

# **Zap-Lok<sup>®</sup> Mechanical Interference Joint**

## Technical Overview -2010

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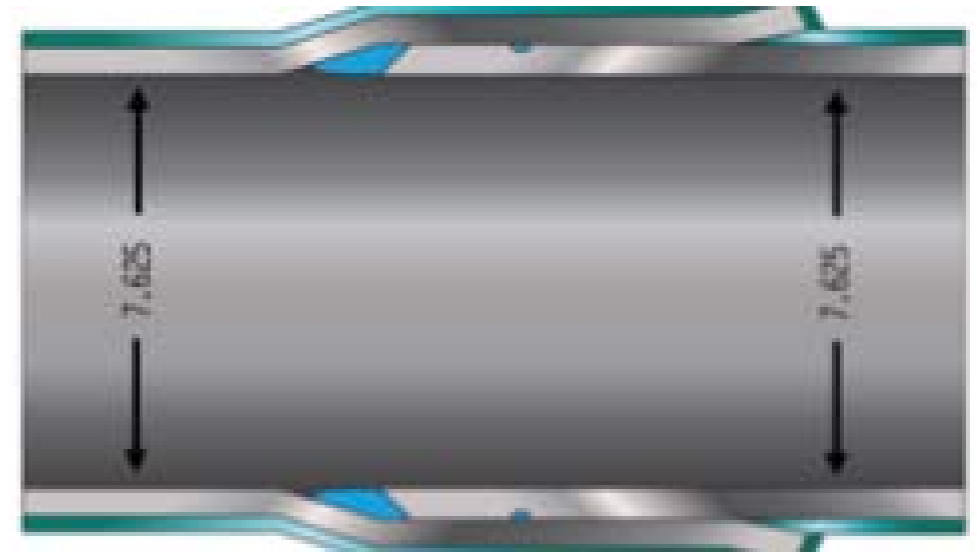
# 1. Company Profile

- Swiftpipe Middle East Ltd. (SME) is a UK company dedicated to improving the cost, efficiency and safety of laying steel pipelines, both onshore and offshore.
- SME supplies Zap-Lok<sup>®</sup> - a faster, lower cost and safer method to join steel line pipe.
- SME has the exclusive license to market, supply and install Zap-Lok<sup>®</sup> in the Middle East including the GCC and North Africa.
- SME has offices in London, (UK Headquarters), Rouen (France) and Muscat (Oman) operated by IBD LLC and Bahrain operated by MCSC.
- Staffed by oil and gas industry professionals, and in combination with its extensive affiliations, SME is well positioned to provide packaged, engineered installation solutions incorporating the Zap-Lok<sup>®</sup> technology.

## 2. The Zap-Lok<sup>®</sup> Joint

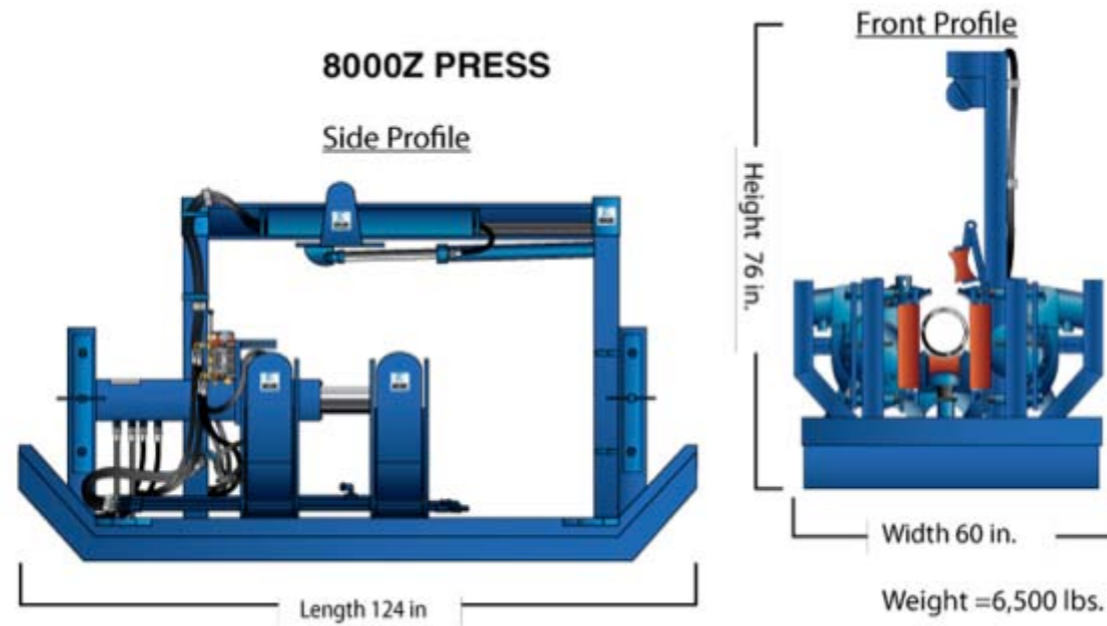


The Zap-Lok<sup>®</sup> joint is a mechanical interference connection that works on the basis of pre-forming male “pin” and female “bell” ends to 40’ (12.2m) standard line pipe - known as the “belling and pinning” process. The bell end is cold formed by approximately 7% which gives rise to an increase in yield strength of the order of 30%. These ends are then mated in the field to form a metal-to-metal seal face. A specialised Epoxy is applied to lubricate the joint during the pressing process as well as providing a smooth bore and secondary seal. Equally, this process is possible at bends, T-joints as well as expansion loops.



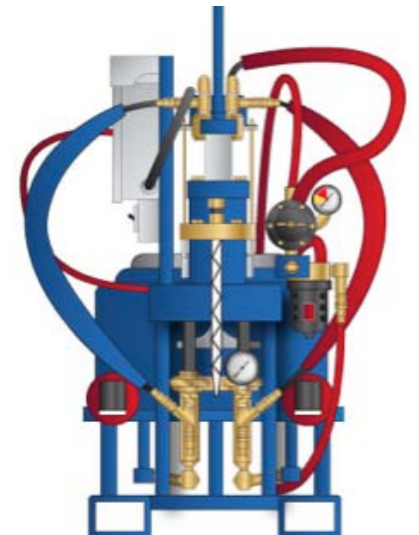
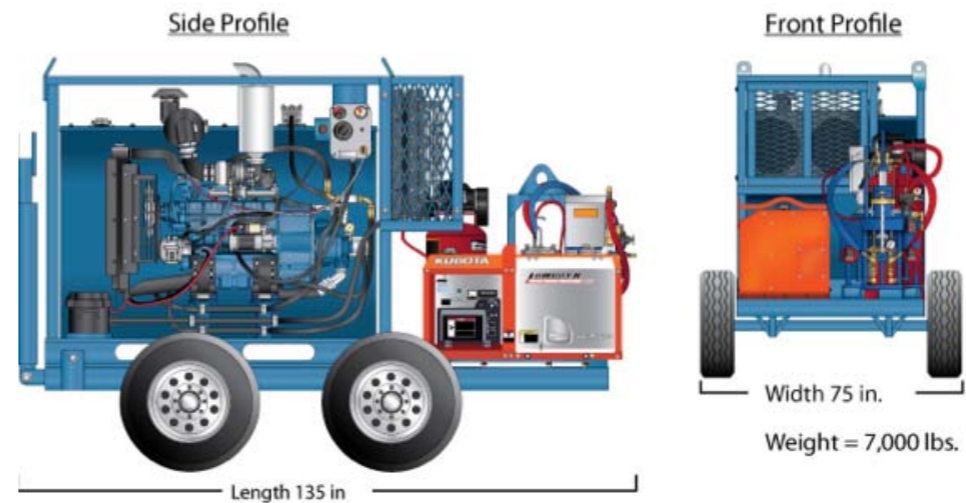
The diagram above shows in some detail a post formed 8¾” OD externally FBE coated joint. Depending on the pipe diameter the interference is between 50 and 75 thousandths of an inch (1.3mm to 1.9mm) on the diameter to form a pre-stressed joint. The cured Epoxy can be seen between the mating parts to form a smooth bore thus reducing turbulence in the fluid flow. The joint is rated the same as a weld and is as strong as the steel line pipe itself.

### 3. Zap-Lok<sup>®</sup> Equipment



The Zap-Lok<sup>®</sup> installation press is easily handled in the field and can be operated by a crew of 6-8 personnel, including two SME technicians. Preparation works to form the male “pin” and female “bell” ends permit connections to be made in the field at rates of 1 joint every 2 minutes.

The ancillary equipment required to operate the press in an effective manner include a portable hydraulic power pack and generator as well as an automated Epoxy resin mixer.



# 4. Specifications

## Zap-Lok® Capability Summary

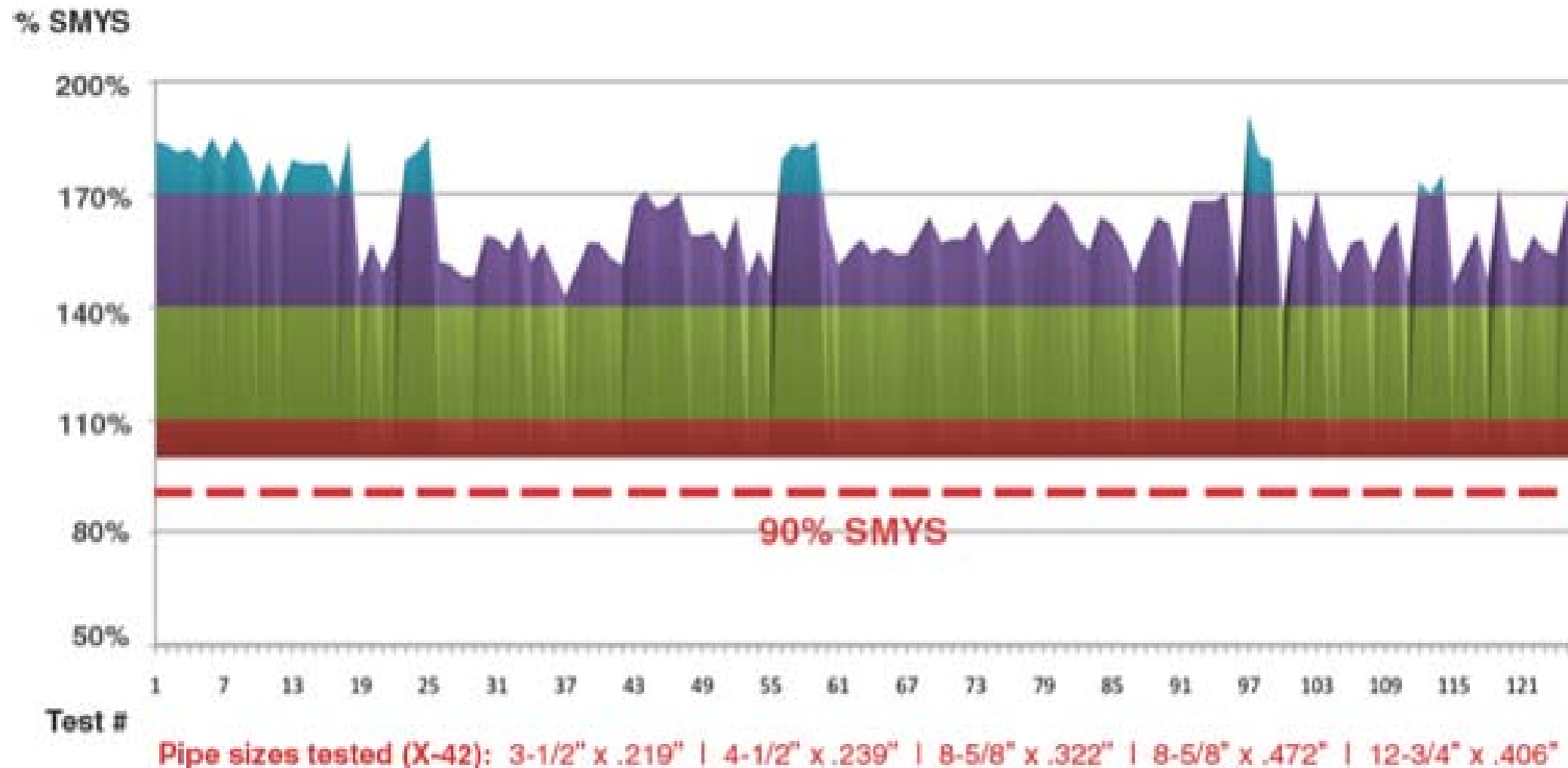
Diameter Range	2" to 16" OD
Material Capability*	- API 5L up to schedule 80 X65 - 13% Cr
Pressure Rating	As per line pipe material specification
Installation Rate**	2-3 km per day
Coating Compatibility	- Internally coated FBE - Externally coated FBE - Externally coated 3LPP and 3LPE - Internal Epoxy and Polyurea flowcoats - Internal PE liners

\* Higher material grades may be considered upon consultation with SME.

\*\* Based on an 8 hour shift and 6 man crew and nominal 6" line pipe installation.

# 4. Specifications

## Strength



The above chart shows the results of hydrostatic burst tests conducted on API 5L, schedule 40 X42 pipe. It can be seen that all pipes fail at over 140% of SMYS. Similar hydrostatic pressure tests have been carried out on alternative steel grades to prove the joint's integrity. Independent tests conducted by Stress Engineering Houston.

# 4. Specifications

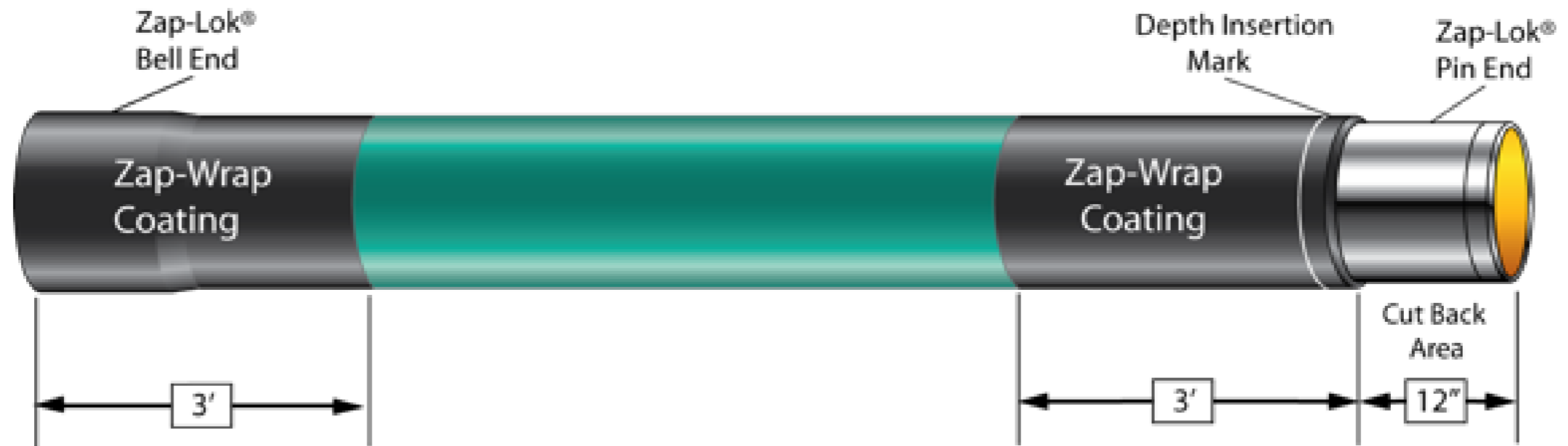
## Coatings

External

FBE, 3LPP and 3LPE require sacrificial Zap-Wrap to be applied during installation.  
No field joint coatings are necessary.

Internal

IPC and flow assurance coatings are holiday free and no additional steps are required.



# 5. Track Record



- First line installed in 1973.
- Over 2 million successful joints completed during this period.
- Full track record available upon request.

# 5. Track Record



Hilly Terrain



Desert Terrain



Side-boom installation of coated pipe



Sharp bend installation

# 5. Track Record



Expansion loop



Flowline corridor



Well-head hook-up



Limited space installation

# 6. QHSE

## Quality

Certified in accordance with the following standards:

- DOT 195 and 192
- ANSI B-31.4
- ANSI B-31.8
- NACE MR0175 / ISO 15156 (2003) for H<sub>2</sub>S service

## Safety

The Zap-Lok<sup>®</sup> joint offers the following safety advantages:

- Fewer operations due to increased productivity.
- Less injuries due to pipe handling.
- All NDT conducted pre-installation during the “belling” and “pinning” process.
- No exposure of workers to welding sparks and toxic emissions.
- Elimination of X-ray hazards.
- Less operators in-field at any one time.
- No recorded serious injury or fatalities during installation.

# 7. Advantages

## Advantages

- Speed of installation - up to 3 km per 8 hour shift.
- Highly competitive on a total installed cost basis.
- Most of the preparation and QA/QC conducted out the field.
- Can join all standard API 5L pipe grade steel as well as 13% Cr.
- NACE MR 0175 compliant for H<sub>2</sub>S service.
- Possible to join ERW and Seamless pipe.
- No need for pipe bevelling - can join straight cut pipe if required.
- Can join pipes of varying wall thickness.
- Smooth bore - no reduction in ID.
- Possibility to connect internally and externally coated pipe.
- Capable of being PE lined in same manner as welded pipe.
- Piggable.
- Smaller crew sizes (6-8 compared to up to 18 with conventional welding).
- Safer than welding operations (see QHSE).
- No recorded post installation joint failure
- Life of pipeline joint connection method

# 8. Contact

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