HDPE Solutions Presentation

August 2025

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Agenda

- HDPE Overview – Why Polyethylene?
- Welding of HDPE
- Conclusion

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Why Polyethylene (PE)?

- Tough (Elongation at Break is 800%)
- Chemically inert material
- Transports variety of materials at various Temperatures, including:
  - Acids
  - Abrasives (Sand etc)
  - Gases (Methane etc)
  - Liquids (Water & Sewage)

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Why Polyethylene (PE)?

- Better flow characteristics than metallic materials over time.
- Nothing sticks to HDPE, so you won't get the internal build ups, like steel over time which will reduce your volume and flow of liquids in the pipelines.
- 10 times better abrasion resistance than steel.
- HDPE pipe does not undergo galvanic corrosion and therefore it may be safely installed in hot soils that would attack metal pipes and there is no need for cathodic protection.

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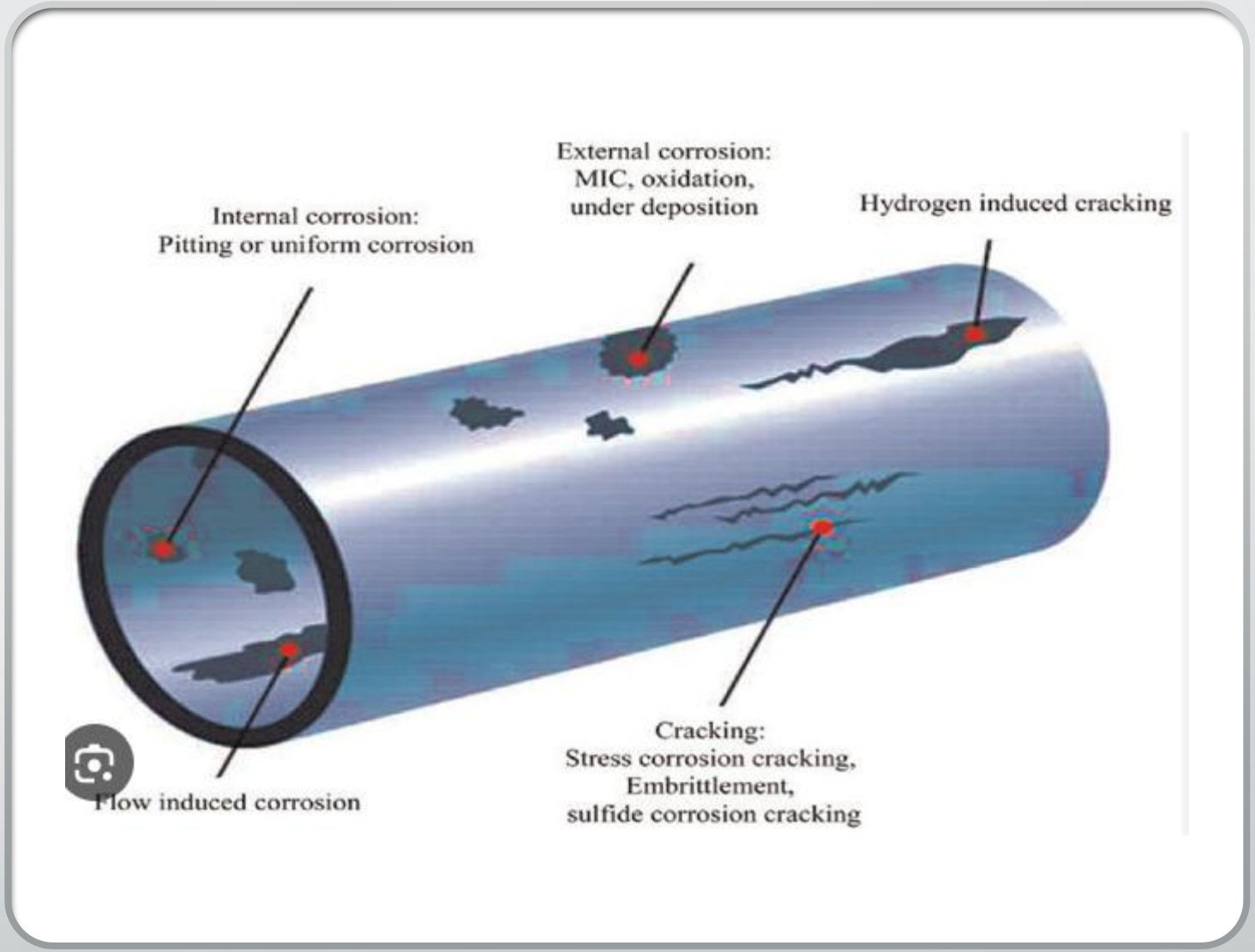
- **Hazen Williams C Factor is 150 and doesn't change over time - Benefits**
  - HDPE pipe has a smooth ID that does not corrode or tuberculate and maintains its flow capability over time.
  - The C Factor of Ductile Iron pipe (140) is dramatically reduced over time due to corrosion and/or tuberculation.



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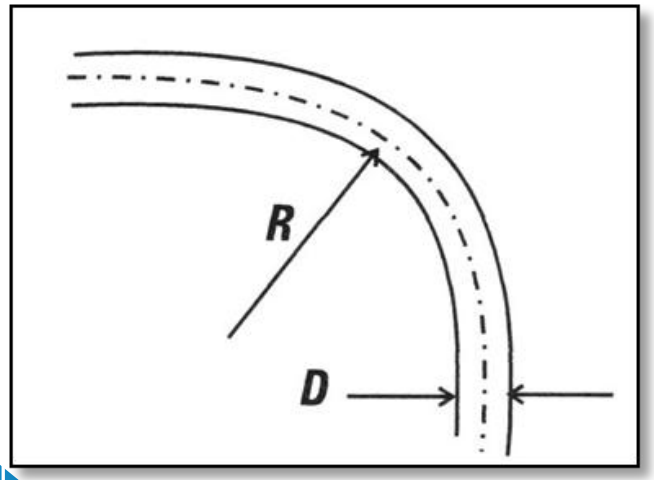
Why Polyethylene (PE)?

- Long service life (100+ Years)
- Leak-free system
- Flexible – has a safe bending radius of 20 to 30 X pipe OD depending on Pipe pressure class.



HDPE Pipeline Applications

- Pressure Pipe Applications (3.2 to 40 Bar)
  - Potable Water (Hot or Cold)
  - Sewerage
  - Storm Water
  - Petro Chemical
  - Slurry Pumping
  - Gas Reticulation
- Gravity Pipe Applications (Max 0.5 Bar)
  - Sewerage
  - Storm Water
  - Manholes

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HDPE Material Grades

- HDPE PE100 (Standard HDPE 60 Degree C HDT) SANS4427-2
- HDPE-RT (Raised Temperature 90 Degree C HDT) SANS4427-2
- HDPE-RC (Resistance to Slow Crack, for unforgiving Laying Conditions) SANS4427-2
- Orange Gas Pipe SANS4437-2

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Certification SANS 4427-2/4437-2/21138-2


SATAS

South African Technical Auditing Services Pty Ltd
(ISO/IEC 17065 : Product Certification)

CERTIFICATE
No: 308.2/1

This is to certify that:

RHO-TECH MANUFACTURING CC

Company registration No CK 2003/001735/07

Is hereby granted permission to apply the above logo to plastic products EAC/IAF 14 NACE 22

manufactured in compliance with

SANS 4427-2

as described in schedule MS25 of this certificate.

PL Posthumus
MANAGING DIRECTOR

DATE ISSUED: 12 May 2023
EXPIRY DATE: 27 June 2024

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South African Technical Auditing Services Pty Ltd
(ISO/IEC 17065 : Product Certification)

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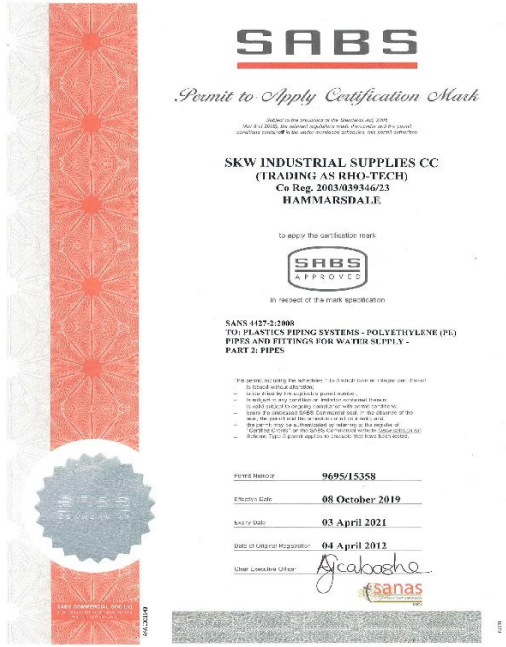
SABS

Permit to Apply Certification Mark

SKW INDUSTRIAL SUPPLIES CC
(TRADING AS RHO-TECH)
Co Reg. 2003/039346/23
HAMMARSDALE

to apply the certification mark

SABS APPROVED

in respect of the mark specification

SANS 4427-2:2008
TG: PLASTICS PIPING SYSTEMS - POLYETHYLENE (PE) PIPES AND FITTINGS FOR WATER SUPPLY - PART 2: PIPES

Permit Number: 9695/15358
Effective Date: 08 October 2019
Expiry Date: 03 April 2021
Date of Original Registration: 04 April 2012
Chief Executive Officer: A Cabasha

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- SATAS & SABS

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SABS 4427 Quality Requirements

- SABS 4427 Cert Holder Raw Material Audit, prior to starting production and procurement of raw material.
- COA from Raw Material Supplier.
- MFI (Melt Flow Index) Pre-check in the Manufacturers onsite Laboratory.
- MFI, Thermal Revision and Tensile tests once the HDPE pipe is produced and prior to delivery.
- Dimensional QA checks, as the HDPE pipes come off the extruders, checking for.
  - Ovality Conformance.
  - Wall Thickness Conformance.
  - OD (Outside Dimension) Conformance.
- Once the HDPE pipe order has been QA checked in accordance with SABS 4427 standards requirements, then a COC is produced, and the pipe is released for delivery/collection.

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Marking – SANS4427

ISO 4427:1996(E)

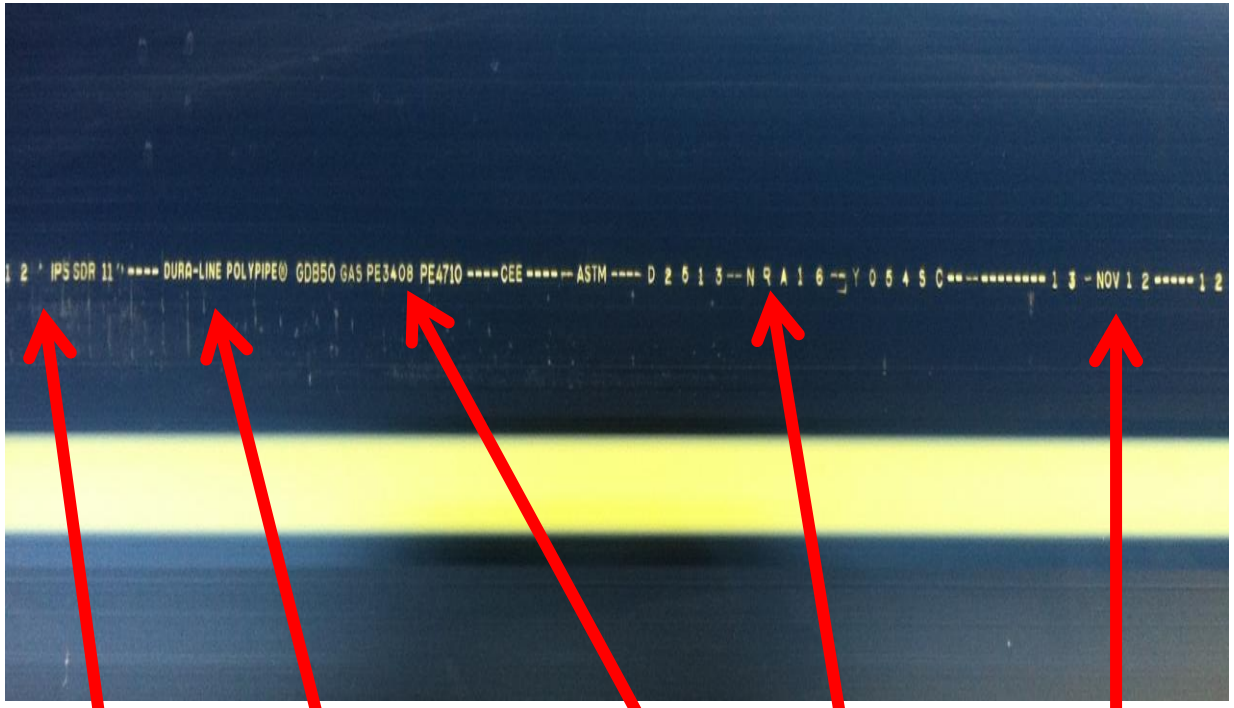
8 Marking

All pipes shall be indelibly marked at maximum intervals of 1 m.

The marking shall indicate at least the following information:

- the manufacturer's name and/or trade mark;
- the dimensions (nominal outside diameter x nominal wall thickness);
- the outside-diameter tolerance (A or B);
- the designation of the pipe material (PE 100, PE 80, PE 63, PE 40 or PE 32);
- the nominal pressure (PN);
- the pipe series (S or SDR) (optional);
- the production period (date or code);
- the number of this International Standard.

The word "water" may also be included if the pipe is intended for drinking water.



Pipe size, Manufacturers name, Resin type, SANS, Date of manufacture

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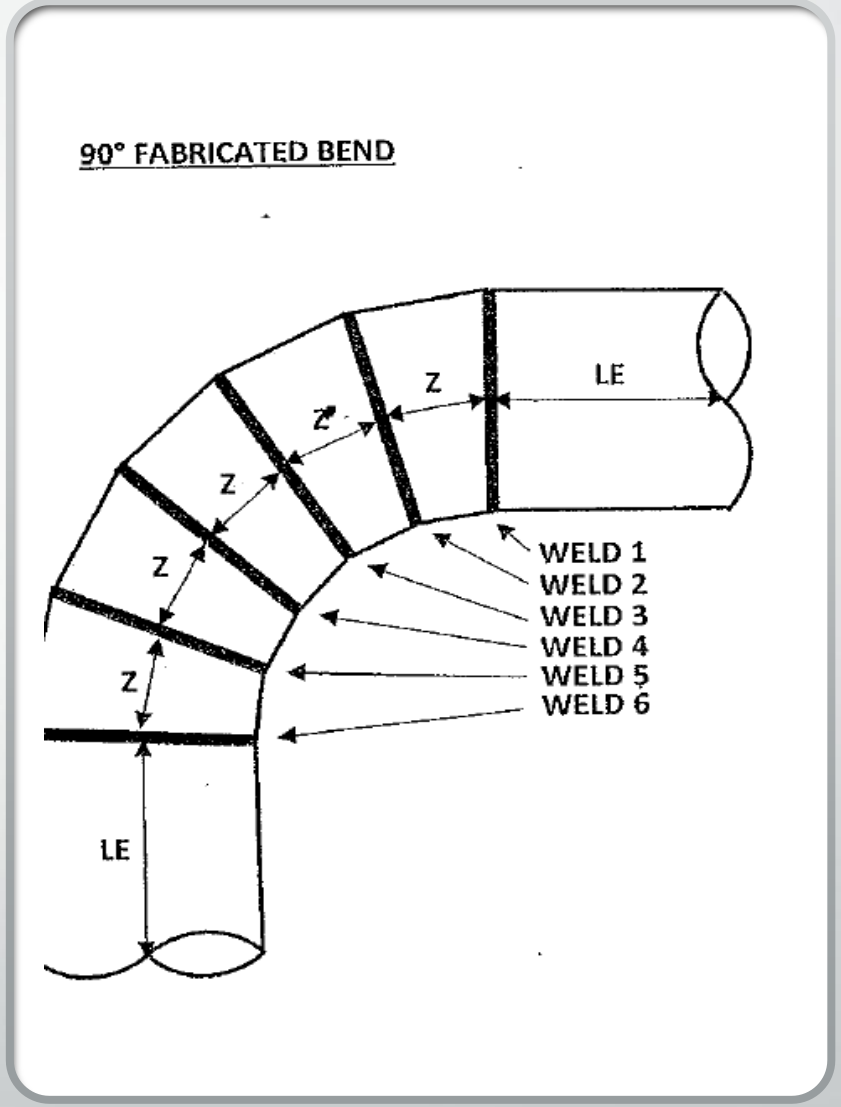
HDPE Pipe Fabricated fittings

- HDPE fabricated fittings, using extruded HDPE pipe of the same class/pressure rating as the pipeline.
- These fittings need to be manufactured under the SABS 4427 – 3 standard requirements.
- What does this standard stipulate, for each type of fabricated fittings:-

- Bends, a cut angle of 7.5 degrees of less, giving you a welded angle of 15 degrees or less, allows for zero derating.

- Bends, with cuts of 7,5 degrees to 15 degrees, giving you a welded angle of 15 degrees to 30 degrees, will be de-rated by 20%.

- Tees and Y-pieces, with an angle of 45 degrees, will be de-rated by 50%.



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Current market HDPE pipe risks

- Unscrupulous Manufacturers using bought in regrind material, to produce your HDPE pipe.
- The effect of this action taking place, would be a reduced pipe life, anything from immediate failure during Hydrostatic Pressure Testing, to a couple of months or a few years.
- This is undeterminable.
- HDPE pipe being sent from manufacturers with COC's where the dimensions do not meet the required standards.
- Damage to the surface of HDPE Pipes and Fittings, where the damage is greater than 10% of the wall thickness, these items need to be either repaired of rejected/guaranteed, but not accepted onsite, for installation in your pipeline.
- Installing de-rated fittings.

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HDPE Moulded Fittings

- Ensure your fittings for your project, comes from a certified & Reputable supplier, with COC Traceability.
- Remember your lines pressure capability is restricted by the weakest component in your pipeline.

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Joining PE

- Heat fusion developed in the 1950's
- In 1969 McElroy® designed its first polyethylene fusion machine

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Types of Fusion

- Saddle Fusion
- Socket Fusion
- Butt Fusion
- Electro-Fusion

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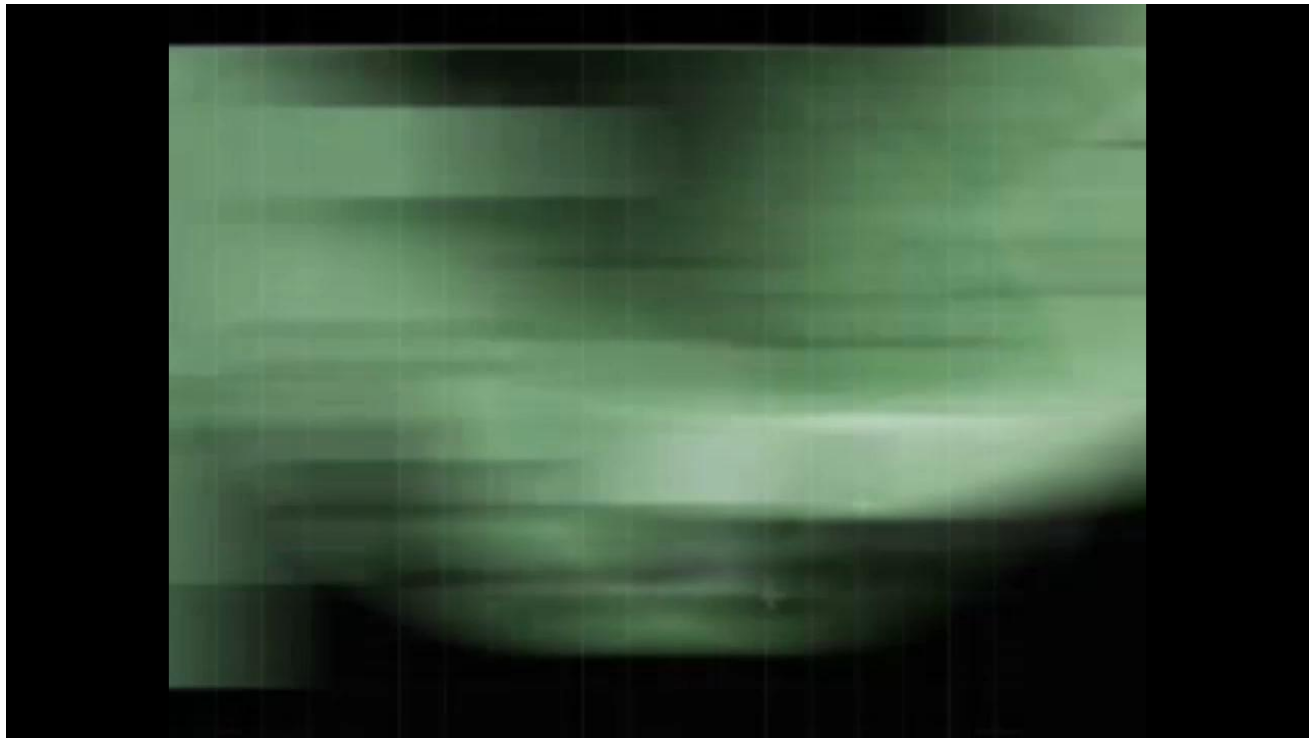

Characteristics of HDPE pipe

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Fusion Parameters and Procedures

- **ISO 12176-1**
  - Standard for manufacture of HDPE equipment
- **ISO 21307 and/or SANS 10268**
  - Standard Procedure for Heat Fusion Joining of Polyethylene Pipe and Fittings
- **SANS10269/10270**
  - (10269) Welding of Thermoplastics – Testing and Approval of Welders.
  - (10270) Welding of Thermoplastics – Approval of Welding Procedures and Welds.

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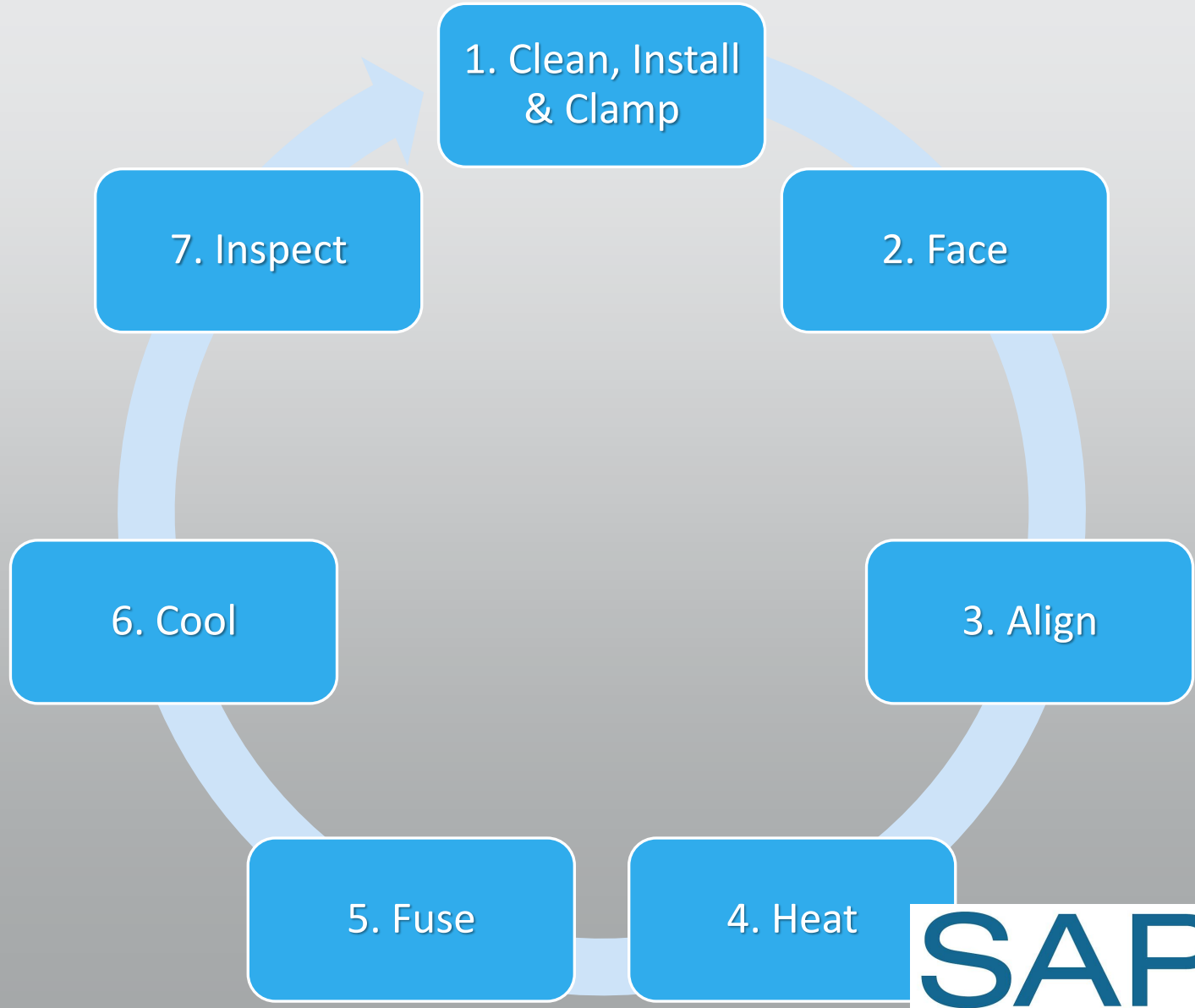
Fusion Parameters and Procedures



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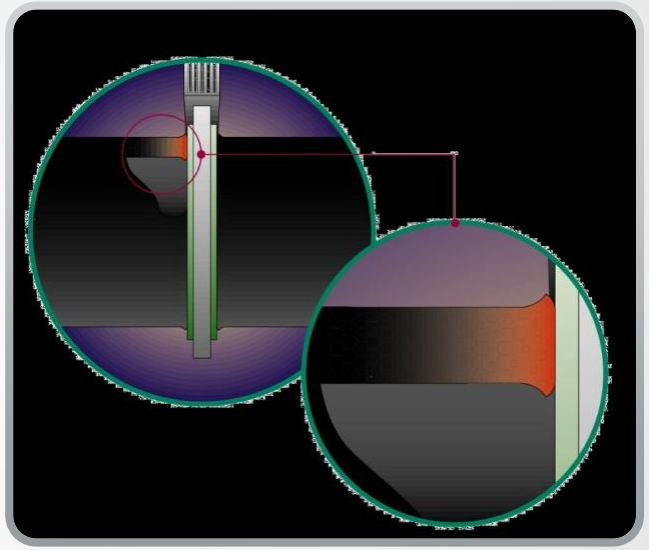
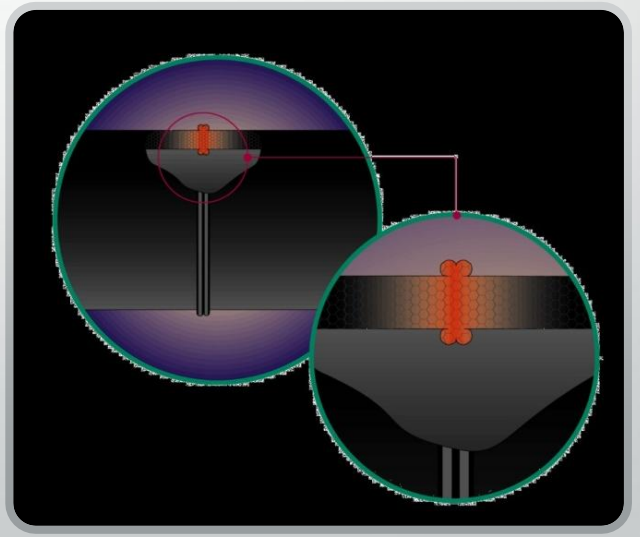
Joining PE

- Mating surfaces are prepared and heated to a designated temperature, the melted surfaces are pressed together and held under pressure. The applied force causes flow of the melted materials, which causes mixing and thus a permanent fusion.





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Fusion Machines

Large Bore

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Small Bore

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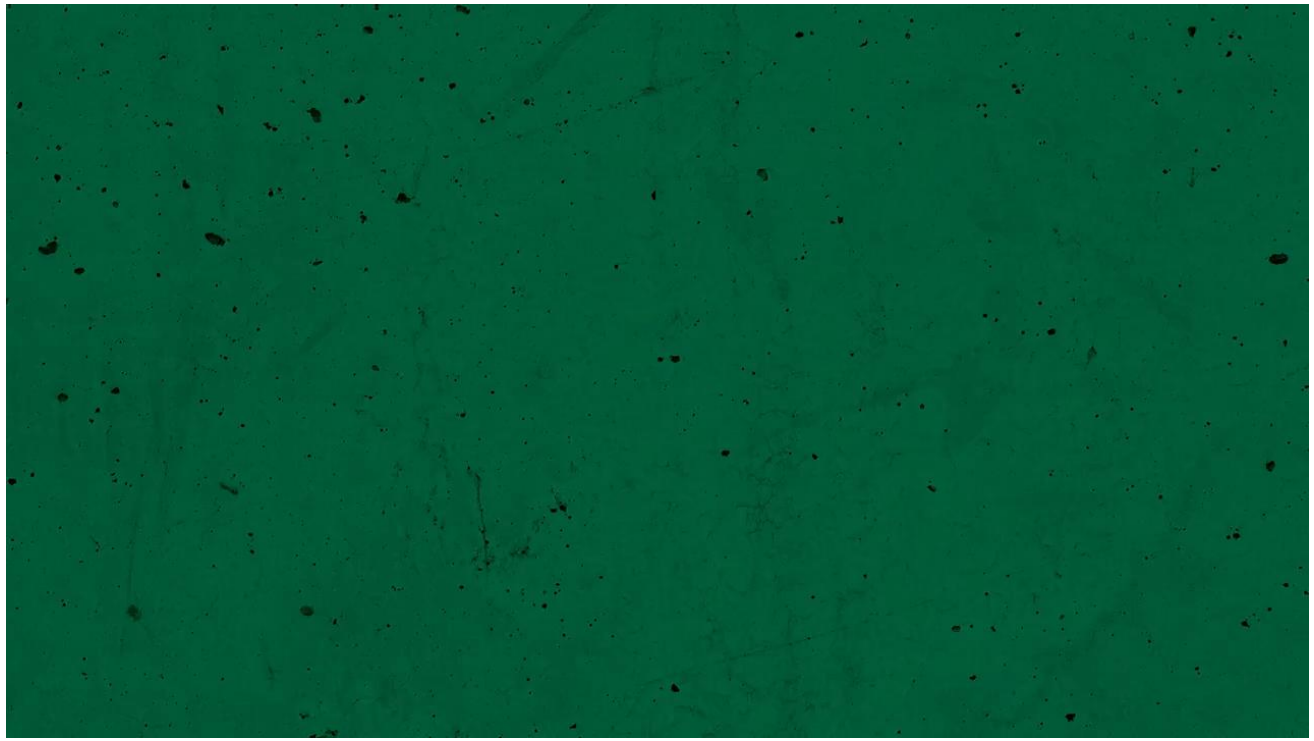

HDPE Welding Process Animation

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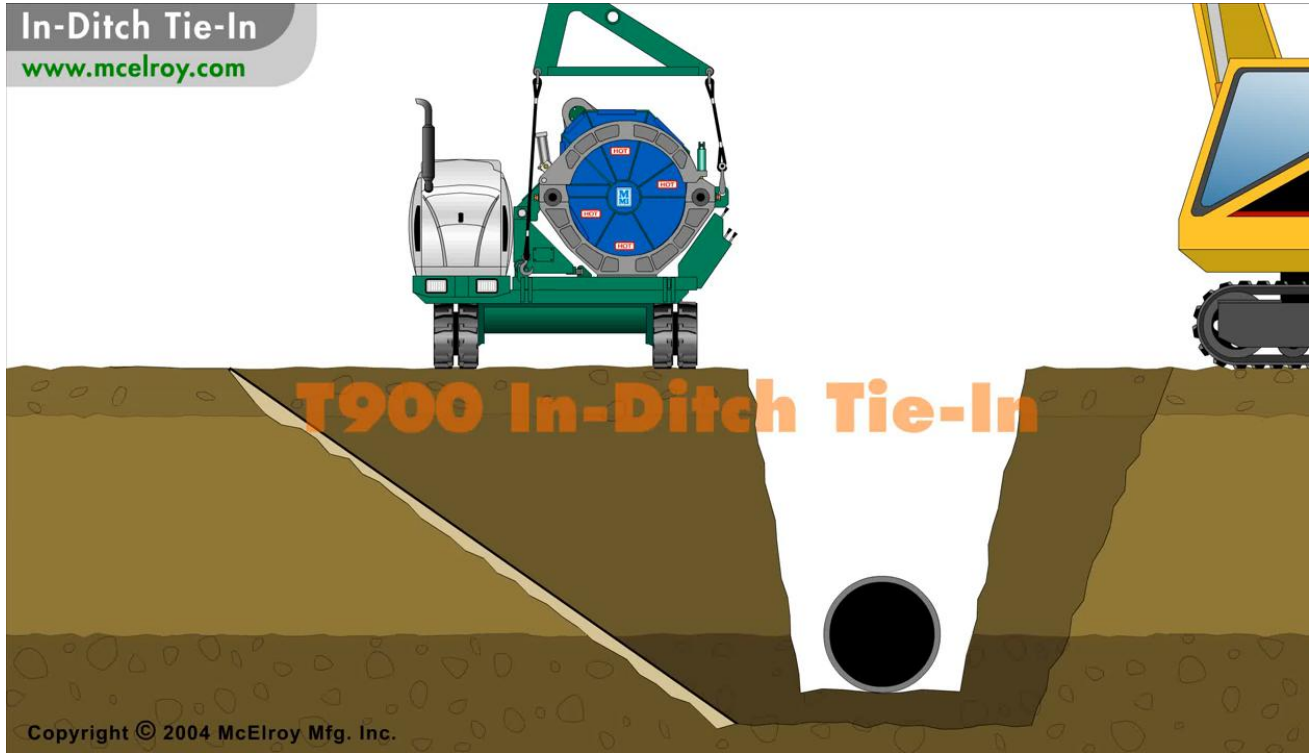

In Trench Welding

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In Field Quality Checks

- **Nondestructive:**
  - Computer Generated Data Logger - Records review.
  - Visual and measurements compared to SANS 10268 part 10.
- **Destructive**
  - Bend test
  - Tensile test

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McElroy Data Logger Weld report

DataLogger VAULT

McElroy Joint Report

Front-end Plot

Heater Removal Plot

Summary Plot

APPROVED

DATE: 06-12-23

SIGN:

DATALOGGER® 7

FUSION JOINT DATA COLLECTION & ANALYSIS

Tensile Testing

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Side Bend Tester

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Field Performance test

- Perform a pressure test , PE100 Material allows for 1.25 x the rated capacity of the lowest denominator in the system for an extended period, 1 to 3 hours with a calculated pressure drop.
- Perform a pressure test in accordance with SANS 2001: DP 2 Medium pressure pipelines. This procedures gives the option of a hydrostatic or compressed air test.

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Conclusion

- According to the Federal Highway Administration, utilities spend $36 billion annually on corrosion protection of pipes. Is your municipality contributing to these expenditures? If the answer is yes, then specify HDPE pipe. It does not corrode, or tuberculate, long life-cycle reduces your maintenance budget, and infiltration into the pipe and exfiltration into the environment is non-existent

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Thank you