

Plastic Pipe
Database
Committee

What's New with Plastic Piping



PPDC Information

- Identifies pipe and fittings used in plastic piping systems
- Explains historically known plastic piping issues
- Identifies trends to assist with Integrity Management Programs

Background

- Response to NTSB recommendation and database was a precondition to DOT not mandating collection
- A national voluntary database of in-service performance of plastic piping systems
- Database administered by AGA on behalf of PPDC



Plastic Piping Database Committee (PPDC)

12 Members

Government Members

- NAPSR Representatives (2)
- NARUC Representatives (2)
- PHMSA/OPS
Representatives (2)

Industry Members

- AGA Member
Representatives (2)
- APGA Member
Representatives (2)
- PPI Member
Representatives (2)

- Up to 3 Invited Guests
- 1 NTSB Liaison
- AGA Observer(s)





Plastic Piping Database Committee (PPDC)

- The scope of the committee has been expanded to include failures and/or leaks of metal or plastic components contained within plastic piping systems.
- Immediate, clearly known, third party damages are not collected or evaluated.



Plastic Piping Database Committee (PPDC)

- The PPDC meets three times per year to review the data.
- Consensus agreements on areas of focus or concern.
- Issues Status Reports after each meeting.
- Provides resources to aid in identification of products and to assist operators with Integrity Management Programs.



Status of Participation

- 115 companies actively submitted data in December 2016
 - Names of active submitters are included in Appendix A of the Status Report
 - Verify that your company is submitting
- PPDC submitters represent these percentages of all installed plastic piping in the U.S.
 - 79% plastic main
 - 87% plastic services

Accuracy and Completeness of Data

VERY IMPORTANT

- Impacts the analysis and conclusions by PPDC
 - Installation Date/Year
 - Comments on Failure Cause
- Needs full cooperation of participants to help resolve submitted data issues
- Increasingly important with Integrity Management Programs

Manufacturers Database

<http://plasticpipe.org/energy/energy-piping-systems-mfg-history.html>

Manufacturers of Plastic Piping Products - Pipe

NOTE: Operators are required to install materials that meet current requirements

Company	Material Designation	From	To	Size Range	Comments
Allied	PE 3306/3406	1965/66	1972/73	1/2" CTS - 2" IPS	Was also a resin producer and supplied the AC ultra high molecular pipe compound to several small pipe extruders including Yardley, Orangeburg, Endot and the Barrett Division of Allied (also an extruder of PVC pipe). Except for Endot, most of these producers/extruders have since gone out of business or have different names today. Pipe was very difficult to fuse.
Amstan	PE3306	Mid-late 1960s			

Manufacturers Database

Manufacturers of Plastic Piping Products - Line Fittings					
NOTE: Operators are required to install materials that meet current requirements					
Company	Material Designation	From	To	Size Range	Comments
Georg Fischer Central Plastics					Produced molded fittings for pipe producers
	PE 2406	??	Present	1" IPS - 12" IPS	Solid Yellow
	PE 3408	??	Present	1" IPS - 12" IPS	Solid Black
CP Chemical					Another name for Performance Pipe

Manufacturers Database

Manufacturers of Plastic Piping Products - Other fittings

NOTE: Operators are required to install materials that meet current requirements

Company	Material Designation	From	To	Size Range	Comments
AMP	Dupont Zytel ST-801				1970's, stainless steel and nylon compression fitting. Technology purchased by Metcal in 1990; can be white in appearance. Dupont Zytel ST-801
	Nylon	??	??	1/2" CTS - 2" IPS	Black with Stainless Steel compression ring. Nylon 66
Georg Fischer Central Plastics					Electrofusion and heat fusion fittings, transition fittings, meter risers.

Manufacturers Database

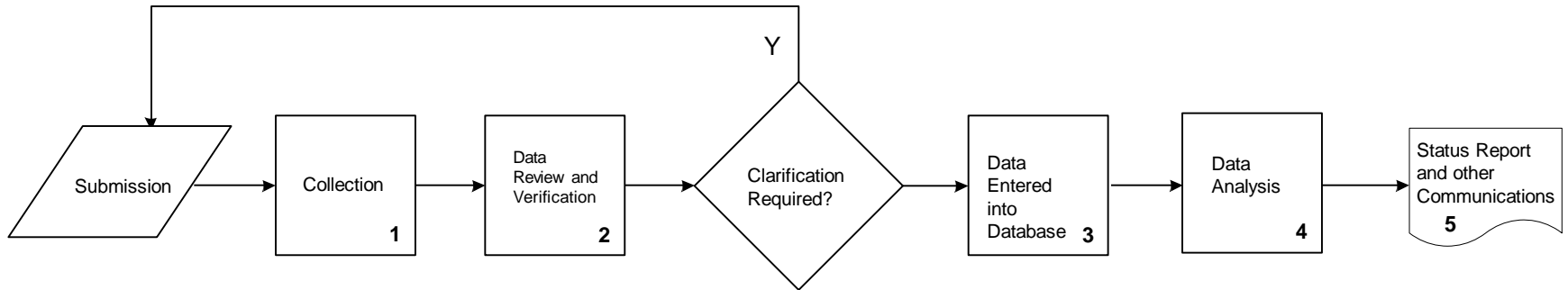
Manufacturers of Plastic Piping Products - Valves

NOTE: Operators are required to install materials that meet current requirements

Company	Material Designation	From	To	Size Range	Comments
Georg Fischer Central Plastics					
Dresser	Nylon	1991	Present	1/2" CTS - 1-1/4" CTS	Style 475 Curb Valve Rilsan
Friatec	PE 3408	1985	1995	2" - 6" IPS	Black body with white operating nut; ball valve



Plastic Pipe Database Committee Data Process Flow



Process Responsibilities

- 1) AGA Data Collection Team
- 2) AGA Data Collection Team
- 3) AGA Data Collection Team
- 4) Plastic Pipe Database Committee
- 5) AGA Data Collection Team / PPDC



Summary of Database

The database

- Contains over 15 years of collected data
 - Over 60,000 data reports
 - Three 5 year leak survey cycles
 - Currently adding 10,000 reports each year



Summary of Database

- Status Report includes analysis of specific data
 - Failures/Leaks on newly installed pipe
 - ABS, PVC and PE leaks by component and cause
 - DuPont & Uponor
 - Century
 - PE 3306
 - AMP
 - Caps
 - PVC

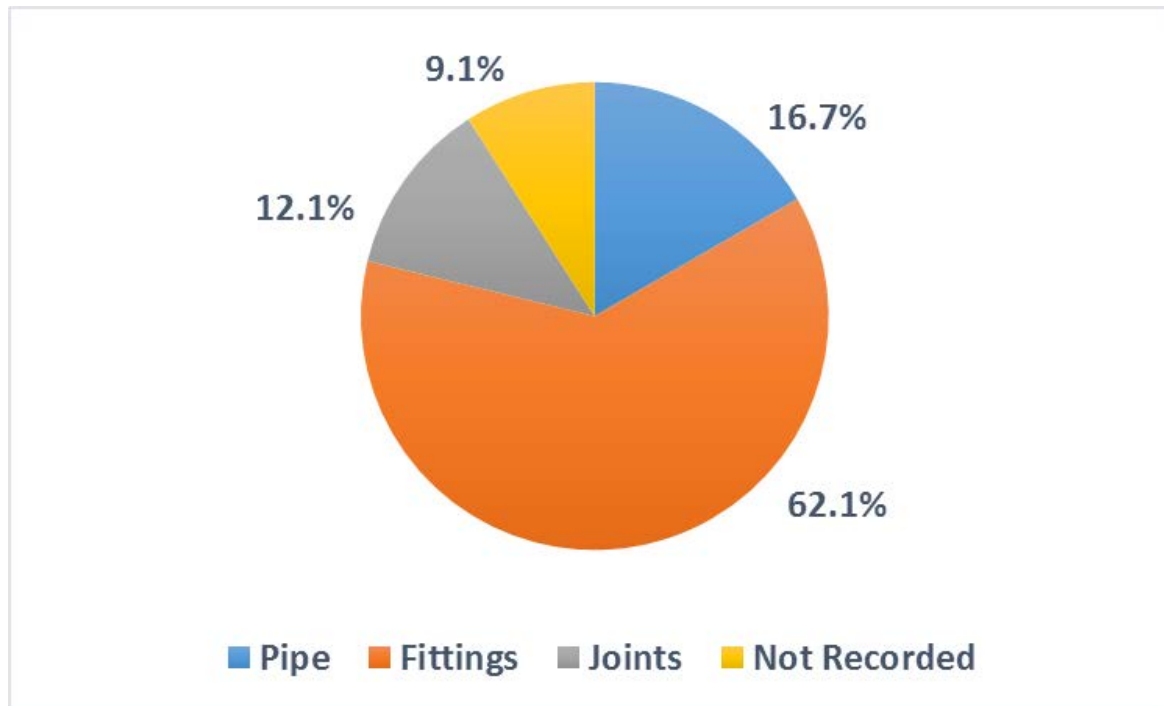
New Installations

- In first 5 years of service the highest reported cause of failures/leaks is installation error
- Installation Error reported in 2015 as the cause for 58% of all failures/leaks occurring within 5 years of installation
- Emphasis should be continued for Operator Qualification Programs, training programs, installation procedure reviews, inspection efforts



ABS Failures by Location

PHMSA 2015 Annual Report Data: 2,953 Miles of ABS Main
PPDC active submitters have 198 Miles of ABS Main

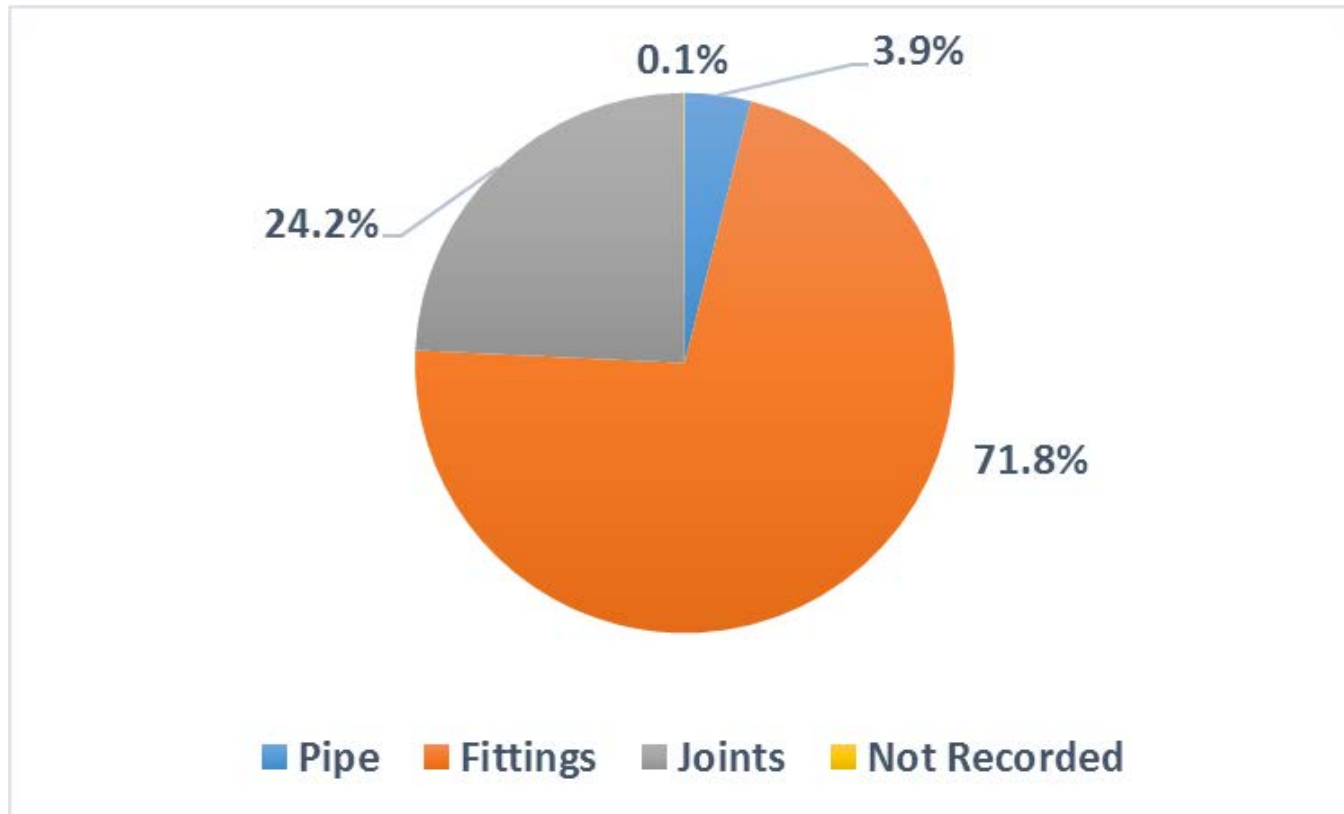


ABS Failure Causes

CAUSE	% of All ABS Failures/Leaks	% of All ABS Pipe Failures/Leaks	% of All ABS Fitting Failures/Leaks	% of All ABS Joint Failures/Leaks
Excessive Expansion/Contraction	1.5%	0.0%	2.4%	0.0%
Excessive External Earth Loading	3.0%	18.2%	0.0%	0.0%
Installation Error	21.2%	9.1%	19.5%	62.5%
Squeeze Off	1.5%	9.1%	0.0%	0.0%
Point Loading	0.0%	0.0%	0.0%	0.0%
Previous Impact	0.0%	0.0%	0.0%	0.0%
Unknown	34.8%	63.6%	31.7%	12.5%
Other	1.5%	0.0%	2.4%	0.0%
Cap	9.1%	0.0%	14.6%	0.0%
Not Recorded	9.1%	0.0%	7.3%	12.5%
Material Defect	15.2%	0.0%	22.0%	12.5%
Gopher/rodent/worm damage	0.0%	0.0%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.0%	0.0%	0.0%	0.0%
Unknown - Abandoned	3.0%	0.0%	0.0%	0.0%
Corrosion	0.0%	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%	100.0%

PVC Failures by Location

PHMSA 2015 Annual Report Data: 11,224 Miles of PVC Main
PPDC active submitters have 4,692 Miles of PVC Main



PVC Failure Causes

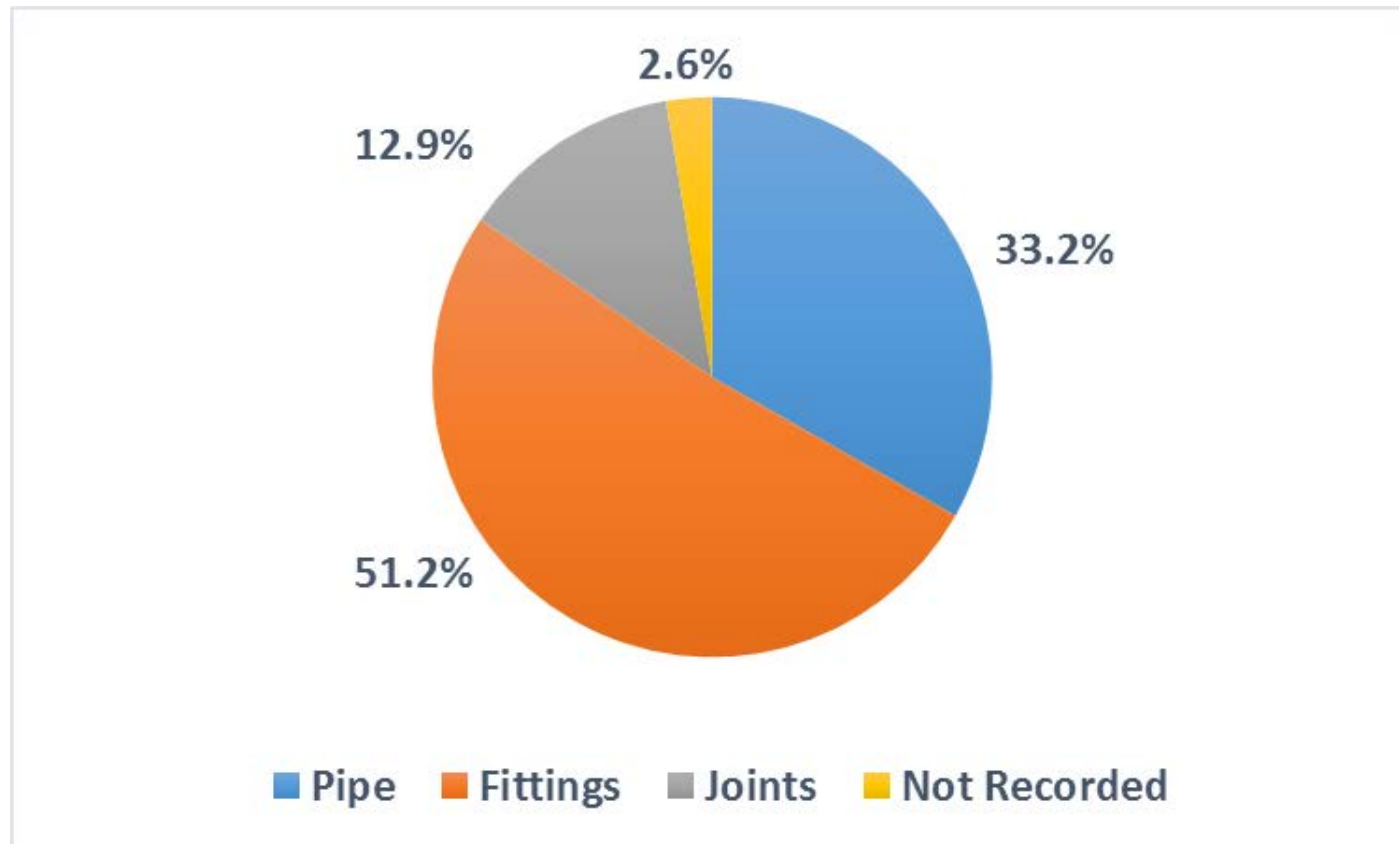
CAUSE	% of All PVC Failures/Leaks	% of PVC Pipe Failures/Leaks	% of PVC Fitting Failures/Leaks	% of PVC Joint Failures/Leaks
Excessive Expansion/Contraction	2.9%	2.9%	3.6%	0.7%
Excessive External Earth Loading	8.4%	18.8%	7.2%	10.3%
Installation Error	34.5%	7.2%	40.1%	22.4%
Squeeze Off	0.2%	4.3%	0.0%	0.0%
Point Loading	2.1%	37.7%	0.4%	1.4%
Previous Impact	0.7%	4.3%	0.7%	0.2%
Unknown	4.8%	5.8%	4.8%	4.4%
Other	1.7%	0.0%	2.0%	1.2%
Cap	0.4%	0.0%	0.6%	0.0%
Not Recorded	10.6%	7.2%	0.5%	41.1%
Material Defect	33.7%	11.6%	40.1%	18.2%
Gopher/rodent/worm damage	0.0%	0.0%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.0%	0.0%	0.0%	0.0%
Unknown - Abandoned	0.0%	0.0%	0.0%	0.0%
Corrosion	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%



PE

Including DuPont & Uponor, Aldyl A

PHMSA 2015 Annual Report Data: 689,329 Miles of PE Main
PPDC active submitters have 550,855 Miles of PE Main



PHMSA annual report data downloaded 11/28/16

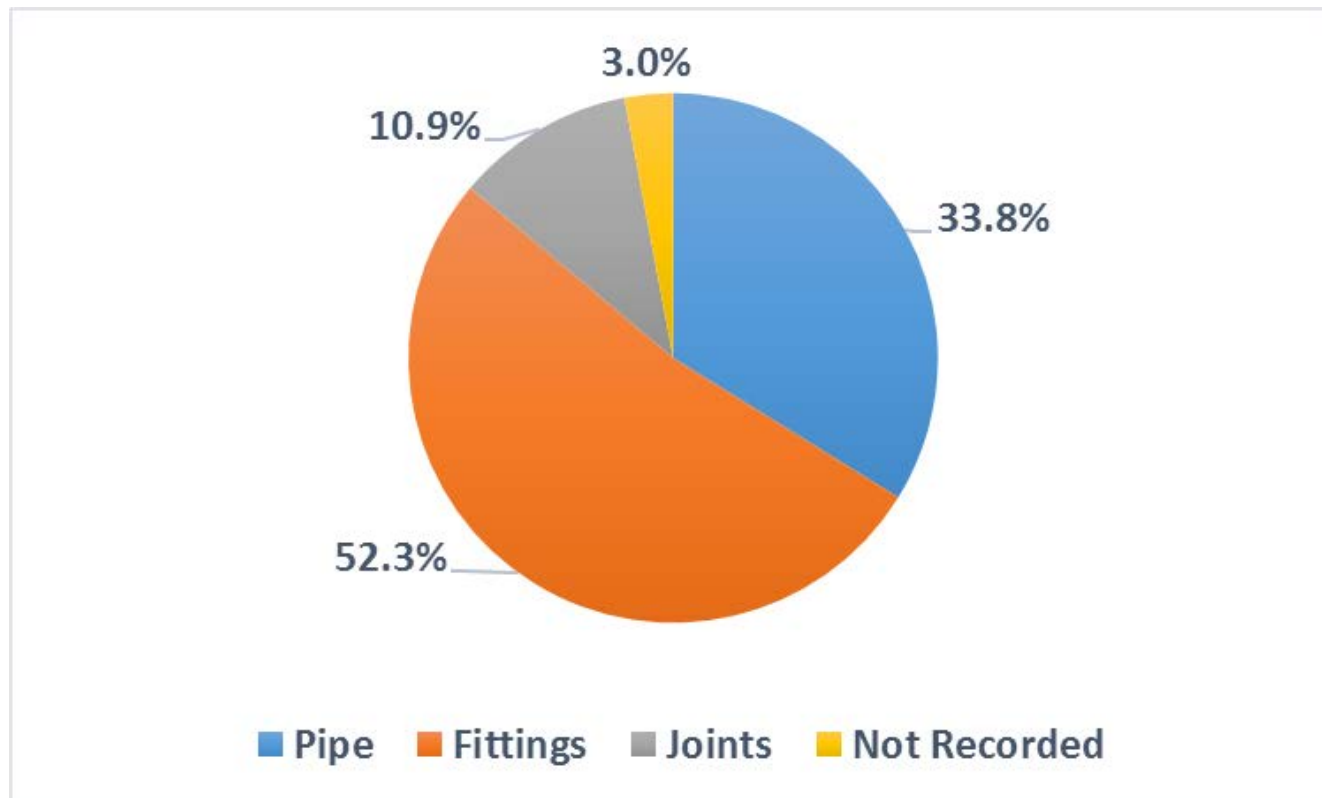


PE Failure/Leak Causes

CAUSE	% of All PE Failures/Leaks	% of PE Less DuPont & Uponor Failures/Leaks	% of PE Less DuPont & Uponor and Century Failures/Leaks
Excessive Expansion/Contraction	1.2%	1.0%	1.0%
Excessive External Earth Loading	6.0%	2.9%	2.9%
Installation Error	29.2%	29.1%	29.2%
Squeeze Off	2.1%	1.6%	1.6%
Point Loading	7.3%	3.8%	3.9%
Previous Impact	1.8%	2.3%	2.3%
Unknown	11.5%	13.8%	13.9%
Other	15.1%	9.4%	9.3%
Cap	5.2%	7.2%	7.2%
Not Recorded	3.2%	4.2%	4.2%
Material Defect	16.9%	24.0%	23.8%
Gopher/rodent/worm damage	0.4%	0.7%	0.7%
Unknown - Not Excavated, Replaced	0.0%	0.0%	0.0%
Unknown - Abandoned	0.0%	0.0%	0.0%
Corrosion	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%

DuPont & Uponor, Aldyl A

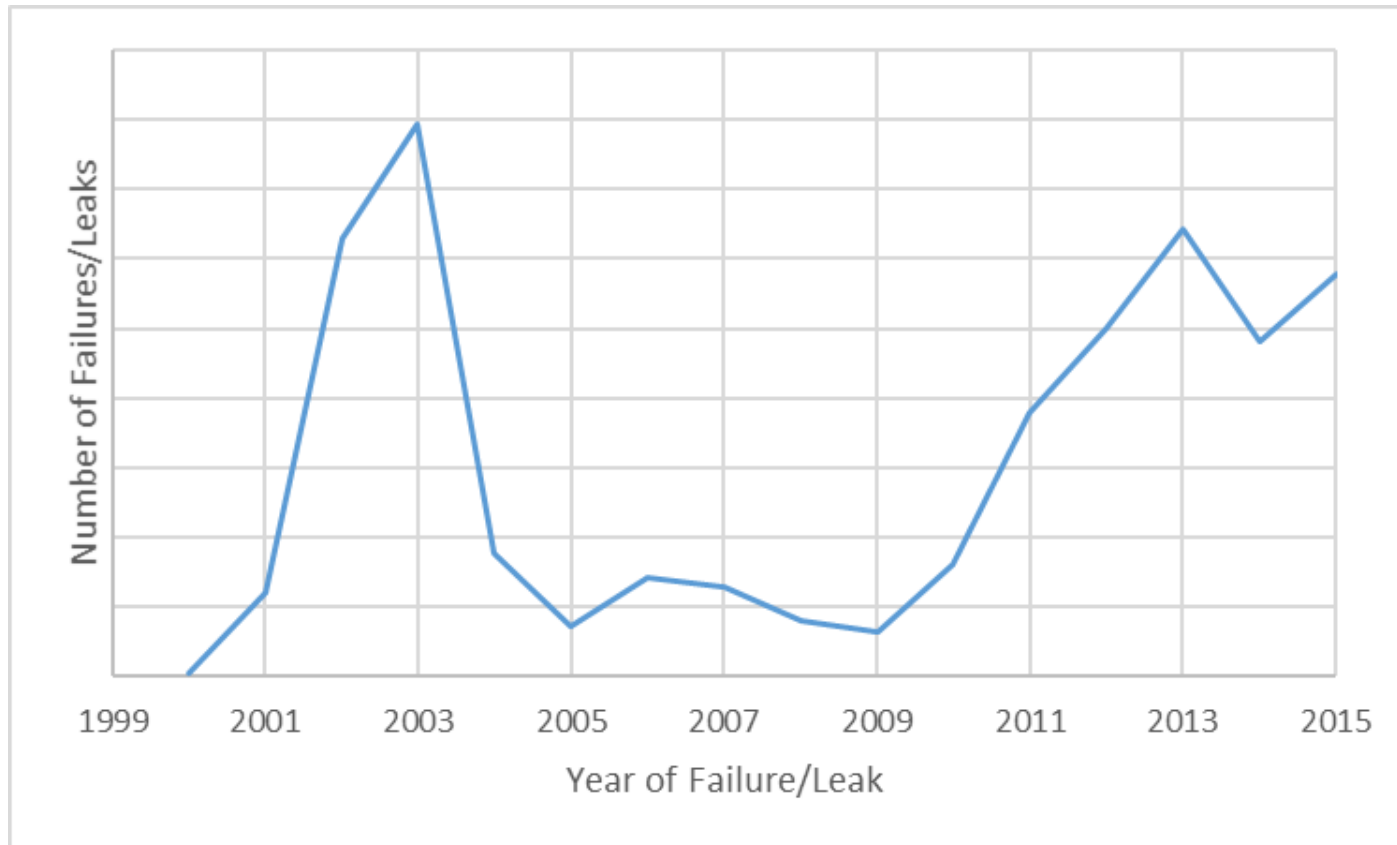
DuPont and Uponor, Aldyl A, piping is not identified as separate from other types of polyethylene in the PHMSA Annual Report information. However, the PPDC includes DuPont and Uponor as manufacturers – Aldyl A is approximately 44% of the database.



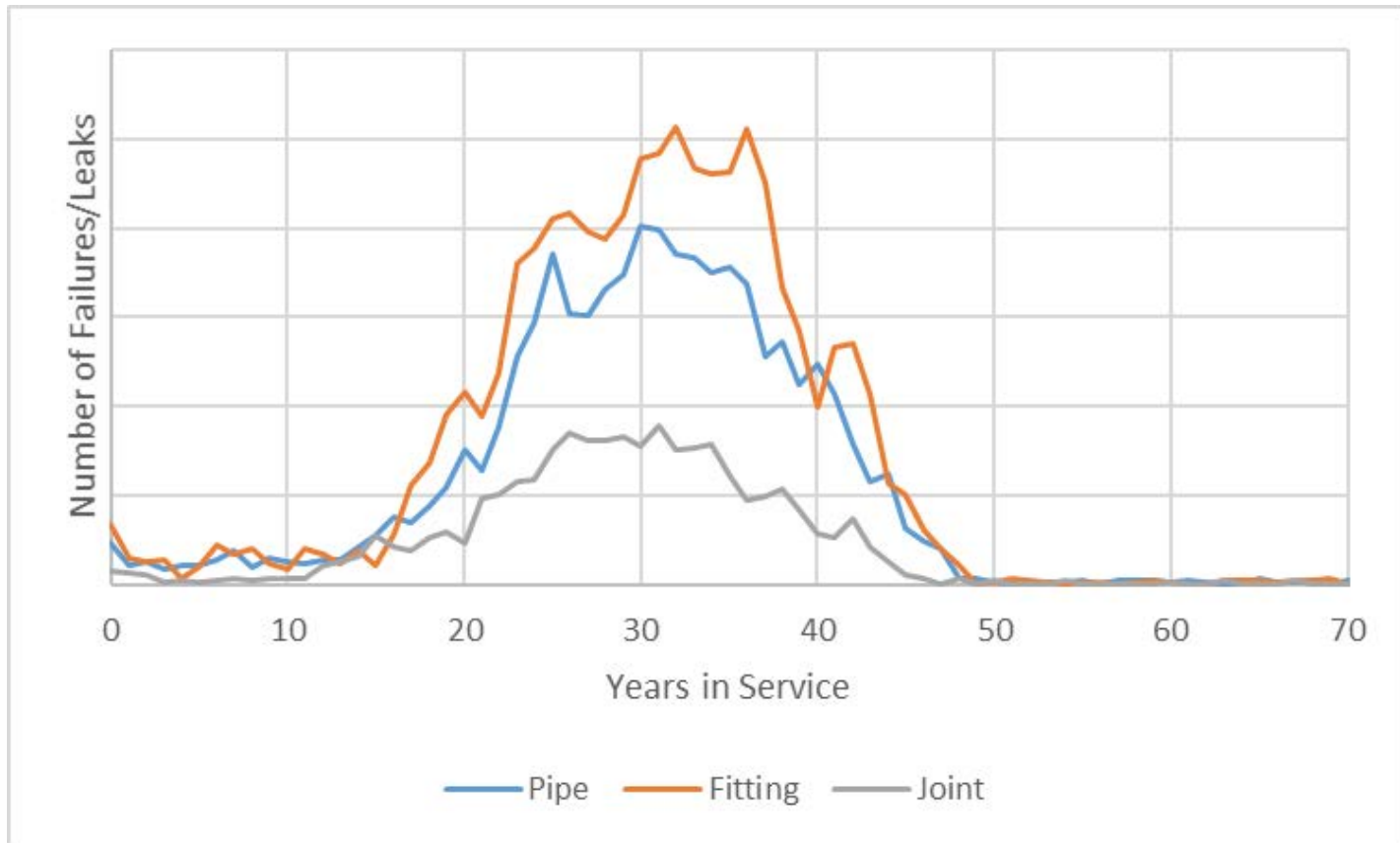
DuPont & Uponor, Aldyl A, Causes

CAUSE	% of All DuPont & Uponor Failures/Leaks	% of DuPont & Uponor Pipe Failures/Leaks	% of DuPont & Uponor Fitting Failures/Leaks	% of DuPont & Uponor Joint Failures/Leaks
Excessive Expansion/Contraction	1.4%	0.8%	0.8%	6.0%
Excessive External Earth Loading	8.5%	14.5%	5.1%	7.3%
Installation Error	26.3%	14.5%	25.6%	64.0%
Squeeze Off	2.3%	6.8%	0.0%	0.0%
Point Loading	10.1%	23.9%	2.6%	5.0%
Previous Impact	1.1%	3.1%	0.1%	0.1%
Unknown	8.7%	8.1%	8.6%	8.9%
Other	19.8%	19.9%	22.5%	1.3%
Cap	3.9%	0.0%	7.4%	0.0%
Not Recorded	2.2%	2.2%	2.0%	2.8%
Material Defect	15.8%	5.9%	25.2%	4.4%
Gopher/rodent/worm damage	0.1%	0.3%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.0%	0.0%	0.0%	0.0%
Unknown - Abandoned	0.0%	0.0%	0.0%	0.0%
Corrosion	0.0%	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%	100.0%

DuPont & Uponor, Aldyl A, Failures by Year of Failure/Leak

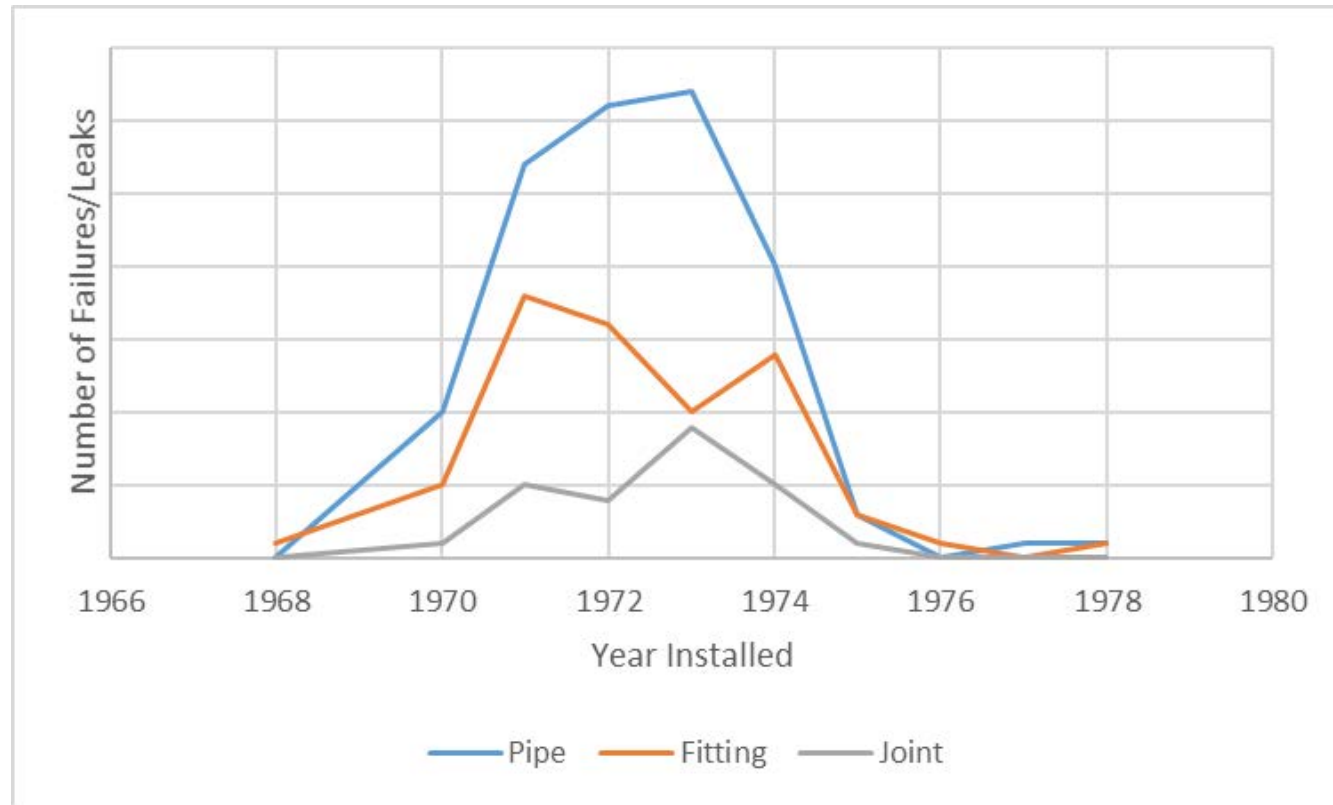


DuPont & Uponor, Aldyl A, Failures by Year in Service





Century Failures

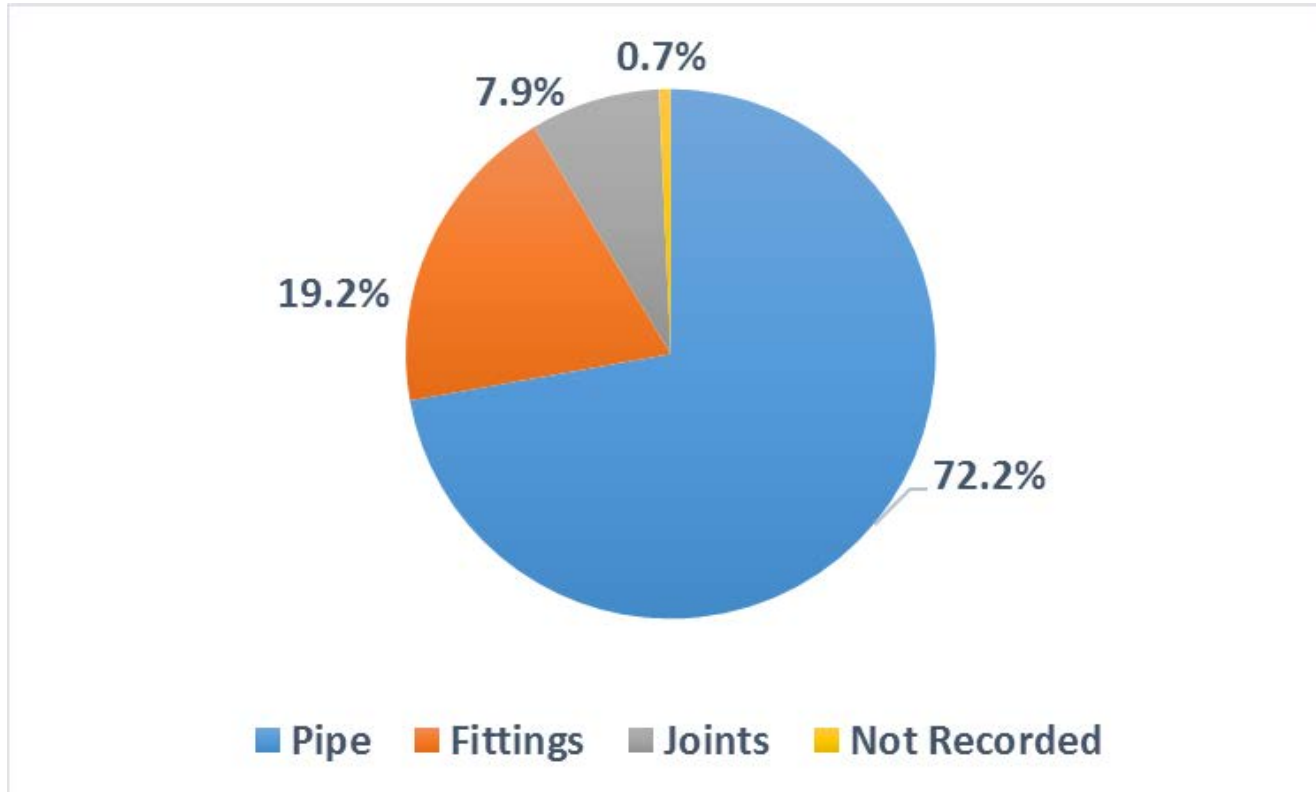


Century Failures by Cause

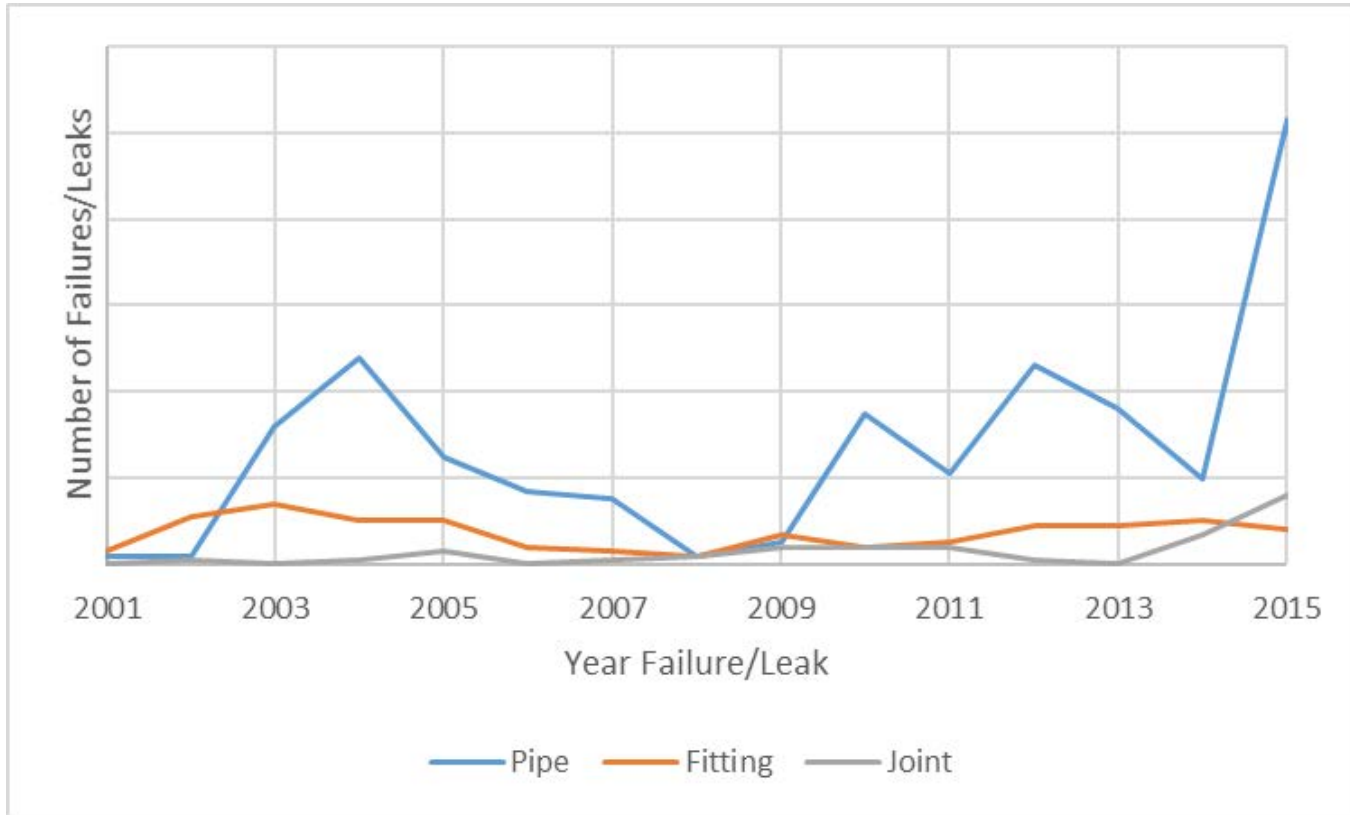
CAUSE	% of All Century Failures/Leaks	% of Century Pipe Failures/Leaks	% of Century Fitting Failures/Leaks	% of Century Joint Failures/Leaks
Excessive Expansion/Contraction	0.0%	0.0%	0.0%	0.0%
Excessive External Earth Loading	0.4%	0.8%	0.0%	0.0%
Installation Error	20.8%	12.7%	25.7%	44.4%
Squeeze Off	0.0%	0.0%	0.0%	0.0%
Point Loading	1.3%	2.4%	0.0%	0.0%
Previous Impact	0.4%	0.8%	0.0%	0.0%
Unknown	6.2%	5.6%	8.6%	0.0%
Other	19.5%	28.6%	5.7%	14.8%
Cap	1.8%	0.0%	5.7%	0.0%
Not Recorded	1.3%	0.0%	4.3%	0.0%
Material Defect	48.2%	49.2%	50.0%	40.7%
Gopher/rodent/worm damage	0.0%	0.0%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.0%	0.0%	0.0%	0.0%
Unknown - Abandoned	0.0%	0.0%	0.0%	0.0%
Corrosion	0.0%	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%	100.0%



PE 3306 Failures



PE 3306 Failures



PE 3306 Failures by Cause

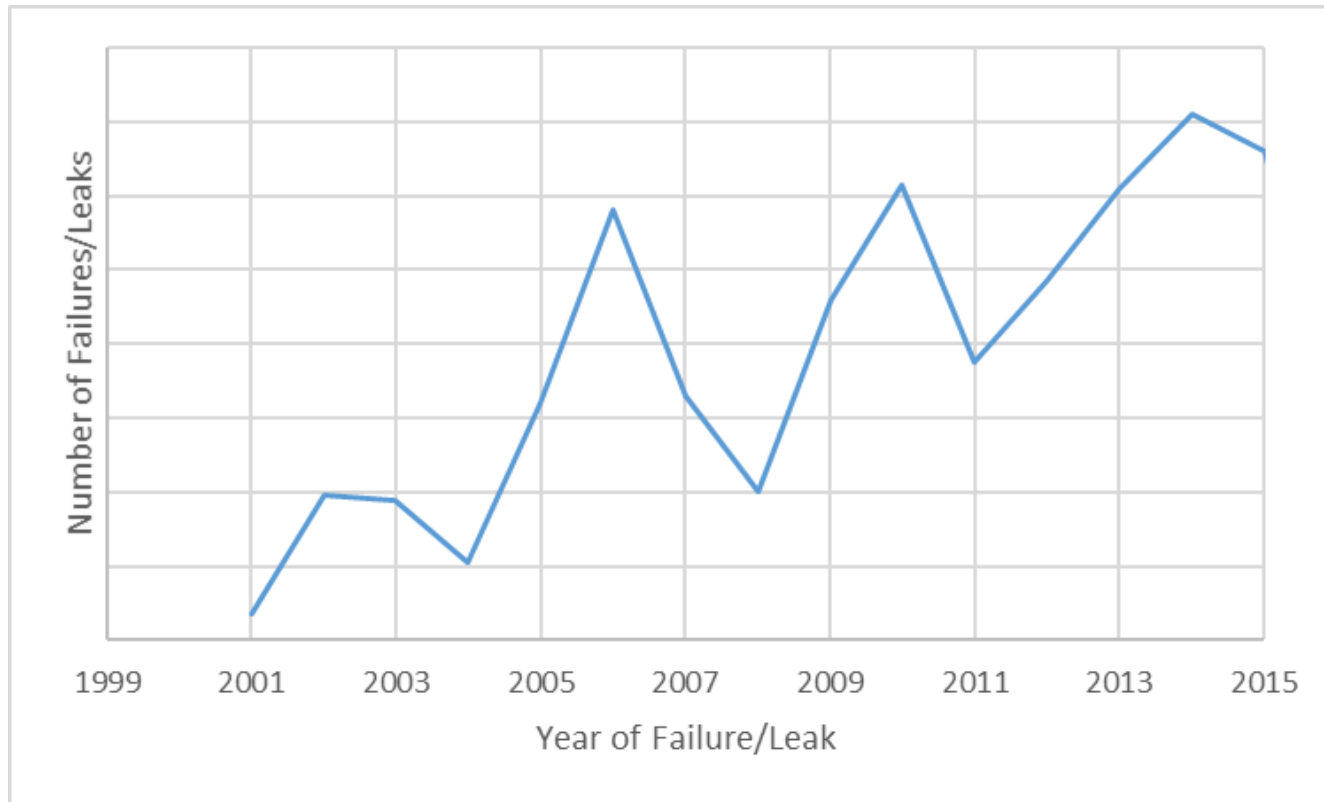
CAUSE	% of All PE 3306 Failures/Leaks	% of PE 3306 Pipe Failures/Leaks	% of PE 3306 Fitting Failures/Leaks	% of PE 3306 Joint Failures/Leaks
Excessive Expansion/Contraction	0.5%	0.5%	0.9%	0.0%
Excessive External Earth Loading	6.3%	6.8%	3.7%	8.9%
Installation Error	5.3%	1.0%	11.9%	28.9%
Squeeze Off	31.7%	42.4%	5.5%	0.0%
Point Loading	14.1%	18.0%	4.6%	2.2%
Previous Impact	1.2%	1.5%	0.9%	0.0%
Unknown	19.7%	16.3%	33.0%	13.3%
Other	7.0%	6.3%	3.7%	22.2%
Cap	0.5%	0.0%	2.8%	0.0%
Not Recorded	2.3%	1.2%	5.5%	2.2%
Material Defect	10.7%	5.4%	26.6%	22.2%
Gopher/rodent/worm damage	0.0%	0.0%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.4%	0.5%	0.0%	0.0%
Unknown - Abandoned	0.0%	0.0%	0.0%	0.0%
Corrosion	0.2%	0.0%	0.9%	0.0%
	100.0%	100.0%	100.0%	100.0%

Cap Failures by Cause

Cause	% of Dupont Caps Failures/Leaks	% of Plexco Caps Failures/Leaks	% of Other Manufacturer Caps Failures/Leaks
Excessive Expansion/Contraction	0.4%	0.0%	0.5%
Excessive External Earth Loading	0.3%	0.6%	0.1%
Installation Error	17.4%	2.6%	38.2%
Squeeze Off	0.0%	0.0%	0.0%
Point Loading	0.4%	0.3%	0.1%
Previous Impact	0.0%	0.0%	0.0%
Unknown	3.0%	2.2%	1.6%
Other	5.9%	11.2%	3.7%
Cap	15.3%	19.6%	20.4%
Not Recorded	2.4%	2.1%	2.3%
Material Defect	54.6%	61.2%	32.7%
Gopher/rodent/worm damage	0.2%	0.0%	0.0%
Unknown - Not Excavated, Replaced	0.0%	0.1%	0.3%
Unknown - Abandoned	0.0%	0.0%	0.2%
Corrosion	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%



Amp Failures



Amp Failures by Cause

CAUSE	% of AMP Failures/Leaks
Excessive Expansion/Contraction	3.7%
Excessive External Earth Loading	17.2%
Installation Error	12.7%
Squeeze Off	0.0%
Point Loading	1.0%
Previous Impact	0.1%
Unknown	23.1%
Other	2.5%
Cap	0.0%
Not Recorded	1.9%
Material Defect	37.8%
Gopher/rodent/worm damage	0.0%
Unknown - Not Excavated, Replaced	0.0%
Unknown - Abandoned	0.0%
Corrosion	0.0%
	100.0%

Examples of Questions Received by PPDC

- PPDC Answers questions from any interested party
- The following questions and responses were reviewed by the PPDC at their August 2016 meeting.
- **Question from AGA member:** Is the industry seeing any trends regarding Permasert® coupling failures and, if so, is there concrete evidence? What is the general consensus on this product? Is it a product that has a finite life and at a certain time, it begins to fail? Is there a reason (with concrete evidence) to stop using these?
- **Response from PPDC:** The PPDC collects data by manufacturer (Perfection) not by brand (Permasert). The fitting types are collected as mechanical fittings and are not broken down further. Additional data on stab type mechanical fittings is available in the PHMSA Mechanical Fitting Failure Report database.
<http://phmsa.dot.gov/portal/site/PHMSA/menuitem.6f23687cf7b00b0f22e4c6962d9c8789/?vgnextoid=06cc95f181584410VgnVCM100000d2c97898RCRD&vgnnextchannel=3430fb649a2dc110VgnVCM1000009ed07898RCRD&vgnnextfmt=print> . In looking at comments submitted to the database, there were few references to Permasert within the Perfection data.



Examples of Questions Received by PPDC

- PPDC Answers questions from any interested party
- The following questions and responses were reviewed by the PPDC at their December 2015 meeting.
- **Question from ASTM F17.20:** What does the PPDC database show for failures/leaks on sidewall heat fusion joints? Are there specific trends relating to preparation of the joint?
- **Response from the PPDC:** Saddle fusions are a type of joint on the failure report form. Saddle fusions represent 1.4% of all data submitted to the PPDC. 63.5% of these failures/leaks were caused by installation error. The majority were installed prior to 1985. Limited information, with regard to specific aspects of the installation error, was reported. Approximately 90% of the saddle fusion failures/leaks were on piping 3” and under.



Examples of Questions Received by PPDC

- Question from AGA: Should Aldyl A and Century failure data still be submitted?
- Response from the PPDC: Yes, additional data points support additional analysis.



Examples of Questions Received by PPDC

- Question from NAPSR: What does the PPDC database show for Handley curb valves? Is there any trend in data since 2007? Are they still being manufactured?
- Response from the PPDC: Handley represents less than 0.1% of the data submitted to the PPDC. The data does indicate an increasing trend of failures/leaks since 2007. Due to the small amount of data submitted, we suggest NAPSR encourage operators who have Handley curb valves in their plastic piping systems to submit data. Handley is not currently listed in the manufacturer database available on the PPDC website. However, Handley has a currently active website; and produces natural gas carrying components.



What does this data mean to you?

192.1007 requires that an operator must demonstrate an understanding of its gas distribution system developed from reasonably available information

- PPDC Status Report includes analysis of specific, nationwide, data
 - Failures/Leaks on newly installed pipe
 - ABS, PVC and PE leaks by component and cause
 - DuPont & Uponor
 - Century
 - AMP
 - 3306
 - Manufacturers Database
 - Plastic Piping Timeline
 - PVC
 - Caps

What does this data mean to you?

192.1007 requires that an operator must consider reasonably available information to identify existing and potential threats.

5 historically known areas of concern are reflected in the PPDC database:

- Century Utility Products polyethylene (PE) pipe produced from 1970 through 1974
- DuPont Aldyl® A low ductile inner wall PE pipe manufactured from 1970 through 1972
- PE pipe manufactured from PE 3306 resin such as Swanson, Orangeburg and Yardley
- DuPont Aldyl® service punch tee with a white Delrin® polyacetal threaded insert
- Plexco service tee with Celcon® polyacetal threaded cap

What does this data mean to you?

For programs dealing with plastic piping concerns

- PPDC Status Report includes analysis of specific data
 - ABS, PVC and PE leaks by component and cause
 - DuPont & Uponor
 - Century
 - PE 3306
 - AMP fittings
 - Caps

What does this data mean to you?

- Many public gas systems use SHRIMP (Simple Handy Risk-based Integrity Management Plan) in developing their DIM Programs.
- SHRIMP uses PPDC published information as part of its risk determination model. APGA SIF looks at the data as SHRIMP continues to develop.
- For individual systems, PPDC information can indicate potential areas to examine in evaluating risks as part of a Distribution Integrity Management Program. Some of these are: material failure trends, years in service trends, cause and failure location.

How might States use the info?

- States might use the list of active submitters to see which companies in their state are or are not participating
- States might use the PPDC analysis publicly available to inquire whether those issues are relevant to a certain operator, and if so, what is being done about it in the context of DIMP
- Responses to questions may also aid in determining what issues to expect

For more information, consult AGA's website at
<http://www.aga.org/Kc/OperationsEngineering/ppdc/Pages/default.aspx>

Or Contact

Kate Miller at (202) 824-7342; kmiller@aga.org

Or

Junaid Faruq at (202) 824-7335; jfaruq@aga.org



Questions?

Thank you for your support of the Plastic
Pipe Database Initiative