

# **Corrosion Prevention for Pipeline Field Weldings by Wrapping with Polyethylene-Butylrubber-Multiply-Tapes**

**Dr.-Ing. Horst Stepanski**  
Leverkusen

Source: Technical information of DENSO GmbH in Leverkusen

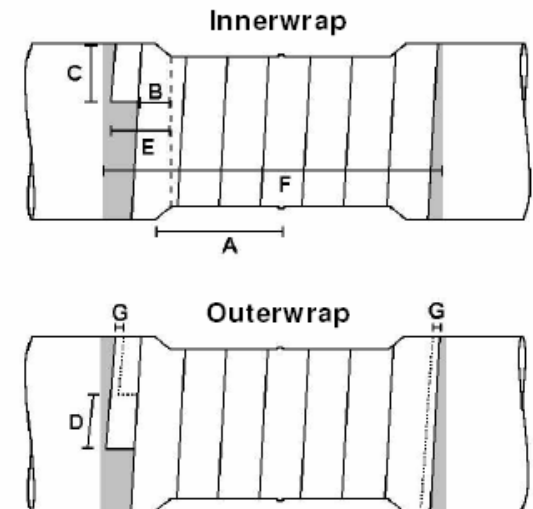
# Guidelines for the application of PE-Butyl tapes for pipeline corrosion prevention

Source: DENSO GmbH

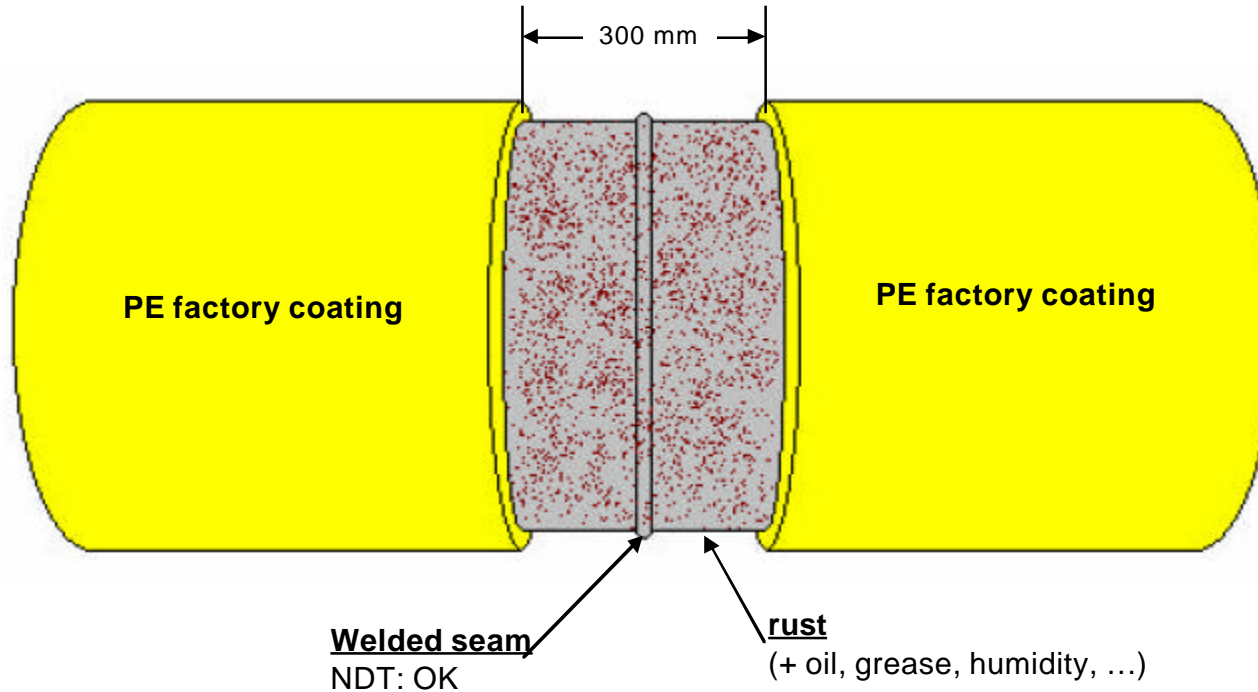


## Basis for calculation

<b>A</b>	Cutback		150 mm		
<b>B</b>	Min. overlap on factory coating		50 mm		
<b>C</b>	Additional quantities required due to start and end of wrapping in 10- and 2-o'clock position		$\frac{1}{6} \times$ pipe circumference		
<b>D</b>	Lengthwise coverage of innerwrap		100 mm		
<b>E</b>	Starting position of wrapping on factory coating (for initial spiral wrapping cycle)	tape width	30 mm	65 mm	
			50 mm	75 mm	
			100 mm	100 mm	
<b>F</b>	Min. application width of primer		wrapping width + 50 mm		
<b>G</b>	Coverage of innerwrap in pipe direction		$\geq 10$ mm		
Overlap innerwrap			50 %		
Overlap outerwrap		2 layers	50 %		
		1 layer	10 mm		
Number of wrapping cycles	Tape width [mm]		30	50	100
	Innerwrap, 2 layers		27,3	16,3	8,3
	Outerwrap, 2 layers		29,3	17,3	9,3
	Outerwrap, 1 layer		22,3	11,3	5,3



# Initial situation



## Processing conditions:

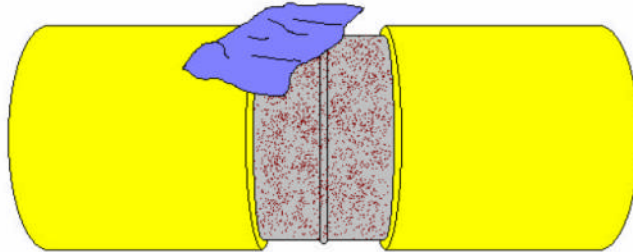
- Tube: -10 to +70 °C (min. 3 °C above dew point)
- Environment: -20 to +50 °C (rel. H. < 90 %)
- Primer: -10 to +40 °C (spec. primers + 50 °C)
- PE Butyl tape: -10 to +50 °C
  
- Welded seam: US test: OK

## QA:

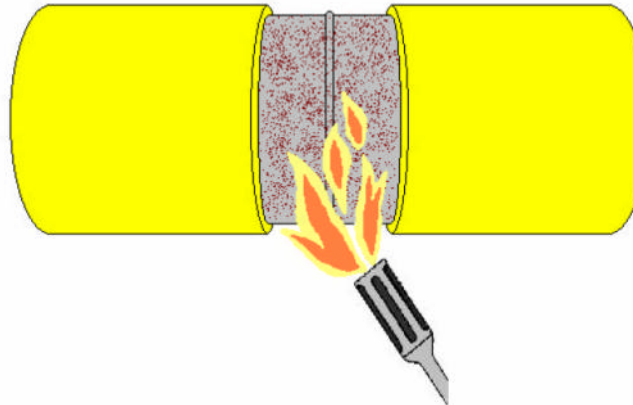
- US test record
- temperature record

# Cleaning

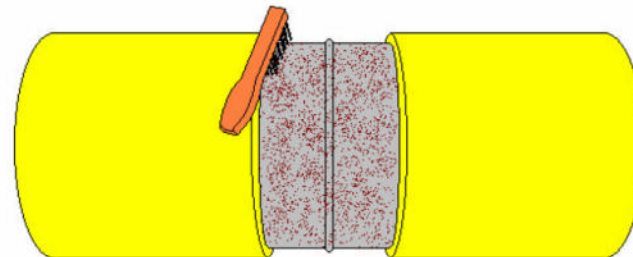
**Removal of oil, grease  
and other contaminations**



**Drying with gas burner  
(if necessary)**



**Rust removal  
(e. g. with wire brush)**



**QA:**

- visual inspection
- attestation

# Sandblasting of a pipeline prior to corrosion prevention alternative to wire brush



**Price:**  
For each joint:  
**approx. 20 €**

- immediate primer application needed to prevent flash rust
- machine expenses (off road blasting equipment with air compressor)
- consumption of grit and fuel
- protective clothing with dust mask
- human productivity higher compared to manual wire brush
- cleaning more efficient and reliable compared to wire brushing

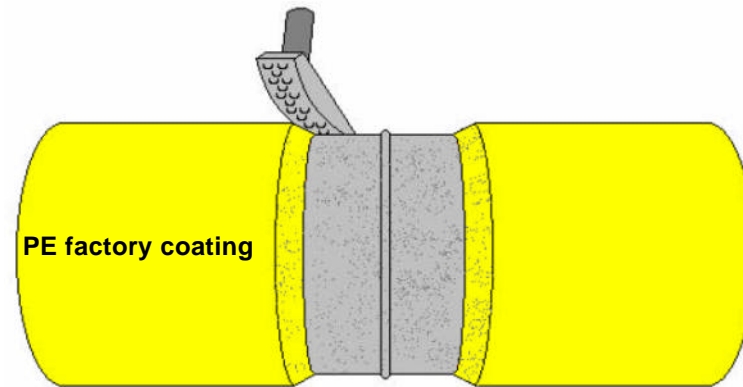
**QA:**

- visual inspection
- attestation

**STEPANSKI**  
**ENGINEERING**

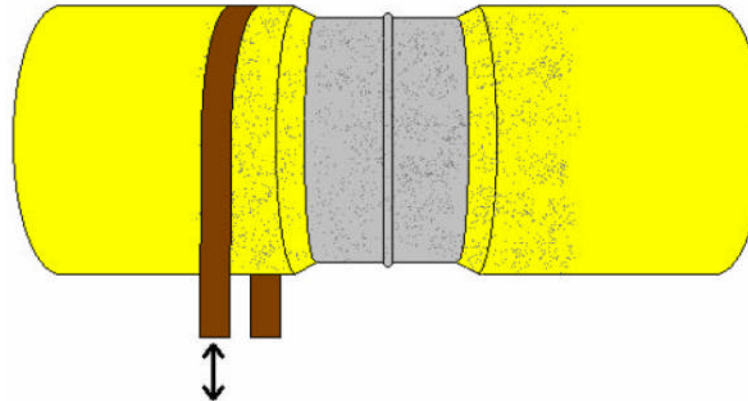
# Preparation of the factory coating

**Edge tapering (30°)**  
to prevent voids



**Roughening of the adjoining area of the factory coating with a coarse emery cloth**

- treated width: 150 mm
- swarf to be removed



**QA:**

- visual inspection
- attestation

# Priming

## Primer application:

- with brush or roller on dry and clean surface
- stir original container until bottom settlings are solved
- factory coating has to be primed „tape width + 5 cm“
- let primer dry until it is tack free („finger test“)
- wrapp within 8 hours

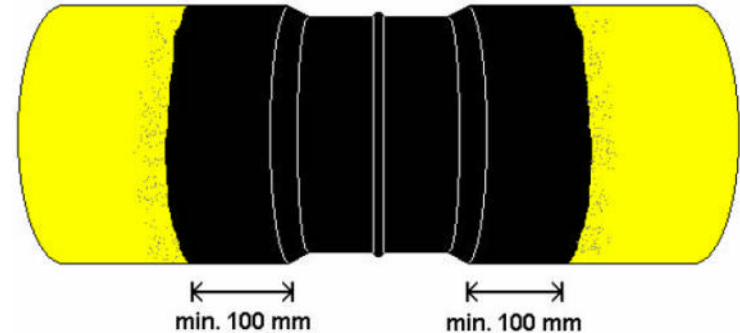
## Primer consumption:

(for 300 mm uncoated tube length)

Pipe diameter	Primer quantity	Mat. Price	Total Price
DN 50	22 ml	0,33 €	1,10 €
DN 150	65 ml	0,98 €	3,25 €
DN 500	210 ml	3,15 €	10,50 €

## QA:

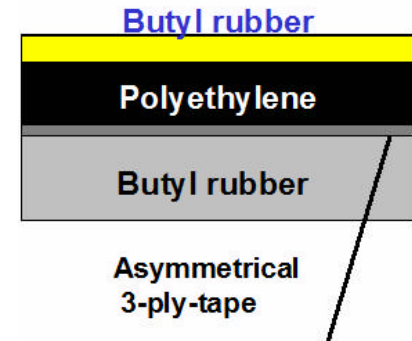
- Record  
(stirring, date and time, temperatures)
- visual inspection
- attestation



# Innerwrap Application

## Innerwrap:

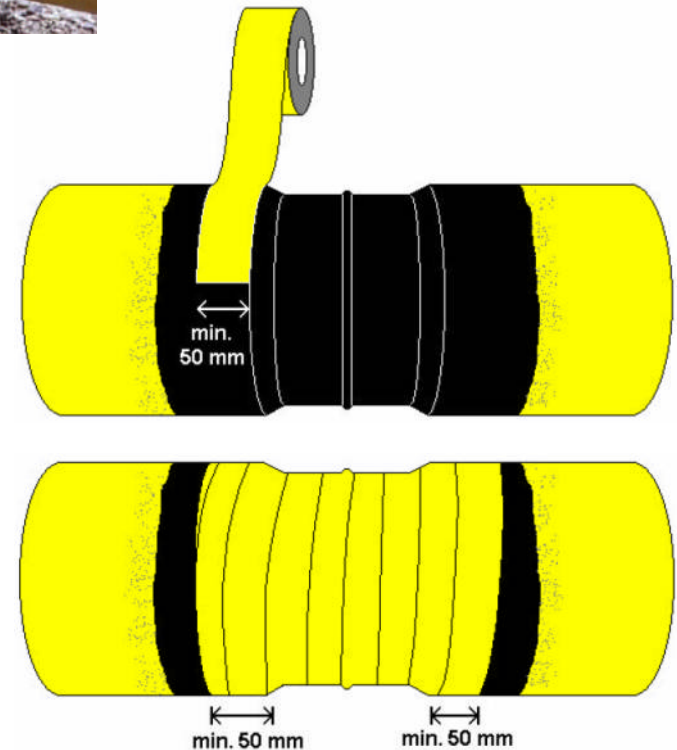
- with butyl 3-ply tape
- min. 50 mm on factory coating
- start with one circumferential wrap on factory coating
- spirally wrap tape under tension
- min. 50 % overlap
- remove interleaving
- tape tension is sufficient, if tape width is narrowed by 1 %
- two innerwrap layers needed



## Tape consumption for innerwrap:

- 2 layers
- 10 % supplement on theoretical amount included

NW	Tape width [mm]	Length [m]	Area [m <sup>2</sup> ]	Mat. price [€]	Total price [€]
DN 50	30	5,7	0,18	5,60	19
DN 150	50	9,5	0,48	14,50	48
DN 500	100	14,5	1,46	42,60	142



Tape widths > 50 mm require a wrapping machine!

# Outerwrap Application

## Outerwrap:

- with butyl-2-ply-tape
- half tape width on factory coating and innerwrap each
- min. 50 % overlap
- wrap spirally
- remove interleaving
- tape tension is sufficient, if tape width is narrowed by 1 %
- two ouerwrap layers recommended

## Tape consumption for innerwrap:

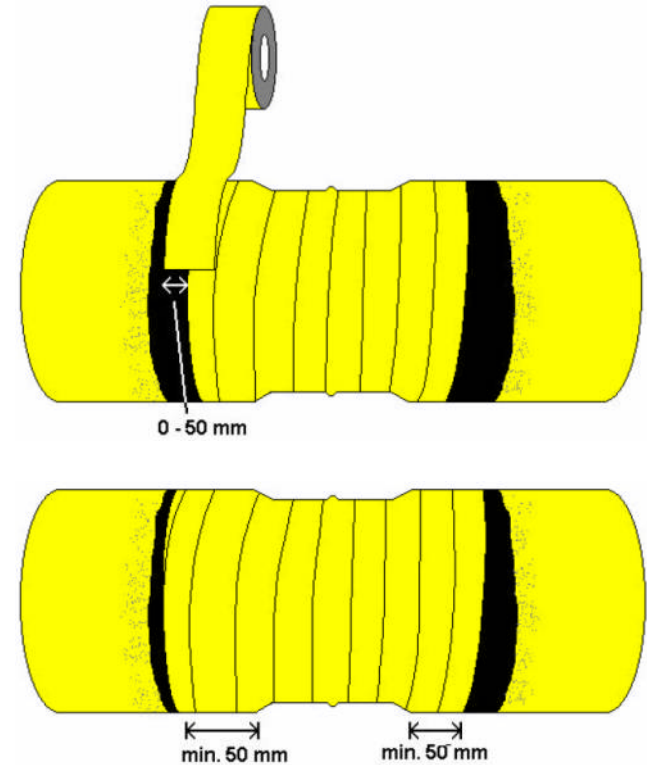
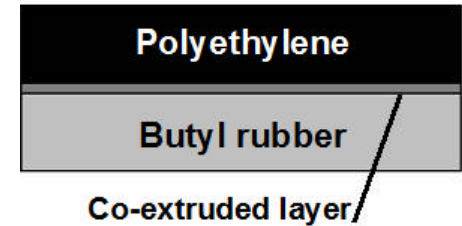
- 2 layers
- 10 % supplement on theoretical amount included

NW	Tape width [mm]	Length [m]	Area [m <sup>2</sup> ]	Mat. Price [€]	Total price [€]
DN 50	30	5,7	0,18	2,70	9
DN 150	50	9,5	0,48	7,14	24
DN 500	100	14,5	1,46	21,17	71

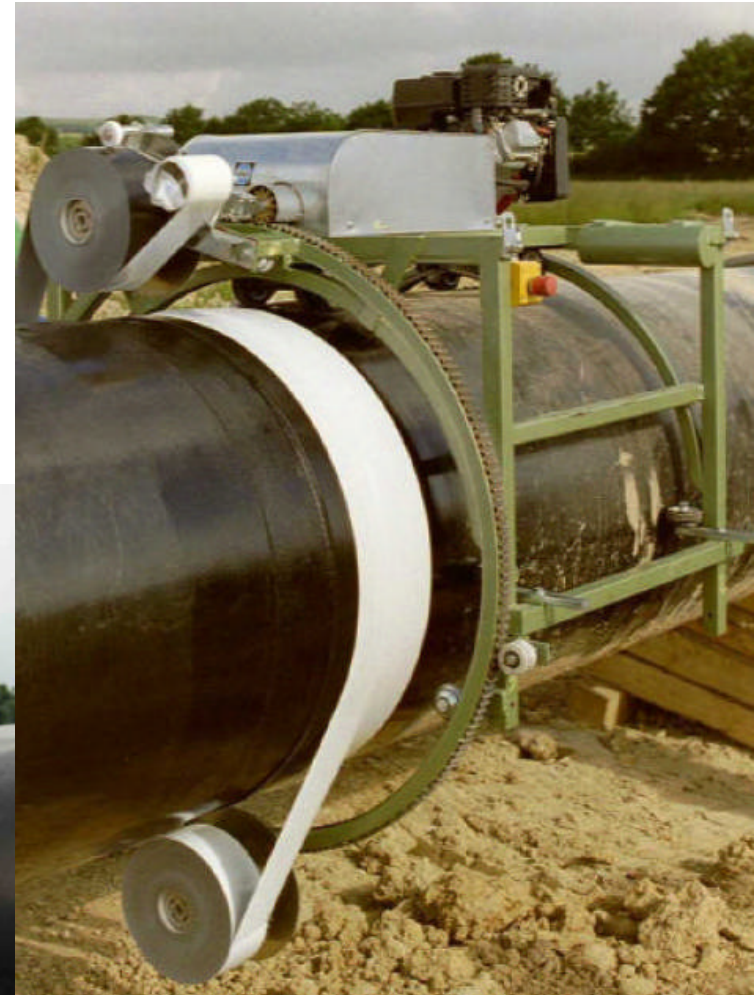
## QA:

- visual test: no wrinkles?
- free of pores test with high voltage holiday detector
- release report

## 2-ply-tape



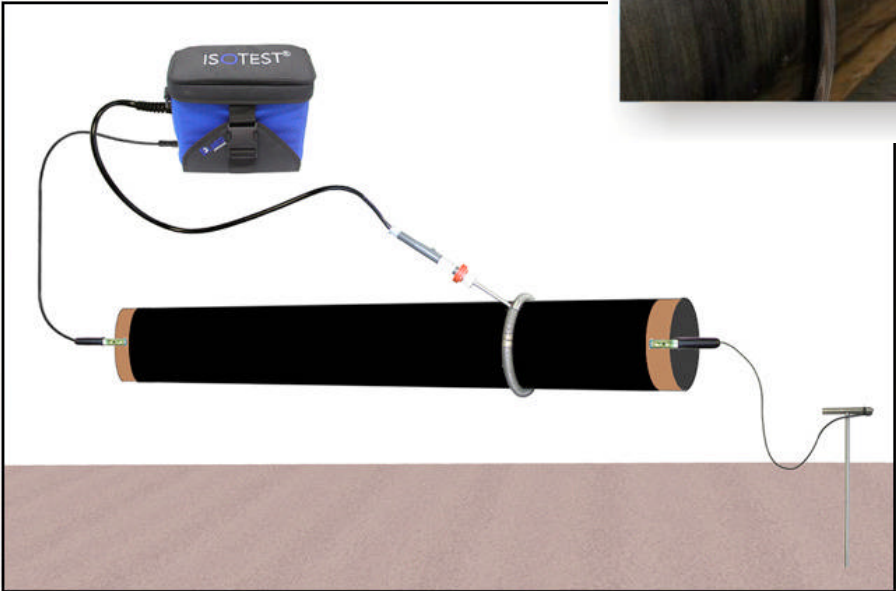
# Wrapping Machines



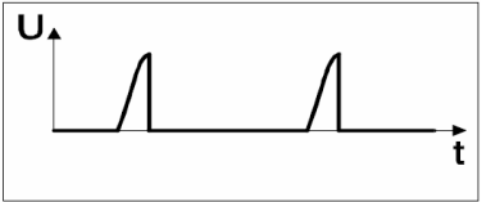
# High Voltage Pore Test



**Prices:**  
Instrument: 2000 €  
Electrode: 200 €



Unipolar pulsing high voltage



Images: ELMED

# Total costs of a conventionally welded pipe joint

Pipe Diameter	Welding costs	Corrosion prevention costs	Total price for each joint
DN 150	75 €	110 €	185 €
DN 500	250 €	320 €	570 €

## Conclusion related to JoinTec:

- total costs for JoinTec sleeves, adhesive and application have to match these costs
- factory coated sleeves may reduce failure risks
- labour costs at the construction should be significantly lowered

# Line cleared!

for the JoinTec Express

