Nal for Manufacturing Co. LTD.
High Density Polyethylene PE 100 DWC Pipes and Fittings

Nal for Manufacturing

Palladium Center, 1st Floor, Office #4S1
Al Faruq Dist. Eastern Road. Exit 16, Riyadh

ALPLAST

Never Accept Less

Double Wall Corrugated Polyethylene (DWC) Pipes & Fittings

CATALOG

2024

W E L C O M E

With cordial welcome and keen interest to serve customers, the easy reaching location at the King Salman industrial city in Riyadh, Nalplast is honored with your visit.

With a 20,000Sqm land area, Nalplast factory was established in 2023 as a rebirth of (Asppco 2015-2020) to present one of the "Future Factories" of KSA that complies with the international "SIRI" program adopted by Vision 2030. We, at Nalplast, are committed to introduce our latest technologies in the field of plastic pipes and fittings, hence, a state-of-the- art machinery is carefully added to give the factory its unique position in the market.

NALPLAST

Never Accept Less

شركة نال للصناعات المحدودة

Nal For Manufacturing Co. Ltd.

Infrastructure

From the concern point of view to a green environment, a major change to the production facility has been introduced to reduce emissions, meet environmental commitments, and therefore improve a clean quality of work to increase employee's satisfaction and happiness in addition to enhancing production quality.

The huge construction demand that the Kingdom is witnessing under vision 2030 energized Nalplast to introduce products that can improve the quality of piping systems and reduce projects costs; the latest advanced products that proved its advancements internationally over the classical piping systems for certain applications, like PVC foam core pipes and DWC polyethylene pipes for drainage and sewage applications has been added to the existing PVC pipes and fittings, COD and HDPE pipes production facilities.

Nalplast adopts a high standard of quality control and certifies its products from many reputed international third parties. The round clock quality control and the strict safety measures are subjects of **"no toleration"** moto inside the factory.

These advanced technologies and control systems are the facilities of Nalplast's professional team of production, sales and management who work to achieve their customers' satisfaction.

Double Wall Corrugated Polyethylene (DWC) Pipes & Fittings

2024

NALPLAST

Never Accept Less

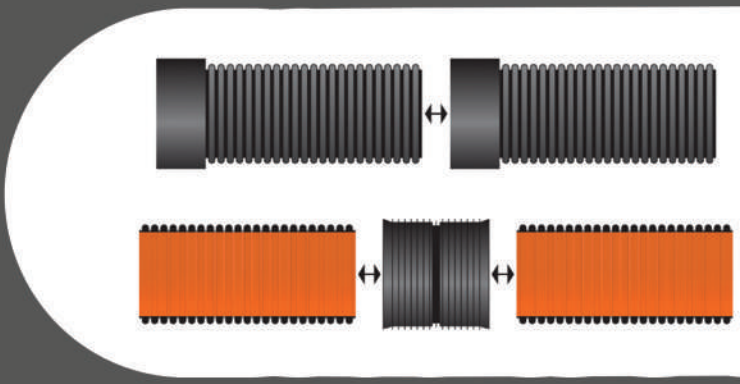


Table of **Content**

Page

1 **Business Overview**
1 Preface
2 **Double Wall Corrugated Pipes: An Overview**
Technical Guide
Raw Material: High Modulus of Elasticity PE
Physical & Mechanical Properties of Material
3 Ring Stiffness
4 Application Field
5 Unique Features of DWC Pipes
7 Comparison Between DWC - Solid wall Pipes
DWC -VS- Concrete Pipes
8 • Flow Rate Comparison
9 • Weight Comparison
10 **Double Wall Corrugated PE Pipes and Fittings**
11 Pipe Dimension Table
12 DWC Pipes Length
13 **Double Wall Corrugated Fittings**
16 Prefabricated Fittings-Backdrop
17 **Quality Assurance**
Product testing
Tests for Quality
21 **Installation Guidelines (Procedures)**
24 **Testing**
Testing With Air Method L
26 DWC-Soil Stiffness

Business Overview:

NALPLAST Pipes is a prominent name in the plastic pipes and fittings industry, playing a crucial role in major infrastructure and real estate projects across the region. With an impressive production capacity per year, NAL is known for its extensive range of products.
Moreover, their ready-to-ship strategy ensures unique service to deliver to its customers the standard required products at any given time. NAL vision is to be at the forefront of innovation, introducing new pipes & fittings systems to serve the growing demand on construction and specially the infrastructure projects.

NAL team members are considered a valuable asset to the company. The production process is overseen by top professionals in the industry, ensuring world-class quality that can compete internationally. With a skilled team and vast experience, NAL is at the forefront of producing specialized products in HDPE and UPVC, catering to clients and partners globally.

NALPLAST takes great pride in being a leading supplier for the construction efforts in KSA, working closely with renowned consultants, construction firms, and developers.

NALPLAST Pipes actively contributes to major projects in both the Middle East and Asia.

Preface

- The content and data in this brochure are licensed to **NALPLAST**, and no photocopies or microfilms are permitted without written authorization from the licensee.
- **NALPLAST** has the right to modify the published data in this brochure without prior notice to meet specific project needs.
- For any technical inquiries, it is advised to contact NALPLAST.

NALPLAST
Never Accept Less

Double Wall Corrugated Pipes: An Overview

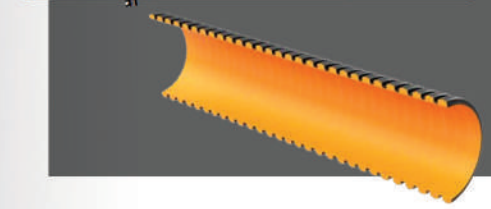
- Double wall corrugated pipes are a type of piping system that offers enhanced strength and durability.
- These pipes consist of two layers, with a corrugated outer layer and a smooth inner layer. This design provides excellent resistance against external pressure, making it suitable for various applications such as drainage, sewage, and cable protection.
- With their lightweight yet robust construction, double wall corrugated pipes are a reliable choice for underground installations, ensuring long-lasting performance and efficient flow of fluids or cables.

NALPLAST DWC pipes are much stronger than solid wall pipes of the same wall thickness.
A unique corrugated external wall structure and glass smooth internal surface allow uninterrupted flow without any blockages and provide the required stiffness and flexibility to sustain soil and traffic loads. It offers a wonderful combination of lowest inner friction, smooth flow characteristics, High flexibility – keep tight, superior strength to weight ratio and ability to support and distribute live and dead loads.

Technical Guide: STD [EN13476/DIN16961]
Specifications for Polyethylene (PE) pipes with profiled, double wall pipes with outside corrugated and inside smooth surface.

Raw Material: High Modulus of Elasticity PE
Polyethylene is a type of thermoplastic known for its exceptional properties that make it suitable for use in water and sewer systems, as well as in the manufacturing of containers for both liquid and solid substances.

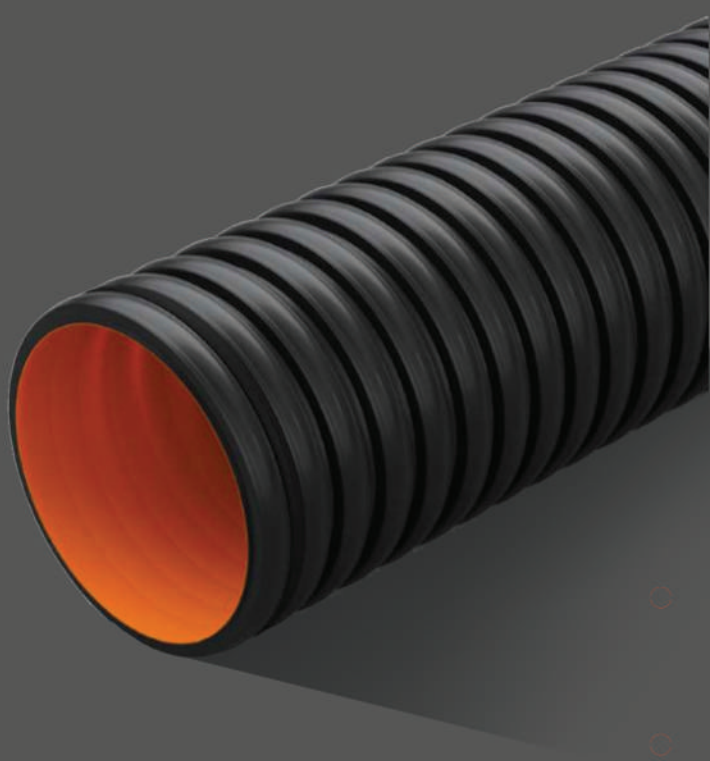
Physical Mechanical
Properties of Material



Properties	Value
Density	0.960 kg/m^3
Modulus Of Elasticity	1100 MPa
Elongation	600 %
Thermal stability - Oxidation induction	20 min
Color	Black/Orange

Ring Stiffness

- The ring stiffness of a pipe refers to its ability to withstand radial forces and resist ring deflection and structural damage.
- Pipes that are buried, such as sewer and water pipes, are exposed to soil pressure, hydrostatic pressure, and live loads from traffic.
- The pipe class SN4 is suitable for light and medium traffic loads, while SN8 and SN12 are designed for heavy traffic loads, as specified in the EN ISO 9969 standard for thermoplastic pipes.
- **The EN 13476-3** standard emphasizes the importance of the sewerage pipes resistance to external loads, specifically the ring stiffness (SN). The pipe resistance is a characteristic feature of elastic pipes and is determined by the relationship between geometric data and material properties.



- **Strength vs Stiffness**
  Strength and stiffness are distinct physical properties of materials, with strength denoting the ability to endure force and pressure, while stiffness indicates resistance to deformation.
- **Strength and stiffness**, though related, differ in that strength is about withstanding stress without breaking, while stiffness is about resisting deformation under stress.

Technically, the pipe's ring stiffness is defined as:
$SN = EI / Dm^3$
Where:
E – Module of elasticity, in Pa.
Dm – Mean pipe diameter, in m.
I – moment of inertia, in m 4 /m.

Standard pipe classes according to ISO9969 have ring stiffness of SN 4,8 and 12 KN/m 2 .

Application Field

- **NALPLAST Double Wall Corrugated Pipes** are designed for long-term use without the need for frequent maintenance.
  They are commonly used for: Underground drainage and sewer systems, as well as for disposing of industrial effluents. Additionally, these pipes are suitable for stormwater drainage, rainwater harvesting, groundwater recharge, and road/highway cross drainage applications.

- **NALPLAST Double Wall Corrugated Pipes**
  The innovative corrugated pipes displayed here have been careful crafted by our dedicated R&D team and manufactured using our specialized machine series. They fully comply with the standards set by EN 13476 & Din 16961, making them suitable for various applications such as private sewage systems, public wastewater drains, and industrial wastewater discharge under specific conditions.

- **NALPLAST Pipes** ensures that all sewage pipe systems undergo scrutiny and approval by national authorities before entering the market. Our company stands out globally for its expertise in creating a seamless blend of a smooth inner wall and a profiled outer wall, utilizing HDPE material to meet market demands and customer preferences for optimal rigidity, flexibility, and material quality.

EN 13476-3	PART 3 – SPECIFICATIONS FOR PIPES AND FITTINGS WITH SMOOTH INTERNAL AND PROFILED EXTERNAL SURFACE AND THE SYSTEM, TYPE B
EN 13476-4	PART 4 – ASSESSMENT OF CONFORMITY
EN ISO 9969	THERMOPLASTICS PIPES – DETERMINATION OF RING STIFFNESS
EN 13476-4	PART 4 – ASSESSMENT OF CONFORMITY
EN ISO 9967	PLASTICS PIPES – DETERMINATION OF CREEP RATIO
ISO 12091	STRUCTURED WALL THERMOPLASTICS PIPES – OVEN TEST
ISO 13967	THERMOPLASTICS FITTINGS – DETERMINATION OF RING STIFFNESS
EN 681-2	ELASTOMERIC SEALS – MATERIAL REQUIREMENTS FOR PIPE JOINTS SEALS USED IN WATER AND DRAINAGE APPLICATIONS – PART 2: THERMOPLASTIC ELASTOMERS
EN 1610	CONSTRUCTION AND TESTING OF DRAINS AND SEWERS
DIN16961	SIZES RANGES COVERED BY EN13476 -DN100-DN1200 & THE ONLY EU STANDARD COVERED SIZES OVER DN1200 MM IS DIN16961 SO FOR LARGE DIAMETER PIPES MANUFACTURE MADE ACCORDING TO DIN16961

Unique Features of DWC Pipes

Exceptional properties of chemical resistance, resistance to corrosion and abrasion.

Corrosion-resistant

Plastics pipes are resistant to corrosion and chemicals, providing excellent durability.
They outperform metal and concrete pipes due to their superior abrasion resistance.
Biogenic Hydrogen Sulfide corrosion is crucial for the longevity of buried pipelines, while Biogenic Sulfide acid corrosion only affects partly filled pipes above the water level.
DWC systems ensure maximum security and durability thanks to the materials used.

Flawless Hydraulic Characteristics.

The smooth inner surface, with a constant coefficient of 0.009 - 0.010, facilitates the efficient disposal of flowing waste.
This smooth surface significantly minimizes the risk of blockages and enhances flow characteristics, resulting in a 40% increase in carrying capacity compared to concrete pipes.

UV-Resistance

Black polyethylene pipes exhibit enduring resistance to atmospheric corrosion and UV radiation, enabling their safe outdoor use and storage without degradation or aging.

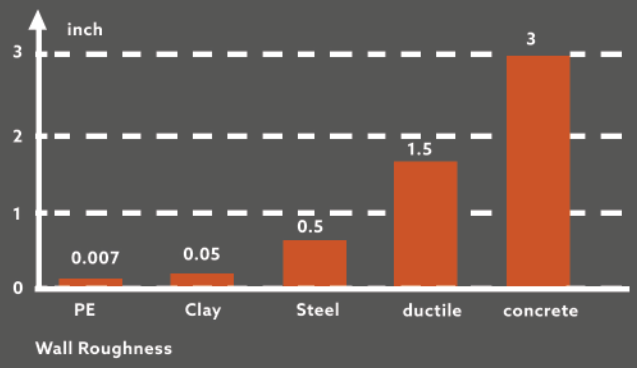
Deflection & amp; Flexure

The settlement of the soil controls the deflection of flexible pipes, rendering traffic and other loads ineffective after settlement.
In contrast, when pipes are stiffer than the soil, they must resist the traffic and other loads. Practical experience has demonstrated that flexible pipes (b) are more effective in resisting traffic and other loads compared to rigid pipes (a) made of concrete or other inflexible materials.
The flexible pipes deflect to accommodate selective strain, allowing the surrounding soil to absorb the strain.

Highly durable against bacteria,

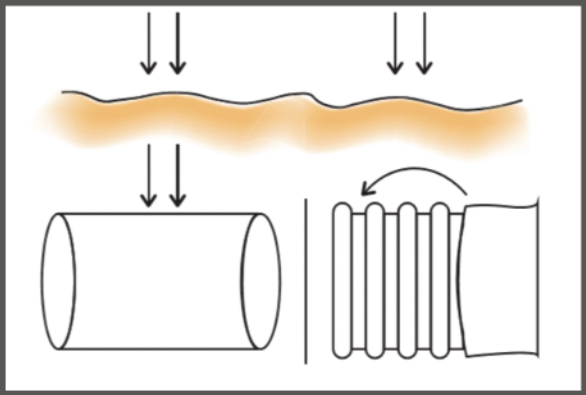
viruses, rodents, and termites.

Rodents are unable to cause damage to plastic pipes due to their smooth and round surface, which does not provide enough grip for their teeth. Additionally, it is worth noting that termites have never caused any damage to polyethylene pipelines in countries where they are prevalent. Furthermore, polyethylene and polypropylene do not serve as a food source for bacteria, fungi, or spores, making them highly resistant to microbial attacks, as well as sulfide acid and sulfates.



Green / Sustainable

The environment is not negatively affected by the processing and reprocessing of these pipes, and the use of watertight joints prevents any pollution of soil and underground water.



ALPLAST
Never Accept Less

Economical / Affordable

These pipes offer significant cost savings with a weight reduction of 60 to 70% compared to solid wall plastic pipes and are 95% lighter than concrete pipes, making them a highly cost-effective option.

Excellent Stiffness

The durability of these pipes allows them to withstand heavy overload pressure, including soil and traffic loads, as well as sustain the different loads encountered during installation and use.

Maintenance-free solution

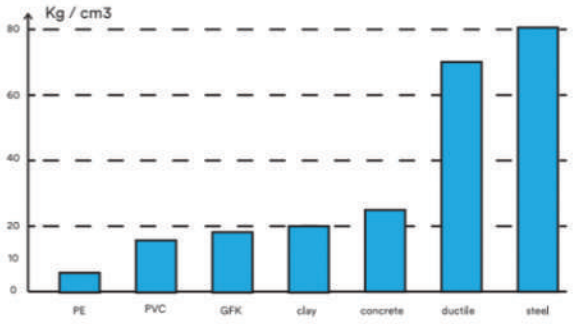
Without scaling, encrustation, or chemical reactivity, regular maintenance is unnecessary.
Periodic flushing with water maintains a smooth surface and improves functionality.

Extended Lifespan

These pipes are designed to withstand corrosion, resist chemical reactions, and provide exceptional abrasion resistance, ensuring a lifespan of over a century.

Waterproof connections

The joints are completely sealed, preventing any water leakage, infiltration, ex-filtration, or root penetration.
This ensures that the surrounding area remains unharmed and eliminates the risk of soil or groundwater contamination.



Material Characteristic Values

Installation made simple and fast

The installation process is made easier and faster with longer and lighter pipes.

Slip-on techniques are used to easily connect these pipes, either with integrally welded couplers or separate couplers.

Unlike traditional concrete or metallic pipes, these pipes are lightweight and do not need heavy equipment for installation.

This makes it convenient to lay them in restricted areas, resulting in cost savings.

HDPE Corrugated Pipe vs Concrete

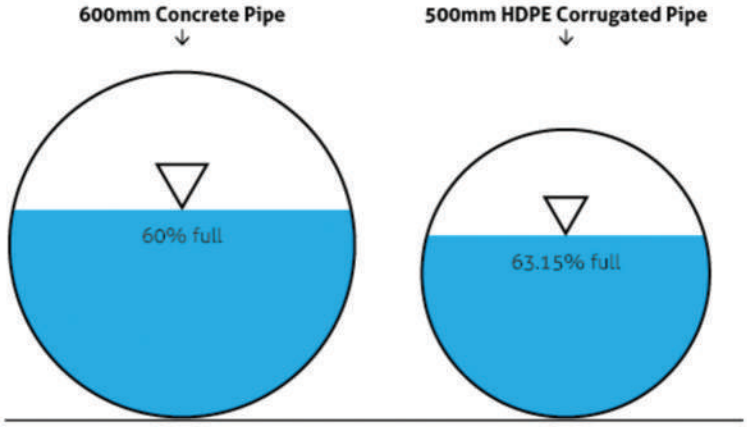
• **Feature** Comparison

Parameters	HDPE Corrugated Pipes	Concrete
Length of pipes available	6.0 m	2.0 – 2.5 m
Pipe material property	**Flexible pipe**	**Rigid pipe**
Pipe design (structural property)	Its flexibility enables it to deform in diameter and joints when subjected to external loads and natural soil movements, allowing it to function for years without impacting the environment.	The inflexible nature of the material prevents it from bending, resulting in damage when subjected to external pressure or leaks caused by soil movement at the joint. This can lead to the contamination of groundwater by sewage, posing a threat to the environment.
Pipe jointing	Socket & Spigot joint with elastomeric sealing ring.	1. Coller joint with help of cement mortar. 2. Socket & Spigot joint with rubber ring and cement mortar.
Pipe weight	**Very light**	Heavy (19-20 times heavy than DWC pipes)
Pipe roughness coefficient	0.009 The increased flow rate is a result of the lower roughness coefficient, leading to smaller pipe diameter requirements during design when compared to concrete and DI pipes.	0.014 A higher roughness coefficient results in a lower flow rate, leading to a larger pipe diameter requirement compared to DWC pipe during the design process.
Handling of pipe	**Easy due to its light weight**	**Difficult due to its heavy weight**
Chemical and Corrosion resistance	This material exhibits exceptional resistance to chemicals and corrosion, particularly against Hydrogen Sulphide gas commonly found in sewer pipes, as well as other harsh chemicals.	Cement is vulnerable to harm caused by strong chemicals and corrosion, making it unsuitable for exposure to Hydrogen Sulphide gas. Therefore, Sulphate resistant cement is utilized in its production to prevent deterioration.
Installation	Excellent flexibility, minimal foundation requirements for installation superior bending capabilities.	The pipe has a high level of rigidity and requires a strong foundation for installation. It is not easily maneuverable or flexible, and connecting it with other pipes can be challenging.
Pipe class	Stiffness class SN 4, SN 8 (Non-Internal Pressure Applications)	NP 1, NP 2, NP 3, NP 4 (Non-Internal Pressure Applications)
Pipe stacking on site	By stacking pipes on a level ground, it is possible to nest smaller diameter pipes inside larger diameter pipes.	The items are arranged individually on a flat surface. They are too heavy to be stacked on top of each other.
Pipe handling on field	This product is designed to be lightweight, ensuring safe and easy manual handling. Additionally, it offers high impact resistance and is virtually unbreakable even when mishandled.	Excessive weight can result in compromised safety during handling, potentially causing damage as a result of improper handling practices.
Working features	High safety under buried installation	Low safety under buried installation
	More than 50 years	Around 15-20 years

NALPLAST
Never Accept Less

• **Flow Rate** Comparison

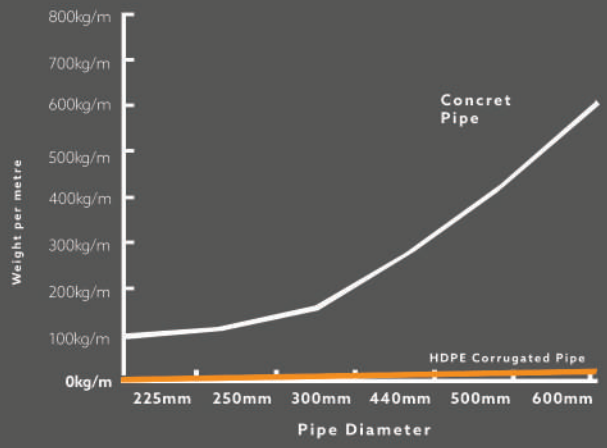
Size	Concrete				HDPE Corrugated Pipes			
	Flow Capacity (m3/s) at 1% Slope		Flow Capacity (m3/s) at 10% Slope		Flow Capacity (m3/s) at 1% Slope		Flow Capacity (m3/s) at 10% Slope	
	at 60% fullness	at 70% fullness	at 60% fullness	at 70% fullness	at 60% fullness	at 70% fullness	at 60% fullness	at 70% fullness
225mm	0.028	0.0349	0.0886	0.1104	0.042	0.0524	0.1329	0.1657
250mm	0.0371	0.0462	0.1173	0.1462	0.0559	0.0696	0.1767	0.2202
300mm	0.0603	0.0752	0.1908	0.2377	0.0905	0.1128	0.2863	0.3568
400mm	0.1299	0.1619	0.4108	0.512	0.1954	0.2435	0.618	0.7702
500mm	0.2356	0.2936	0.7449	0.9283	0.3548	0.4422	1.122	1.3983
600mm	0.3831	0.4774	1.2113	1.5095	0.5749	0.7164	1.818	2.2656



The table clearly demonstrates that HDPE Corrugated Piping offers a greater flow rate because of its lower roughness coefficient. Consequently, when designing the system, it is generally feasible to utilize a smaller size in **NALPLAST HDPE** Corrugated Pipes compared to concrete pipes of the same diameter.

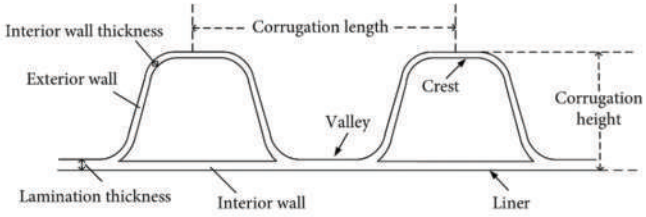
Weight Comparison

The weight disparity between **NALPLAST HDPE** Corrugated Pipes and Concrete Pipes is clearly depicted in the below chart.
Consequently, these pipes offer enhanced convenience and safety during handling and allow for easier field adjustments.
As a result, installation costs and time are reduced.



Double Wall Corrugated PE Pipes and Fittings [DIN16961 /EN13476]

SYSTEM	EN13476-DIN16961
MATERIAL	HIGH MODULUS OF ELASTICITY PE
SIZES	ID 100 - 1000mm
STIFFNESS KN/M2	SN4 & SN8
PERFORATION	APPLICABLE
JOINTING	RUBBER GASKET - EN681



NALPLAST
Never Accept Less

Pipe Dimension

The material and profile design are crucial factors for the product's success, with **NALPLAST** pipes tailored to meet specific requirements outlined in SASO ISO 21138 1-3, DIN 16961 and EN 13476 profile design standards.

NOMINAL SIZE DN (MM)	ID* (MM)	OD* (MM)	STIFFNESS CLASS KN/M2
100	98	113	SN4 / SN8
150	148	171	SN4 / SN8
200	197	228	SN4 / SN8
250	247	286	SN4 / SN8
300	296	344	SN4 / SN8
400	394	458	SN4 / SN8
500	493	576	SN4 / SN8
600	593	691	SN4 / SN8
800	791	923	SN4 / SN8
1000	989	1151	SN4 / SN8

* Approximate ≈

SN Stands for Nominal Ring Stiffness. It represents the Ring Stiffness of a flexible pipe and indicates the pipes' ability to resist Traffic Load as well as Soil Load against proposed depth

BASIC SELECTION OF SN CLASS OF PIPE

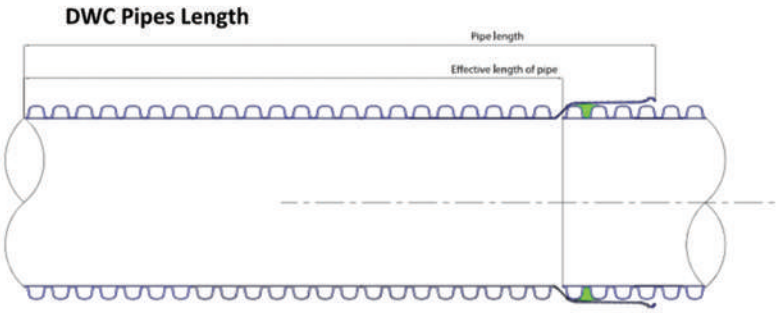
The selection of SN class of Pipe depends upon major two factors:

1. Burial depth (Cover height).
2. type of Traffic load on site.

ON PIPE RING STIFFNESS

The double wall corrugated pipes are available with a Blue Sideline and Ring Stiffness SN4, while the pipes with an orange sideline have Ring Stiffness SN8.

DWC Pipes Length



ID* (MM)	TOTAL LENGTH OF PIPE WITH SOCKET	EFFECTIVE LENGTH	SOCKET LENGTH
100	6261	6171	90
150	6164	6043	121
200	6187	6048	139
250	6213	6052	161
300	6220	6018	202
400	6237	6004	233
500	6317	6032	285
600	6306	5983	323
800	6254	5907	347
1000	6286	5912	374

The corrugated pipes displayed here have been developed by our research and development team and manufactured using a specially designed series of machines.

They fully comply with the standards of EN 13476 and Din 16961, making them suitable for various applications such as sewage systems on private properties, public wastewater drains, and industrial wastewater discharge under specific conditions.

On-site features provide a major benefit:

1. Each pipe is equipped with a built-in socket for custom length adjustment.
2. Without the need for welding or bonding - simply connect manually.

NALPLAST corrugated pipes offer outstanding usability.
Various connection concepts are available for pipe systems, with the inline produced single-layer socket system being the most cost-effective based on a practical model calculation.

NALPLAST PIPES opted for this technology for their pipe production.

ALPLAST
Never Accept Less

Double Wall Corrugated Fittings

SYSTEM	EN13476-DIN16961
MATERIAL	HIGH MODULUS OF ELASTICITY PE
SIZES	ID 100 - 1000 MM
STIFFNESS	KN/M2 SN4 & SN8
JOINTING	RUBBER GASKET - EN681
FABRICATED FITTINGS	APPLICABLE
FABRICATED BACKDROP	APPLICABLE

To obtain additional information about our fittings' partner, we kindly ask you to visit their website at https://www.redseapipes.com/en.

Fittings

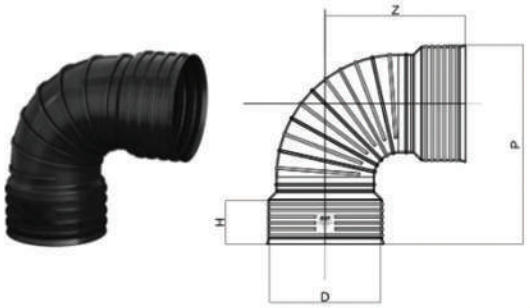
Dual Wall Corrugated HDPE Drainage Fittings consist of a high-density polyethylene pipe that features a smooth interior wall and a corrugated exterior wall, providing excellent hydraulic performance and durability.

Our range of fittings includes bends with angles of 22.5°, 45°, and 90°, catering to all requirements of our dual wall pipes.

Polyethylene molded fittings are designed for use in non-pressurized sewerage and drainage systems.

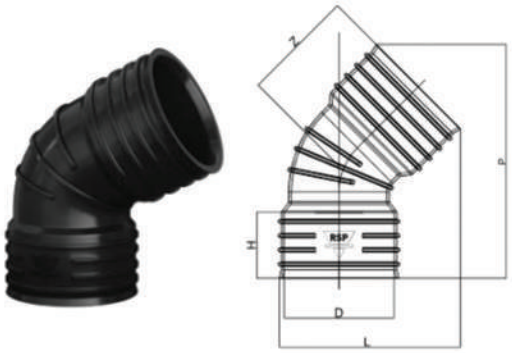
These fittings, available in black, come in standard shapes and angles, with joint sockets on both ends.

ELBOW 90°



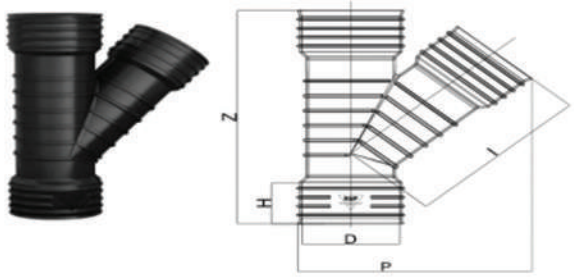
(D) (mm)	(H) (mm)	(Z) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	174	237	SN4 / SN8
150	113	266	363	SN4 / SN8
200	134	336	461	SN4 / SN8
250	155	407	564	SN4 / SN8
300	190	493	681	SN4 / SN8
500	218	724	1031	SN4 / SN8
600	270	877	1247	SN4 / SN8
800	314	1179	1672	SN4 / SN8
1000	408	1409	2017	SN4 / SN8

ELBOW 45°



(D) (mm)	(H) (mm)	(Z) (mm)	(L) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	118	190	246	SN4 / SN8
150	113	184	295	383	SN4 / SN8
200	134	222	363	460	SN4 / SN8
250	155	272	459	573	SN4 / SN8
300	190	330	552	694	SN4 / SN8
400	168	357	672	782	SN4 / SN8
500	218	458	846	997	SN4 / SN8
600	270	548	1017	1194	SN4 / SN8
800	374	758	1375	1640	SN4 / SN8
1000	408	911	1679	1983	SN4 / SN85

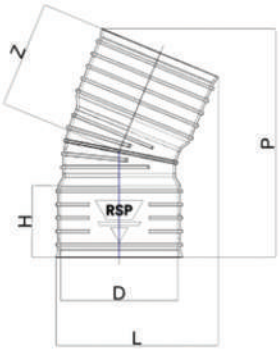
Y-TEE



(D) (mm)	(I) (mm)	(H) (mm)	(Z) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	241	360	278	SN4 / SN8
150	113	371	553	427	SN4 / SN8
200	134	466	713	541	SN4 / SN8
250	155	562	851	664	SN4 / SN8
300	190	698	1021	813	SN4 / SN8
400	168	814	1148	996	SN4 / SN8
500	218	1039	1448	1257	SN4 / SN8
600	270	1277	1824	1533	SN4 / SN8

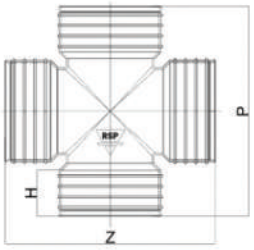
**Fittings mentioned in the table will be sourced from our partner, and the minimum order level will bedetermined when placing the purchase order.

ELBOW 22.5°



(D) (mm)	(H) (mm)	(Z) (mm)	(L) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	118	162	230	SN4 / SN8
150	113	184	248	351	SN4 / SN8
200	134	222	301	426	SN4 / SN8
250	155	272	391	512	SN4 / SN8
300	190	330	471	628	SN4 / SN8
400	168	357	593	694	SN4 / SN8
500	218	458	734	846	SN4 / SN8
600	270	548	891	1049	SN4 / SN8
800	374	758	1189	1408	SN4 / SN8
1000	408	911	1461	1711	SN4 / SN8

CROSS TEE



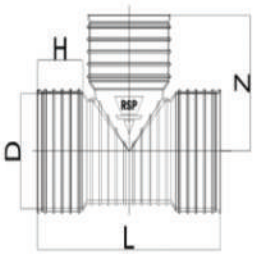
(D) (mm)	(H) (mm)	(Z) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	280	280	SN4 / SN8
150	93	396	396	SN4 / SN8
200	110	502	502	SN4 / SN8
250	118	586	586	SN4 / SN8
300	145	710	710	SN4 / SN8
400	168	890	890	SN4 / SN8
500	220	1120	1120	SN4 / SN8
600	270	1340	1340	SN4 / SN8
800	374	1830	1830	SN4 / SN8
1000	409	2220	2220	SN4 / SN8

Fittings

**Fittings mentioned in the table will be sourced from our partner, and the minimum order level will be determined when placing the purchase order.

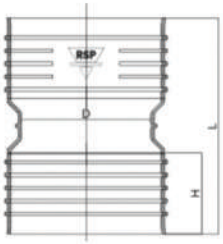
ALPLAST
Never Accept Less

EQUAL TEE



(D) (mm)	(H) (mm)	(Z) (mm)	(L) (mm)	(P) (mm)	Stiffness SN kN/m²
100	70	143	284	207	SN4 / SN8
150	113	218	436	313	SN4 / SN8
200	134	275	550	400	SN4 / SN8
250	155	330	660	486	SN4 / SN8
300	190	400	800	586	SN4 / SN8
400	168	445	890	691	SN4 / SN8
500	218	560	1120	867	SN4 / SN8
600	270	670	1340	1038	SN4 / SN8
800	374	915	1830	1403	SN4 / SN8
1000	408	1110	2220	1720	SN4 / SN8

COUPLER



(D) (mm)	(H) (mm)	(L) (mm)	Stiffness SN kN/m²
100*	70	205	SN4 / SN8
150*	113	329	SN4 / SN8
200*	134	361	SN4 / SN8
250*	155	417	SN4 / SN8
300*	190	472	SN4 / SN8
400	168	444	SN4 / SN8
500	218	586	SN4 / SN8
600	270	701	SN4 / SN8
800	374	943	
1000	408	1040	

Quality Assurance

Product testing

To guarantee that our products meet the manufacturing standards, NAL ensures that their performance is technically identical.

This can be achieved through product testing conducted by a NAL accredited LAB ISO/IEC 17025:2017 or a third-party laboratory.

Our capabilities include conducting all the necessary rigorous tests according to DIN 16961 and EN 13476.

These tests play a crucial role in maintaining the high quality and trouble-free performance of our double wall corrugated polyethylene pipes. Quality, testing, and certifications are key aspects of our commitment to excellence.

Tests for Quality

1. Ring Flexibility.
2. Oxidation Induction Time Test.
3. Impact Test.
4. Melt Flow Index Test.
5. Ring Stiffness.
6. Creep Ratio.
7. Physical Properties.
8. Water Tightness Test.
9. Effect on Heating.

ALPLAST
Never Accept Less

Double Wall Corrugated Pipes can be significantly impacted by changes in various factors,including:

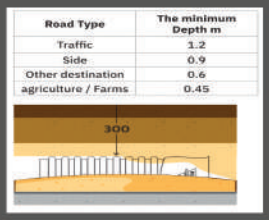
1. The dimensions of the trench, such as its width and depth.
2. The level of compaction of the material surrounding the pipes, both in the embedment and the main backfill.
3. The condition of the pipe support and the bottom of the trench.
4. The presence of construction traffic and temporary loads.
5. The characteristics of the soil, including its type and parameters, such as the subsoil, trench walls, and backfill.
6. The overall ground and soil conditions, such as frost and thaw cycles, rain, snow, and flooding.
7. The level of the groundwater table.
8. The existence of additional pipelines within the same trench.

Excavation: Trench Preparation:

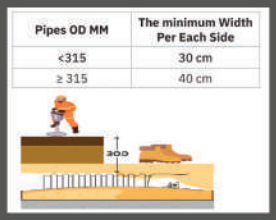
1. Prior to laying pipes, it is essential to create a sand bedding layer at the base of the trench to minimize the pressure exerted on the pipes, preventing potential damage such as breakage, bending, or deflation caused by movement or external factors like rocks and sharp objects.

2. The thickness of the bedding layer under the pipes should be equal to one-third of the outer diameter of the pipes to ensure proper support and stability.

3. The excavation dimensions should be determined based on the required bedding heights above the pipes and the excavation width to maintain the integrity and functionality of the pipeline system.



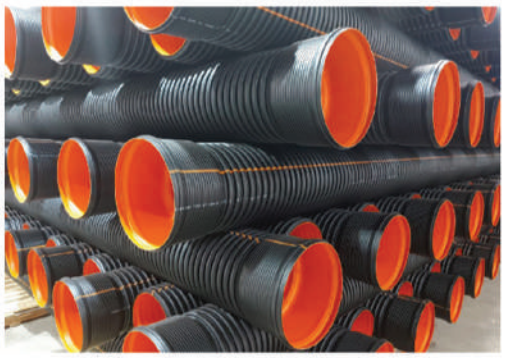
The bedding layer beneath the pipes should have a minimum thickness of 15 cm if the soil is rocky, and at least 30 cm if there is a layer of sand present.



Proper compaction of the layers is essential, using a machine to compact up to 150 mm from the top of the pipe, avoiding direct compaction over the crown of the pipe.

NALPLAST DWC pipes & Fitting

- 100 to 1000mm nominal diameter with an effective length of 6 meters with rubber gasket jointing according to EN681.
- Pipes are socket and spigot type.
- Ring stiffness options include 4 and 8KN/M2 .



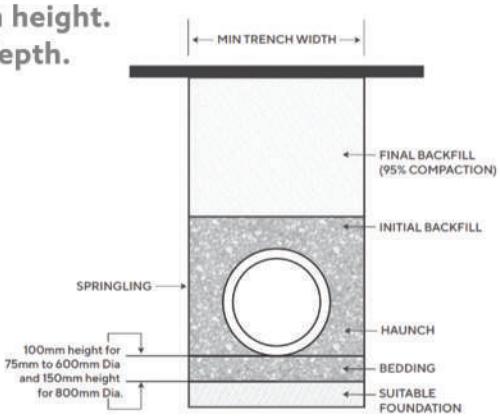
Storage

- The maximum height for storage in vertical rows is 3 meters.
- Ensure the storage floor is level.
- Avoid placing any load or stress on the pipe socket.

Trench Preparation

- Bedding for trench according to EN1610 - ISO 16098 standards.
- Sand material used for trench bedding with 150:300 mm height.
- Measurement of trench bedding in terms of width and depth.

DN (Pipes)	Minimum trench width (OD + x)
	Supported Trench
<225	OD+0.40
>225 to <350	OD+0.50
>350 to <700	OD+0.70
>700 to <1200	OD+0.85
>1200 to	OD+1.00



The minimum working space between the pipe and the trench wall or support is equal to half of the sum of the external diameter (OD) and x, where OD represents the external diameter in meters.

Double Wall Corrugated Pipes

can be significantly impacted by changes in various factors, including:

MAXIMUM AND MINIMUM BURIAL DEPTHS FOR SN4 AND SN8 PIPES

1. Determining factors for load carrying capacity of pipe and soil envelop include cover height, with minimum cover heights dependent on backfill and proposed traffic loads.
2. Increase in burial depth allows live load to be dispersed over a greater area of surrounding soil, but also increases weight of soil column directly above the pipe.
3. Maximum cover heights are dependent on variables such as stiffness class of pipe, ground water table level, backfill material, and Maximum Burial Depth level.
4. SN4 pipes are recommended for low or negligible traffic load and low burial depths, with recommended burial depth for SN4 and SN8 pipes ranging from 0.8 M to 6.0 M.

NOTES

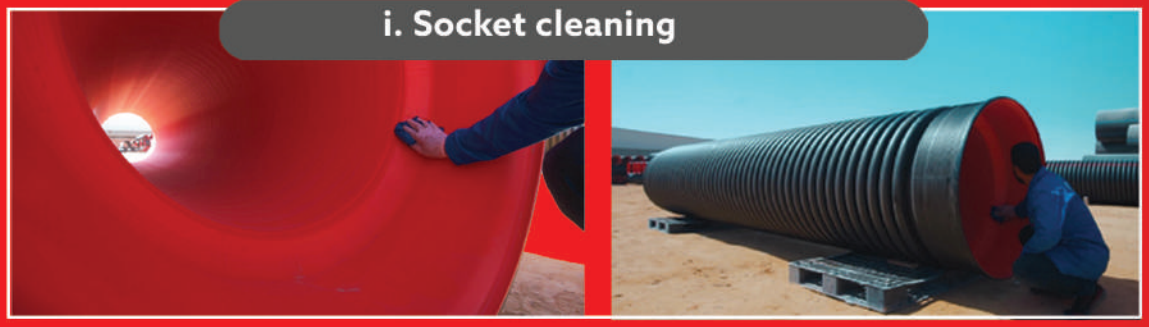
1. The installation should adhere to the guidelines set by the standards followed by **NALPLAST.**
2. The height of the cover will vary depending on the backfill material and soil stiffness.
3. The minimum depth of cover should be measured from the top of the pipe's crown to the ground level.
4. The design deflection limits recommended are in accordance with the standards followed by **NALPLAST.**

Installation Guidelines (Procedures)

1. Cleaning
2. Place the gasket between the initial corrugated valley
3. Lubricating
4. Jointing

1. Cleaning

i. Socket cleaning



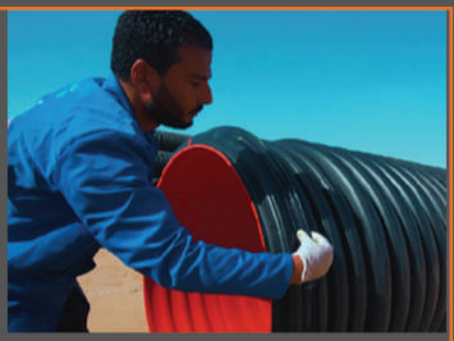
ii. Spigot cleaning

iii. Rubber gasket cleaning

2. Place the gasket between the initial corrugated valley

3. Lubricating

Ensure the socket is properly lubricated.



Lubricate the rubber gasket for better performance.

4. Jointing

Backhoe method

Insert the spigot with jointed gasket into the socket ensuring proper vertical and horizontal alignment, and maintain the pipe level throughout the process.

Apply consistent lateral pressure until the gasket is correctly

Testing

(It is strongly advised to conduct an air test for testing purposes.)

Precautions:

Prior to conducting tests, it is strongly advised to examine the joints for:

- Misalignment.
- Gasket rolling.
- The presence of foreign materials.

Testing With Air Method L

Table 3 provides the testing durations for pipelines, excluding manholes and inspection chambers, based on pipe size and testing methods (LA; LB; LC; LD). Initially, a pressure that is about 10% higher than the required test pressure, P0, should be maintained for approximately 5 minutes. Subsequently, the pressure should be adjusted to the test pressure specified in table 3 for testing methods LA, LB, LC, or LD. If the pressure drop observed after the designated testing period is lower than the value Δ mentioned in table 3, the pipeline is considered compliant.

Testing Method	P_0 kPa	ΔP kPa	Testing Time Min						
			DN100	DN200	DN300	DN400	DN600	DN800	DN1000
LA	10 (1)	25.5 (0.25)	5	5	7	10	14	19	24
LB	50 (5)	10 (1)	4	4	6	7	11	15	19
LC	100 (10)	15 (1.5)	3	3	4	5	8	11	14
LD	200 (20)	15 (1.5)	1.5	1.5	2	2.5	4	5	7
K_p-Values			0.058	0.058	0.04	0.03	0.02	0.015	0.012

$$t = \frac{1}{K_p} \quad X \quad \frac{P_0}{P_0 - \Delta P} \qquad K_p = \frac{12}{DN}$$

With t rounded to the nearest 0,5 minute
when t ≤ 5 min, to the nearest minute when t > 5 min.

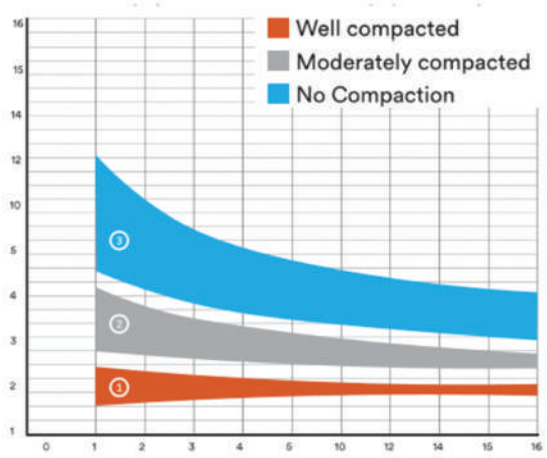
Testing steps

1. The compressor is positioned at one end of the pipeline for testing purposes.
2. Once the end of the pipe is confirmed to be clean, an inflatable balloon is inserted and pressurized with air until it covers the entire diameter of the pipe opening.
3. The compressor is then relocated to the opposite end of the pipeline.
4. Following the cleaning of the hole, a balloon designed for filling and pushing is placed inside the pipe.
5. The balloon is inflated with air until it completely covers the pipe opening.
6. Subsequently, the air inlet of the balloon is redirected to fill the line, and the pipes are pressurized to the required level.
7. A gauge is attached to the balloon filling channel to monitor the air pressure inside the pipeline throughout the designated testing period.

Testing Procedures:

1. Test duration depends on the diameter of the pipes being tested.
2. The gauge is monitored once the required pressure is reached, for a period corresponding to the tested diameter.
3. Table (1) displays the test duration, test pressure value, and corresponding diameter according to European code EN1610.

DWC-Soil Stiffness



The level of pipe deflection depends on the quality of trench backfilling

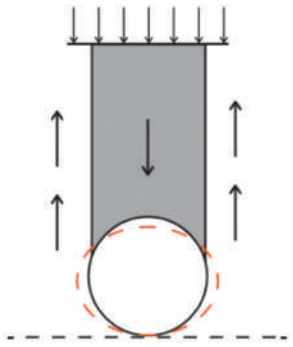


Figure 1

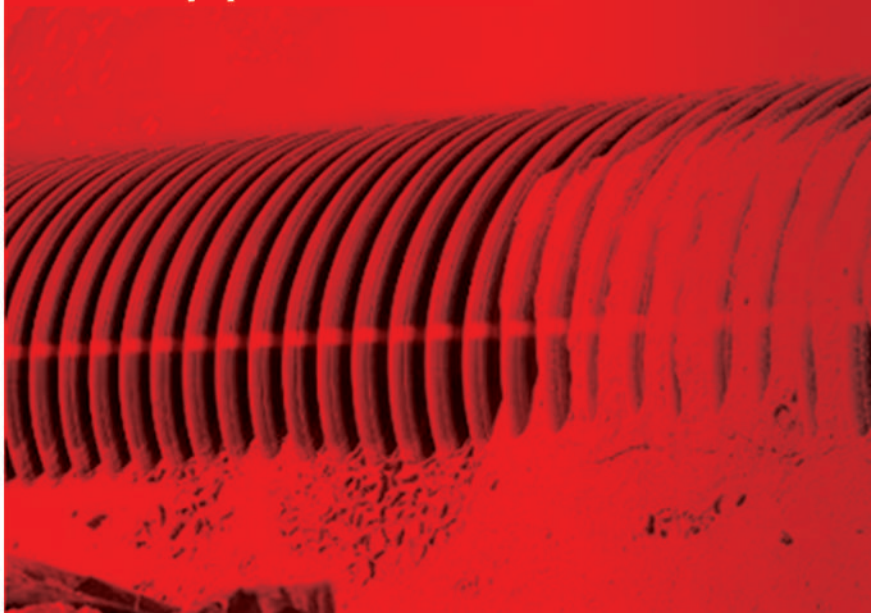
The HDPE corrugated pipe is a flexible pipe used in municipal engineering. Buried flexible pipes share the earth's pressure with the surrounding soil. Due to the pipe's lower stiffness compared to the soil, when a load is applied, the adjacent soil prism deflects less than the central soil prism. This results in an upward friction force on the central soil prism, causing the earth pressure on the pipe to be less than the weight of the central soil prism [1] .

The behavior of a buried flexible pipe is affected by both the hoop stiffness of the pipe and the stiffness of the backfill [2].

The stiffness of the backfill is primarily determined by compaction level [3], water content [4], soil properties [5], and grade [6]. Earth pressure above a flexible pipe significantly impacts pipe deformation, with loads categorized as soil loads and external loads.

The force transferred from external loads to the crown of the pipe varies depending on soil conditions [7] [8].

The deformation of a pipe during installation is influenced by factors such as the compaction method [9], compaction equipment [10], groove width, backfill material, backfill pipe cover thickness, pipe diameter, and pipe hoop stiffness [11].

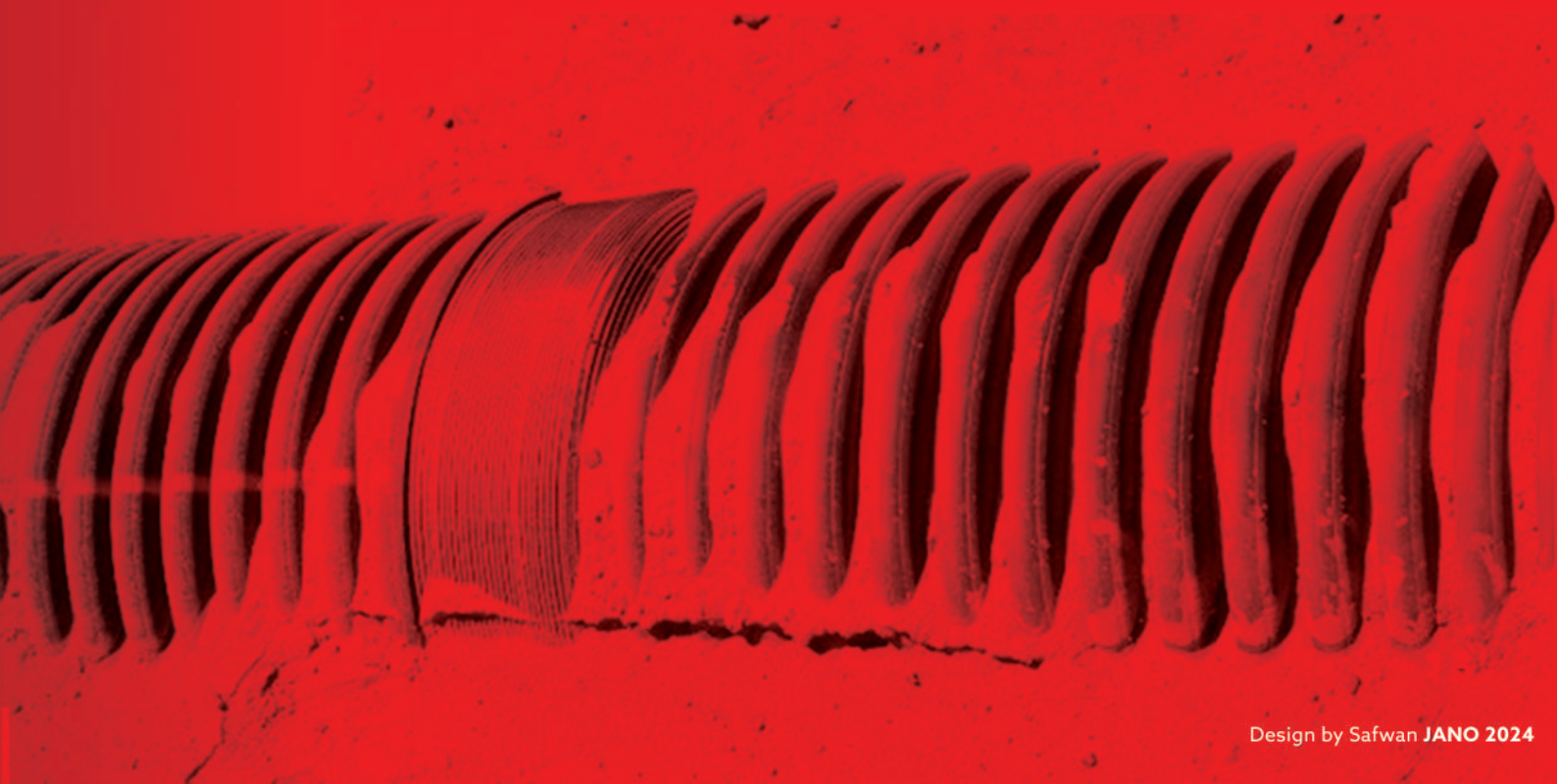


NALPLAST

Never Accept Less

شركة نال للصناعة المحدودة

Nal For Manufacturing Co. Ltd.



Design by Safwan **JANO 2024**

Never Accept Less

شركة نال للصناعة المحدودة

Nal For Manufacturing Co. Ltd.

المملكة العربية السعودية
الرياض ـ حي الفاروق
الدائري الشرقي ـ مخرج 16

KSA – Riyadh
Al Faruk Dist.
Eastern Ring Road Ext. 16

Tel +966114655880

NALPLAST

Never Accept Less