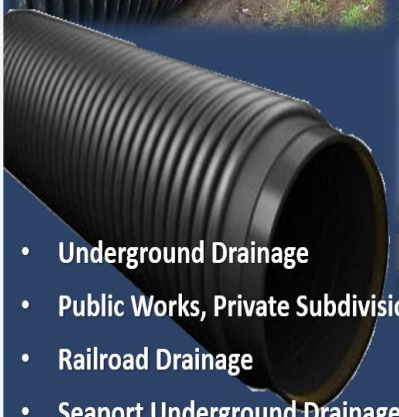
TIGERSHIELD
INDUSTRIAL CORPORATION

CARAT STRUCTURED WALL HDPE PIPE SYSTEM






- Underground Drainage
- Public Works, Private Subdivision and Highway Drainage
- Railroad Drainage
- Seaport Underground Drainage
- Airport Drainage and Power Plant Outfall Pipeline
- Irrigation Water Supply, Water Tank Reservoir and Water Storage System
- Petrochem plant
- Landfill and Storm Water Pipelines
- Penstock Pipeline for Hydropower and Headrace for Hydropower

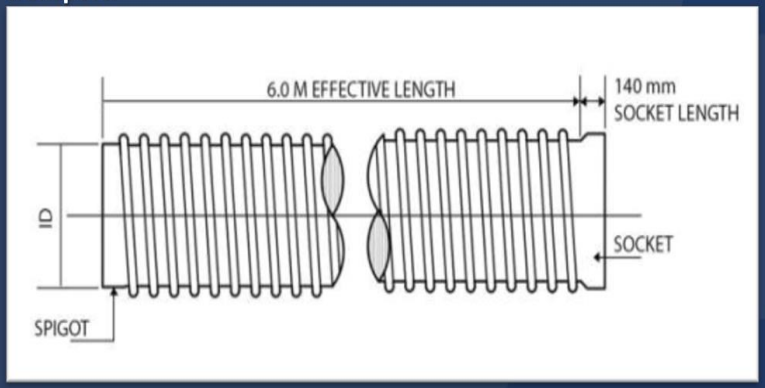
CARAT STRUCTURED WALL HDPE PIPE SYSTEM


Introduction

Carat Structured wall HDPE pipe is a type of plastic pipe that is made from high-density polyethylene (HDPE). It is characterized by its spirally wound construction, which gives it a high degree of strength and flexibility, Is now considered the front runner in replacing traditional pipe system materials like concrete, CMP (corrugated metal pipe) and PVC (polyvinylchloride).

Standard Length

The Standard length of 6 meters making it easier to store, handle and transport.



Pipes can be manufactured in different sizes – 600mm up to 3500mm – and in different ring stiffness's.

WALL PIPE FEATURES AND BENEFITS

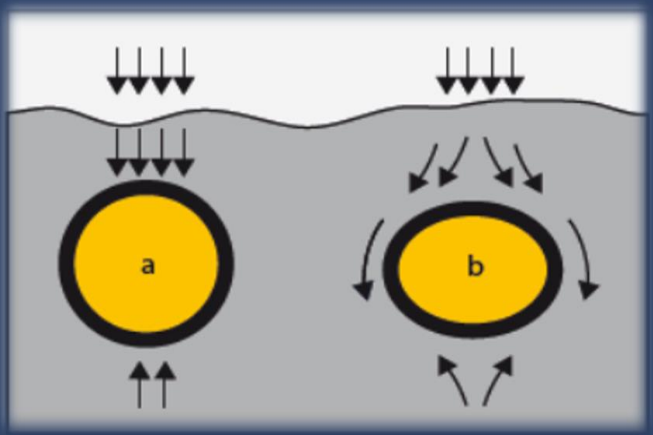
Carat Structured wall HDPE pipe offers a number of advantages over traditional materials, such as concrete and steel. It is lightweight, corrosion-resistant, and has a long service life. Structured wall pipe is also relatively easy to install, which can save time and money on construction projects.

Here are some of the benefits of using Carat Structured wall pipe:

- It is lightweight: Carat Structured wall pipe is much lighter than concrete or steel pipes, which makes it easier to transport and install.
- Corrosion-resistant: Carat Structured wall pipe is resistant to corrosion from chemicals and other environmental factors
- Long service life: Carat Structured wall pipe has a long service life (100 Years in Service), which can save money on replacement costs.
- Easy to install: Carat Structured wall pipe is relatively easy to install, which can save time and money on construction projects

•Carat Structured wall pipe is a versatile and reliable material that can be used in a variety of applications. It is a good choice for projects where weight, corrosion resistance, and long service life are important considerations

DEFLECTION IS SAFETY



Deflection of flexible pipes compared to flexural resistant pipes

The deflection of flexible pipes is controlled by the settlement of the soil. After settlement, traffic and other loads do not affect the pipe deflection anymore. When pipes are relatively more rigid than the soil, the traffic and other loads have to be resisted by the pipe. Many years of practical experience have shown that flexible pipes (b) can resist traffic and other loads more effective than flexural resistant pipes (a) made of concrete or other rigid material. As shown in the drawing, the flexible pipes elude a selective strain by deflection. By this means the surrounding soil absorbs this strain.

ELECTRO FUSION JOINT

The most preferred joint system, as the whole pipe system becomes a homogenous unit. A welding wire which is included in the socket or spigot is heated with the help of a special welding device whereby the two pipe ends (socket and spigot) are jointed together. The electro-fusion jointing technique is a very favourable, simple and secure method to install pipes in even very narrow trenches in a short time. This technique of heat fusion joining for suspended piping, where space & pipe movement is limited, the heated internally by a wire coil at the interface of the joint.

ELECTRO FUSION JOINTING TOOLS:

CHAIN BLOCK

TENSIONER CLAMP

LIFTING BELT

STEEL STRIP COIL

WELDING MACHINE

TECHNICAL DATA (Pipe Diameter)

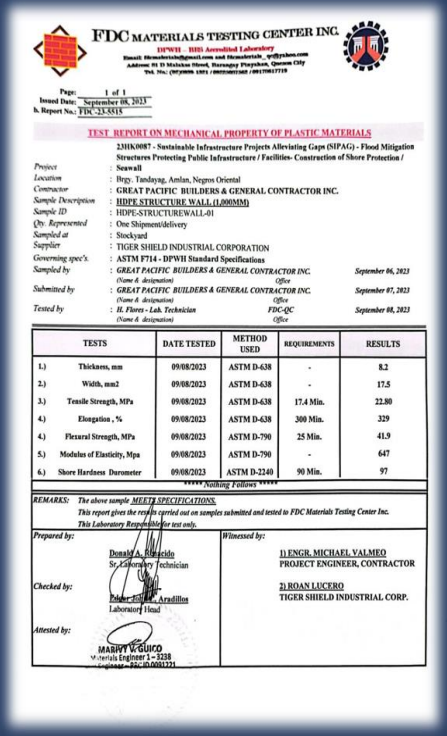
PIPE DIAMETER SIZES	
DN / ID	DN / OD RANGE
600 mm	610 – 760 mm
800 mm	810 – 960 mm
1000 mm	1010 – 1160 mm
1200 mm	1210 – 1360 mm
1500 mm	1510 – 1660 mm
1800 mm	1810 – 1960 mm
2000 mm	2010 – 2160 mm
3000 mm	3010 – 3160 mm

HDPE Easily manufactures through a semi-automated process; with sizes and internal diameter (ID) ranging from DN 600mm to DN 3000mm.

Load Bearing and Non-Load Bearing

1. NON-LOAD BEARING (NLB)- Are products which are intended for use and are capable of withstanding Dead/Earth Loads and Surcharge/Permanent Loads.
2. LOAD BEARING (LB) – Are product which are intended for used are capable of withstanding Dead/Earth Loads and Surcharge/Permanent Loads, and Live Loads (such as, but not limited to traffic Loads from heavy Vehicles.)

TEST RESULT FOR MECHANICAL & QUALITY



FDC MATERIALS TESTING CENTER INC.
DPWH - BHS Accredited Laboratory

Page: 1 of 1
Issued Date: September 08, 2023
b. Report No.: FDC-23-5515

TEST REPORT ON MECHANICAL PROPERTY OF PLASTIC MATERIALS

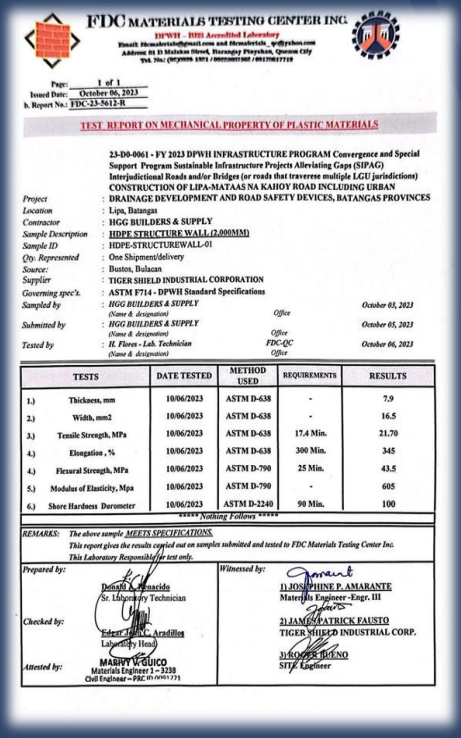
Project: 23HK0087 - Sustainable Infrastructure Projects Alleviating Gaps (SIPAG) - Flood Mitigation Structures Protecting Public Infrastructure / Facilities- Construction of Shore Protection / Seawall
Location: Brgy. Tandayag, Amlan, Negros Oriental
Contractor: GREAT PACIFIC BUILDERS & GENERAL CONTRACTOR INC.
Sample Description: HDPE STRUCTURE WALL (1,000MM)
Sample ID: HDPE-STRUCTUREWALL-01
Qty. Represented: One Shipment/delivery
Sampled at: Stockyard
Supplier: TIGER SHIELD INDUSTRIAL CORPORATION
Governing spec's.: ASTM F714 - DPWH Standard Specifications
Sampled by: GREAT PACIFIC BUILDERS & GENERAL CONTRACTOR INC. (Name & designation) — Office — September 06, 2023
Submitted by: GREAT PACIFIC BUILDERS & GENERAL CONTRACTOR INC. (Name & designation) — Office — September 07, 2023
Tested by: H. Flores - Lab. Technician (Name & designation) — FDC-QC Office — September 08, 2023

	TESTS	DATE TESTED	METHOD USED	REQUIREMENTS	RESULTS
1.)	Thickness, mm	09/08/2023	ASTM D-638	-	8.2
2.)	Width, mm2	09/08/2023	ASTM D-638	-	17.5
3.)	Tensile Strength, MPa	09/08/2023	ASTM D-638	17.4 Min.	22.80
4.)	Elongation , %	09/08/2023	ASTM D-638	300 Min.	329
4.)	Flexural Strength, MPa	09/08/2023	ASTM D-790	25 Min.	41.9
5.)	Modulus of Elasticity, Mpa	09/08/2023	ASTM D-790	-	647
6.)	Shore Hardness Durometer	09/08/2023	ASTM D-2240	90 Min.	97

***** Nothing Follows *****

REMARKS: The above sample MEETS SPECIFICATIONS.
This report gives the results carried out on samples submitted and tested to FDC Materials Testing Center Inc.
This Laboratory Responsible for test only.

Prepared by: Donald A. Ranacido, Sr. Laboratory Technician
Checked by: Edcer Glenn C. Aradillos, Laboratory Head
Attested by: MARIVY V. GUICO, Materials Engineer I – 3238, Civil Engineer – PRC ID 0093721
Witnessed by: 1) ENGR. MICHAEL VALMEO, PROJECT ENGINEER, CONTRACTOR; 2) ROAN LUCERO, TIGER SHIELD INDUSTRIAL CORP.



FDC MATERIALS TESTING CENTER INC.
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Page: 1 of 1
Issued Date: October 06, 2023
b. Report No.: FDC-23-5612-R

TEST REPORT ON MECHANICAL PROPERTY OF PLASTIC MATERIALS

Project: 23-D0-0061 - FY 2023 DPWH INFRASTRUCTURE PROGRAM Convergence and Special Support Program Sustainable Infrastructure Projects Alleviating Gaps (SIPAG) Interjudicional Roads and/or Bridges (or roads that traverese multiple LGU jurisdictions) CONSTRUCTION OF LIPA-MATAAS NA KAHOY ROAD INCLUDING URBAN DRAINAGE DEVELOPMENT AND ROAD SAFETY DEVICES, BATANGAS PROVINCES
Location: Lipa, Batangas
Contractor: HGG BUILDERS & SUPPLY
Sample Description: HDPE STRUCTURE WALL (2,000MM)
Sample ID: HDPE-STRUCTUREWALL-01
Qty. Represented: One Shipment/delivery
Source: Buntos, Bulacan
Supplier: TIGER SHIELD INDUSTRIAL CORPORATION
Governing spec's.: ASTM F714 - DPWH Standard Specifications
Sampled by: HGG BUILDERS & SUPPLY (Name & designation) — Office — October 03, 2023
Submitted by: HGG BUILDERS & SUPPLY (Name & designation) — Office — October 05, 2023
Tested by: H. Flores - Lab. Technician (Name & designation) — FDC-QC Office — October 06, 2023

	TESTS	DATE TESTED	METHOD USED	REQUIREMENTS	RESULTS
1.)	Thickness, mm	10/06/2023	ASTM D-638	-	7.9
2.)	Width, mm2	10/06/2023	ASTM D-638	-	16.5
3.)	Tensile Strength, MPa	10/06/2023	ASTM D-638	17.4 Min.	21.70
4.)	Elongation , %	10/06/2023	ASTM D-638	300 Min.	345
4.)	Flexural Strength, MPa	10/06/2023	ASTM D-790	25 Min.	43.5
5.)	Modulus of Elasticity, Mpa	10/06/2023	ASTM D-790	-	605
6.)	Shore Hardness Durometer	10/06/2023	ASTM D-2240	90 Min.	100

***** Nothing Follows *****

REMARKS: The above sample MEETS SPECIFICATIONS.
This report gives the results carried out on samples submitted and tested to FDC Materials Testing Center Inc.
This Laboratory Responsible for test only.

Prepared by: Donald A. Ranacido, Sr. Laboratory Technician
Checked by: Edcer Glenn C. Aradillos, Laboratory Head
Attested by: MARIVY V. GUICO, Materials Engineer I – 3238, Civil Engineer – PRC ID 0093721
Witnessed by: 1) JOSEPHINE P. AMARANTE, Materials Engineer -Engr. III; 2) JAMES PATRICK FAUSTO, TIGER SHIELD INDUSTRIAL CORP.; 3) ROGER BUENO, SITE Engineer

Tigershield Plant Conduct testing for the *Ring Stiffness* of the Carat Structured Wall HDPE Pipe.

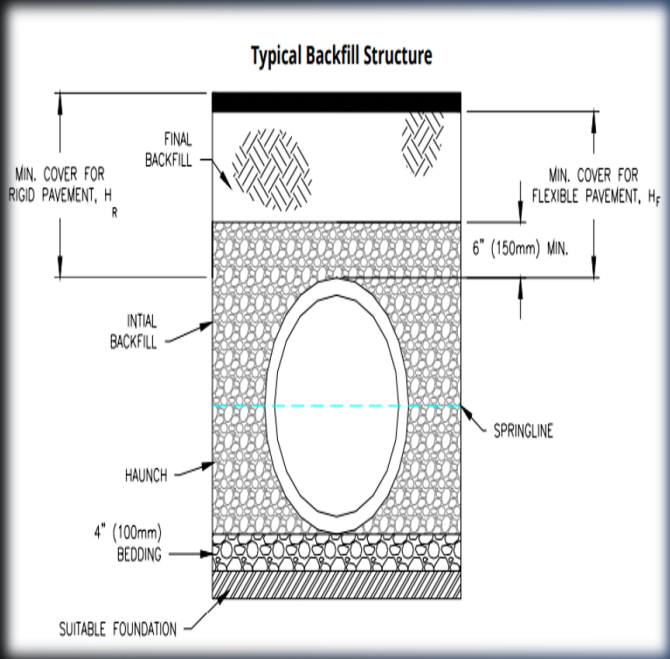
Structured Wall HDPE Pipe Embedment

The recommendations presented here detail how to install a dependable subsurface drainage or groundwater control system. Installation with proper backfill materials, compaction levels, and placement procedures are essential to achieve long term system performance.

These recommendations assume that the drainage designer used design criteria available from ASTM F449 and ASTM F2648 Trench Detail Under Pavement.

Table 1. Classes of Embedment & Backfill Materials

Description	Soil Classificaton		Min. Compaction Required (Std. Proctor Density (%)
	ASTM D2321	ASTM D2487	
Graded or crushed stone Crushed Gravel	Class I	.	Dumped
Well-graded sand, gravels, and gravelsand mixtures: Poorly graded sand, gravels, and gravel/sand mixtures; Little or no fines	Class II	GW GP SW SP	85%
Silty or clayey gravels, Gravels/ sand/silt or gravels and clay mix- tures, silty or clayey sands, sand/ clay or sand/silt mixtures	Class III	GM GC SM SC	90%



Backfill Selection

- Only native soil meeting class I, II, or III, as described in Table 1, are acceptable backfill materials.
- Class I materials can be dumped around pipe. Lightly tamp or knifed to ensure voids are eliminated.
- Non-cohesive sand, sand/gravel mixes and other Class II or III materials must be compacted to remove voids.

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