SAPPMA

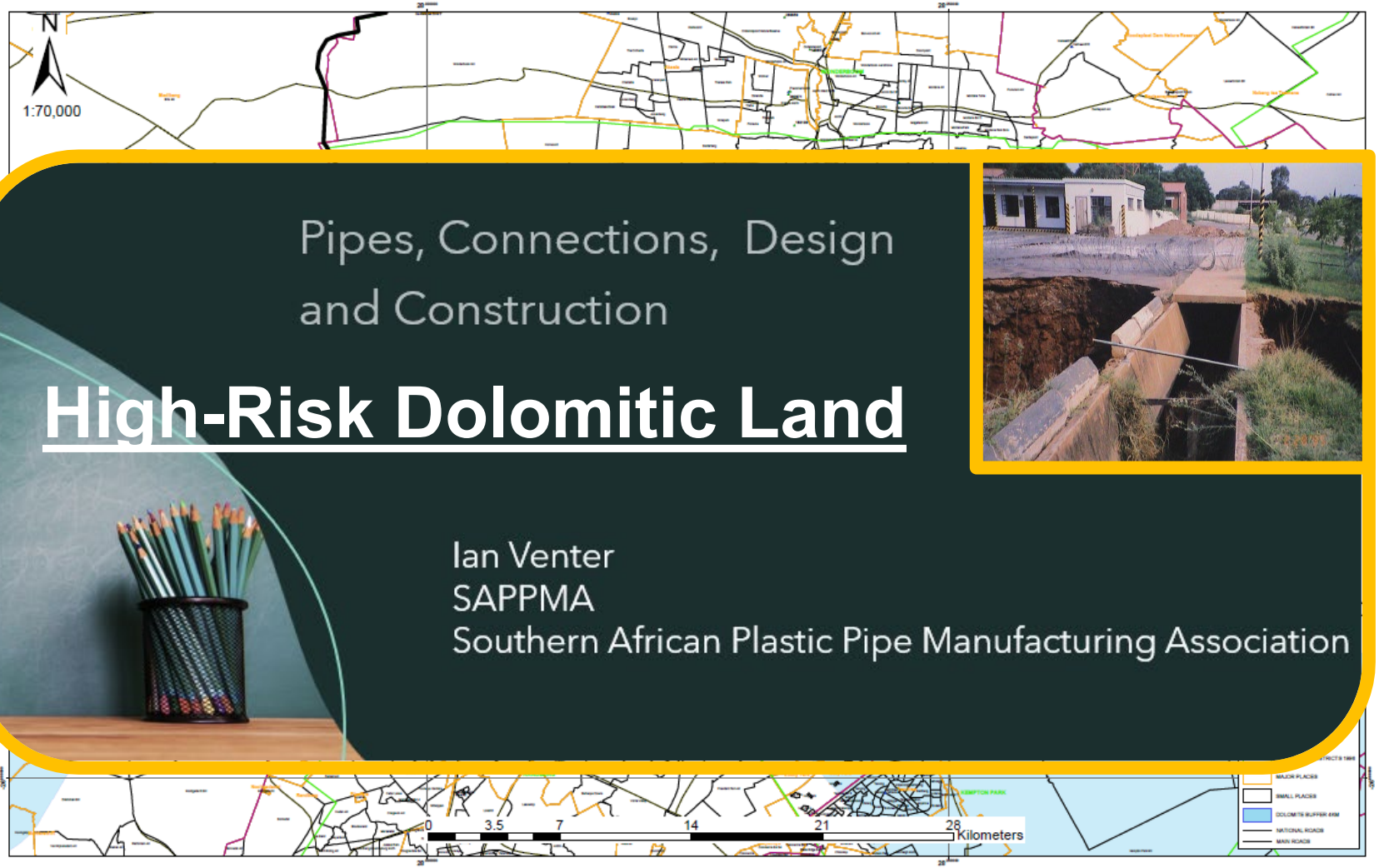
southern african plastic pipe manufacturers association

WEBINAR V

Pipes, Connections, Design and Construction

High-Risk Dolomitic Land

Ian Venter
SAPPMA
Southern African Plastic Pipe Manufacturing Association



Presenter

Webinar V

23-06-2022

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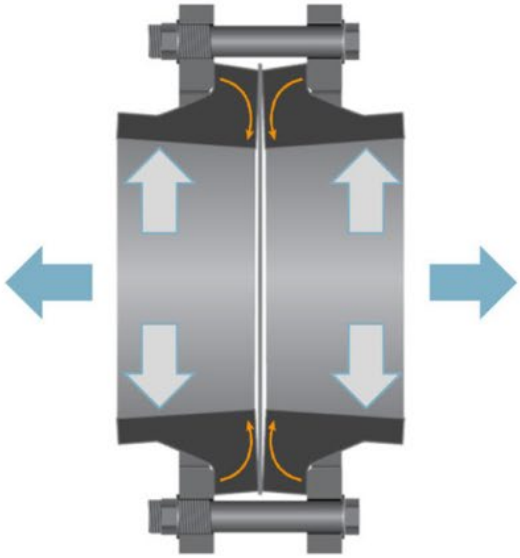
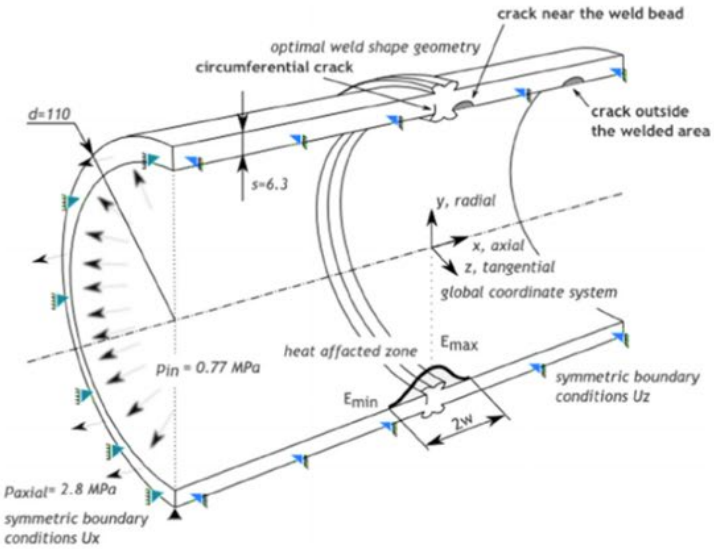
Ian Venter

What are we hoping to achieve

Water tightness, Self spanning, Cost-effective Design with a 100 year plus design life





Overview


Aspects ensuring service life-
The Outcome is in your hands
SAPPMA
southern african plastic pipe manufacturers association
System design
Product Design
Standards
Specifications
Manufacturing
Quality management and Control
Handling and storage
Installation and jointing
Pre- commissioning Testing
Commissioning
Maintenance and repairs

We understand the formation of sinkholes

Specify your specific needs

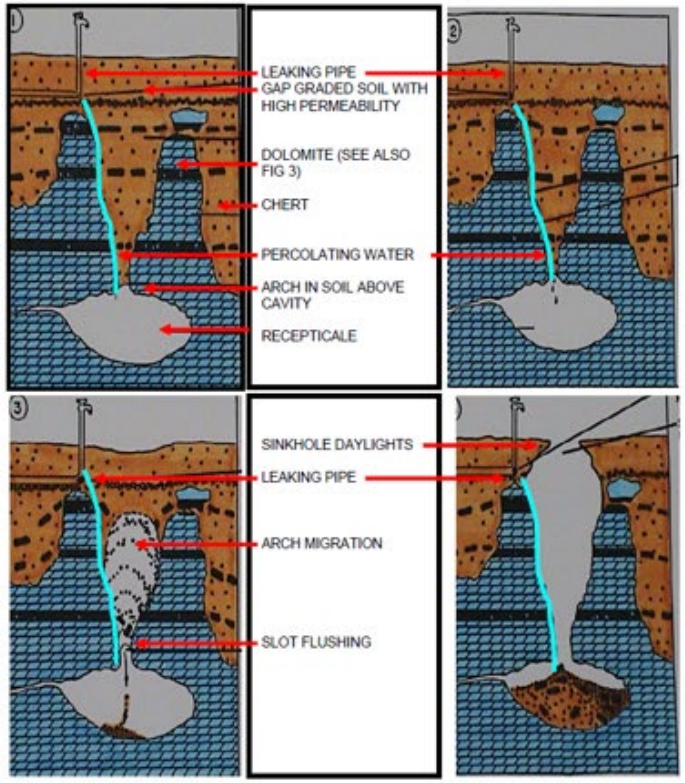


FIGURE 2: MECHANISM OF SINKHOLE FORMATION

You need to drive the bus *(Hop-On, Hop-Off)*

TE 3: SINKHOLE ON HIGHWAY AS RESULT OF LEAKING WATER PIPE

ATE 5: SINKHOLE AS RESULT OF LEAKING WATER MAINS

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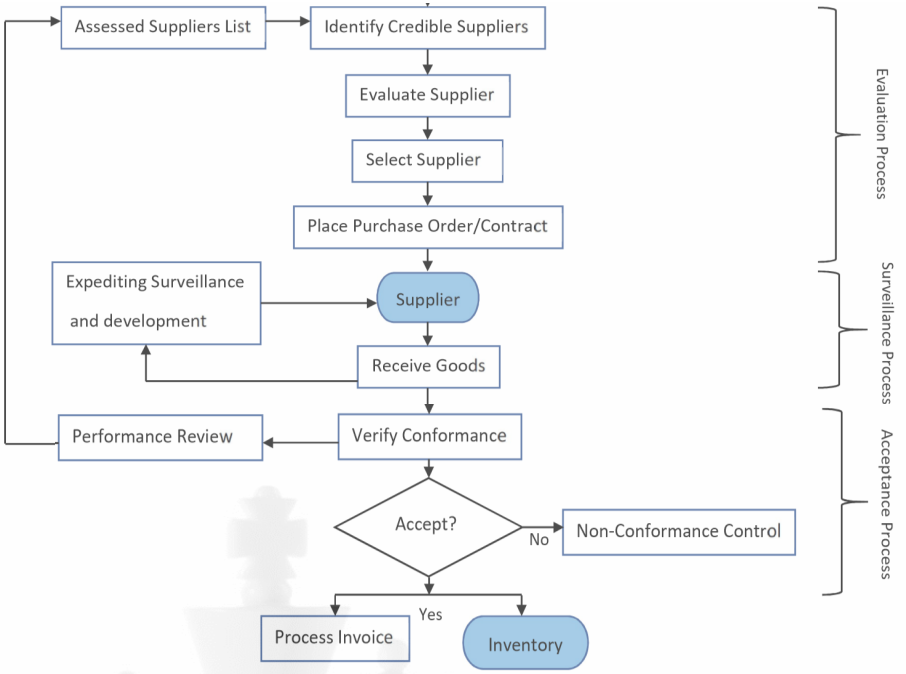
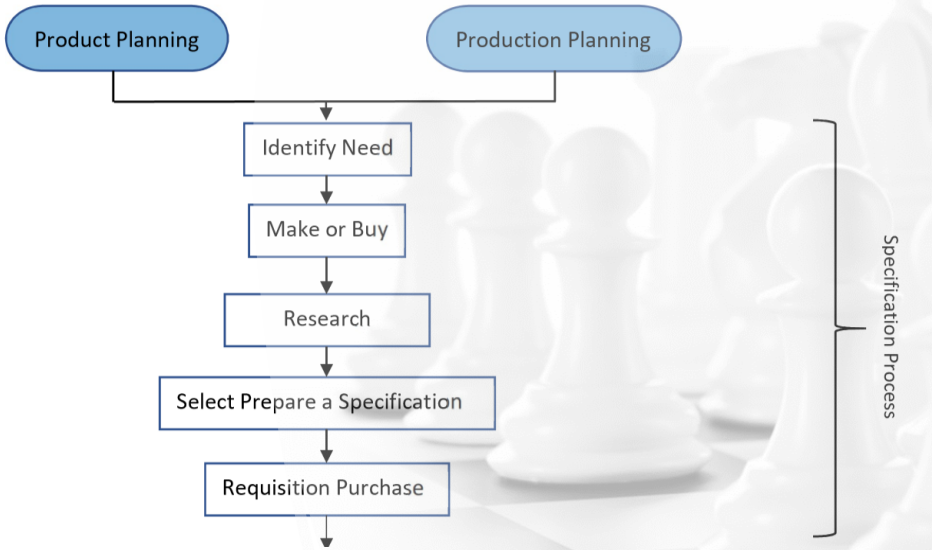
Design



Procurement Process



Revised SANS 1936-3:2019

Preferences as per SABS TC Working Group

SANS 1936-3:2019
Edition 2

Table 4 — Preferred pipe types for use on sites designated as D2 or D3 dolomite land

1	2	3	4	5	6
Application	**Pipe type and material classification**	**Minimum pressure rating or ring stiffness**	**Applicable standards**	**Pipe joint requirements**	**Additional requirements and comments**
Water supply (see 6.2.2.10)					
Bulk supply: OD ≥ 300mm	Steel pipes	In accordance with design requirements	SANS 719 or	Continuous butt, sleeve or socket welds. Mechanical jointing devices (including flanges) shall be used only in manholes. Screwed joints shall not be used.	Pipes shall be protected against corrosion by means of galvanizing or coatings and, where required, by cathodic protection.
	High density polyethylene (HDPE): PE 100	PN 10 SDR 17[a, b]	The relevant parts of SANS 4427 SANS 10268-1 SANS 10268-2 SANS 10268-10 SANS10269 SANS 10270 SANS 6269 SANS 1671-1 SANS 1671-2 DIN EN 1555-3 DIN EN 12201-3	Butt welded in accordance with the relevant parts of SANS Welding of thermoplastic standards Mechanical jointing devices (including flanges) shall be used only in manholes.	Number of joints shall be kept to a minimum.

Preferences as per SABS TC Working Group

OD ≥ 75mm to < 300mm	High density polyethylene (HDPE): PE 100	PN 12,5 SDR 13.6[a, b]	The relevant parts of SANS 4427	Butt welded in accordance with the relevant parts of SANS Welding of thermoplastic standards Mechanical jointing devices (including flanges and compression fittings) shall be used only in manholes.	Number of joints shall be kept to a minimum. 75mm and 90mm diameter pipes should preferably be supplied in 100m rolls. 110mm diameter pipes should be supplied in 50m rolls.
OD < 63mm	High density polyethylene (HDPE): PE 100	PN 12,5 SDR 13.6[a, b, c]	The relevant parts of SANS 4427 SANS 10268-1	Electrofusion or butt-fusion in accordance with SANS Welding of thermoplastic standards[c]	Number of joints shall be kept to a minimum.

1	2	3	4	5	6
Application	**Pipe type and material classification**	**Minimum pressure rating or ring stiffness**	**Applicable standards**	**Pipe joint requirements**	**Additional requirements and comments**
			SANS 10268-2 SANS 10268-10 SANS10269 SANS 10270 SANS 6269 SANS 1671-1 SANS 1671-2 DIN EN 1555-3 DIN EN 12201-3	Mechanical jointing devices (including flanges and compression fittings) shall be used only in manholes.	Pipes supplied in 100m rolls

Preferences as per SABS TC Working Group

Irrigation pipe (4.7.4 e)					
OD 50mm-63mm (permanently pressurised)	High density olyethylene (HDPE): PE 100	PN12.5 SDR 13.6[a, b, c]	The relevant parts of SANS 4427 SANS 10268-1 SANS 10268-2 SANS 10268-10 SANS10269 SANS 10270 SANS 6269 SANS 1671-1 SANS 1671-2 DIN EN 1555-3 DIN EN 12201-3	Electrofusion or butt-fusion in accordance with SANS Welding of thermoplastic standards [c] Mechanical jointing devices (including flanges and compression fittings) shall be used only in manholes.	Number of joints shall be kept to a minimum. Pipes supplied in 50m to 100m rolls
OD 20mm-40mm (not permanently pressurised)	High density polyethylene (HDPE): PE 100	PN6 SDR 26[d]	The relevant parts of SANS 4427 Relivant SANS ISO 17885	Mechanical jointing devices (compression fittings SANS ISO 17885)	Number of joints shall be kept to a minimum. Pipes supplied in 50m to 100m rolls

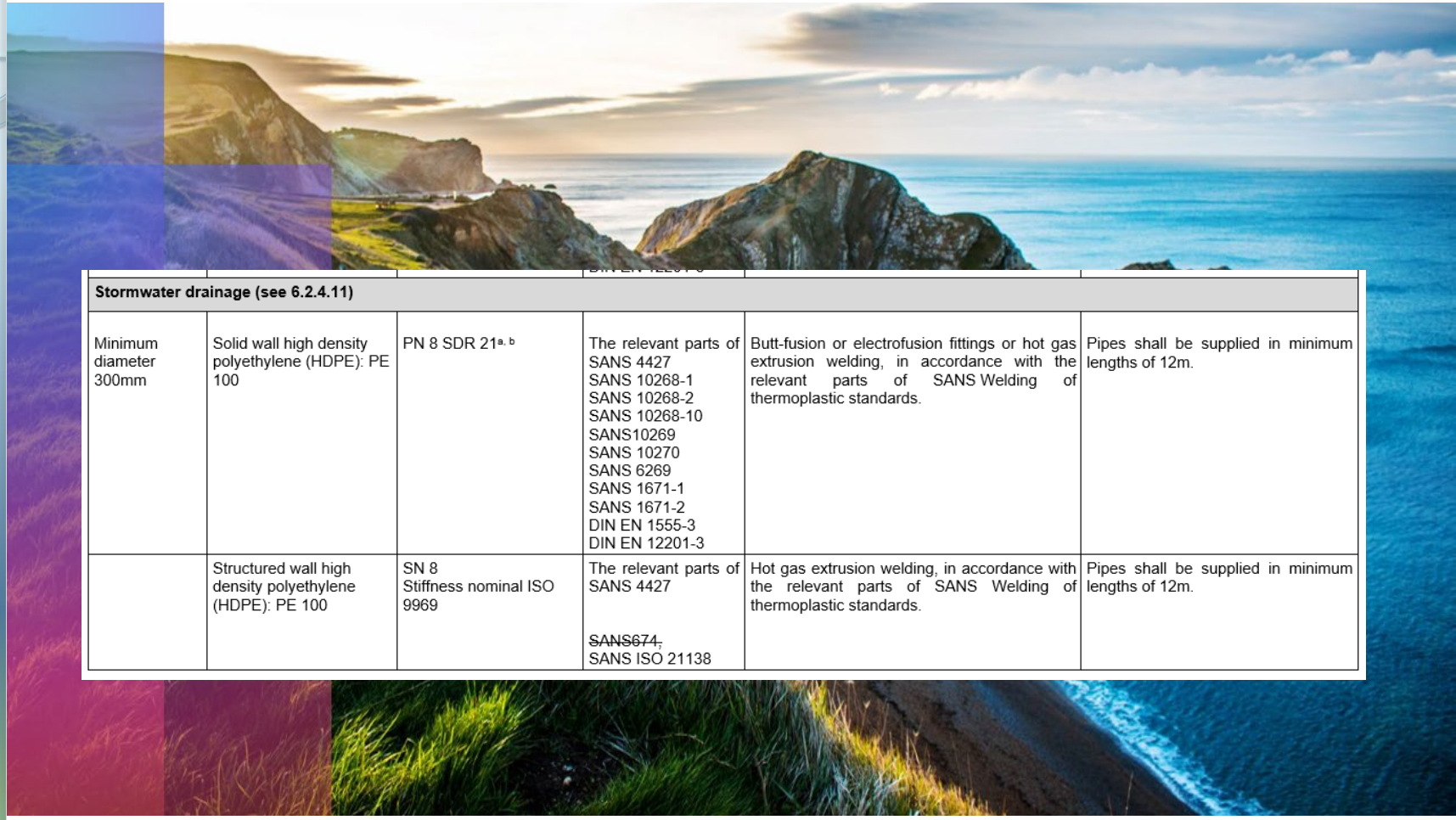
Preferences as per SABS TC Working Group

Sewers (see 6.2.3.5)					

SANS 1936-3:2019
Edition 2

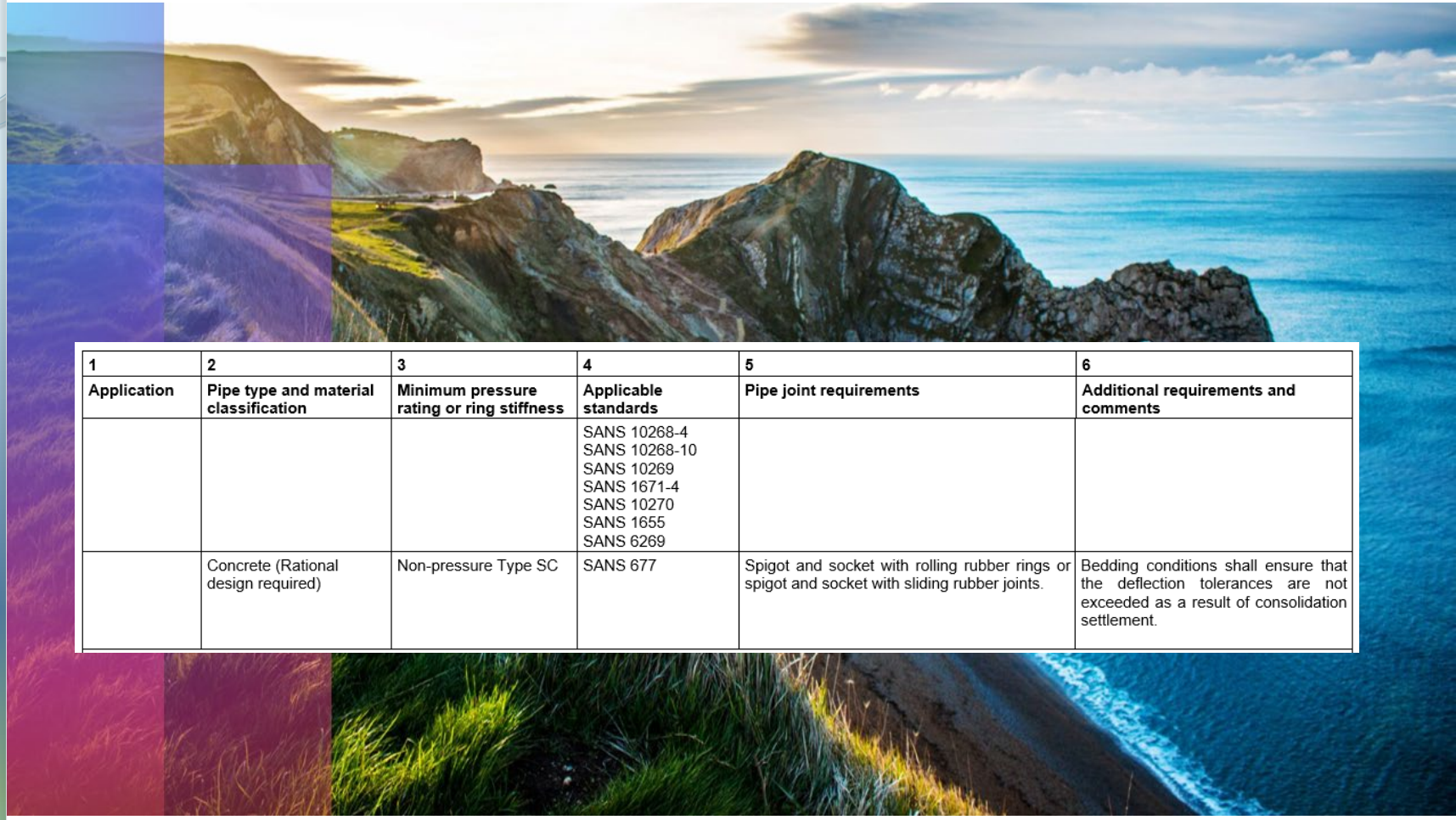
1	2	3	4	5	6
Application	**Pipe type and material classification**	**Minimum pressure rating or ring stiffness**	**Applicable standards**	**Pipe joint requirements**	**Additional requirements and comments**
All diameters	High density olyethylene (HDPE): PE 100	PN 10 SDR 17[a, b]	The relevant parts of SANS 4427 SANS 10268-1 SANS 10268-2 SANS 10268-10 SANS10269 SANS 10270 SANS 6269 SANS 1671-1 SANS 1671-2 DIN EN 1555-3 DIN EN 12201-3	Butt-fusion, electrofusion in accordance with the relevant parts of SANS Welding of thermoplastic standards (All internal weld beads to be removed during installation)	Pipes shall be supplied in minimum lengths of 12m.

Preferences as per SABS TC Working Group



Stormwater drainage (see 6.2.4.11)					
Minimum diameter 300mm	Solid wall high density polyethylene (HDPE): PE 100	PN 8 SDR 21[a, b]	The relevant parts of SANS 4427 SANS 10268-1 SANS 10268-2 SANS 10268-10 SANS10269 SANS 10270 SANS 6269 SANS 1671-1 SANS 1671-2 DIN EN 1555-3 DIN EN 12201-3	Butt-fusion or electrofusion fittings or hot gas extrusion welding, in accordance with the relevant parts of SANS Welding of thermoplastic standards.	Pipes shall be supplied in minimum lengths of 12m.
	Structured wall high density polyethylene (HDPE): PE 100	SN 8 Stiffness nominal ISO 9969	The relevant parts of SANS 4427 ~~SANS674,~~ SANS ISO 21138	Hot gas extrusion welding, in accordance with the relevant parts of SANS Welding of thermoplastic standards.	Pipes shall be supplied in minimum lengths of 12m.

Preferences as per SABS TC Working Group



1	2	3	4	5	6
Application	**Pipe type and material classification**	**Minimum pressure rating or ring stiffness**	**Applicable standards**	**Pipe joint requirements**	**Additional requirements and comments**
			SANS 10268-4 SANS 10268-10 SANS 10269 SANS 1671-4 SANS 10270 SANS 1655 SANS 6269		
	Concrete (Rational design required)	Non-pressure Type SC	SANS 677	Spigot and socket with rolling rubber rings or spigot and socket with sliding rubber joints.	Bedding conditions shall ensure that the deflection tolerances are not exceeded as a result of consolidation settlement.

Preferences as per SABS TC Working Group

a) The minimum pressure rating shall be as stated or in accordance with design requirements, whichever is higher. The design of the pipe shall make allowance for the design pressure and potential loss of support as required in 6.2.1.1.
b) On residential land, the pressure rating shall not be lower than PN 12.5 as the applicable pipe sizes are prone to damage by gardening activities.
c) Small diameter(DN/OD ≤63mm) HDPE pipes preferably jointed by electrofusion instead of butt-fusion.
d) Only temporarily pressurised irrigation pipe may be joined by compression fittings.
e) Pipes with localized external damage of a depth of 5% (or greater) of the documented minimum pipe wall thickness will not be allowed to be installed.
f) The standard dimensional ratio (SDR) corresponds to the quotient between the outside diameter and the wall thickness of the pipe. It is non-dimensional.
g) Nominal pressure (PN) corresponds to the maximum permissible operating pressure (in Bar) of the pipe at 20°C.
SEE ANNEXURE 1: HDPE PRODUCT MANUFACTURING, TESTING, ORDERING AND INSTALLATION

$$SDR = \frac{d_e}{e}$$

Equation 4.3

SDR = standard dimension ratio (-)
d_e = rounded outside diameter of the pipe (mm)
e = pipe wall thickness (mm)

Understanding PFA (Maximum allowable operating pressure

Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) —

Part 1:
General

1 Scope

This document specifies the general aspects of polyethylene (PE) compounds for the manufacture of pressure pipes and fittings (mains and service pipes) for buried or above ground applications, intended for the conveyance of:

— water for human consumption;

— raw water prior to treatment;

— drainage and sewerage under pressure;

— vacuum sewer systems;

— water for other purposes.

This document also specifies the test parameters for the test methods referred to in this document.

In conjunction with other parts of the ISO 4427 series, this document is applicable to PE pipes and fittings, their joints and to joints with components made of PE and other materials, intended to be used under the following conditions:

a) a maximum allowable operating pressure (PFA) up to and including 25 bar[1)];

b) an operating temperature of 20 °C as the reference temperature.

NOTE 1 For other operating temperatures, guidance is given in Annex A.

The ISO 4427 series covers a range of maximum allowable operating pressures and gives requirements concerning colours.

NOTE 2 It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and installation practices or codes.

Component or System Related pressure

Table 1 - Designation of pressures in English, French and German

Abbreviation[a]	English	French	German	
DP	design pressure	pression de calcul en régime permanent	Systembetriebsdruck	System related
MDP	maximum design pressure	pression maximale de calcul	höchster Systembetriebsdruck	
STP	system test pressure	pression d'épreuve du réseau	Systemprüfdruck	
PFA	allowable operating pressure	pression de fonctionnement admissible	zulässiger Bauteilbetriebsdruck	Component related
PMA	allowable maximum operating pressure	pression maximale admissible	höchster zulässiger Bauteilbetriebsdruck	
PEA	allowable site test pressure	pression d'épreuve admissible sur chantier	zulässiger Bauteilprüfdruck auf der Baustelle	
OP	operating pressure	pression de fonctionnement	Betriebsdruck	System related
SP	service pressure	pression de service	Versorgungsdruck	

[a] Valid for all language versions.

Component or System Related pressure

3.1.1
allowable maximum operating pressure (PMA)
maximum pressure occurring from time to time, including surge, that a component is capable of withstanding in service

3.1.2
allowable operating pressure (PFA)
maximum hydrostatic pressure that a component is capable of withstanding continuously in service

3.1.3
allowable site test pressure (PEA)
maximum hydrostatic pressure that a newly installed component is capable of withstanding for a relatively short duration, in order to ensure the integrity and tightness of the pipeline

3.1.4
design pressure (DP)
maximum operating pressure of the system or of the pressure zone fixed by the designer considering future developments but excluding surge

3.1.5
maximum design pressure (MDP)
maximum operating pressure of the system or of the pressure zone fixed by the designer considering future developments and including surge, where:

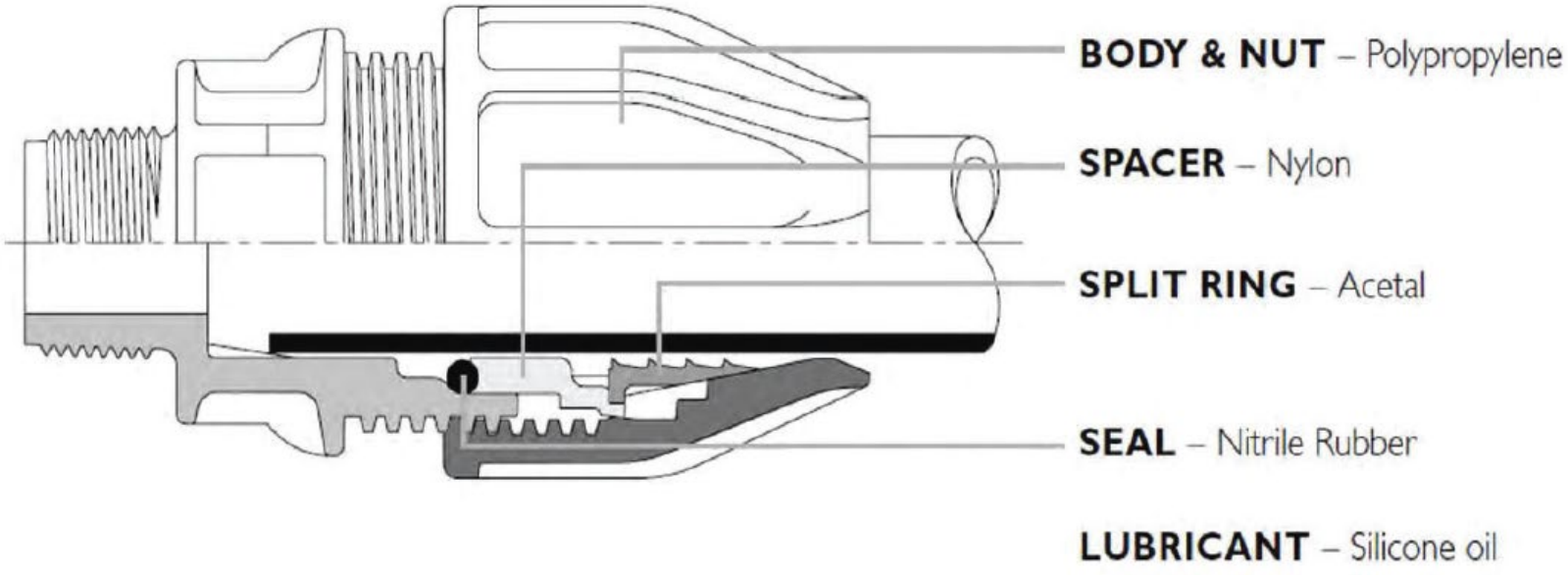
— MDP is designated MDPa, when there is a fixed allowance for surge;

— MDP is designated MDPc, when the surge is calculated

ISO 17885 - Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications

Plastic mechanical compression fittings component materials

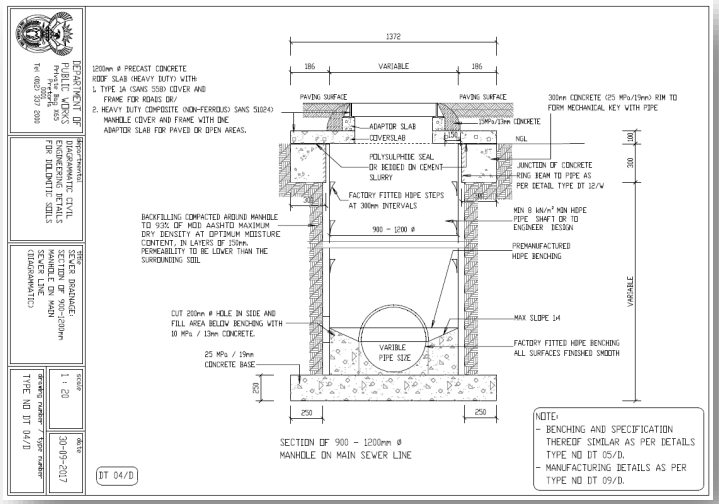
- Polypropylene is used for the body and nut as it is stiffer and harder than PE
- Acetal is a very hard plastic which can bite in to the PE pipe. Nylon also used.



Manhole & Sewer Pipe Testing

6.2.3.1 All manholes shall be watertight and tested for watertightness prior to delivery and during construction (zero leakage).

6.2.3.2 Sewers and gravity drainage systems, inclusive of pipes, sleeves or conduits shall be subjected to hydraulic testing up to a maximum of 1,25 x nominal manufactured pressure, after installation, in accordance with SANS 2001 DP2, in addition to any requirements specified in this part of SANS 1936, for the selected pipe type, irrespective of the application. Such test shall be conducted with the pipe material temperature not exceeding 23 degrees Celsius.



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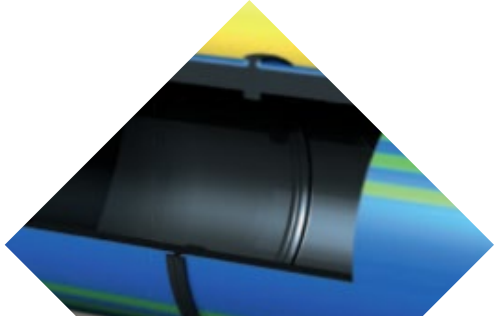
ANNEXURE 1: HDPE PRODUCT MANUFACTURING, TESTING, ORDERING AND INSTALLATION

Material or process	Product application/use	Requirement
Raw material	All types	SANS ISO 4427 Polyethylene PE100 raw material to be virgin unprocessed pre-compounded raw material.
		At no stage of manufacture may pipe or fittings be manufactured from in-house own PE100 reworked raw material
	Gas	Orange standard, SANS ISO 4437 polyethylene PE100 raw material to be virgin unprocessed pre-compounded raw material.
	Particular application	For specific projects the specifying entity will be allowed to ask for specific PE100 raw material requirements greater than is required by SANS ISO 4427-1
Marking of manufactured products	All types	All locally produced fabricated products to be uniquely printed inline during manufacturing or after manufacturing with the standard SANS 4427 requirements as well specific application (water/sewer/stormwater/sleeve etc) details and project information.
Quality control reports	All types	1.All product quality reports as per the Quality Control Plan (QCP) to be reported in the format of EN102 04

Type of certificate	Designation	Content	Tests	Confirmation
2.1	Works certificate. according to 2.1	Confirmation of agreement with the purchase order	No test results	Compliance with agreements
2.2	Works certificate according to 2.2	Confirmation of agreement with the purchase order specifying the results of non-specific tests	Guideline values, tested on a semi finished product made using the same material, e.g.: - Density - Melting point	Compliance with agreements
3.1	Acceptance certificate according to .3.1	Confirmation of agreement with the purchase order specifying the results of specific tests	Mean values, tested at a semi-finished product* from the same production** e.g.: - Density - Melting point - Tensile strength - Tensile elongation at break - Impact strength	Compliance with agreements

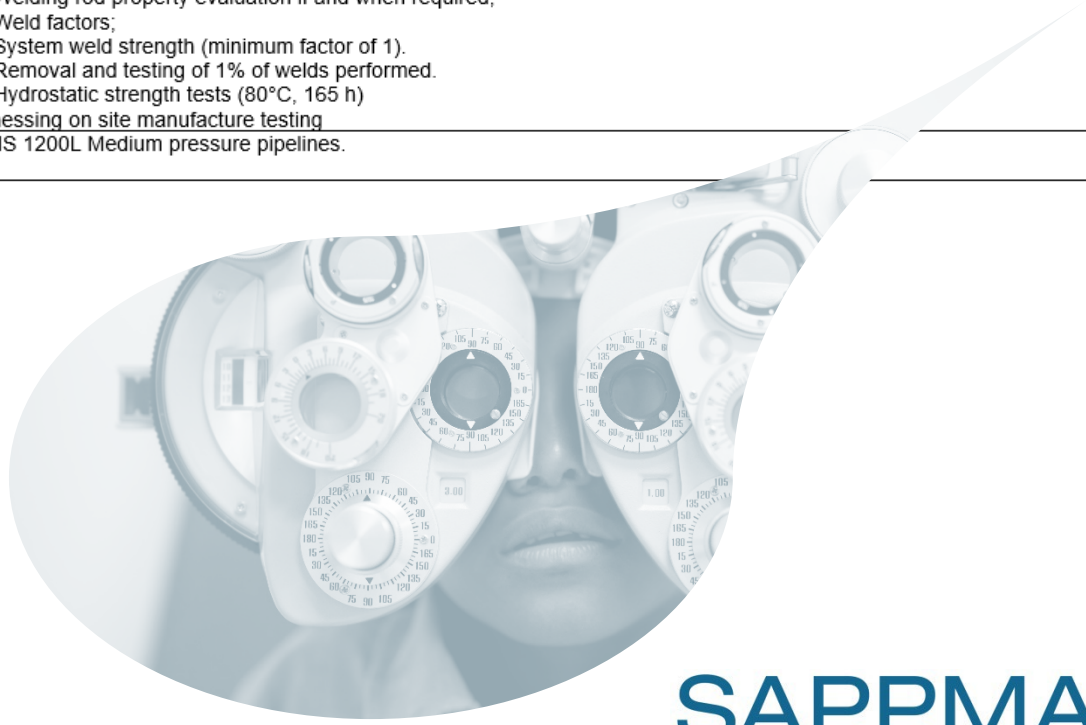
	* or of the input material, if the required test data or material samples are available ** Test data originates from the production of the supplied material
	Works certificate in accordance with 2.1: Certificate in which the manufacturer confirms without indicating the test results that the



Material or process	Product application/use	Requirement
		supplied products comply with the requirements of the purchase order and the specified standard of quality.
		Works certificate in accordance with 2.2: Certificate in which the manufacturer confirms with an indication of the test results that the supplied products comply with the requirements of the purchase order and the specified standard of quality. Non-specific tests are tests which are intended to determine whether products manufactured in accordance with the same product specification and using the same method, comply with the requirements set out in the purchase order. The tested products do not necessarily have to originate from the delivery itself, but can originate from different comparable production processes.
		Acceptance test in accordance with 3.1: In an acceptance test certificate in accordance with 3.1, the manufacturer confirms, with indication of the specific test results, that the delivered products comply with the requirements specified in the purchase order. The acceptance test certificate is confirmed by an acceptance officer of the manufacturer who is independent of the production department. In the acceptance test certificate in accordance with 3.1, the manufacturer is permitted to adopt test results which were determined on the basis of specific testing of the input material or semi-finished products used. However, this is only possible with the proviso that the manufacturer uses methods to ensure traceability and is able to submit the relevant test certificate. Otherwise, the test results are determined from cut test specimens from the relevant semi-finished production batch. Test costs are incurred for an acceptance test certificate in accordance with 3.1 (depending on the required test results).
		Declarations of conformity: These are documents providing a declaration on whether the material or the input material used in its production processes has a certain property { FDA (Food and Drug Administration) or national equivalent, biocompatibility, combustion class in accordance UL (underwriter's laboratory or equivalent), drinking water approvals etc.}
Weld joint evaluation	Water, Sewer	SANS 10268-10 Assessment Class I
	Dry services sleeves	SANS 10268-10 Assessment Class II
Weld requirements that are to be stipulated on design drawings	All types	a) to the type of welding process (standard); b) the tests to be performed as per SANS 6269; c) the frequency and assessment class; as well as the d) weld factor pass-fail criteria.
Preliminary weld procedures	All types	a) All preliminary weld procedures for welds performed on any of the pipe types need to have a weld factor in line with the method of welding as per SANS 6269 b) All pipe system weld factors need to be 1 or greater
Weld beads	Water	Remove only when life cycle cost shows the welding bead having an impact.
	Sewer	Remove
	Stormwater	Remove from all solid wall pipes up to 400mm diameter
	Sleeves	Remove based on client preference
Fittings	All types	a) shall be void-free for sizes OD ≤450mm b) designs need to call for fully pressure rated fittings (Marking needs to be in line with SANS ISO 4427-3). In the case of de-rated fabricated fittings, all ends need to be fitted with fabricated internally chamfered butt-welding transition pieces.

SANS 1936-3:2019
Edition 2

Material or process	Product application/use	Requirement
Component manufacturers to the main manufacturer	All types	Must prove their Quality Control Process (QCP) of component manufacturing complies with that of the main manufacturer.
		Orders to Component manufacturers must state that they are to be members of SAPPMA/IFPA , if applicable.
		Orders to Component manufacturers must have a summary page that needs to be forwarded with the bill of materials in order to communicate specific component requirements.
Testing	All types	Designs need to allow for Approved Inspection Authority and or process
		Designs need to allow for third-party testing/inspection
		Testing by Third-party inspectors/testing bodies /engineers may involve. a. Dimensional; b. Raw materials; i. MFI (melt flow index); ii. OIT (oxidation induction time); iii. Carbon Black content; iv. Carbon Black distribution; v. Short term pressure test; c. Weld visual inspection; d. Welding rod property evaluation if and when required; e. Weld factors; f. System weld strength (minimum factor of 1). g. Removal and testing of 1% of welds performed. h. Hydrostatic strength tests (80°C, 165 h) Witnessing on site manufacture testing
Pre-commissioning tests	All types	SANS 1200L Medium pressure pipelines.



Connections

Welding (Important aspects to keep in mind)

SAPPMA/IFPA membership

Supervisor

Process for performing the weld

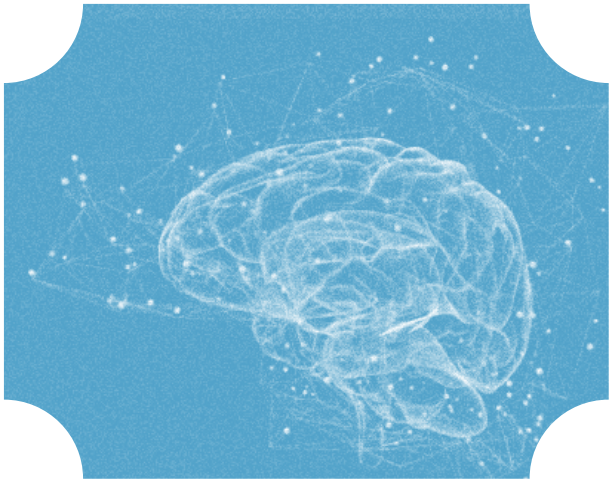
Welding Process

Person Performing the weld

Equipment needs

Use of a WPS Welding Procedure Specification

Visual Inspections and mechanical testing to SANS 10268-10



Welding Process at a Glance

1. Heated-Tool Butt Welding — Abbreviation according to SANS 10269 — HS Welding — SANS 10268-1

Butt Welding

Butt Welding - HS Welding

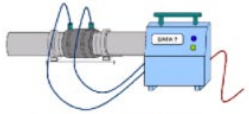
2. Heated-Tool Socket Welding — Abbreviation according to SANS 10269 — HD Welding — SANS 10268-1

Socket Welding

Socket Welding

Socket Welding - HD Welding

3. Electrofusion Welding — Abbreviation according to SANS 10269 — HM Welding — SANS 10268-2



Electrofusion Welding

Electrofusion Welding

Electrofusion Welding - HM Welding

4. Hot-Gas String-Bead Welding — Abbreviation according to SANS 10269 — WZ Welding — SANS 10268-3

Bead Welding

String Bead Welding - WZ Welding

5. Hot-Gas Extrusion welding — Abbreviation according to SANS 10269 — WE Welding — SANS 10268-4

Extrusion Welding

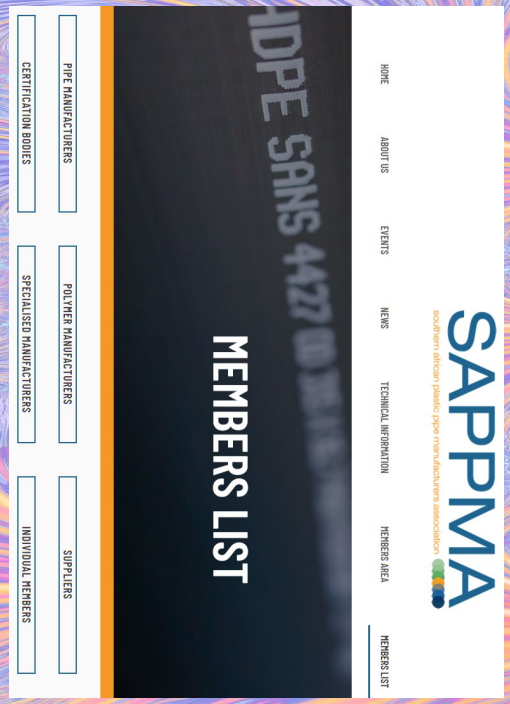
Extrusion Welding WE - Welding

...pes of welding

SAPPMA IFPA membership

Confirm the pipes and fittings are supplied by SAPPMA member

- Go to www.SAPPMA.co.za
- Open Members list
- Find Member amongst the members list
- If member can be found in the list
- Current member
- If member can not be found in the list
- Not a current member



SAPPMA IFPA membership

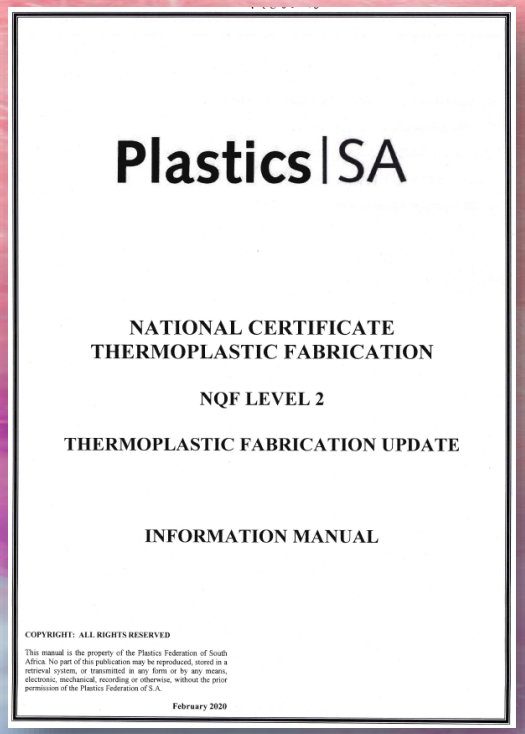
- Obtain the Latest SAPPMA Certificate from the manufacturer
- On the Certificate, the details of the product standard will be indicated
- E.g. SANS ISO 4427-2 Pipe, Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply
- E.g. SANS ISO 4427-3 Fittings, Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply
- E.g. SANS ISO 21138-2 Plastics piping systems for non-pressure underground drainage and sewerage —
- Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)
- If the certificate does not show you the product standard of interest, the holding company of the certificate have not been audited for this standard or they have not passed the audit
- Request (BRT) Batch Release Test Certificates for components

SAPPMA IFPA membership

- Confirm fabricated items were SAPPMA components and it was fabricated by a SAPPMA IFPA fabricator
- For IFPA membership
- Go to www.SAPPMA.co.za
- Open IFPA heading
- If the fabricator company is part of the list
- Current IFPA member
- Obtain Company Unique welder number
- This is not the persons who welds number, this is a unique company number
- Each weld needs to reflect this unique company weld number 1234

SAPPMA IFPA membership

- Weld need to be traceable to the IFPA company and to the person who performed the weld in the company
- Each welder welding for this company needs to have a unique welder number
- Weld need to be traceable to the IFPA company and to the person who performed the weld in the company
- If the Fabricator company is not part of the list
- Not a current member of IFPA


Plastics|SA

NATIONAL CERTIFICATE
THERMOPLASTIC FABRICATION

NQF LEVEL 2

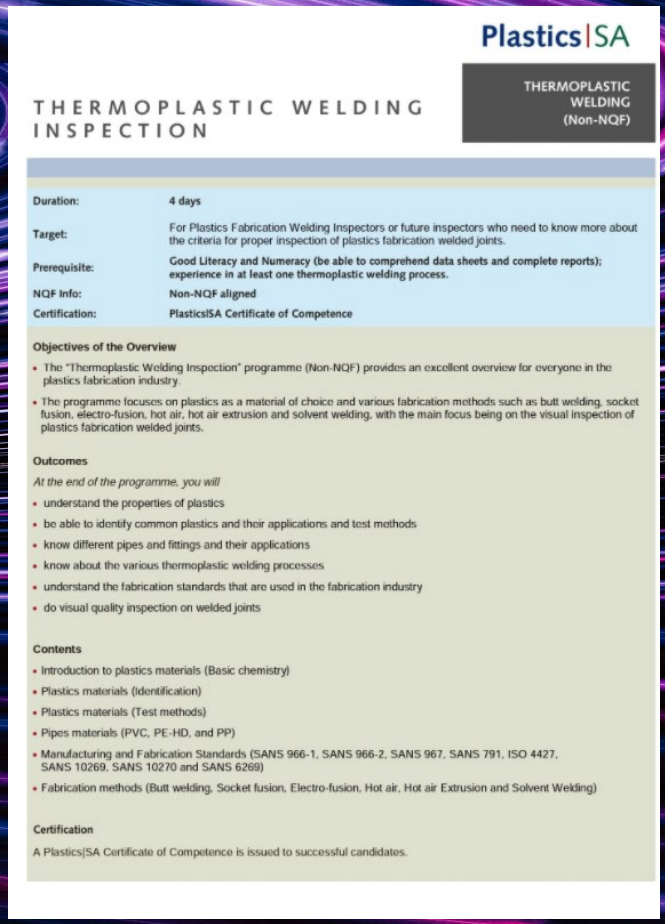
THERMOPLASTIC FABRICATION UPDATE

INFORMATION MANUAL

February 2020

Supervisor

- Qualified Weld inspector
- Plastics SA Training
- Certification
- SANS 10269
- Plastics SA
- SANS 10268-1 NQF4
- Plastics SA
- SANS 10268-2 NQF 4
- SANS 10208-3 NQF 4
- SANS 10208-4 NQF 4
- SANS Other



Plastics|SA

THERMOPLASTIC WELDING INSPECTION

THERMOPLASTIC WELDING (Non-NQF)

Duration:	**4 days**
Target:	For Plastics Fabrication Welding Inspectors or future inspectors who need to know more about the criteria for proper inspection of plastics fabrication welded joints.
Prerequisite:	**Good Literacy and Numeracy (be able to comprehend data sheets and complete reports); experience in at least one thermoplastic welding process.**
NQF Info:	**Non-NQF aligned**
Certification:	**PlasticsISA Certificate of Competence**

Objectives of the Overview

- The "Thermoplastic Welding Inspection" programme (Non-NQF) provides an excellent overview for everyone in the plastics fabrication industry.
- The programme focuses on plastics as a material of choice and various fabrication methods such as butt welding, socket fusion, electro-fusion, hot air, hot air extrusion and solvent welding, with the main focus being on the visual inspection of plastics fabrication welded joints.

Outcomes

At the end of the programme, you will

- understand the properties of plastics
- be able to identify common plastics and their applications and test methods
- know different pipes and fittings and their applications
- know about the various thermoplastic welding processes
- understand the fabrication standards that are used in the fabrication industry
- do visual quality inspection on welded joints

Contents

- Introduction to plastics materials (Basic chemistry)
- Plastics materials (Identification)
- Plastics materials (Test methods)
- Pipes materials (PVC, PE-HD, and PP)
- Manufacturing and Fabrication Standards (SANS 966-1, SANS 966-2, SANS 967, SANS 791, ISO 4427, SANS 10269, SANS 10270 and SANS 6269)
- Fabrication methods (Butt welding, Socket fusion, Electro-fusion, Hot air, Hot air Extrusion and Solvent Welding)

Certification

A Plastics|SA Certificate of Competence is issued to successful candidates.

Plastics|SA

Certificate

Accreditation Number 17-QA/ACC/0109/07

In compliance with the MERSETA Education and Training Quality Assurance

ID Number

was found competent in the following programme

Thermoplastic Welding Inspection

encompassing the following processes:

Butt Welding (HS), Hot Air Welding (WF)
Extrusion Welding (WE), Electro-Fusion Welding (HM)
Socket Fusion Welding (HD), Solvent Welding (SW)

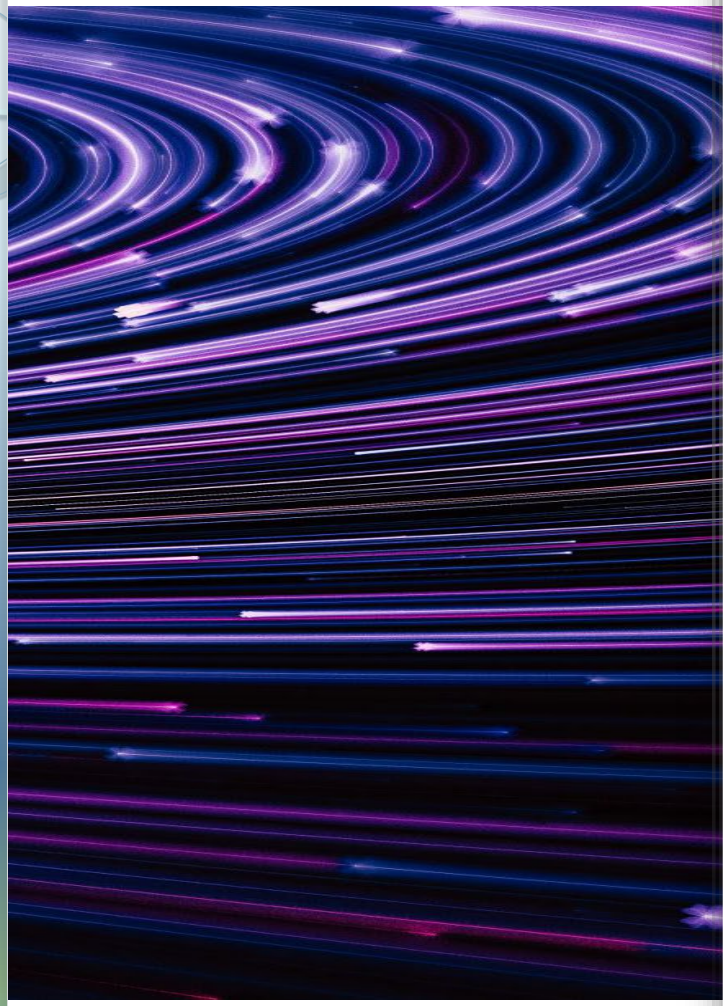
Training Executive - Kirtida Bhana

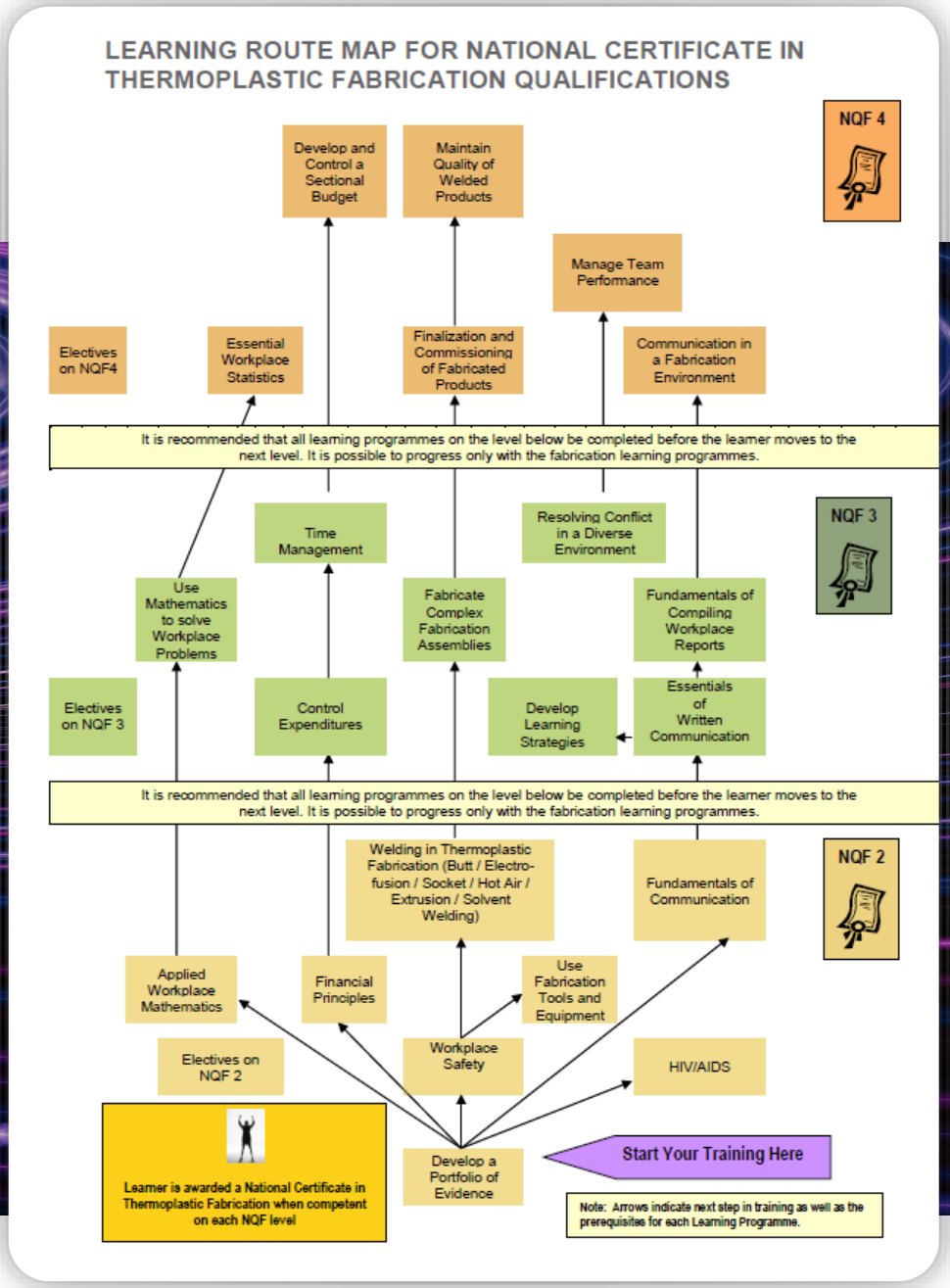
Learner No: PFSA 105921

Regional Training Manager - Isaya Ntuli

October 2020

Supervisor





SAPPMA
southern african plastic pipe manufacturers association

Supervisor (NB-Make a note)

INTERNATIONAL STANDARD

ISO 21307

Third edition
2017-12

Plastics pipes and fittings — Butt fusion jointing procedures for polyethylene (PE) piping systems

Tubes et raccords en matières plastiques — Modes opératoires d'assemblage par soudage bout à bout de tubes et raccords en polyéthylène (PE)

Plastics pipes and fittings — Butt fusion jointing procedures for polyethylene (PE) piping systems

1 Scope

This document establishes general principles regarding the procedure used in the construction and quality assessment of butt fusion jointing of polyethylene (PE) piping system components specified in accordance with relevant ISO standards. These components are installed in accordance with the relevant codes of practice, national regulations or industry guidance. Specifically, this document specifies three butt fusion jointing procedures for PE pipes and fittings. These are:

— single low-pressure fusion jointing procedure;

— dual low-pressure fusion jointing procedure;

— single high-pressure fusion jointing procedure.

This document takes into consideration the materials and components used, the fusion jointing procedure and equipment and the quality assessment of the completed joint. It can be applied in conjunction with appropriate national regulations and standards.

NOTE 1 The references for these procedures are given in the Bibliography.[1][2][3][4][5][6] Single low-pressure fusion jointing procedure is derived from multiple procedures and agreed by experts, given in the Bibliography [1][2].

NOTE 2 The three procedures detailed in this document are based on those most commonly used. It is not the intention that one or more of these procedures be used to replace well established and verified industry based procedures.

Process for performing the weld Welding Process

5. Hot-gas extrusion welding according to SANS 10268 Part 4

General

- Welders must possess a valid Approval Certificate to SANS 10269 from a MerSETA accredited training organisation.
- Welding machine must conform to SANS 1671-4.
- Weld zone must be protected from adverse weather conditions.
- Joint faces shall be undamaged and cleaned prior to welding.
- Filler materials shall comply with the requirements of SANS 1655.
- For system operating pressure less than 40 kPa (0.4 Bar).

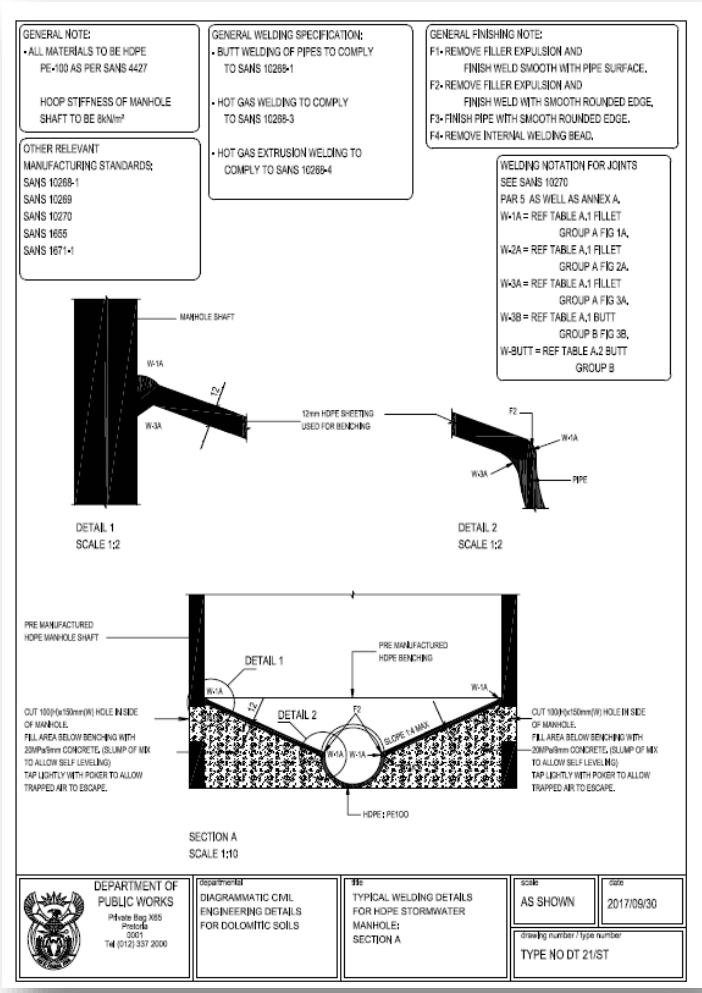
Hot air extrusion machine preparation and care

- Start-up as per machine manufacturer's operating instructions.
- Ensure all extrudate residue is completely melted before extrusion drive is switched.
- Extrude and discard all reheated material prior to welding – repeated if welding is interrupted for longer than 5 minutes or fillers changed.
- Ensure correct welding shoe for job, clean welding shoe and check condition.

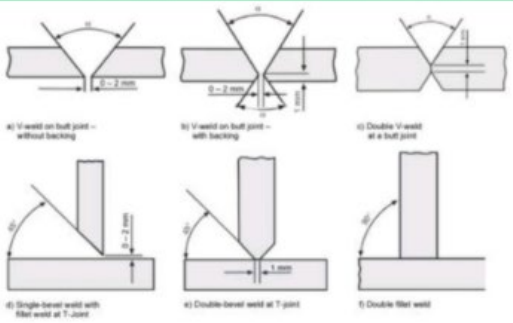
Welding procedure

- Ensure welding filler clean and dry – dry in exhaust air oven, if necessary, and protected against the elements.
- Switch on machine and set temperature and airflow to required setting as per manufacturer's instructions – after it has reached operating temperature, confirm the temperature of the material at the material outlet, in the middle of the strand, with a prick sensor of a quick-display temperature gauge.
- Confirm the temperature of the hot air, with a thermos sensor of approximately 1mm diameter, approximately 5mm inside the nozzle. The thermos sensor should be maintained and calibrated.
- Confirm air flow, using a flow meter – repeat all checks on prolonged welding jobs every 20 to 30 minutes and after work interruption.
- Equalise joining parts temperature prior to welding.
- Prepare joints, as set out below, and prepare weld surfaces, ensure all oxidised material is removed from joint faces.
- Secure materials, provide adequate accessibility to joining surfaces and ensure the welder is not hindered during the welding process – tack materials if necessary to avoid displacement of the joining parts during welding and avoid, or minimize, welding out of position so required welder counter pressure is maintained.

IFPA is a SAPPMA Initiative
NPC Registration No 2008/019278/08
Directors: CP Bandaria, BWJ Coleman, L du Preez, T Hobson, JA Venter (CEO), TJ Woolward
18 Gazelle Ave, Corporate Park, Midrand · P/Bag X68, Halfway House, 1685
Tel 011 314 4021 · admin@sappma.co.za · www.sappma.co.za



Process for performing the weld Welding Process



- Clean joint faces and weld zone with lint-free paper and conforming cleaning solvent - do not touch the surfaces afterwards.
- Clean the required length of welding rod with lint-free paper and conforming cleaning solvent – scrap if required.
- Confirm welding shoe temperature, heat with baffle plate if required, air exiting nozzle and extrudate with the thermos sensor.
- Preheated weld start and melt completely with hot air and immediately before the shoe is placed on the welding groove, the welding filler, which has already emerged, is removed from the welding shoe opening – after the groove is filled, the material builds up, due to the counter pressure generated by the welder, and the welding shoe begins moving forward.
- In manual welding, the welding speed is determined by the machine output and the cross section of the weld.
- Preheating of joining parts must be adjusted to welding speed to ensure the material is plasticised to 0.5mm to 1mm deep – the plasticised zone must be wider than the weld width and melt depth is checked directly in front of the welding shoe with a thin blunt tool.
- Welder must ensure that the molten base material at the weld sidewalls is not pushed off by the welding shoe nose – at restarts and ends of circumferential welds, diagonally machine off the previously executed weld ends.
- When parts of considerable size are welded, assistance is necessary – who ensures the welding shoe is always in the optimum position with respect to the workpiece and controls the preheating of base material.
- Ensure the weld does not cool down abruptly or non-uniformly – the weld can be covered, directly after welding to prevent subsequent formation of shrinkage cavities.

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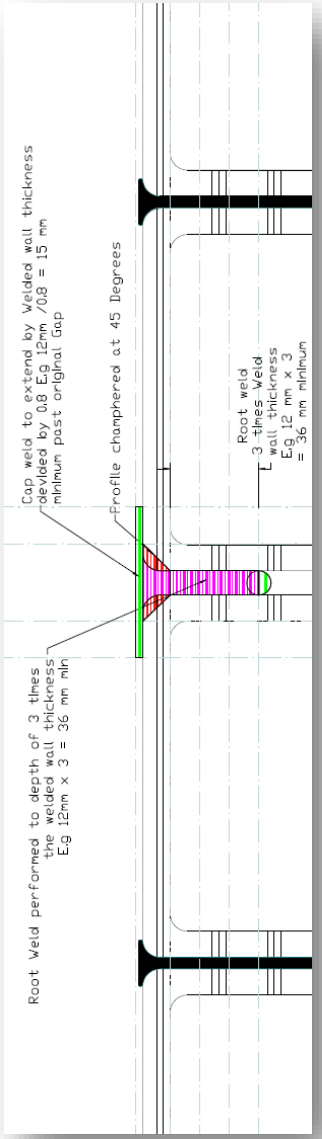
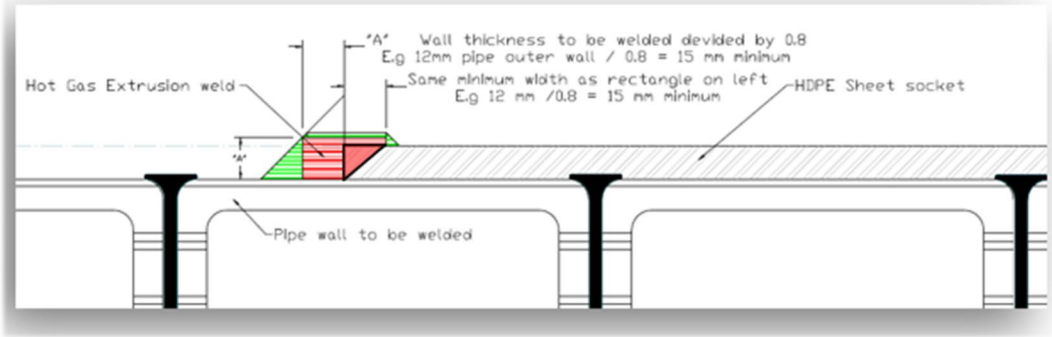


Process for performing the weld
Welding Process

- In multi-layer welds the cooled sidewalls and surfaces will be subjected to chip-producing machining.
- In discontinuous welding, the filler is extracted and placed in the plasticised welding groove, section by section, with the quiver and a press-on tool is used to apply the correct weld pressure and to shape the weld.
- Machining of welds is generally not necessary because the individual welding processes allow uniformly smooth surfaces with marginal zones welded without notches. However, depending on the design of the welding shoe, the form of the weld and any geometrical irregularities of the parts to be welded, it is not always possible to prevent extrudate from being pushed underneath the sealing faces of the welding shoe and escaping at the sides. This produces "flash" with the expulsion head. Filler expulsion is unconnected with the base material and shall be removed. Whilst the material is still moderately warm, a scraper shall be used to draw the filler expulsion away to the welded areas of the marginal zones. Finish machining, if required, must be done when the welds are completely cooled and without notches.
- Test welds should be conducted before any production commences.
- Mark the weld and record the weld protocol on the required sheet.
- Visually inspect the weld and record findings.

Note: Weld design

All welds needs to be designed to achieve the desired properties and structural strength required by the component.



Process for performing the weld
Person Performing the weld

Plastics SA – MerSETA registered training

Equipment supplier training

Non –MerSETA registered

Process for performing the weld
Person Performing the weld

Process for performing the weld
Person Performing the weld

Process for performing the weld
Person Performing the weld

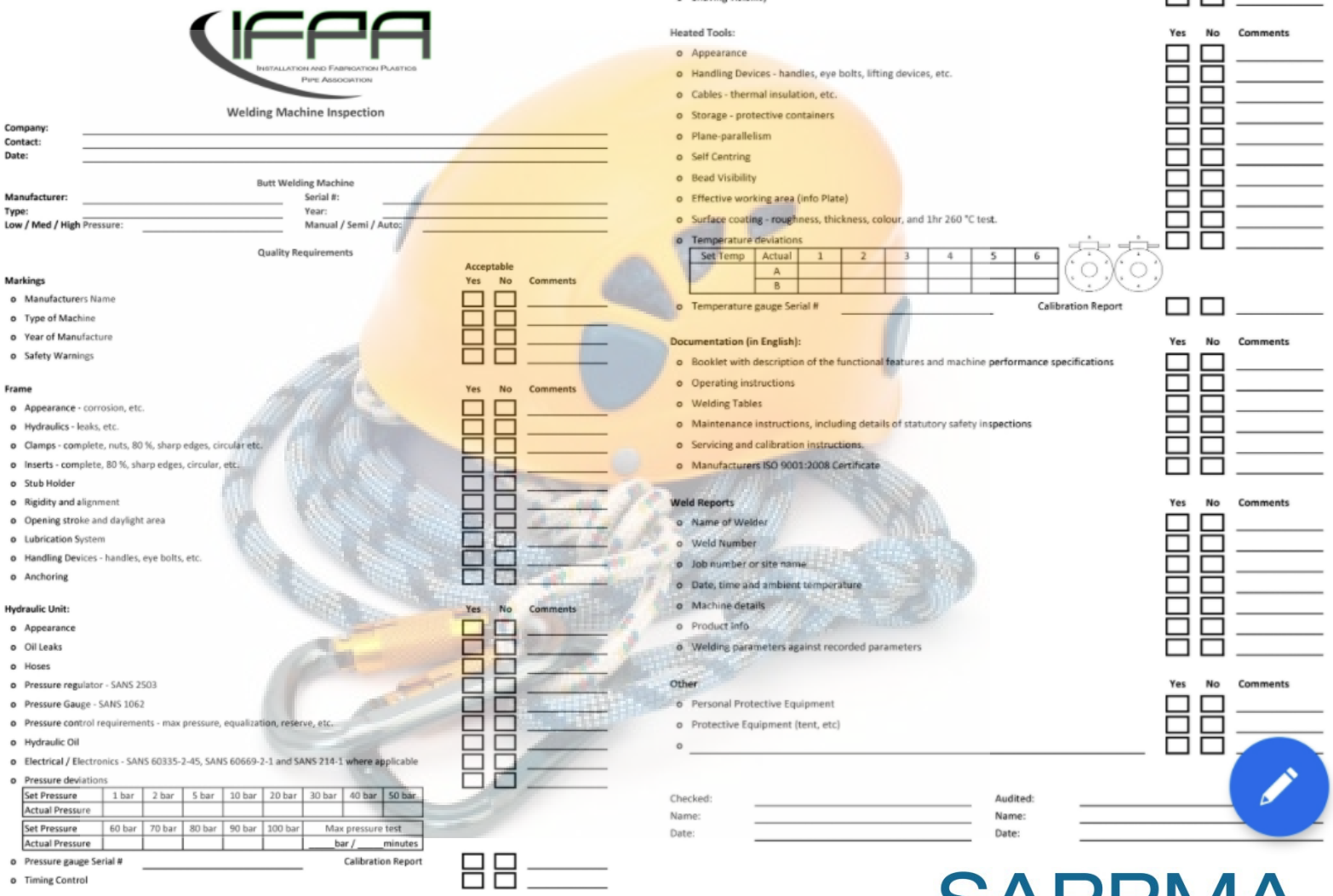
1. Heated-Tool Butt Welding
Abbreviation according to SANS 10269
HS Welding
SANS 10268-1
Butt Welding
2. Heated-Tool Socket Welding
Abbreviation according to SANS 10269
HD Welding
SANS 10268-1
Socket Welding
Socket Welding
3. Electrofusion Welding
Abbreviation according to SANS 10269
HM Welding
SANS 10268-2
Electrofusion Welding
Electrofusion Welding
4. Hot-Gas String-Bead Welding
Abbreviation according to SANS 10269
WZ Welding
SANS 10268-3
Bead Welding
5. Hot-Gas Extrusion welding
Abbreviation according to SANS 10269
WE Welding
SANS 10268-4
Extrusion Welding
Other types of welding

Process for performing the weld

Equipment Needs

SANS 1671-1

E.g. Welding machine inspection



IFPA
Installation and Fabrication Plastics Pipe Association

Welding Machine Inspection

Company:
Contact:
Date:

Butt Welding Machine

Manufacturer: Serial #:
Type: Year:
Low / Med / High Pressure: Manual / Semi / Auto:

Quality Requirements

Markings — Acceptable: Yes / No — Comments
- Manufacturers Name
- Type of Machine
- Year of Manufacture
- Safety Warnings

Frame — Yes / No — Comments
- Appearance - corrosion, etc.
- Hydraulics - leaks, etc.
- Clamps - complete, nuts, 80 %, sharp edges, circular etc.
- Inserts - complete, 80 %, sharp edges, circular, etc.
- Stub Holder
- Rigidity and alignment
- Opening stroke and daylight area
- Lubrication System
- Handling Devices - handles, eye bolts, etc.
- Anchoring

Hydraulic Unit: — Yes / No — Comments
- Appearance
- Oil Leaks
- Hoses
- Pressure regulator - SANS 2503
- Pressure Gauge - SANS 1062
- Pressure control requirements - max pressure, equalization, reserve, etc.
- Hydraulic Oil
- Electrical / Electronics - SANS 60335-2-45, SANS 60669-2-1 and SANS 214-1 where applicable
- Pressure deviations

Set Pressure	1 bar	2 bar	5 bar	10 bar	20 bar	30 bar	40 bar	50 bar
Actual Pressure								

Set Pressure	60 bar	70 bar	80 bar	90 bar	100 bar	Max pressure test
Actual Pressure						___bar / ___minutes

- Pressure gauge Serial # Calibration Report
- Timing Control

Planer — Yes / No — Comments
- Appearance
- Plane-parallelism
- Blades
- Safety Switch
- Electrical / Electronics - SANS 60335-2-45, SANS 60669-2-1 and SANS 214-1 where applicable
- Handling Devices - handles, eye bolts, lifting devices, etc.
- Shaving visibility

Heated Tools: — Yes / No — Comments
- Appearance
- Handling Devices - handles, eye bolts, lifting devices, etc.
- Cables - thermal insulation, etc.
- Storage - protective containers
- Plane-parallelism
- Self Centring
- Bead Visibility
- Effective working area (info Plate)
- Surface coating - roughness, thickness, colour, and 1hr 260 °C test.
- Temperature deviations

Set Temp	Actual	1	2	3	4	5	6
	A						
	B						

- Temperature gauge Serial # Calibration Report

Documentation (in English): — Yes / No — Comments
- Booklet with description of the functional features and machine performance specifications
- Operating instructions
- Welding Tables
- Maintenance instructions, including details of statutory safety inspections
- Servicing and calibration instructions.
- Manufacturers ISO 9001:2008 Certificate

Weld Reports — Yes / No — Comments
- Name of Welder
- Weld Number
- Job number or site name
- Date, time and ambient temperature
- Machine details
- Product info
- Welding parameters against recorded parameters

Other — Yes / No — Comments
- Personal Protective Equipment
- Protective Equipment (tent, etc)
-

Checked: Audited:
Name: Name:
Date: Date:

Process for performing the weld

Equipment Needs

International Testing certificate

Declaration of conformity

Capitale Sociale Lit. 10.400,00
C.C.I.A. 288283 – M GE 006674
Cod.Fisc.-P.IVA IT02661630109
Tribunale di Genova n° 43279

ITS ItalTradeServices srl

Via Scarsellini 77 , P.O. Box 82250
16149 Genova
Phone: +39-0106423396
Fax: +39-0106423513

TESTING CERTIFICATE FOR MACHINE MODEL PT 125

Serial Number 1019 1577

WELDING MACHINE COMPONENTS TESTED
ACCORDING TO THE STANDARD DVS 2208/1

DATE : October , 30th , 2019

REFERENCE INSTRUMENTS UTILIZED FOR MACHINE CALIBRATION

TEST INSTRUMENT :	THERMOMETER DELTA OHM
MODEL :	HD8802 AND PROBE TP755 N°1004973848
SERIAL NUMBER :	1004973848

TEST INSTRUMENT:	PRESSURE GAUGE MA - TER
MODEL :	MNRAC.320.022
SERIAL NUMBER :	178.97
DN :	200
ACCURANCY :	0.25%
RANGE :	0-160 bar

FEATURES OF THE MACHINE COMPONENTS

HEATING MIRROR

MODEL MACHINE	PT125	PT160 PT200 PT250 PT315 PT355 PT500	PT630	PT800 PT1000	PT1200 PT1600
EFFECTIVE AREA (cm²)	< 250	=250 ... = 2000	=2000 ... = 5000	=5000 ... =12000	= 12000
Total technically determined Variation (°C)	8	10	14	16	17

PRESSURE GAUGE

MODEL MACHINE	PT 125 PT160 PT200 PT250	PT315 PT355 PT500 PT630 PT800 PT1000 PT1200 PT1600
Range	0 - 100 Bar	0-160 Bar
Accuracy	1%	1%

ALLOWED VARIATION FROM PLANE PARALLELISM OF THE JOINING SURFACE AFTER THE PLANNING PROCESS

Pipe Diameter (mm)	Allowed variation from plane parallelism (mm)
=355	= 0,5
400 ... < 630	= 1,0
630 ... < 800	= 1,3
800 ... < 1000	= 1,5
> 1000	= 2,0

Parallelism of the joining surface has been calibrate, by means of using a gauge, with an accuracy of the 0,1mm

Test carried out by Tecnodue authorized tester

Capitale sociale Euro 10.400,00
C.C.I.A. 288283 – M GE 006674
Cod. Fisc. – P.IVA IT02661630109
Tribunale di Genova n° 43279

ITS Ital Trade Services srl

Via Scarsellini 77
16149 Genova
Phone: +39-010-6423396
Fax: +39-010-6423513

To whom it may concern

CEE DECLARATION OF CONFORMITY

Producer : Tecnodue Srl
Address: Via Bacchiglione 22/1
Cervarese S.Croce , Padova

We declare under our sole responsibility that the product :

ITEM : TRENCH WELDING MACHINE FOR PE-PP-PVDF PIPES
MODEL : **PT 125**
SERIAL NUMBER : **1019 1577**
PRODUCTION YEAR: **2019**

complies with the following CEE directives and related modifications:

2006/42/CE (machinery)
2014/30/EU (electromagnetic compatibility)
2014/35/EU (electrical equipment designed for use within certain voltage limits)
2003/10/CE (exposure of workers to the risks arising from physical agents (noise))

October , 2019

SANS 1671-2
SANS 1671-3
SANS 1671-4

I.T.S. - ITAL-TRADE SERVICES S.R.L.

SAPPMA
southern african plastic pipe manufacturers association

Process for performing the weld

Use of a WPS Welding Procedure Specification

Introduction

Welding requires skill. Determining "how to weld" requires knowledge regarding the welded materials and the welding process, among numerous other factors.

Because of the significant number of variables involved, the welding engineer's knowledge and the welder's skill must be validated by a series of tests.

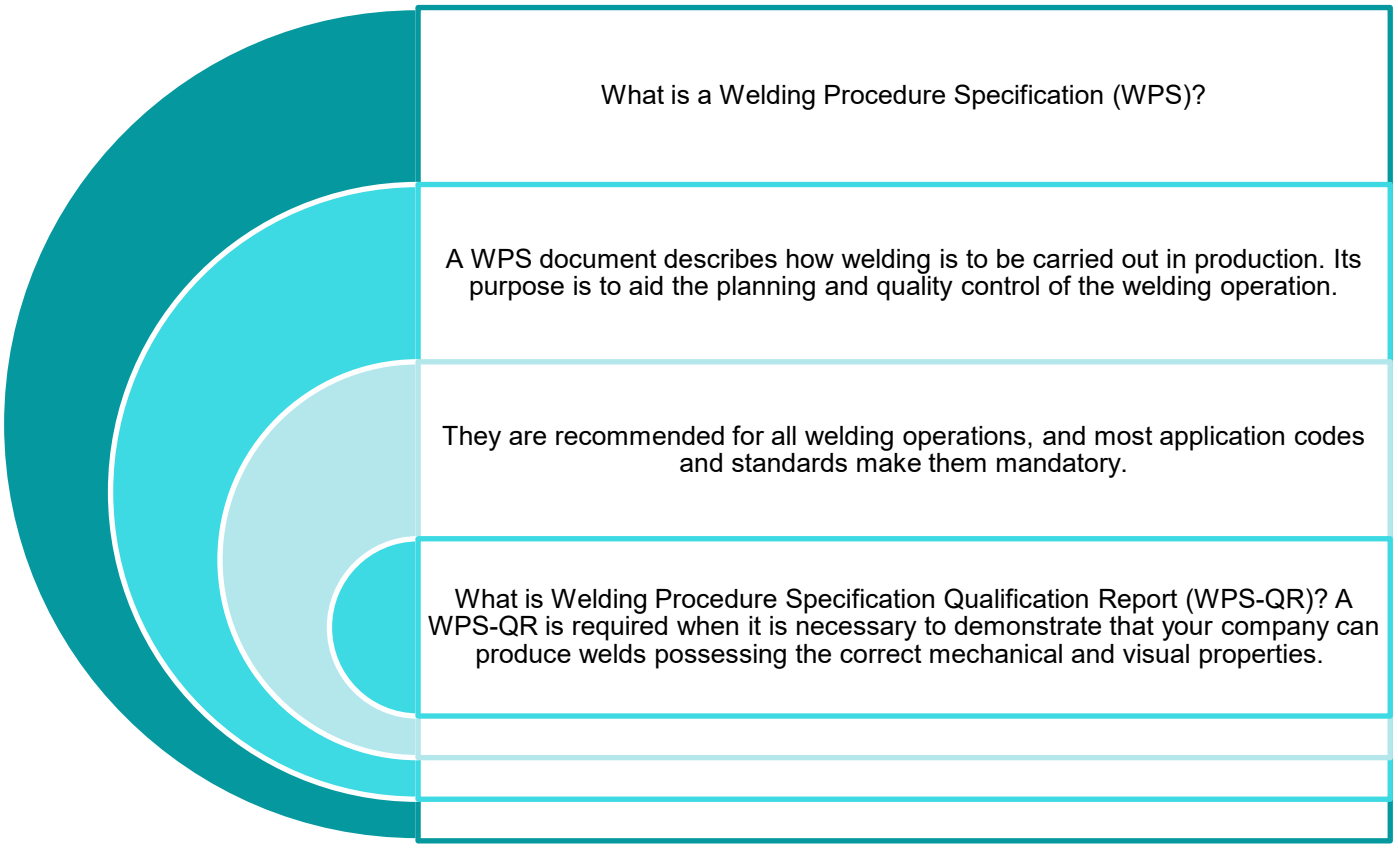
All this information reflects in the Welding Procedure Specification (WPS), obtained through a P-WPS (Preliminary Welding Procedure Specification) witness weld, visual inspection and a mechanical test.

The completed Welding Procedure Specification Qualification Report (WPS-QR) is available after completing a certificate of compliance, by the inspector, to the requirements as set out in the Welding Procedure Specification Qualification Report (WPS-QR).

The associated Test Reports for the samples submitted and visual evaluation details at the time of the drawing up of the WPS are available for evaluation and form part of the qualification file content.

Process for performing the weld

Use of a WPS Welding Procedure Specification



Process for performing the weld

Use of a WPS Welding Procedure Specification

A welding procedure must be qualified following the requirements of an appropriate welding procedure standard, such as SANS 10270, as follows:

1. Produce a preliminary welding procedure specification (P-WPS) as stated above.

2. Weld a test piece following the requirements of your specification. A certified welding inspector or an Inspection Body should witness the completed weld's joint setup, welding, and visual examination. The test details such as the welding temperature, welding pressure, soaking time, change over time, welding time, etc., must be recorded during the test.

3. Once the welding is complete, the test piece must be subject to destructive and non-destructive examination, such as mechanical tests defined by the welding procedure standard. This work must be carried out in a qualified laboratory, but the Inspection Body may require witnessing the tests and viewing any results.

4. If the test is successful, you or the test body completes the appropriate documents that the test body's surveyor signs and endorses.

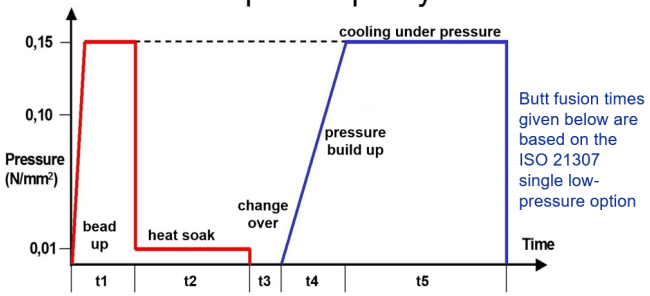
Process for performing the weld

Use of a WPS Welding Procedure Specification

If a WPS is used in conjunction with an approved procedure qualification record (WPS-QR), the ranges stated should be per the approval ranges permitted by the (WPS-QR) and the appropriate standard. However, careful consideration should be given to the ranges specified to ensure they are achievable so that these ranges represent good welding practice.

What information should they include?

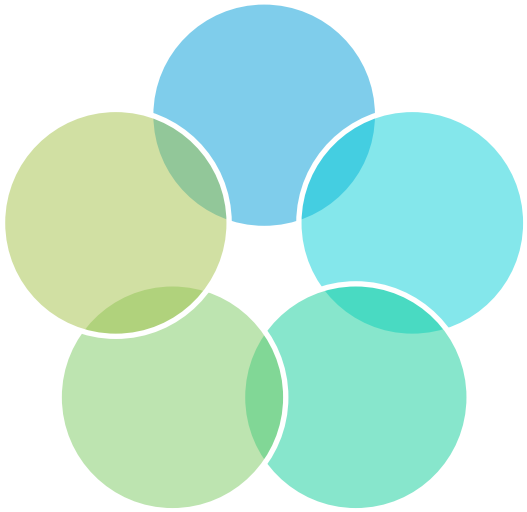
Sufficient details enable any competent person to apply the information and produce a weld of acceptable quality.



	t1	t2	t3	t4	t5	
110 mm SDR11	30s	110s	5s	6s	780s	**15.5 mins**
315 mm SDR11	60s	315s	7s	7s	1920s	**38.5 mins**
630 mm SDR11	120s	629s	10s	10s	4369s	**72.8 mins**

The amount of detail and level of controls specified on a WPS is dependant on the application and criticality of the joint application.

Except for heated tool butt welding, ranges are usually permitted on thicknesses, diameters, joint types, etc.



For most applications, the information required is generally similar to that recorded on a Welding Procedure Specification Qualification Report (WPS-QR).

Process for performing the weld

Approval of welding procedures and welds

WPS Welding Procedure Specification

SANS 10270 Welding of thermoplastics — Approval of welding procedures and welds

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Process for performing the weld

Approval of welding procedures and welds
Reference standards forming part of SANS 10270

SANS 1655, *Welding of thermoplastics – Welding rods, fillers and solvents.*

SANS 6269, *Welding of thermoplastics – Test methods for welded joints.*

SANS 6947/ISO 6947, *Welds – Working positions – Definitions of angles of slope and rotation.*

SANS 10268-1, *Welding of thermoplastics – Welding processes – Part 1: Heated-tool welding.*

SANS 10268-2, *Welding of thermoplastics – Welding processes – Part 2: Electrofusion welding.*

SANS 10268-3, *Welding of thermoplastics – Welding processes – Part 3: Hot-gas welding.*

SANS 10268-4, *Welding of thermoplastics – Welding processes – Part 4: Hot-gas extrusion welding.*

SANS 10268-5, *Welding of thermoplastics – Welding processes – Part 5: Solvent welding.*

SANS 10268-10, *Welding of thermoplastics – Welding processes – Part 10: Weld defects.*

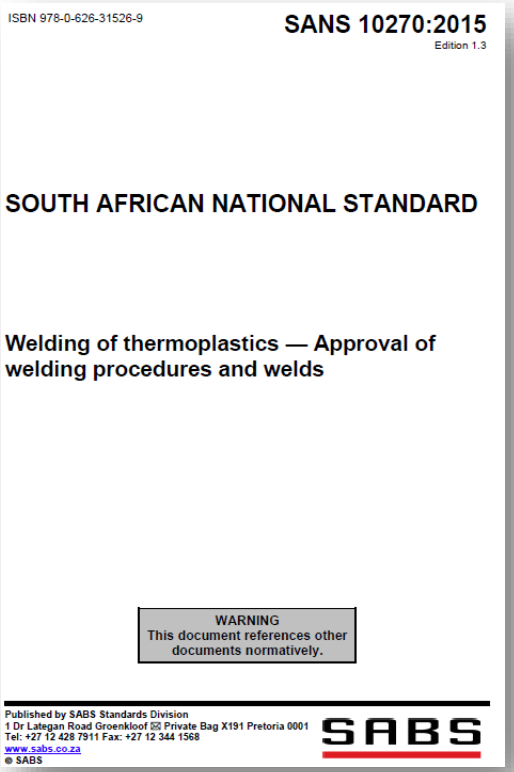
SANS 10269, *Welding of thermoplastics – Testing and approval of welders.*

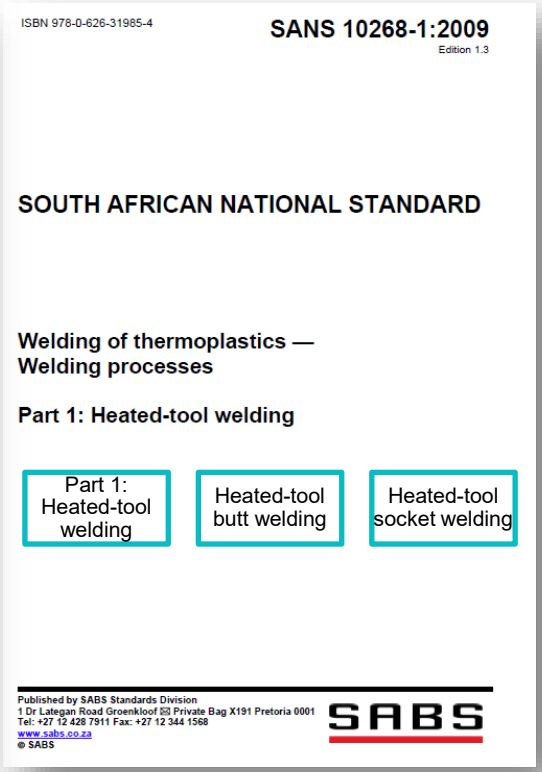
Process for performing the weld

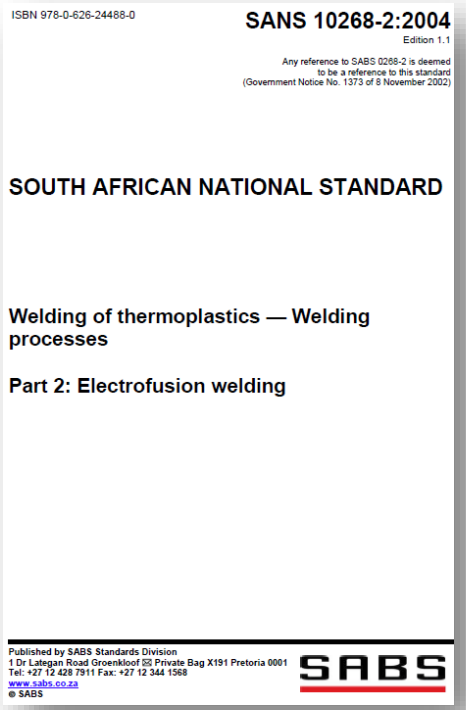
Approval of welding procedures and welds

SANS 10270 Welding of thermoplastics — Approval of welding procedures and welds

SANS 10268-1 Welding of thermoplastics — Welding processes







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Process for performing the weld

WPS-QR Welding procedure specification qualification report

Summary of the approval procedure

The contractor compiles a P-WPS (preliminary welding procedure specification) and submits it to the customer

A qualification weld is carried out under conditions as previously described in the standard and under the supervision of the inspector

The inspector completes a certificate of compliance with the P-WPS and submits Joints for tests

Upon satisfactory completion of the tests, the inspector completes the WPS-QR (Welding Procedure Specification Quality Report)

The P-WPS can then be reissued as the final WPS (Welding Procedure Specification)

WPS needs to be incorporated into a WI Works Instruction forming part of a QMS Quality Management System following minimum requirements of SANS ISO 9001:2015 or equivalent.

Normative references to the standard

Reference standards

Equivalence (Acceptance)of existing welding procedures

Perform Supplementary tests (Refer to the previous WPS-QR for the specific weld to be performed)

WPS not available

WPS available

Process for performing the weld

Visual Inspections and mechanical testing to SANS 10268-10

ISBN 978-0-626-34817-5

SANS 10268-10:2009
Edition 1.3

SOUTH AFRICAN NATIONAL STANDARD

Welding of thermoplastics — Welding processes

Part 10: Weld defects

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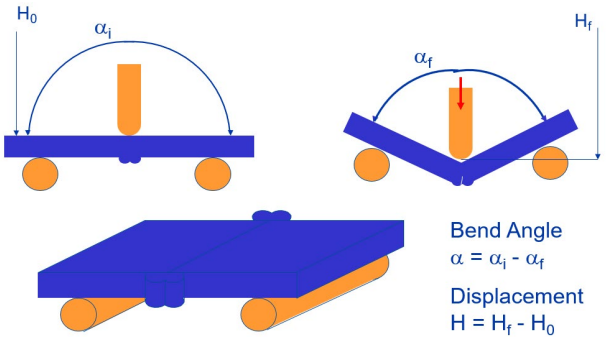

8 Assessment tables

Table 2 — Description of assessment classes for heated-tool butt welding (HS) — External quality of joint

1	2	3	4	5
Type of fault	Description	Assessment class		
		I	II	III
1 Cracks	Cracks running length-wise or crosswise to weld, and located: – in the weld; – in the base material; or – in the heat-affected zone	Not permissible	Not permissible	Not permissible
2 Bead notches	Continuous or local notches lengthwise to weld with notch root in base material, caused, for example, by: – insufficient joint pressure; – warming-up time too short; or – cooling time too short	Not permissible	Not permissible	Not permissible
3 Notches and flutes	Notches in the edge of the base material, not been corrected	Locally permissible if ending of 2 mm	Locally permissible if ending of 4 mm	Locally permissible if ending of 5 mm
5 Angular deflection	Caused by machine fault or layout fault	Permissible if $e \leq 1$ mm	Permissible if $e \leq 2$ mm	Permissible if $e \leq 4$ mm

4.4 Examination and testing

Visual examination and testing of welded joints shall comply with the requirements of SANS 6269.

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Process for performing the weld

Visual Inspections and mechanical testing to SANS 10268-10 Assessment Class

6 Assessment classes

6.1 Classification

Specific requirements for load-carrying capacity and the safety requirements for the commodity being carried by the welded joints in various piping systems are given in SANS 791, SANS 966-1, SANS 967, SANS 15874-3, SANS 4427-3 and SANS 10112. **Amdt 1; amdt 3**

The following table of assessment classes shall be used as a basis for designers, manufacturers and inspectors, to be able to determine the measures required for the necessary quality control of the welding processes.

Table 1 — Measures required for quality control

1	2
Assessment class	**Requirement level**
I	High requirements for safety or for load-carrying capacity, or for both
II	Medium requirements for safety or for load-carrying capacity, or for both
III	Low requirements for safety or for load-carrying capacity, or for both

6.2 Criteria for allocation of assessment class

When requirements for specific welded joints are drawn up, they should be appropriate for the local situation or the specific application (i.e. cognizance should be taken of the commodity to be conveyed).

In the allocation of assessment classes, the following factors shall be considered:

a) the type of stress to which the system will be subjected during operation (for example, static or dynamic);

b) the material to be welded (for example, viscous or brittle);

c) the operating conditions under which the system will work (for example, static or changing);

d) the production site and conditions (for example, workshop, construction site or welding position); and

e) the potential danger presented by the commodity to be conveyed (for example, gases, fluids that are dangerous when mixed with water, etc.).

6.3 Assessment

The test results obtained in accordance with 4.4 shall form the basis for the classification of welded joints into one of the three assessment classes in accordance with the appropriate table supplied in this part of SANS 10268. These results shall be used to determine points where the requirements

are not complied with. Should the component or welded joint not correspond to the assessment class specified, then it will be deemed to be a reject. (See also 6.4.)

6.4 Overlapping faults

Should two or more types of faults occur simultaneously in a welded joint, the detrimental effect that each individual fault has on the weld could be increased systematically. Tests should then be carried out to ascertain whether the welded joint still meets the requirements specified or whether restrictions should be placed on the component or on the assembled system with regard to safety and quality standards. In certain circumstances, the component or system might have to be re-classified into another assessment class, depending upon mutual agreement between the manufacturer and the purchaser.

7 Acceptance of components or systems

If tests on a component or system confirm that the requirements specified have been met, the component or system shall be deemed to comply with the requirements.

Where the requirements are not met, and corrective action is not possible, the manufacturer shall produce a special document that specifies the usability of the component or system in comparison with the requirements of the original specification.

In this case, acceptance or rejection shall be as agreed upon between the manufacturer and the purchaser.

During the specification process, you need to ensure you specify the Assessment class expected

Process for performing the weld

Visual Inspections and mechanical testing to SANS 10268-10 Visual inspection of each Weld

This part of SANS 10268 describes various defects that could occur during the welding processes

It also covers the causes of the defects encountered and the assessment class requirements for welds made by means of the above welding processes.

Mechanical testing of x% or more in line welded joints

Table B.1 — Sample sizes

1	2	3	4
Lot size pipes or pipe fittings	**Sample for inspection**[a]		**Sample for testing** pipes or pipe fittings
	Sample size pipes or pipe fittings	**Acceptance number** (AQL = 1,0)	
150 – 280	32	1	13
281 – 500	50	1	13
501 – 1 200	80	2	20
1 201 – 3 200	125	3	32
3 201 – 10 000	200	5	32

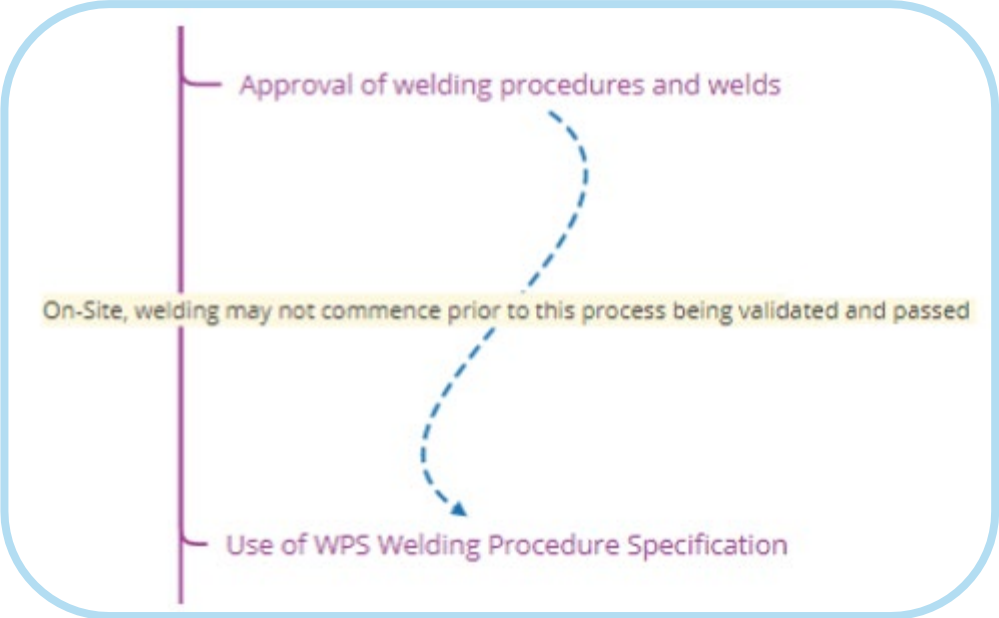
[a] General inspection level II has been used (see SANS 2859-1).

Process for performing the weld

Outcome of WPS

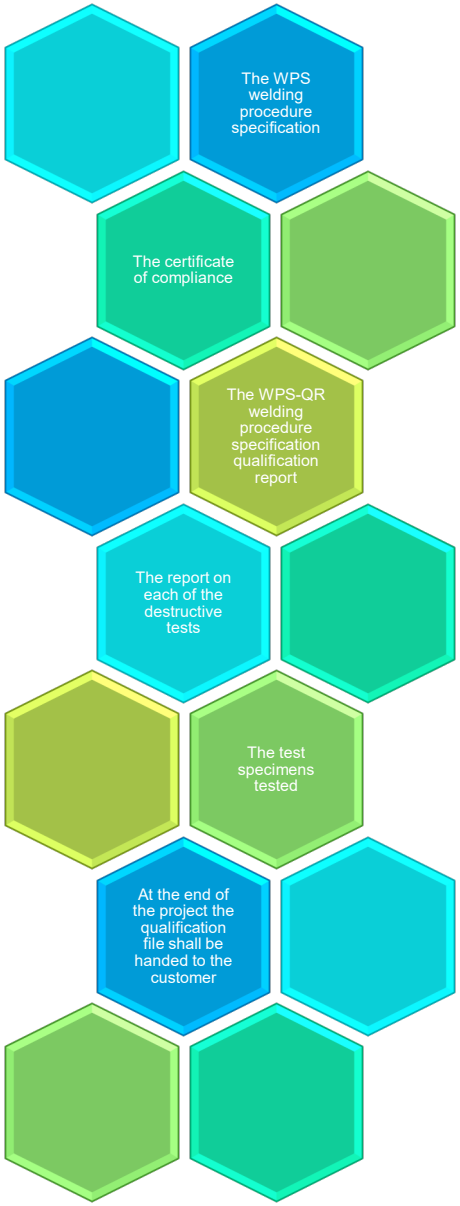
Outcome required; Procedure with sufficient details to enable a competent person to apply the information and produce a weld of acceptable quality

On-Site, welding may not commence prior to passing the approval of welding procedures and testing of welds



Process for performing the weld

Qualification file (Minimum Content Required)



Construction

Executive Summary

[Kaleidoscope Creative Design Services] will implement this quality control plan to reduce errors and meet customer specifications by setting the quality design standards and providing remedial action for design errors.

Objectives

This quality control plan will have the following objectives:

1. Set the criteria for checking the quality of the completed designs by January 2030.
2. Document design errors and seek remedial action by January 2030.

Operational Plan

ACTION	PURPOSE	DEADLINE
Set the criteria for checking the quality of the completed designs	To reduce design errors and meet customer specifications	January 05, 2030
Document design errors and seek remedial action	To reduce design errors and meet customer specifications	January 05, 2030

Strategy

The QC team lead will develop quality standards, review them, and disseminate information to the team. Any designs that fail to meet the standards will be reworked.

Process for Quality Control of Construction

Process validation has now been completed
The next step is Quality Control Plans

- QCP Quality Control plan (Components, E.g. Raw Materials, Pipe, fittings, Valves, Backing Rings etc.
- QCP Welding Fabrication E.g. Drawings, Tolerances, Measuring, Control, Staff skills and competency, equipment, methods, processes and procedures, QC quality Control
- QCP Finished product
- QCP Product on site Staking Storage and Handling
- QCP Site welding and joint assemblies(e.g. Fitment, Flange adapter alignment, gaskets, bolt torque etc.)
- QCP for remedial work to be performed where Standard requirements were not met

Process for Quality Control of Construction

Process validation has now been completed
The next step is Quality Control Plans

Quality Control Plan

Doc No.	RQC-QMS-MGM01
Rev. No.	1/2016
Rev. Date	17/11/2016

Project: EXIMIS — Order No.: 1028

Process Description: Manufacturing, Supply and Delivery of HDPE PIPE: HDPE OD 130 mm X ID 80 mm BLACK ROLLER PIPE — QCP No.: MGM-02 — Rev No.: 01

No	Activity	Acceptance Criteria / Specification	* Specification Requirement	Frequency	Checklist / Document type	Intervention Levels: MPS	SIGN	EXIMIS	SIGN	DATE
1	Approval of QCP	QMS		Once Off		V				20/4/18
2	Receipt and Approval of PE 100 Raw Material.	QMS (LAB W.I 4.2)		Per Batch	COA	W				
3	Testing of PE 100 Raw Materials. (MFI, OIT)	QMS (FAB W.I 7.5)	SANS 4427-1	Per Batch	COC	T				
4	Extrusion of HDPE ROLLER PIPE	QMS (WEHO W.I. 7.5)	SANS ISO 9001:2008	Per Batch	PCS	V				
5	Product Traceability: Mark all products according to specification.	Project Specification	SANS 4427-2	Per Item		V				
6	Inspection and testing of Extruded Pipe (OD, Wall Thickness & Pipe Length, workmanship, etc.) PLUS STRAIGHTNESS + STACKING # NO SAGGING + STRAPPING + CORRECT STORAGE UNDER ROOF	QMS (LAB W.I. 8.2)	SANS 4427-2	Per Batch	3.1 Test Certificate	V				
7	Destructive Tests: Tensile & Elongation at break, OIT after processing. NO WELD	QMS (LAB W.I 8.2). Internal Spec.	ISO 9969, ISO 1133, ISO 11357	Per Batch	3.1 Test Certificate	V				
8	Control of Monitoring and Measurement : Calibration records of equipment used in Manufacturing	QMS (LAB W.I 7.6, SANS 10268)		Once Off	Calibration Certificates	V				
9	Submision of all material Certificates (Final Release records)	Project Specification		Per Batch	3.1 Test reports	V				
10	NCR's/Concessions if any (Printing etc.)			As required		V				
11	FINAL HANDOVER: Pre-Loading, Loading and Offloading Inspections	Project Specification		Per Delivery		W				
12	DATA PACKS: Archieve all Records for Project Documentation	Project Specification		Once Off	DATA pack	V				

LEGENDS: ENG - Engineer CON - Contractor LAB - Laboratory SUB - Sub contractor

INTERVENTION KEYS: H - Hold W - Witness T - Test V - Verify DR - Document review S - Surveillance

	Name	Position	Signature	Date
Prepared By:	J G THERON	TECHNICAL / QA MANAGER		2018/04/20
Reviewed By:	J G THERON	TECHNICAL / QA MANAGER		2018/04/20
EXIMIS				20/04/2018

PLS NOTE: STRAIGHTNESS IS OF UTMOST IMPORTANCE (NB)

STACKING / STRAPPING / STORAGE UNDER ROOF / IN ANY WAY TO PREVENT ANY SAGGING

* Please refer to Specifications Register PS LD 3.1 - 3.5

Questions and Answers

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Ian Venter