

Qualification of Persons Joining Plastic Pipe and Components

Nebraska Pipeline Safety Seminar, Grand Island, NE

March 11, 2014

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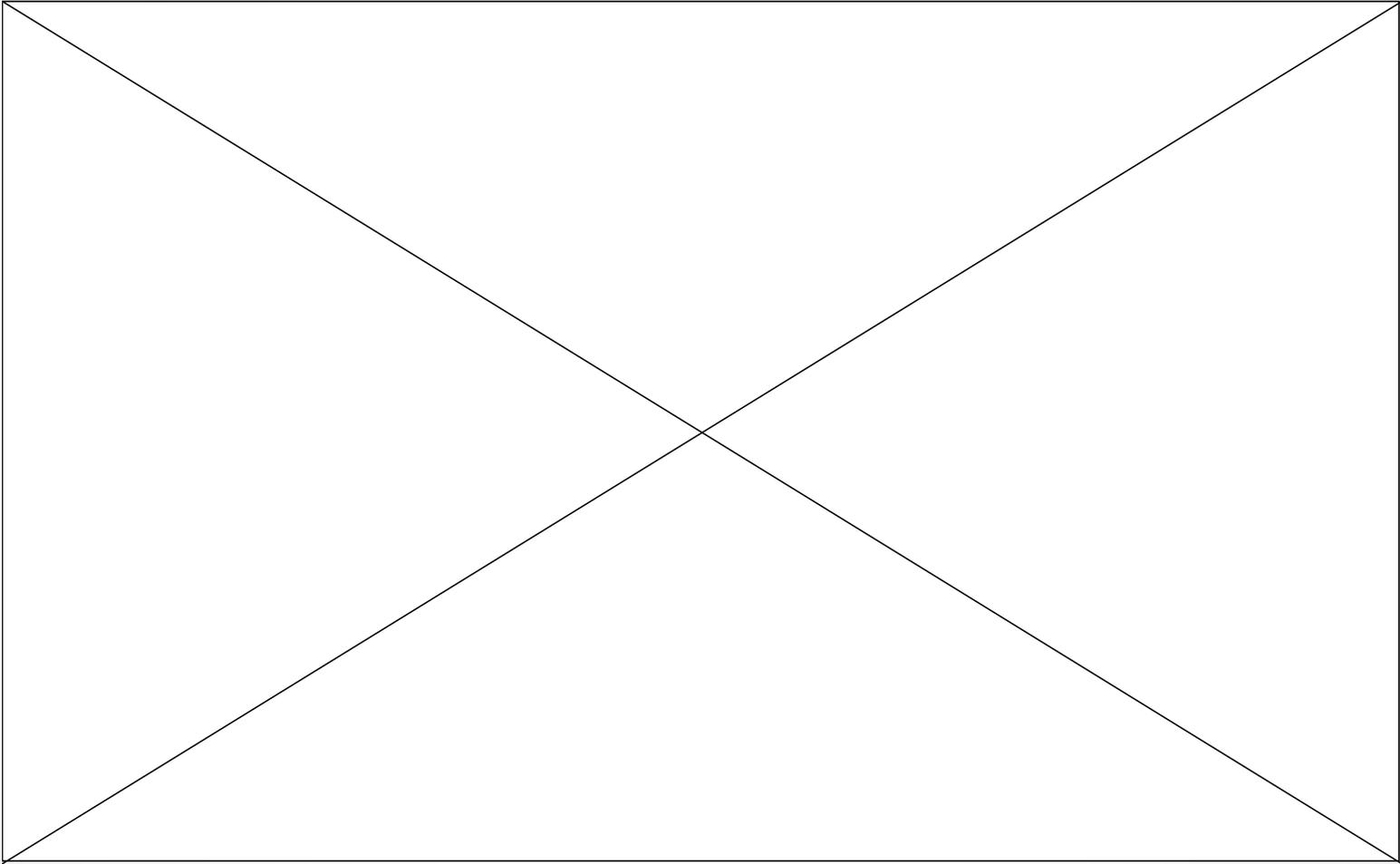
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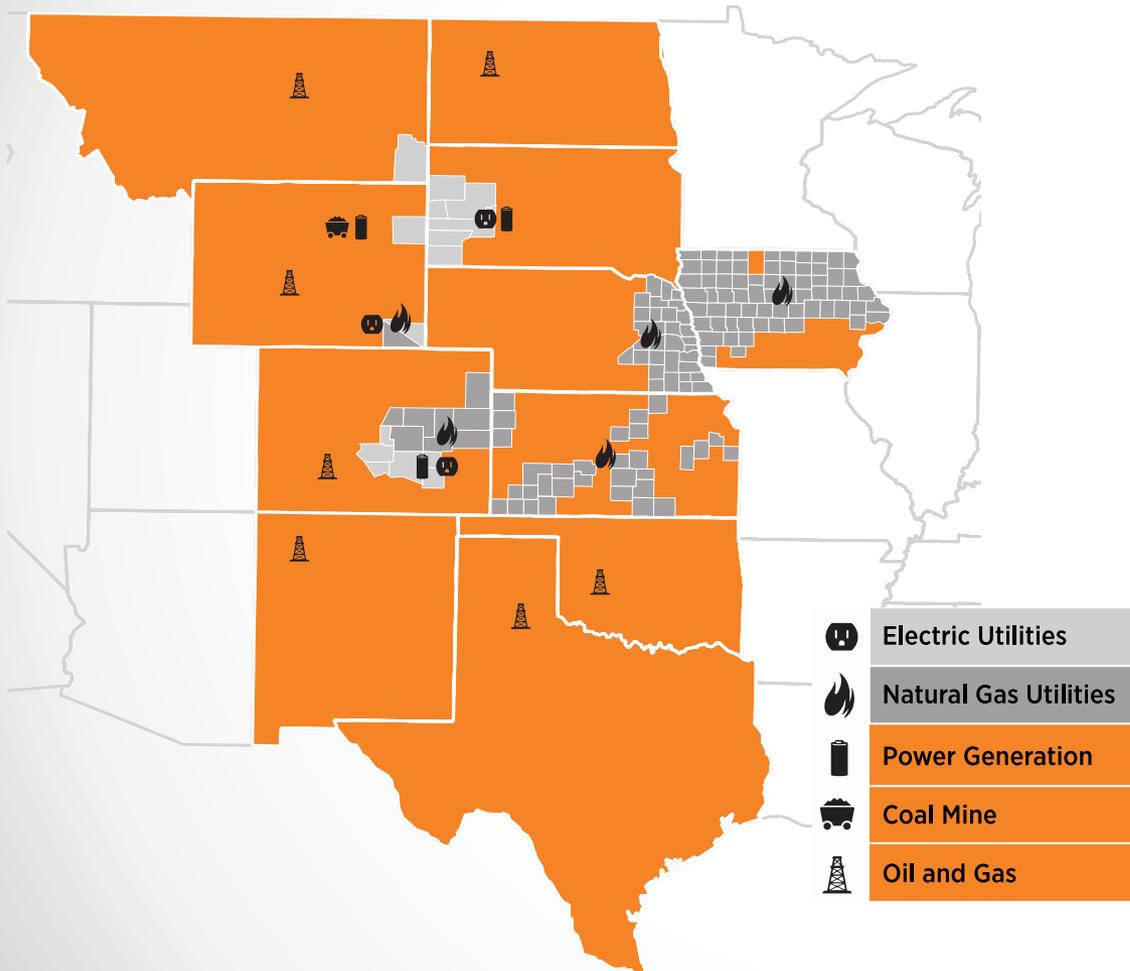
Safety First!!!



Black Hills Corporation Overview

A diversified energy company with a tradition of exemplary service and a vision to be the energy partner of choice.

Based in Rapid City, SD, with corporate offices in Denver, CO, and Papillion, NE, the company serves 769,000 utility customers in Colorado, Iowa, Kansas, Montana, Nebraska, South Dakota and Wyoming. The company's non-regulated businesses generate wholesale electricity and produce natural gas, crude oil and coal. Employees partner to produce results that *improve life with energy*.



Utilities, Power Generation & Fuel Production

Utilities

Electric Utilities

- Black Hills Power
- Cheyenne Light*
- Colorado Electric

Gas Utilities

- Colorado Gas
- Kansas Gas
- Nebraska Gas
- Iowa Gas

Non-Regulated Energy

Power Generation

- Black Hills Electric Generation

Coal Mining

- Wyodak Resources

Oil and Gas

- Black Hills Exploration and Production

* Utility supplies electric and gas service to Cheyenne, Wyoming and vicinity



Code Requirements

Code Requirements

- §192.285 Plastic pipe: Qualifying persons to make joints
 - (a) No person may make a plastic pipe joint unless that person has been qualified under the applicable joining procedure by:
 - (1) Appropriate training or experience in the use of the procedure; and
 - (2) Making a specimen joint from pipe sections joined according to the procedure that passes the inspection and test set forth in paragraph (b) of this section.

Code Requirements

- §192.285 Plastic pipe: Qualifying persons to make joints
 - (b) The specimen joint must be:
 - (1) Visually examined during and after assembly or joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure; and
 - (2) In the case of a heat fusion, solvent cement, or adhesive joint:
 - (i) Tested under any one of the test methods listed under §192.283(a) applicable to the type of joint and material being tested;
 - (ii) Examined by ultrasonic inspection and found not to contain flaws that would cause failure; or
 - (iii) Cut into at least 3 longitudinal strap, each of which is:
 - (A) Visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area; and
 - (B) Deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

Code Requirements

- §192.285 Plastic pipe: Qualifying persons to make joints
 - (c) A person must be requalified under an applicable procedure, if during any 12-month period that person:
 - (1) Does not make any joints under that procedure; or
 - (2) Has 3 joints or 3 percent of the joints made, whichever is greater, under that procedure that are found unacceptable by testing under §192.513.
 - (d) Each operator shall establish a method to determine that each person making joints in plastic pipelines in the operator's system is qualified in accordance with this section.

Code Translation

- No one can make a plastic joint unless they have been trained on the procedure and make a joint using the procedure.
- Sample joints must pass a visual inspection while being made and after completion.
- Completed sample joints must pass testing (destructive)
- Joiners must be requalified every 12 months (waivers notwithstanding)
- Operators must have a method to qualify joiners



BHE Qualification

BHE Qualification

- Use “train the trainer” approach
- Engineering personnel and representatives train and qualify “Expert Trainers” and “Apprentice Trainers”
- Expert Trainers train and qualify BHE Technicians and contractor personnel
- Classroom sessions on joining procedures and other O&M topics.
- Hands-on qualification for butt fusion, saddle fusion, electrofusion, socket fusion, solvent joining, & mechanical joining.

BHE Qualification

- To obtain qualification trainees must pass the following:
 - Written PE exam – 50 true/false & multiple choice questions – 80% to pass
 - Written AOC exam – 9 short answer questions – 100% to pass
 - Visual exam – Evaluate 33 joint examples – 80% to pass
 - Hands-on visual – Make all joints under observation of training personnel
 - Hands-on destructive – All sample joints destructively tested
- Failures during training
 - Any failed test, can take retest immediately.
 - Subsequent failures result in full retraining.
- Failures in field
 - Pressure test or rejection by inspector after joiner allows joint in system
 - Qualifications revoked – no further joining until re-qualified.

INSPECTOR/JOINER CERTIFICATION TEST REPORT

Name (Print):				Company Name:			
Social Sec. No. (Last 4 digits):				Employee No:		Phone:	
Test Location (City/State):				E-mail Address:			
Test Type	Steel Written	Steel Visual	Plastic Written	Plastic Visual	Mechanical Written	Mechanical Visual	Excavation Written
Knowledge Test Score							
*AOC ✓	<input type="checkbox"/>						

*AOC = Abnormal Operating Conditions/AOC Test Score Must Be 100% To Pass

MDPE = Medium Density Polyethylene (PE 2406, PE 2708)

HDPE = High Density Polyethylene (PE 3408, PE 4710, PE 100)

	Fusion Description	VISUAL		DESTRUCTIVE		MECHANICAL VISUAL	
		Pass	Fail	Pass	Fail	Pass	Fail
Butt Heat Fusion All Sizes	MDPE					MaxiGrip	
	HDPE					MetFit	
	HDPE X MDPE					Normac	
Saddle Heat Fusion All Sizes	MDPE					Dresser 90-Universal	
	HDPE					Dresser 401/501	
	MDPE Tee X HDPE Pipe**					Dresser 711	
**Note: HDPE 1/2" CTS Outlet Tee not approved for use.							
Electrofusion All Sizes	MDPE, HDPE, & Aldyl A - Coupling					Continental Stl. Tee Service Outlet	
	MDPE, HDPE, & Aldyl A - Tee					Continental Stl. Tee Saddle	
PVC Solvent Cement	All Sizes					Continental 48 PVC/PE Trans	
						Continental PA-11 Eliminator - PVC	
Socket Heat Fusion	All Sizes					Perfection Permasert	
						Perfection Permalock	
Other Mechanicals/Equipment Not Listed						Perf. Permasert XL	
						ConStab	

FUSION EQUIPMENT

McElroy Equipment	Visual		Destructive		Miscellaneous Equipment	Visual		Destructive	
	Evaluator Initials		Evaluator Initials			Evaluator Initials		Evaluator Initials	
	Pass	Fail	Pass	Fail		Pass	Fail	Pass	Fail
2CU/2LC/4CU/N14 Butt					Battery Box				
2CU Saddle					Barcode				
28 Butt					Dedicated Central				
Sidewinder									

This document certifies that the above named has successfully completed training according to Black Hills Energy's written procedures and is qualified as indicated below (mark all that apply):

- Plastic Inspector
 Steel Distribution Inspector
 Mechanical Fitting Inspector
 Apprentice Trainer
 Plastic Joiner
 Excavation Inspector
 Mechanical Joiner
 Expert Trainer

Certified by:	Date:
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Form 48-4218 (Rev. 10/14/13)

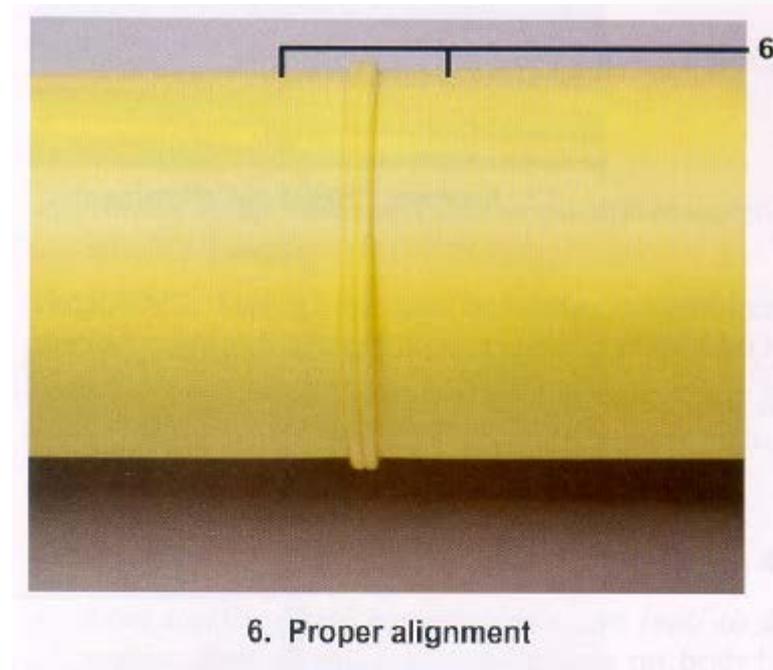
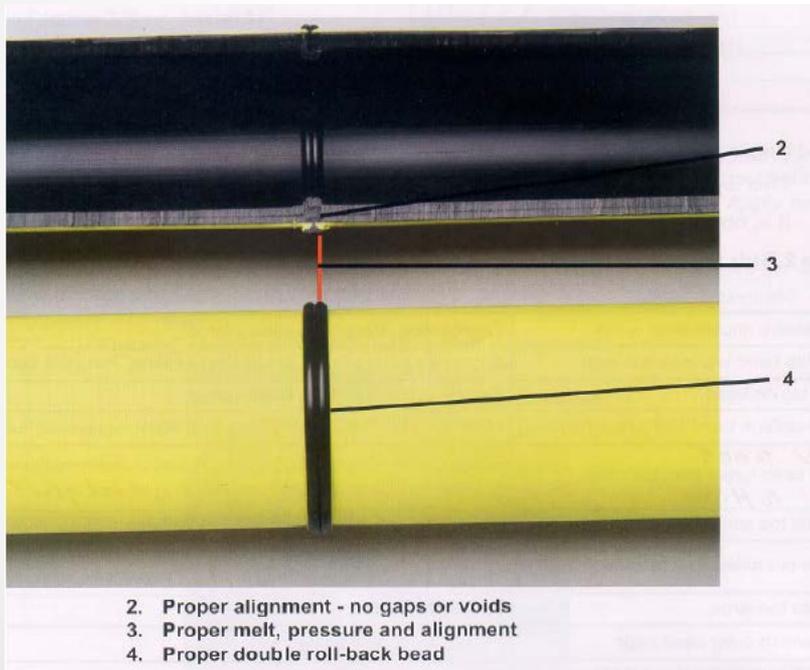


Butt Fusion

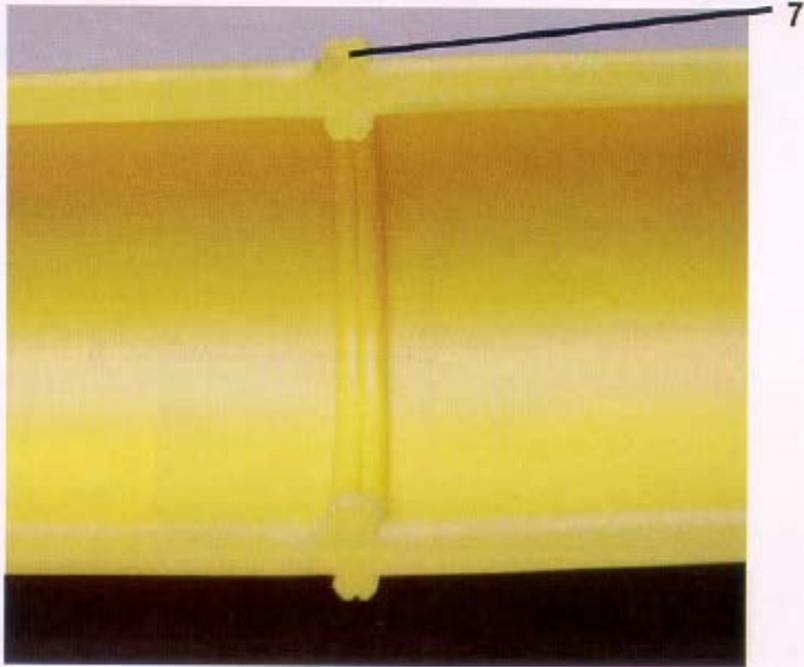
Butt Fusion

- Key elements:
 - Pipe prep (clean, dry, free of defects)
 - Proper facing (until stops bottom out, remove debris)
 - Proper alignment (high/low, reface after adjustments)
 - Correct iron temp (pyrometer, iron gauge indicates internal temp)
 - Proper melt procedure (contact with iron, no additional force; increase time, not temp or pressure)
 - Correct joining of melted ends (check for proper melt, do not slam together, achieve double roll back)
 - Sufficient cooling time (holding pressure, after pressure released)
 - Visual inspection (proper bead size, uniform, alignment; HD material smaller bead than MD material)
 - **When in doubt, cut it out!!!**

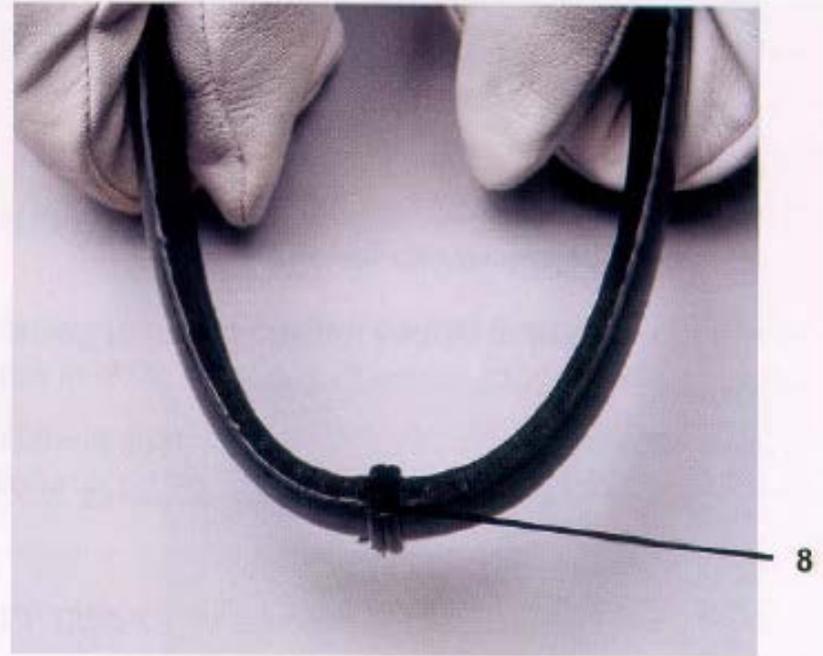
Butt Fusion - Acceptable



Butt Fusion - Acceptable

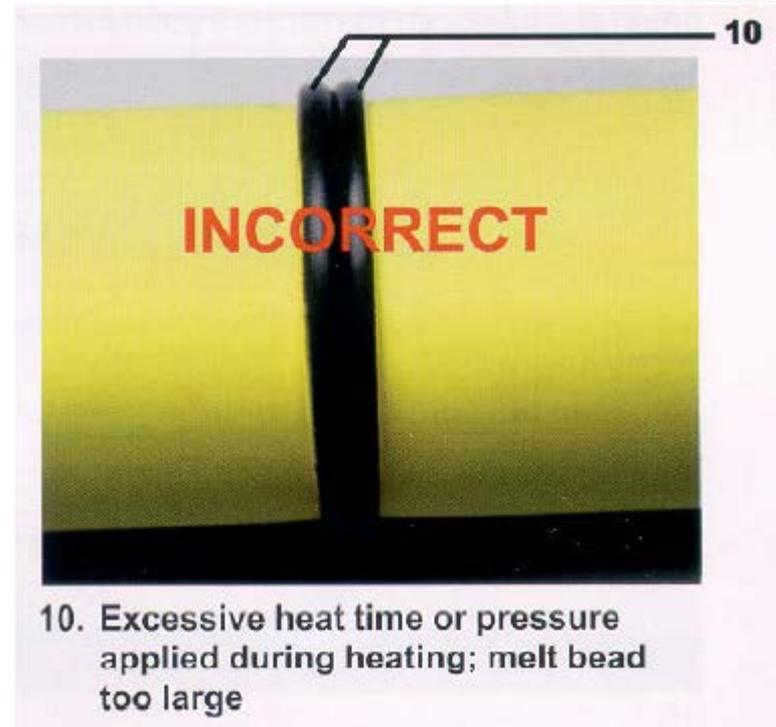
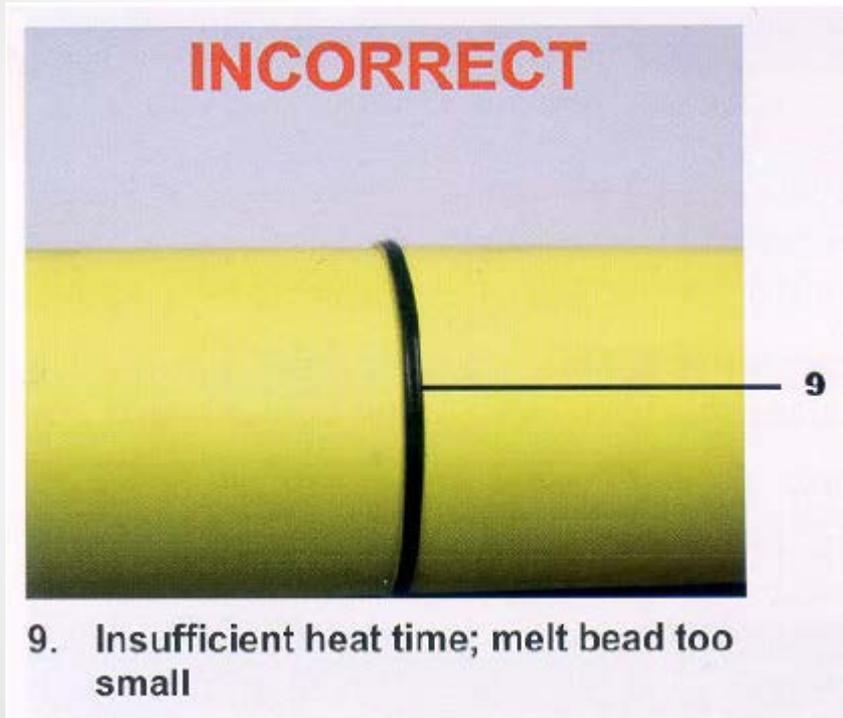


7. Proper double roll-back bead

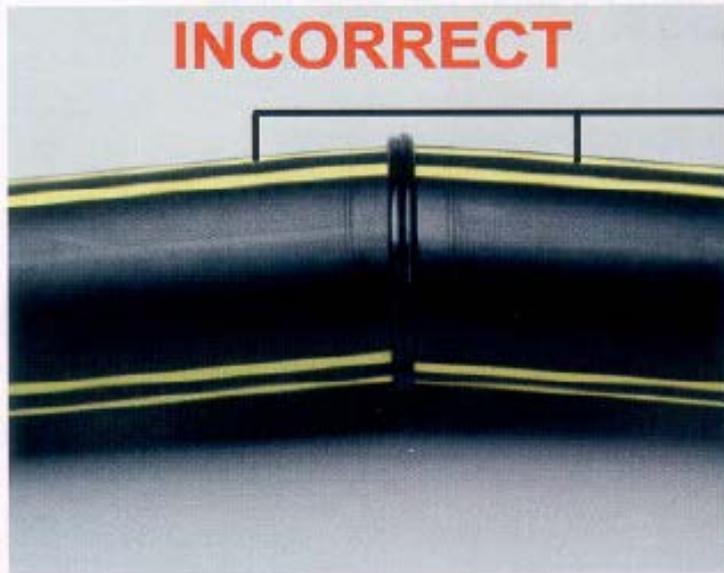


8. No gaps or voids when bent

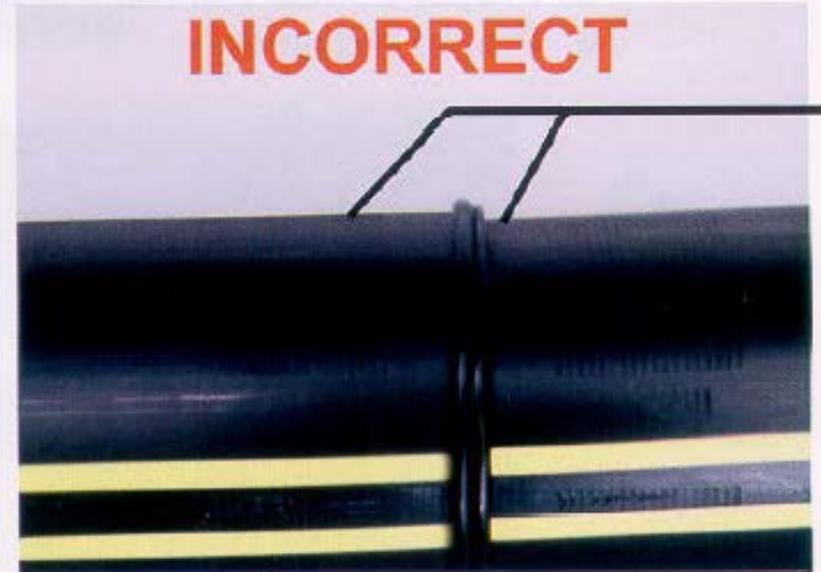
Butt Fusion - Unacceptable



Butt Fusion - Unacceptable

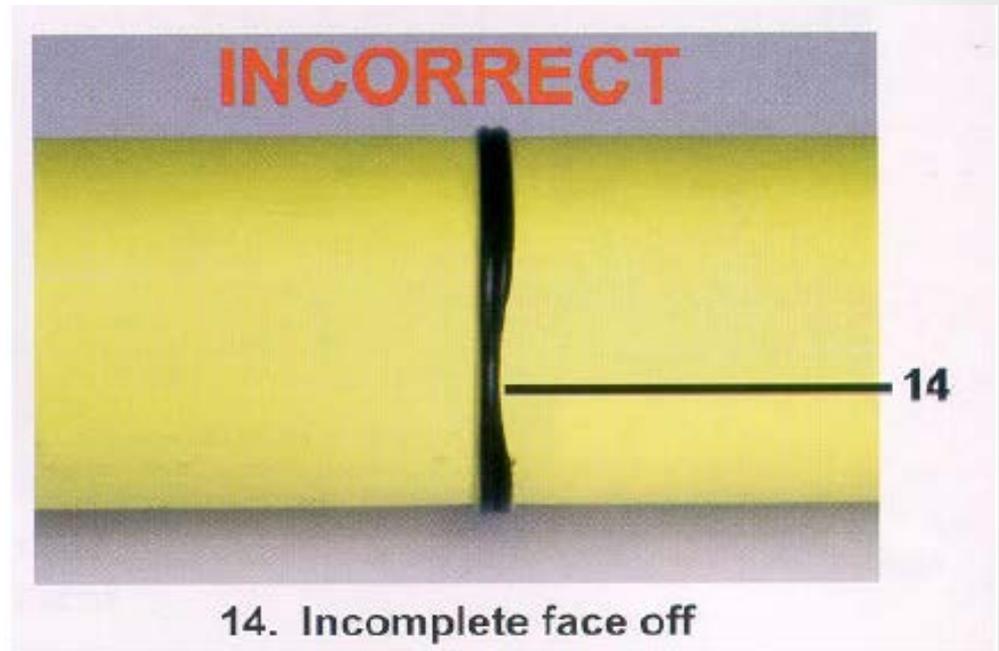


11. Pipe angled into fusion unit



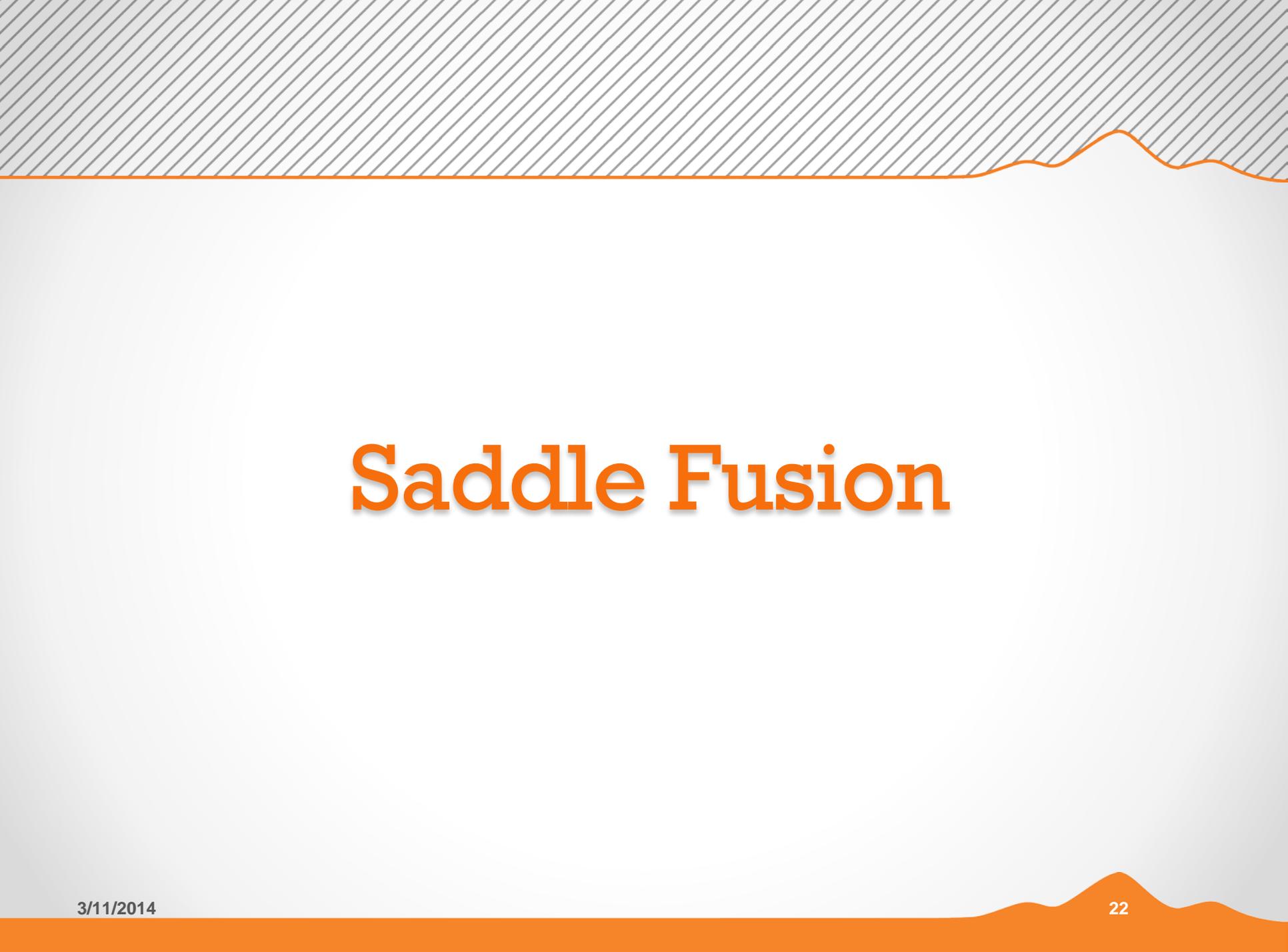
12. Improper "High-Low" alignment

Butt Fusion - Unacceptable



Butt Fusion – LD Fittings



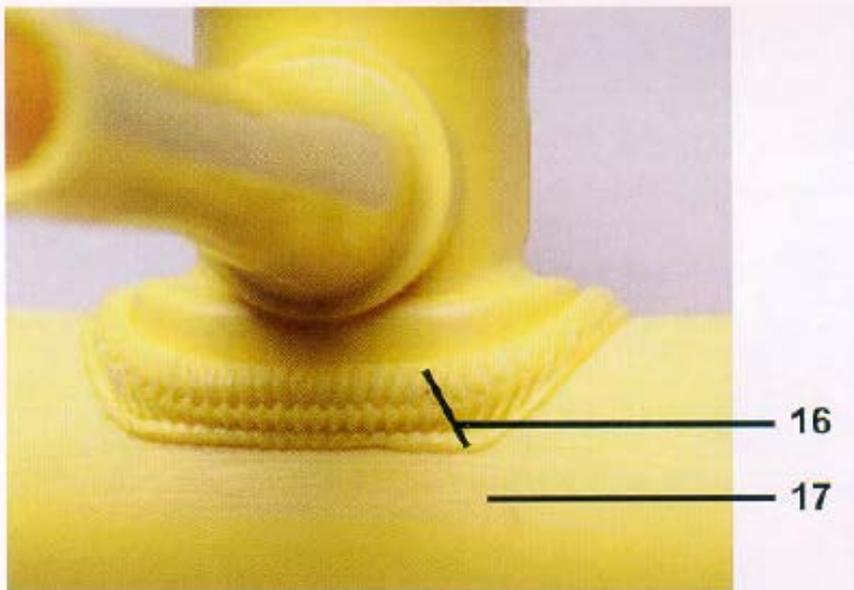


Saddle Fusion

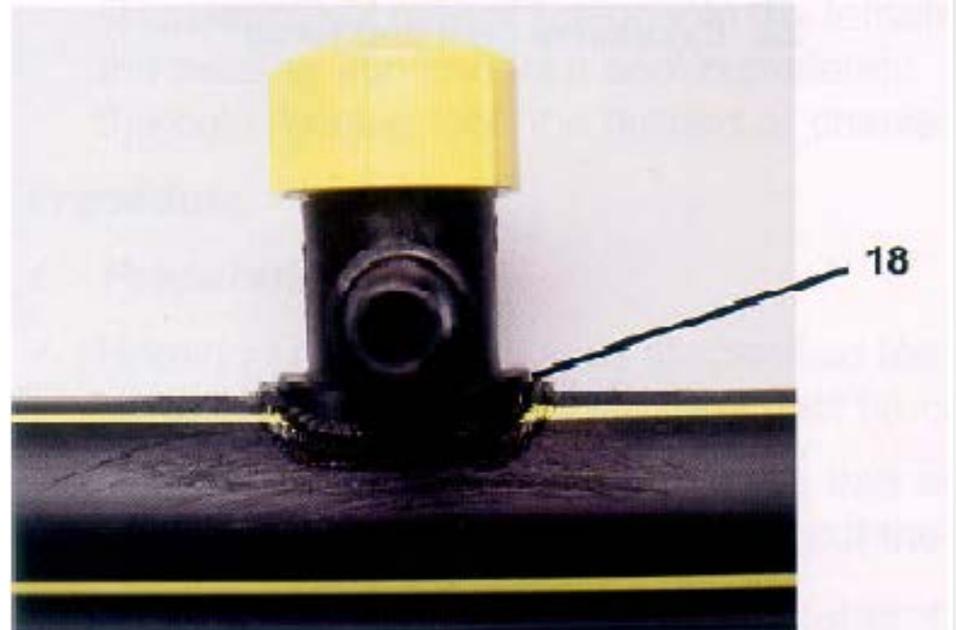
Saddle Fusion

- Key elements:
 - Use a machine (helps insure proper alignment)
 - Proper iron adaptors and machine inserts for size of pipe
 - Pipe/tee prep (clean, then roughen)
 - Correct iron temp (pyrometer, iron gauge indicates internal temp)
 - Proper melt procedure (contact with iron at specified pressure, uniform melt; increase time, not temp or pressure)
 - Correct joining of melted surfaces (check for proper melt, no iron drag, do not slam together, use specified pressure)
 - Sufficient cooling time (holding pressure, after pressure released)
 - Visual inspection (triple bead, inside bead, uniform, shoulder height)
 - **When in doubt, cut it out!!!**

Saddle Fusion - Acceptable

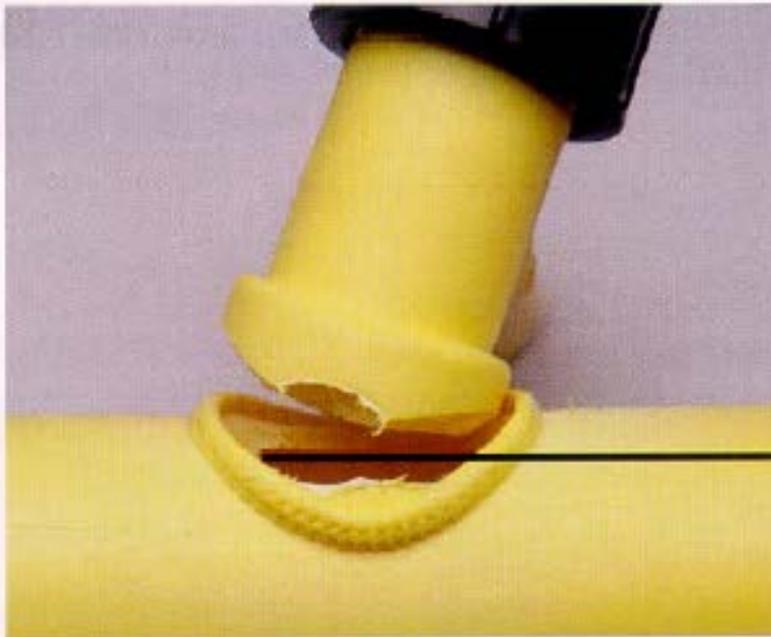


- 16. Proper alignment, force and melt
- 17. Proper pipe surface preparation

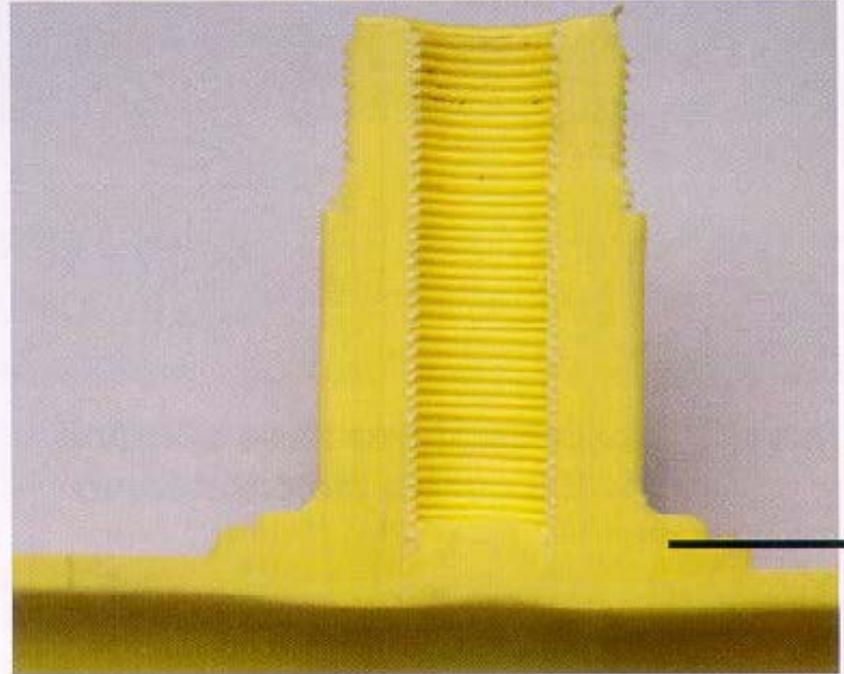


- 18. Melt bead below or parallel with top of filling base

Saddle Fusion - Acceptable

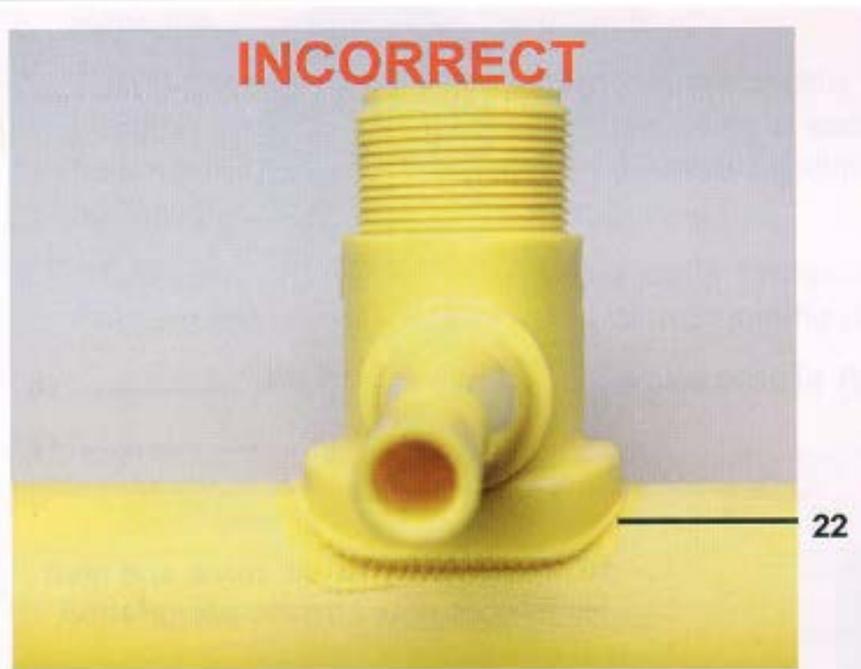


19. Material pulled from pipe when impact tested

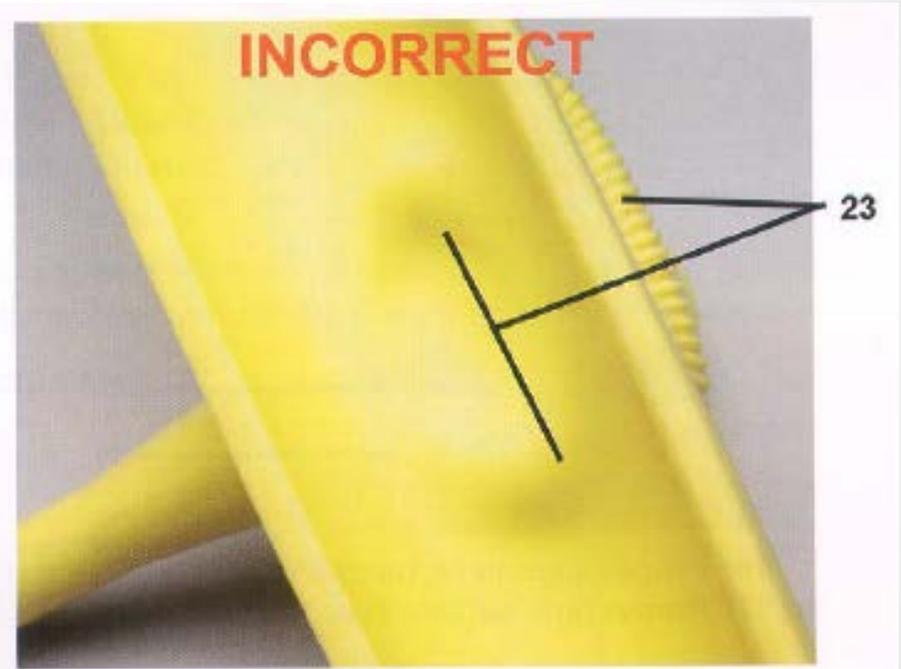


21. No gap or voids at fusion interface

Saddle Fusion - Unacceptable

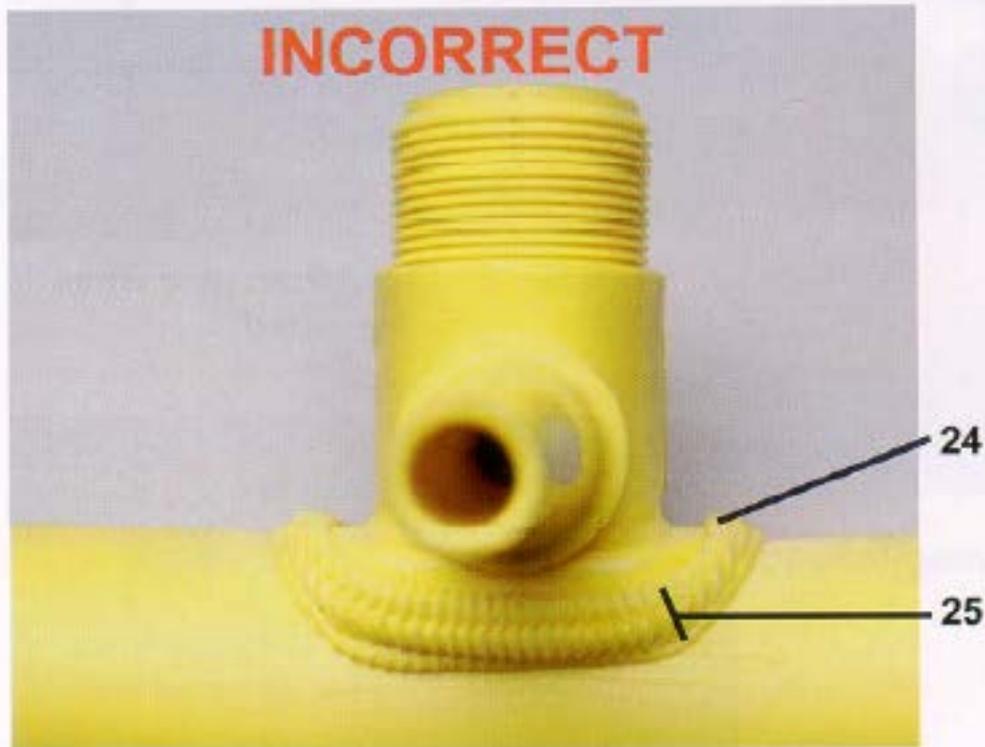


22. Insufficient melt and misaligned



23. Excessive melt and force

Saddle Fusion - Unacceptable

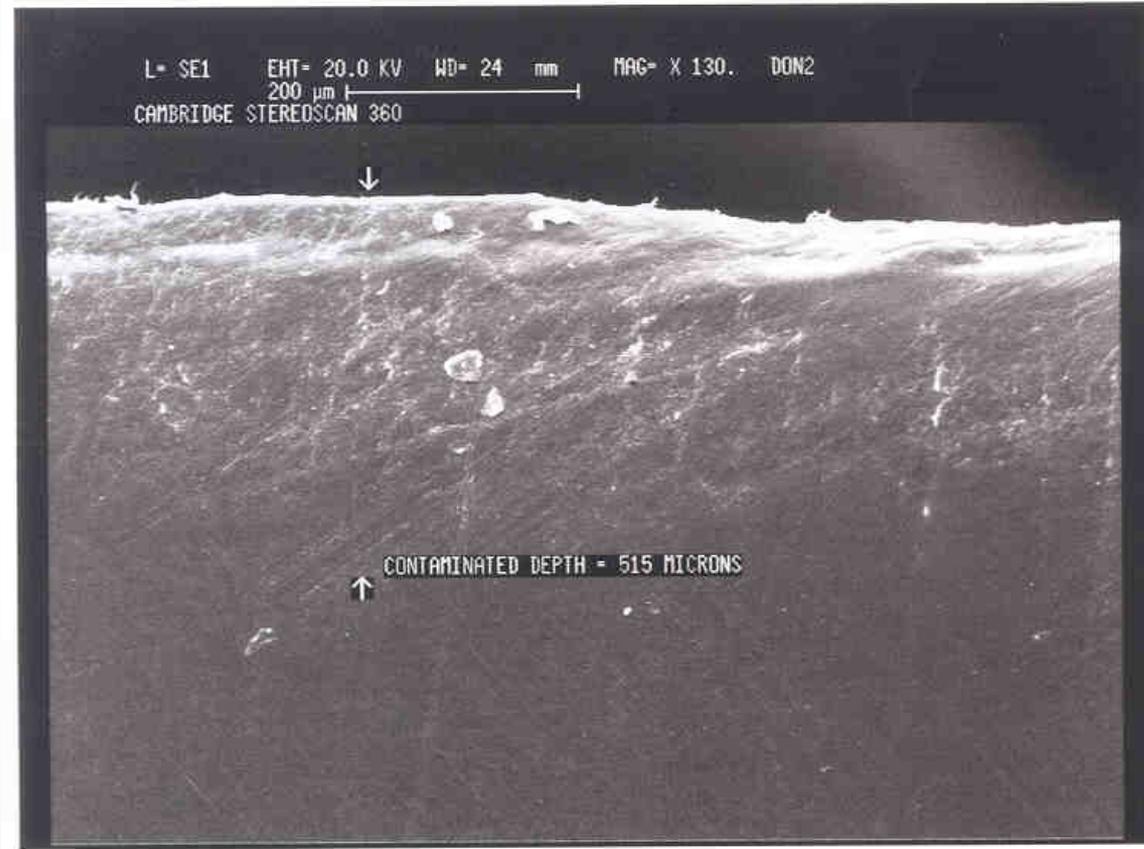


- 24. Bead above base of fitting
- 25. Excessive melt and force

Saddle Fusion – Pipe Prep



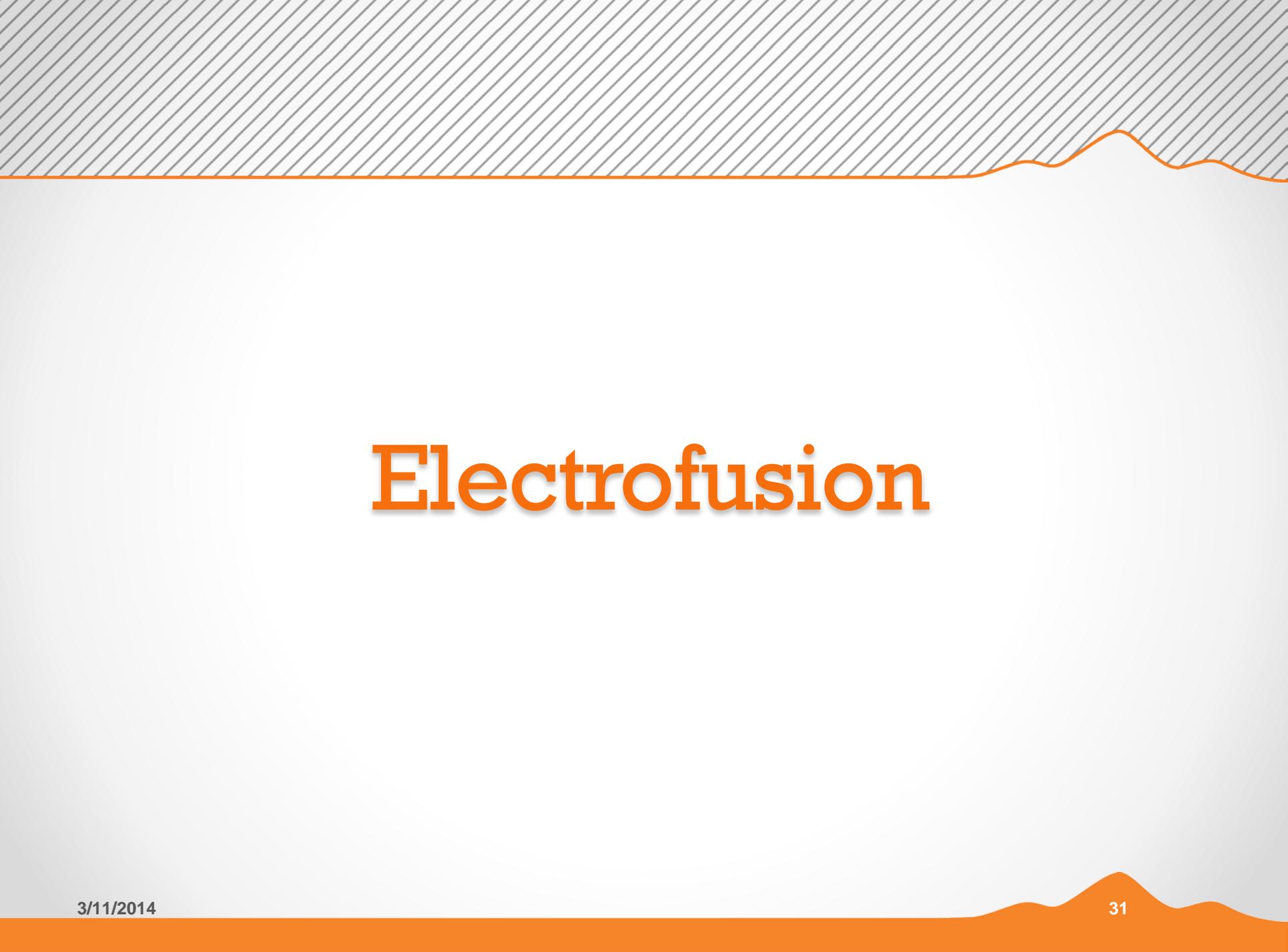
Saddle Fusion – Pipe Prep



515 μm = .02 in \approx 10% wall in 2" SDR 11 pipe

Saddle Fusion – Pipe Prep



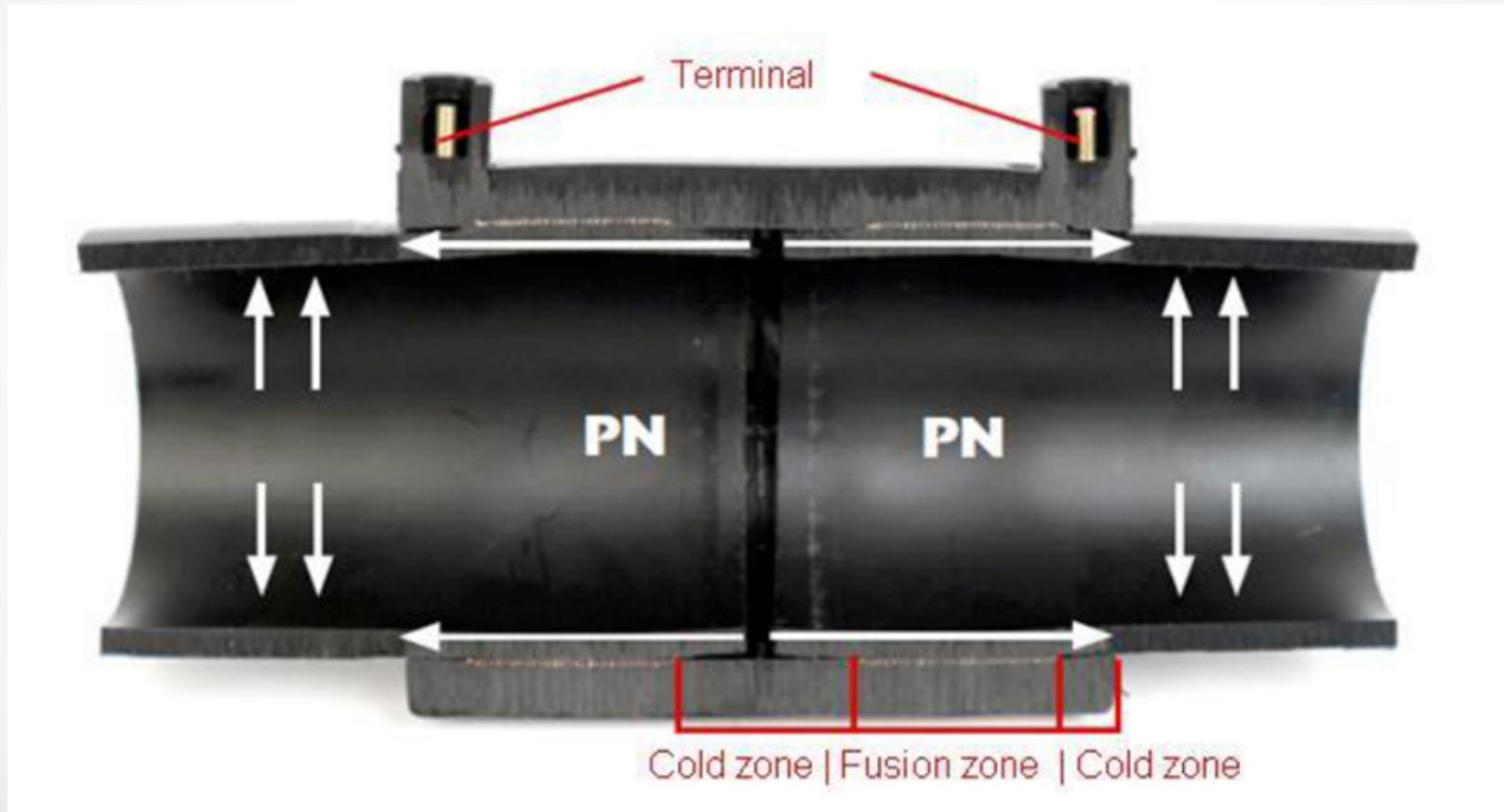


Electrofusion

Electrofusion

- Key elements:
 - Adequate power supply
 - Pipe prep (clean, no moisture, no grease, no oil, square ends)
 - Proper pipe scraping (correct tool, enough area, don't contaminate after)
 - Use restraints
 - Proper cooling time
 - Fittings can be reburned **only** in event of power interruption
 - **When in doubt, cut it out!!!**

Electrofusion - Acceptable



Electrofusion - Unacceptable

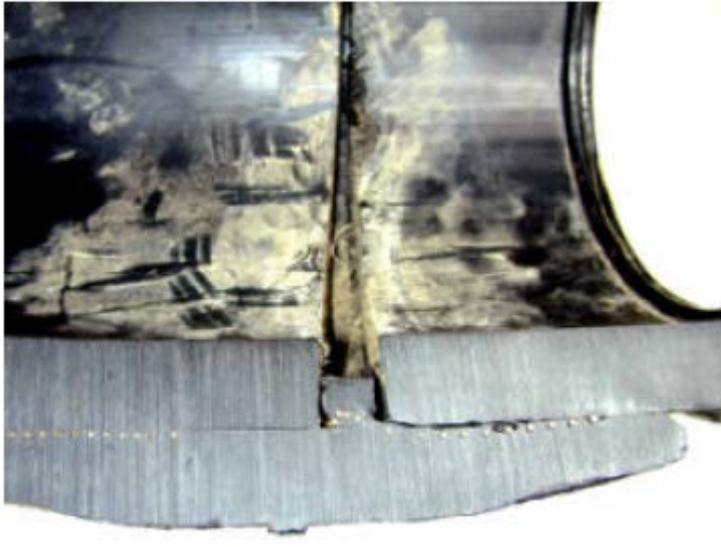


No prep – cleaning
or scraping



Over-scraping

Electrofusion - Unacceptable

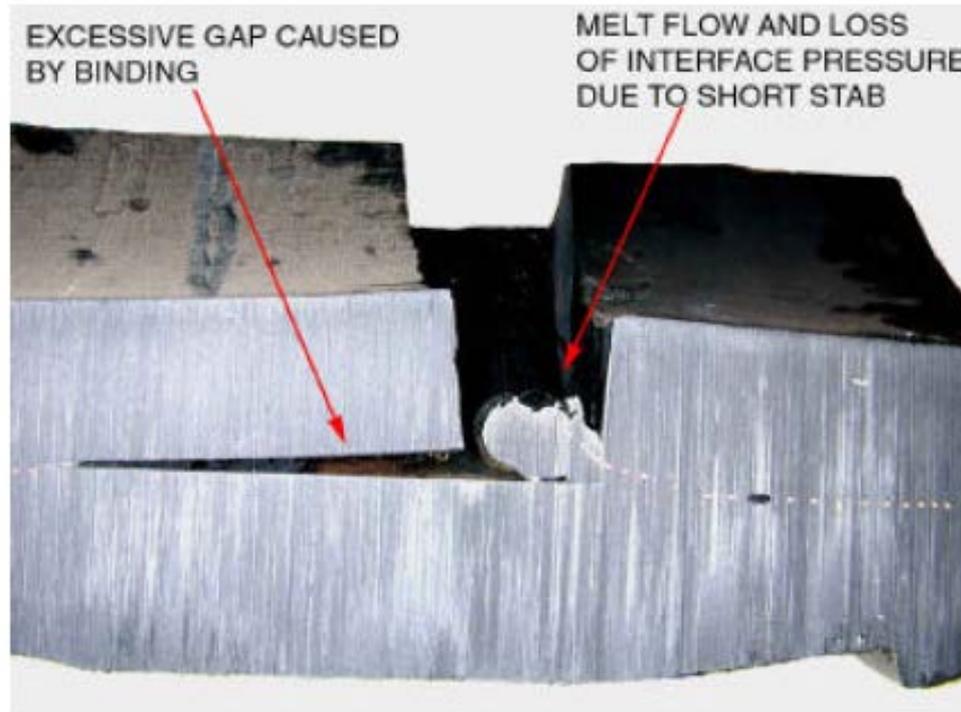


Off center, pipe
end not square

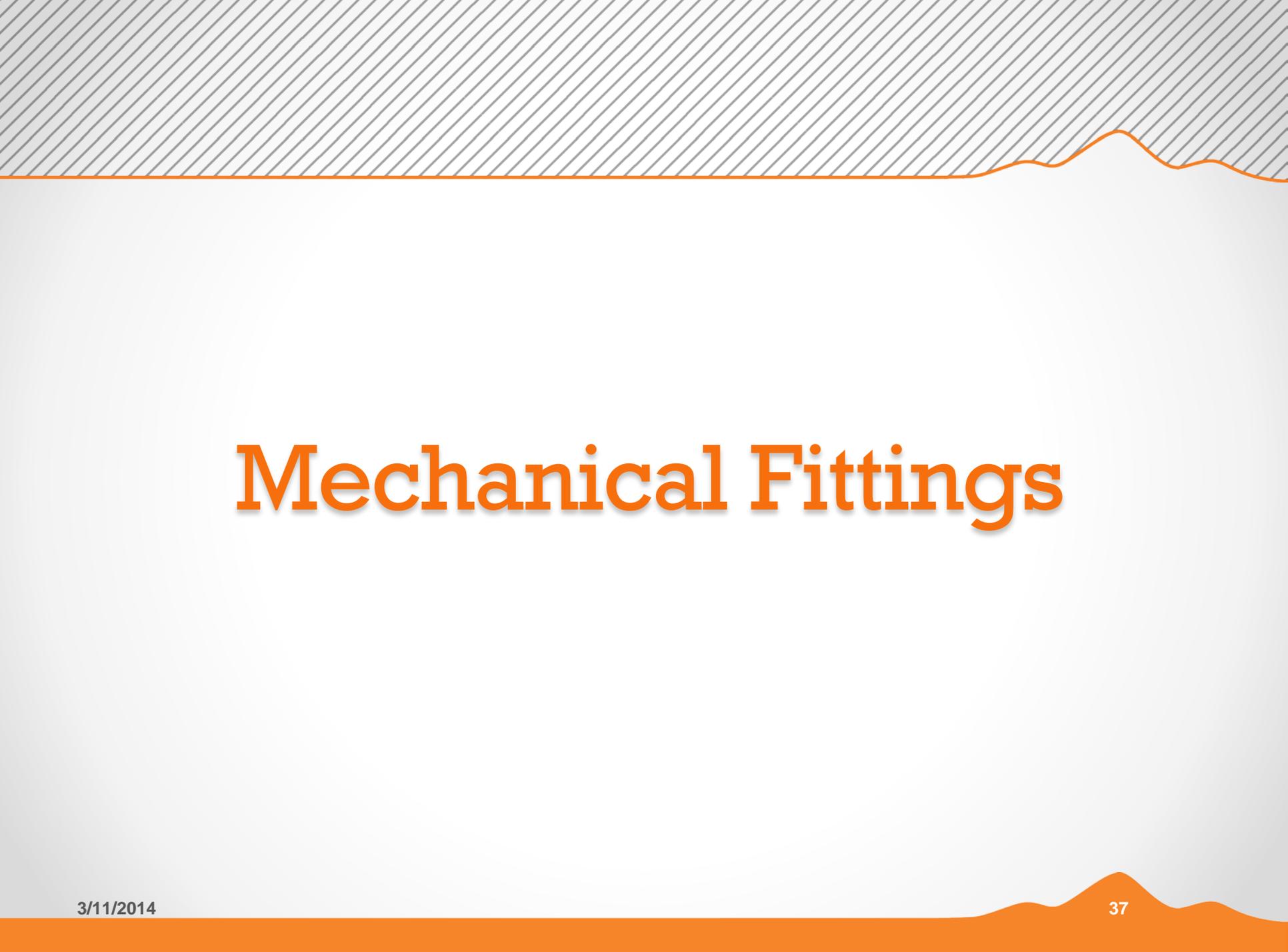


Over-scraping,
undersized or out of
round pipe

Electrofusion - Unacceptable



Short-stab,
excessive binding



Mechanical Fittings

Mechanical Fittings

- Key elements:
 - Pipe prep (clean, free of defects)
 - Follow mfg instructions (included with each fitting)
 - Permasert
 - Keep in bag until used
 - Cut ends square
 - Correct chamfer tool
 - Correct stab depth
 - Permasert XL
 - Square ends
 - Assure gap between pipe ends
 - Proper torque

Mechanical Fittings - Acceptable



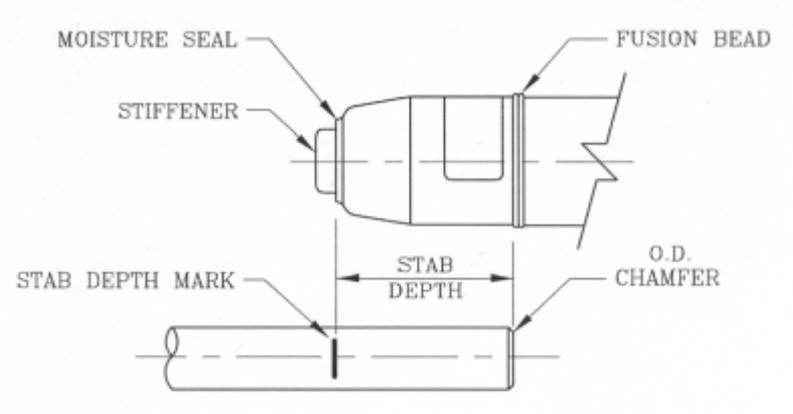
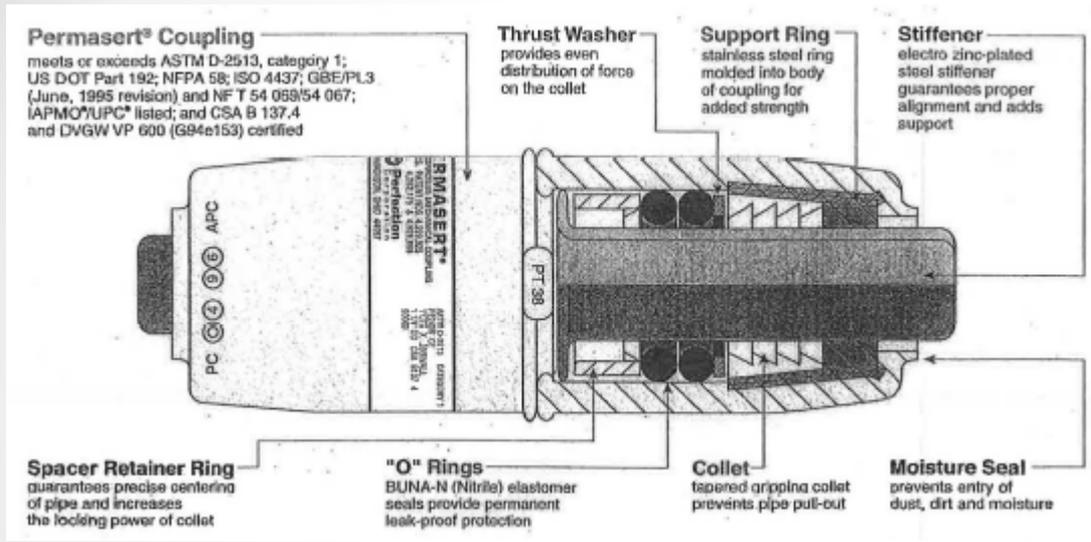
Mechanical Fittings - Acceptable



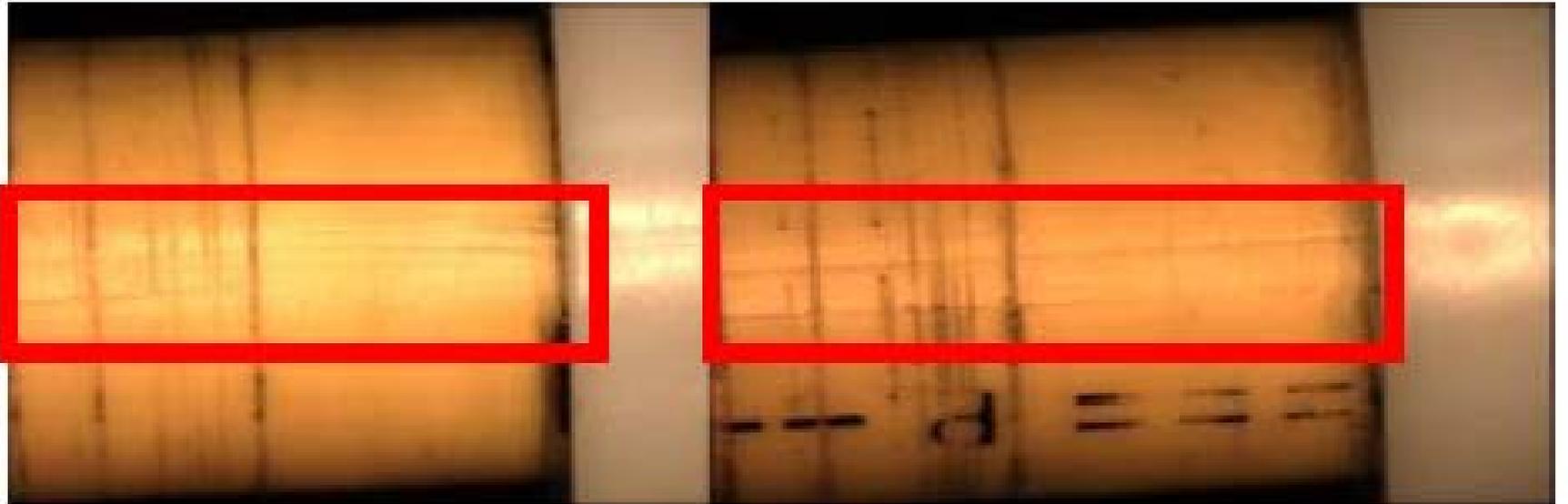
Mechanical Fittings - Unacceptable



Mechanical Fittings - Problems



Mechanical Fittings - Problems



Mechanical Fittings - Problems



Questions?

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