NEXT SHALE 2017

Organized by: dmg::events

Navigating the Future of Unconventional Resources

FORGO FUSION: Reusable Mechanical System for HDPE Piping Systems

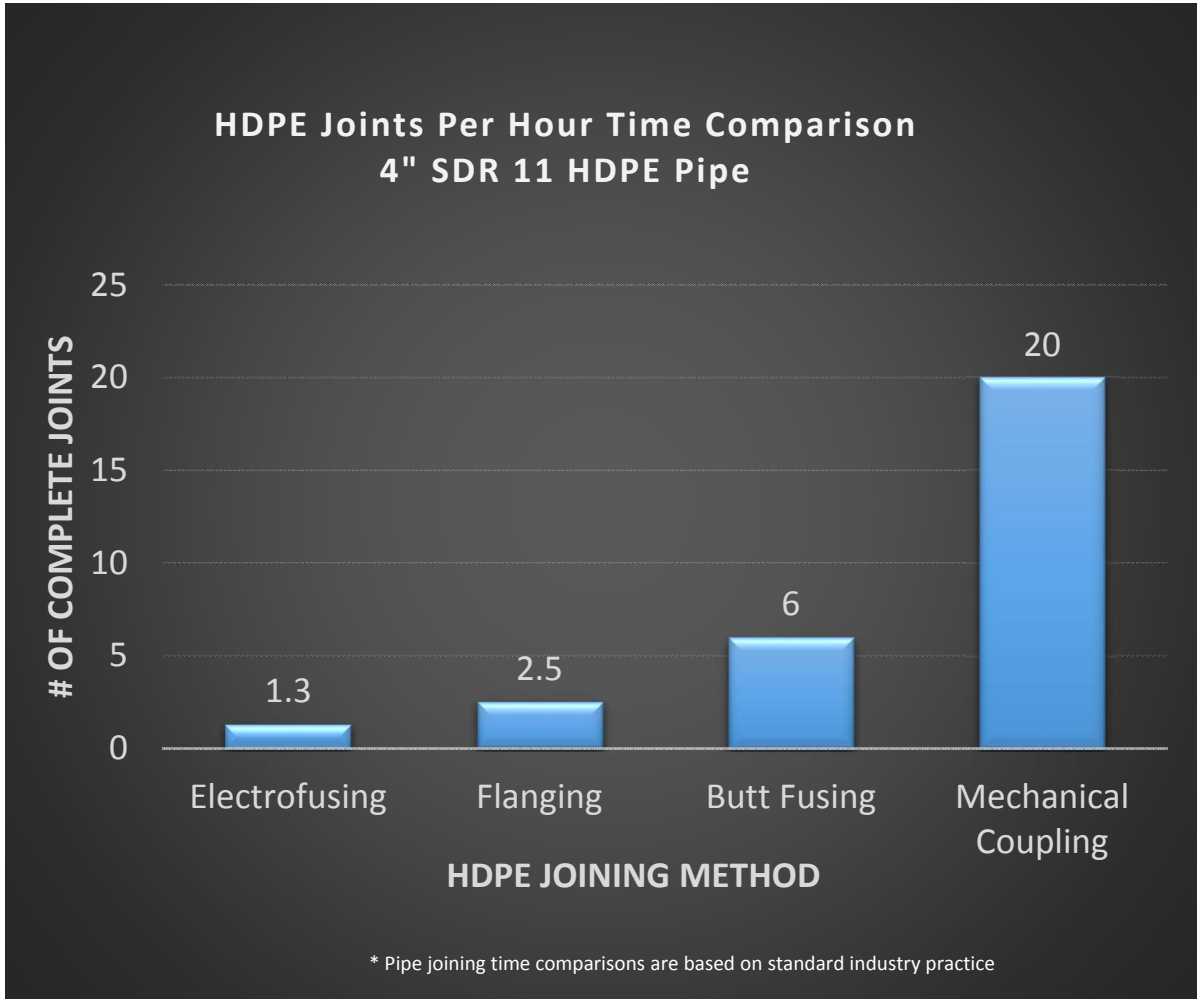
VICTAULIC

NS17 - 153

Common HDPE Joining Methods

- **Electrofusion**
  - **Heat applied**
- **Flanging**
  - **Flange is fused to pipe**
  - **Joints are bolted**
- **Butt Fusion**
  - **Heat applied**
- **Mechanical coupling**
  - **2-Methods**
    1. **Plain end pipe**
       - **Couplings with sharp teeth are bolted on**
    2. **Pipe is grooved**
       - **Couplings are bolted on**

Common HDPE Joining Methods



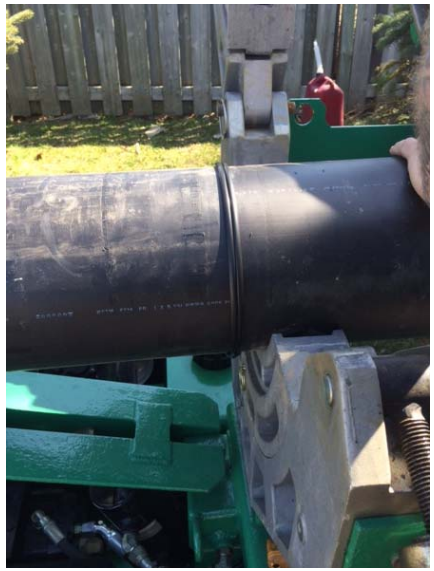
Fusion Pros and Cons

Pros

- Industry accepted practice
- Joint “as strong as the pipe”

Cons

- Equipment purchase or daily rental charges
- Weather Dependent
- Space requirements
- Trained operators
- Maintenance
- Inspection-visual indicator of good joint
- Increased labour costs per joint



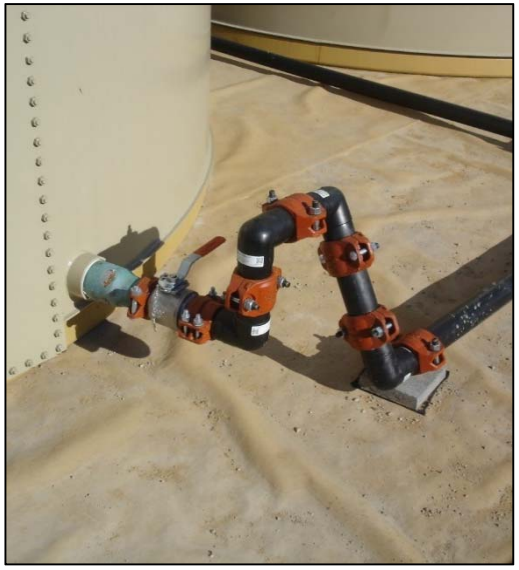
HDPE Fusing with McElroy Unit 18” DR11

Task Description	Elapsed Time
Start up machine	00:30
Turn on heating plate	00:45
Install pipe lengths*	03:30
Set system pressures	06:30
Face pipe ends on cutter wheel	09:00
Once heater reaches temp, heat pipe with heating plate	25:00
Join pipe and let cool	25:15
Remove joint from machine	**53:15**

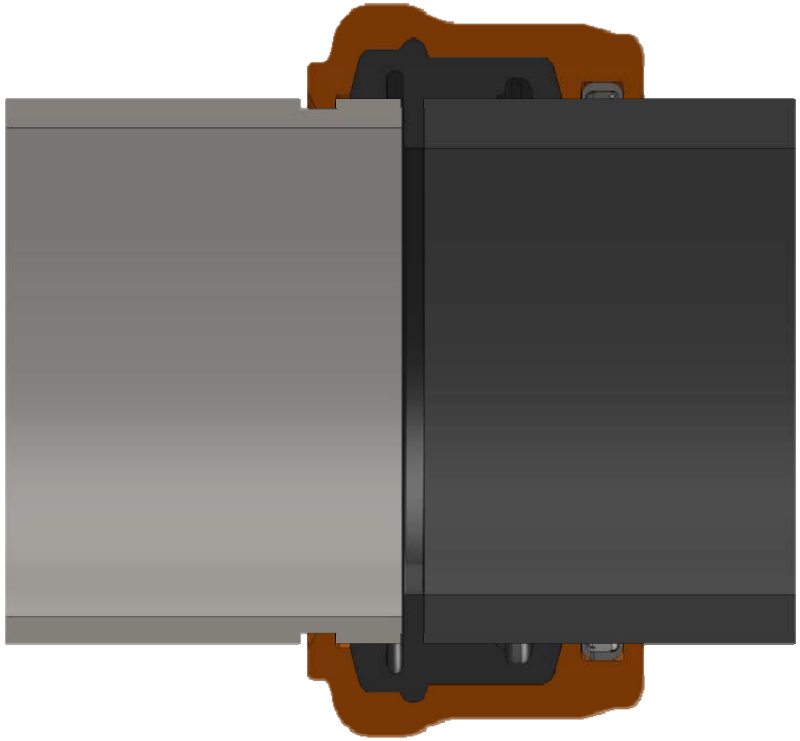
Mechanical Joining: Engineered to be the Quickest & Most Reliable Method

- Directly joins HDPE without heat
- Temperature/environment does not effect installation time
- Retaining rings engage into pipe wall OD
- Visual confirmation of installation
- Reusable yet permanent pipe joint
- Can be dragged as if fused
- 2 Methods
  - Field assembly required
  - Ready to install

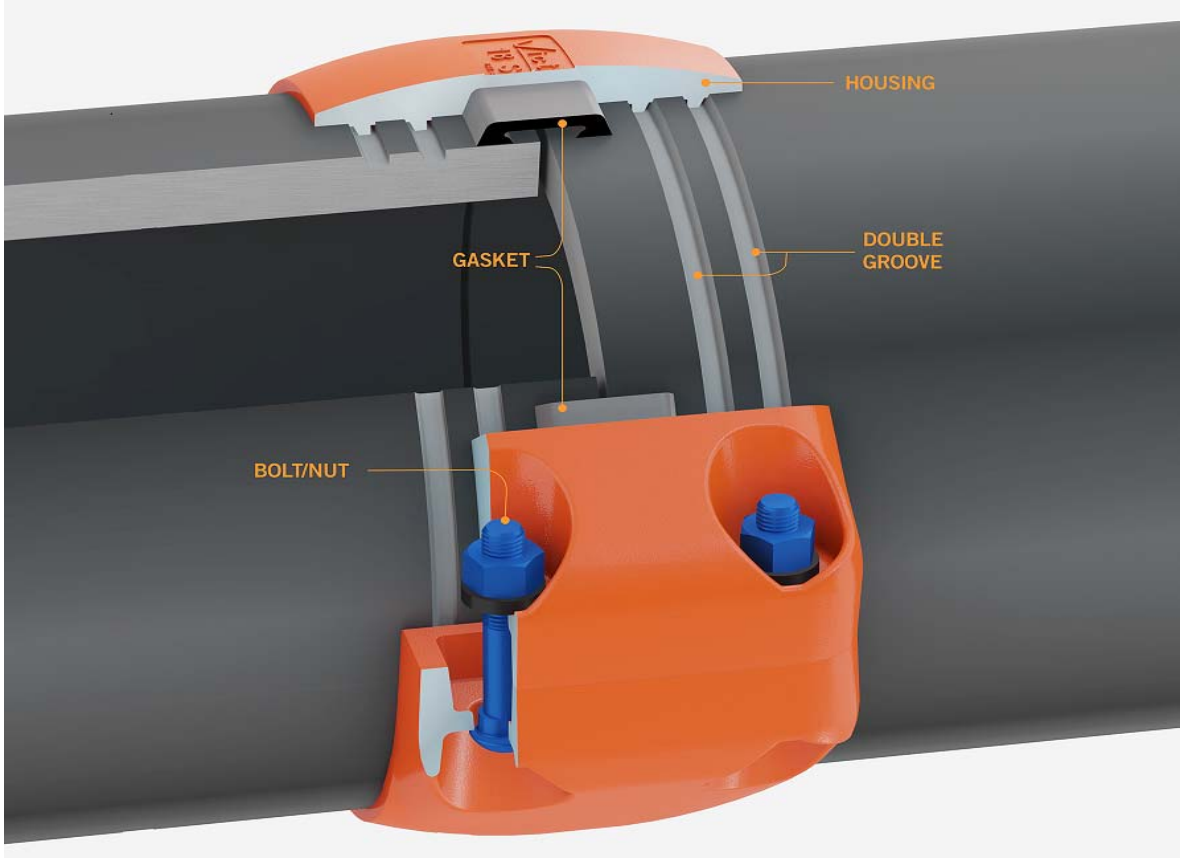
Mechanical Joining: How it Works



Style 907 Transition Coupling

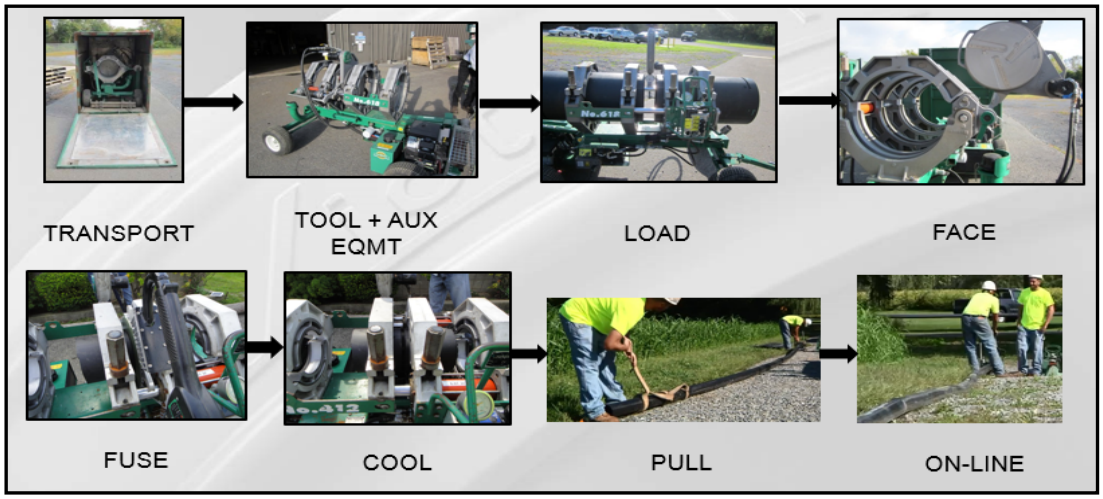


Style 908 Coupling for Double Grooved HDPE Pipe



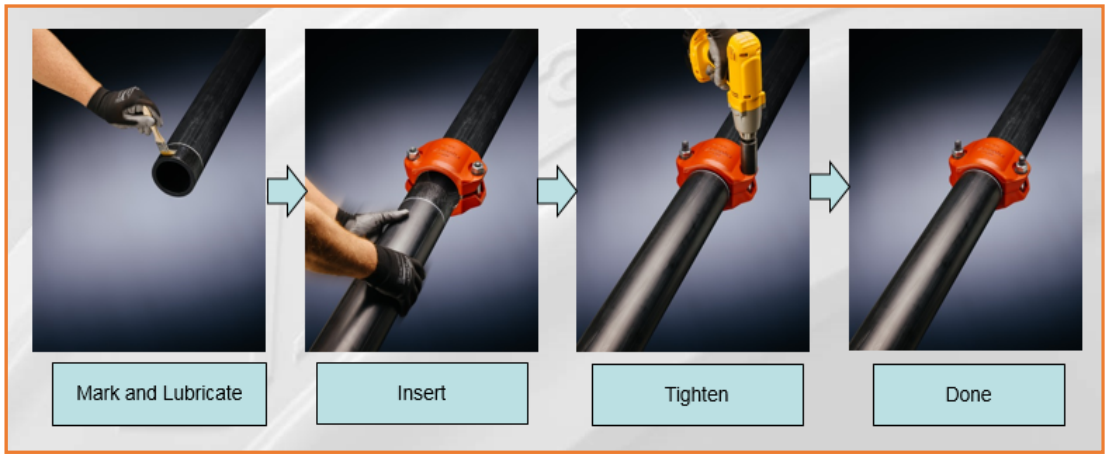
Installation Comparison

FUSION



VS.

MECHANICAL



Mechanical Joining Benefits

Up to 10X faster

- Immediately in service
- Vertical installations simplified
- Ideal for tight spaces

Weather independent installation

- Weather is not a factor- no tents required
- No heating or cooling time required

No Power Required

- Hand tools or impact wrench
- No special training or regular certification needed

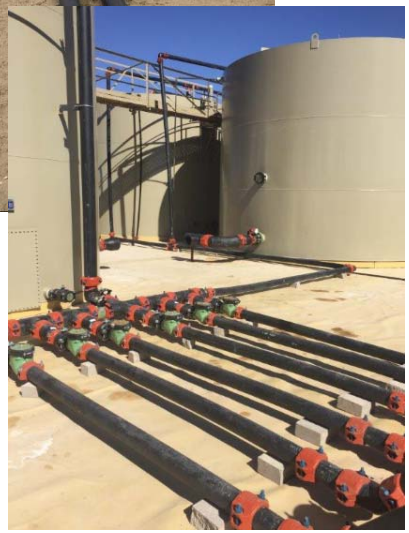
Meets or Exceeds the Rating of the Pipe

- Coupling will fail before the pipe

Hand tools or impact wrench

Reduces safety concerns

- No hot plate or sharp knives needed



Reliability: Style 905 Joint Performance

PE4710 SDR 11

Style 905 coupling *(Installation-Ready™)*

	IPS size	2”		3”		4”		6”	
	Weight, Lbs	5.1		7.3		9.8		16.7	
Performance	Specification	Spec	Test	Spec	Test	Spec	Test	Spec	Test
Hydrostatic Burst, psi	ASTM-F714	200	2.5 X	200	2.5 X	200	2.5 X	200	2.5 X
End Pull Load, lbs	ASTM F1804	1600	2.0 X	3475	1.5 X	5750	1.5 X	12450	1.2 X
Min bend radius, inches	PPI TN-27	60	0.5 X	88	0.55 X	112	0.45 X	166	0.4 X

Reliability: Style 907 Joint Performance

PE4710 SDR 11

Style 907 transition *(HDPE to grooved, Installation-Ready™)*

	IPS size	**2”**		**3”**		**4”**		**6”**	
	Weight, Lbs	5.1		7.3		9.8		16.7	
Performance	Specification	Spec	Test	Spec	Test	Spec	Test	Spec	Test
Hydrostatic Burst, psi	ASTM-F714	200	2.5 X	200	2.5 X	200	2.5 X	200	2.5 X
End Pull Load, lbs	ASTM F1804	1600	2.0 X	3475	1.5 X	5750	1.5 X	12450	1.2 X
Min bend radius, inches	PPI TN-27	60	0.5 X	88	0.55 X	112	0.45 X	166	0.4 X

Pressure Test Performance

- 4" HDPE SDR-11 Pipe failed at over 700 PSI
- Coupling joint remains intact

Victaulic Style 905 Coupling

Victaulic

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All Weather Installation

Can be installed in all weather conditions

- Rain
- Snow
- Sleet
- Wind/dust

11 total inches of rain over 1 week of installation. No downtime.

Constructive Productivity

HDPE Pipe Wall SDR 11- Size-In.	Fused Joints/ Hr.	Victaulic 905 Joints/Hr.
3	5	20
4	4	20
6 & 8	3	18
HDPE Pipe Wall SDR 11- Size-In.	**Fused Joints/ Hr.**	**Victaulic 908 Joints/Hr.**
10	2	10
12	1.75	10
14	1.50	10
16	1.50	10
18 & 20	1.50	8
24	1	8

Mechanical Joining Case Study

FOX CREEK FRAC, ALBERTA

Installation Efficiency

- 2 minutes per 4"/100mm joint versus 15 minutes to fuse
- 4"/100mm 90 degree elbow with 2 connections took 4 minutes versus 30 minutes to fuse

Safety

- eliminating the use of chain saws to buck up the pipe

Reusable Asset

- joints can be reused and taken to the next site

Water Transfer Applications

Layflat Hose

- Mechanical joining for easy connections and disassembly
- HDPE and Carbon Steel

Pigging Applications

Mechanical Joining vs Flanged

- A union at every joint for easy disassembly and relocation without any large equipment
- Less nuts and bolts vs flanges
- Easy transition to HDPE, steel or lay flat hoses eliminating extra tools and transitions

10” Flanged: 52.4% and 522.2 lbs heavier than mechanically grooved