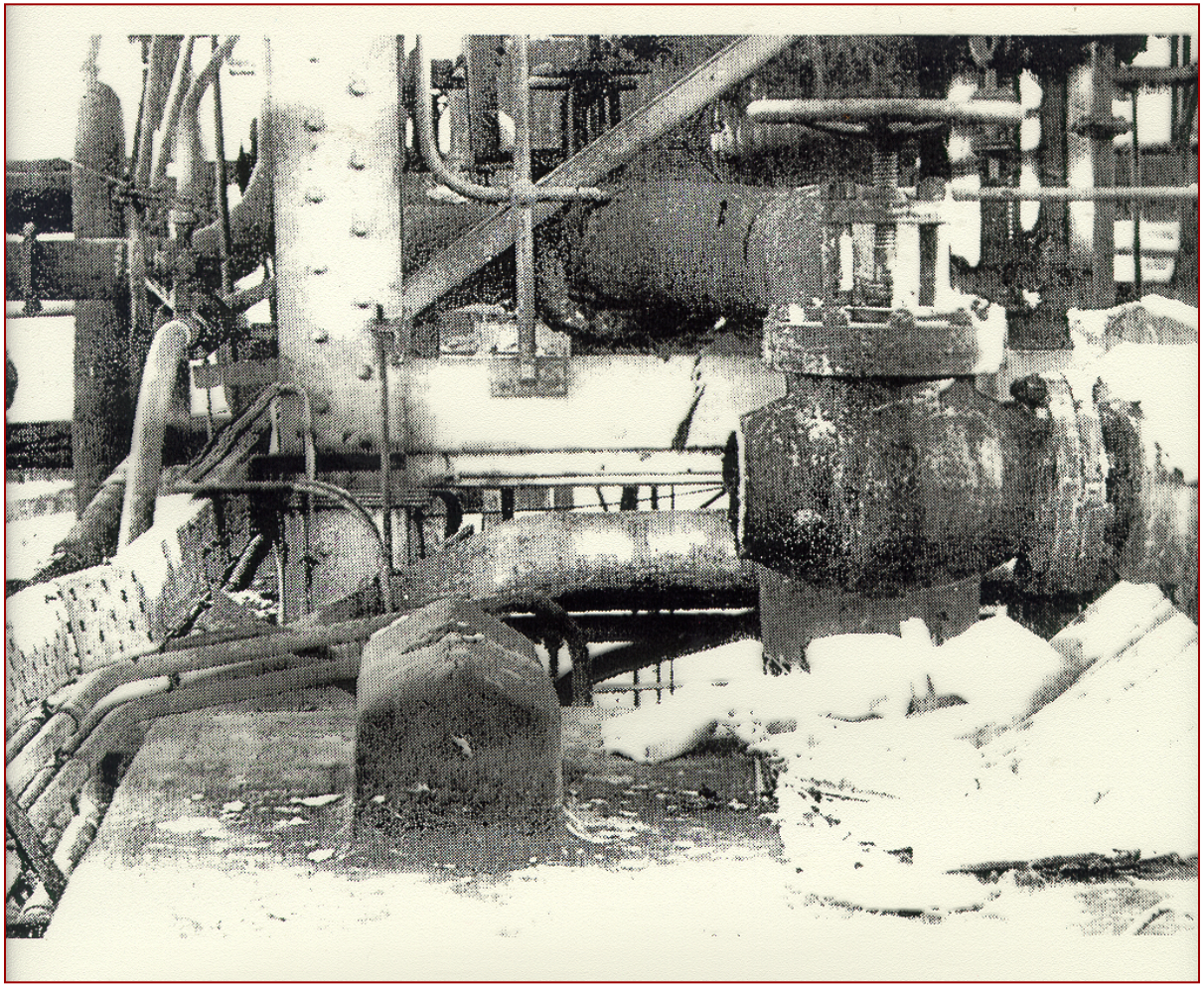
Learn more about our training:

- Steam Fundamental Level 1
- Steam Fundamental Level 2
- Valve and Valve Automation
- HDPE Fusion
- Aquatherm Fusion

- Training Calendar
- Steam Fundamental Level 1
- Steam Fundamental Level 2
- HDPE Fusion
- Aquatherm Fusion
- Orion Socket Fusion
- Flexitallic Best Practices
- Product Demonstration Videos

Crushed Float due to Waterhammer

What is missing?



Found It

Larger example of Waterhammer

30” VALVE 30 PSI = 1 DEATH

CONCLUSION

- QUESTIONS?
- www.Schimberg.com