

2019 Version

GAPEX
AGILITY.RELIABLE.FOCUS



GAPEX HDPE Corrugated Pipe & Fittings For Subsoil And Drainage Applications

A Reliable Drainage Solution Provider

GRAND APEX INTERNATIONAL CO.,LTD

新力國際技術產品有限公司

一、總述 Overview

Gapex HDPE波紋管道排水系統為廣大用戶提供了一個全面完善的排水系列產品，Gapex 排水產品因應不同的項目、不同的用戶要求提供更好質量，更容易安裝、更經濟、壽命更長的排水管道，確保每位客戶的工程項目都有一個出色的質量表現，同時也為客戶節省更多的費用。

Gapex HDPE corrugated pipe & fittings offer a comprehensive drainage products spectrum to our customers. Benefits of Gapex drainage products attribute to excellent quality, easy to install, economical and longevity piping solutions at the request of your projects' needs and challenges. At Gapex, we assure excellent quality performance for every project we participate and achieve cost saving to every of our customers.

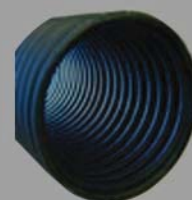
Gapex 排水系列產品包括：單壁排水管、雙壁排水管、單壁有孔疏水管、雙壁有孔疏水管，另外我們提供有不同的管道連接配件供客戶選擇包括：疏水管用的Soil Tight Joint 及排水管用 Water Tight Joint，同時我們也提供有不同的三通、直通、管堵等轉接配件提供給廣大的客戶使用。

Gapex corrugated pipes series include single wall corrugated pipe (E-Mono series) & twin wall corrugated pipe (H-Dual series). We also can offer perforation pattern to both E-Mono and H-Dual series as per your project's drainage design requires. In terms of on site pipe jointing, Gapex offer two jointing technologies: Soil Tight Joint for subsoil & Water Tight Joint for drainage applications. Moreover, a holistic range of Gapex corrugated fittings, like bends, Tees, Y-Tees & transition fittings, are also readily available.

Gapex HDPE波紋管產品為城市的建築、綠化用地、地下排水管網、電力預埋管、排風排氣管等建築設施提供更加先進的產品。



H-Dual
HDPE Corrugated
Twin Wall pipe



E-mono
HDPE Corrugated
Single Wall pipe



Water Tight joint



Soil Tight Joint

Gapex HDPE corrugated drainage products offer advanced solutions to variety of applications: urban building, green, underground draining system, electrical conduit, and air exhausting system.

二、應用範圍 Common Applications

Gapex HDPE波紋管的應用範圍：

Gapex HDPE corrugated drainage product used in a wide variety of end-use applications:



小區排水
•Residential drainage



堆填區及廢物管理
•Landfills and waste management

現場廢水處理
•On-site wastewater treatment



采礦
•Mining



高爾夫
•Golf

球場
•Soccer Pitch



蓄洪設施
•Retention/detention systems



高速公路
•Highway drainage

排洪管及排汙管
•Storm and sanitary sewers

休閒
•Recreation

三、性能優勢 Benefits

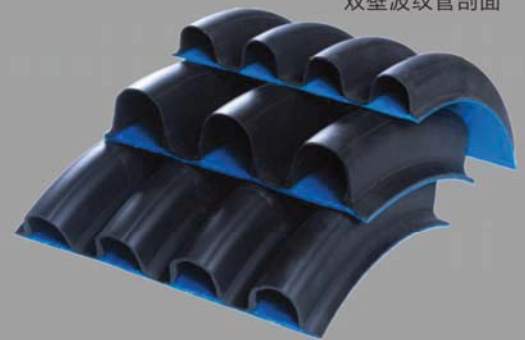
3.1 良好的結構強度 Excellent Structural Strength

Gapex 波紋管的結構設計接合了HDPE材料的柔韌的特點，所設計的E-mono（單壁管）及H-dual（雙壁管）具有較優勝的彈性及結構強度，當管道承受外壓力時，可以將其所承受的單點壓力分散到管身及周圍的回填土中，管道可以用更輕型的材料，0抗壓強度更好，H-dual 雙壁管在有300MM 最小覆蓋的情況下，可以承受H-20的荷載。

Structural design of E-mono & H-dual Gapex corrugated drainage pipes attribute the flexibility characteristics of HDPE together it provide excellent structural strength for its integrity. When the pipes subject to loading, they are able to disperse point loading to its surrounding soils. With such, pipes can be much lighter in weight but provide excellent crush resistance. For instance, with a minimum 300mm of soil coverage, H-dual can undertake a H-20 surcharge loading.



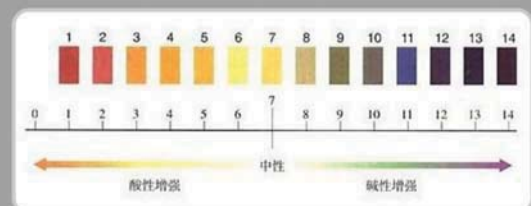
高密度HDPE
雙壁波紋管剖面



3.2 Durability 耐用性

HDPE材料的延展性和優良的分子結構令到HDPE材料具有很好的耐磨性，而且比重很輕，可以方便運輸安裝。在應用結果中HDPE管道的抗磨蝕情況比混凝土管道的材料損失少20%，HDPE 材料適用的PE值範圍為1.5 至14，具有較好的抗酸鹼能力，同時抵禦低溫的能力也很好，可適應不同環境的需要。所以在一些惡劣寒冷的環境下，HDPE材料是一個很好的選擇。

Both ductility and molecular structure of HDPE materials render superb durability of Gapex corrugated pipes. Ease of transportation and installation can be obtained due to its low density. The superb corrosion resistance of HDPE reveals application result that material loss at HDPE piping system is 20% less than concrete pipes. HDPE offers excellent resistance to acids and alkaline: it can safely be used with PH range from 1.5 to 14. In addition, HDPE can maintain its performance even at sub-zero temperatures. Thus, Gapex pipes are an attractive option in rigorous environments .



三、性能優勢 Benefits

3.3 流量效率 Flow Efficiency

H-dual (雙壁管) 光滑的內壁大大減低了管壁對水流的阻力，同時也減低了水流對管壁的侵蝕，增加了管道的耐用性，保證管道的排水速度。

Gapex H-Dual pipe provides an excellent smooth inner wall which reduces the flow friction resistance greatly and also provide superb corrosion resistance against pipe wall. This enhances the durability of the pipe and ensures maximum flow capacity.



3.4 重量輕、容易安裝

Light-weight, Easy Installation

由於HDPE的比重輕，同樣1000MM管徑混凝土管重量是HDPE波紋管的13倍，因此HDPE波紋排水管更容易運輸及切割。對搬運管道人工的數量和裝卸設備的要求相對較低，同時相應地減少搬運過程中工人受傷害的潛在風險。在遇到需要切割的情況，HDPE波紋管更顯優勢。

Thanks to the lightweight property of HDPE, for example a DN1000 concrete pipe is 13 times heavier than HDPE corrugated pipe, Gapex corrugated pipe can be handled, transported and installed with ease. This renders easier installation and cutting, lessen onsite work crews, reduced the need of heavy equipment and improve safety at work. At conditions where pipe needs to be cut on-site, Gapex corrugated pipe excels.

HDPE波紋排水管由於管重量輕，一次成型的管道可以做到6M或9M，這樣大大減少了管道接頭數量，加快了安裝的速度，同時也減少了接口沉降引起滲漏的風險。

Because of the light weight of HDPE corrugated pipe, the length of the pipe can be manufactured up to 6 or 9 m. This means less joints, faster installation, and reduced risk of leakage.



三、性能優勢 Benefits

3.5 優良的柔韌性 Flexible

HDPE 特有的分子結構，材料性能有很強的柔韌性，使用HDPE材料加波紋的結構設計，Gapex HDPE corrugated pipe 的彈性比陶土管及混凝土管更為優勝，特別是單壁的管道在高爾夫球場等綠化用地的應用中，大大減少了配件的使用，安裝變得更便捷、更方便。最重的是單壁管道為客戶提供了更為節建造成本的排水方案。

The remarkable flexibility property of HDPE material comes for its inherent distinctive molecular structure. Superimposing the flexibility with the corrugated profile design, Gapex HDPE corrugated pipe demonstrate its superior flexibility than vitrified clay or concrete pipes. Especially when single wall pipe is adopted at most golf course or greening projects, large elimination of fittings are feasible. With reduction of connection fittings, more simple installation and economic drainage solutions can be provided.



3.6 快速的疏水功能 Fast Flow Drainage

Gapex HDPE 波紋有孔疏水管可提供多種打孔方式，可以符合BS及ASTM的疏水速度要求。在高爾夫球場及運動場地，Gapex 的打孔管能迅速排出多餘的水份，務求草地在大雨過後的最短時間內恢復運作。

Gapex HDPE corrugated pipe offer a variety of perforation patterns. All such patterns are strictly conform to BS or ASTM' s flow requirements. At golf courses and athletic fields application, HDPE perforated pipes provide quick response to transport and divert rainwater away from the subsoil after intense rainfall, with such the turf can resume to normal operation at shortest time.



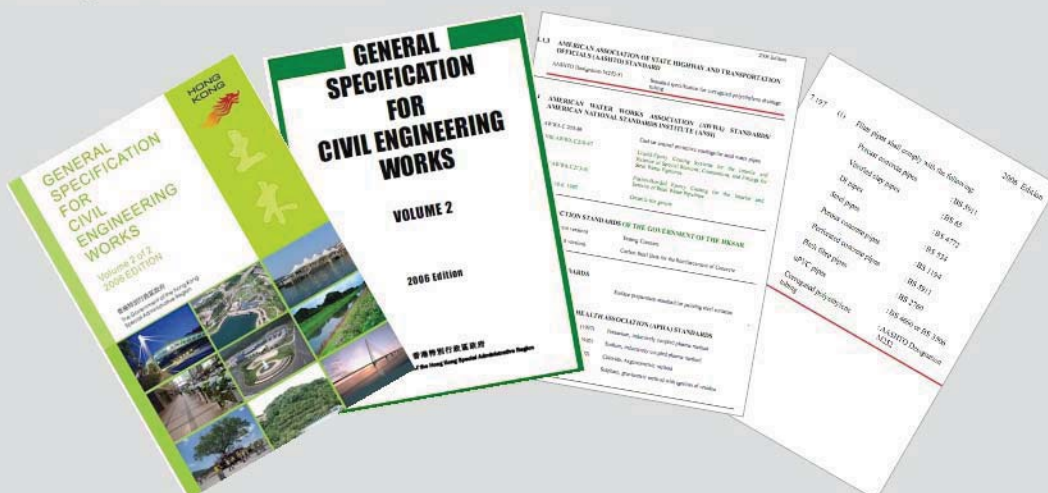
四．符合規範與質量 Quality and Specifications

Gapex HDPE corrugated pipe 的生產廠嚴格按照質ISO9001：2008質量管理體系進行管理生產，務求所提供的產品達到美國ASTM重要6項要求

Manufacturer of HDPE corrugated pipes strictly implements all quality and production requirements as stated in ISO 9001:2008, the Quality Management Systems. This can also assures pipes as manufactured and supplied conforms to all the Six(6) ASTM' s critical requirements.

GAPEX HDPE波紋排水管道系統，為客戶提供了高強度、高質量、使用壽命更長，維修更加便捷的排水產品，GAPEX提供的單壁和雙壁波紋管經香港檢測機構檢測符合美國家公路和運輸辦事處協會（AASHTO）AASHTO M252或M294的pipe stiffness and pipe flattening, and environmental stress cracking Test 要求。AASHTO M252 標準已於2006年成為香港特區政府認可使用的土木工程排水產品標準。

Gapex HDPE corrugated pipes offers a products to our customers with high strength, excellent quality, longevity lifespan and ease to maintenances. Both E-Mono and H-Dual series provided by Gapex have successfully passed and tested by a HOKLAS approved laboratory on all tastings requirements as specified at AASHTO M252 or M294. Testing areas includes pipe stiffness, pipe flattening, environmental stress etc. Moreover, the AASHTO M252 has been stated and recognized as an approved drainage piping materials under the HKSAR General Specifications for Civil Engineering works since 2006.



四. 符合規範與質量 Quality and Specifications

香港政府認可實驗室檢測報告 The Hong Kong Government accredited laboratory test reports

美國標準 American Standard: ASTM M252
測試報告 Test report

英國標準 :
British Standard BS4962 測試報告

CASTCO 佳力高試驗中心有限公司
CASTCO TESTING CENTRE LTD.
Test Report
Testing of Corrugated Polyethylene Pipe
(AS/NZS1538)

Date of issue: 22 November 2012
Page 2 of 2 pages

Lab: 00000000000000000000

4. Pipe stiffness (Clause 7.1.4.3.1)
Date of test: 22 November 2012

Nominal Diameter (mm)	Stiffness (kN/m ²)
300	100
300	100
300	100

Calculate the pipe stiffness, PS , by using the following equation: $PS = F/A(\Delta/P)$
Requirement: For diameter 300 mm, the pipe shall have a minimum pipe stiffness

Test result: Passed

5. Pipe flatness (Clause 7.1.4.3.2)
Date of test: 22 November 2012

Nominal Diameter (mm)	Actual Deflection (mm)
300	0.05
300	0.05
300	0.05

Requirement: There shall be no evidence of wall buckling, cracking, splitting or

Test result: Passed

6. Environmental Stress Cracking (Clause 7.1.4.3.3)
Date of test: 14-15 November 2012

Test piece no.	Temperature (°C)	Duration (hrs)
1	30	24
2	30	24
3	30	24

Requirement: There shall be no cracking of the pipe.

Test result: Passed

Checked by: **EU HO MAN**
Certified by: **EU HO MAN**

NUTEK SYSTEMS, LTD.
TEST REPORT
(OUR REFERENCE NO. 111312-107)

TITLE: Testing of Pipe
OUR REFERENCE NO.: 111312-1
DESCRIPTION OF SAMPLE: GAPEX SLOTTED DRAIN PIPE 110mm HDPE corrugated pipe with perforation
SAMPLE SUBMITTED BY: Grand Apex International Co. Ltd.
BRAND: GAPEX
BODY MARKINGS: GA19-1
METHOD OF TEST: BS4962:1982
PERIOD OF TESTS: 22nd to 24th April 2004

2. RESISTANCE TO IMPACT (BS4962 Clause 6)
The test pieces were conditioned at 1°C for at least 1 h prior to test

Test	Mass of rubber (kg)	Falling height of rubber (mm)	Sign
1 st	0.5	400	
2 nd	0.5	500	
3 rd	0.5	600	
4 th	0.5	700	
5 th	0.5	800	
6 th	0.5	900	
7 th	0.5	1000	
8 th	0.5	1100	
9 th	0.5	1200	
10 th	0.5	1300	
11 th	0.5	1400	
12 th	0.5	1500	
13 th	0.5	1600	
14 th	0.5	1700	
15 th	0.5	1800	
16 th	0.5	1900	
17 th	0.5	2000	

3. EXTENSIBILITY TEST (BS4962 Clause 6)

Sample	Test load (N)	Extension (mm)	Event
1	10	10	
2	10	10	

4. SUMMARY OF RESULTS (apply only to the sample tested)
Resistance to impact: Satisfactory
Extensibility test: Satisfactory

Dimension	Sample	BS Requirement	
Nominal size (mm)	100	-	
Minimum internal diameter (mm)	94.3	≥ 94*	
Perforation	Last dimension (mm)	0.8	≥ 0.8
	Minimum value	2.0	≥ 2.0
Number of perforation in every 30mm length of pipe	Number of perforation in every 30mm length of pipe	15	≥ 1
	Number of perforation per 120° segment in every 10mm length of pipe	14	≥ 1
Outside diameter (mm)	Min.	100	≥ 100 ± 0.5
	Max.	106.4	≤ 106 ± 0.5
Wall thickness, min. (mm)	1.3	-	

* Manufacturer's specification.

生產質量監測 Production Quality Monitoring



環剛度檢測
Ring Stiffness
Testing & Verifications



沖擊檢測
Impact Testing &
Verifications



重量檢測
Weight Verifications



直徑檢測
Diameter Verifications

五、產品規格資料 Product Specifications

產品名稱 Product Name	GAPEX 高密度聚乙烯波紋管 GAPEX HDPE CORRUGATED PIPES
材料 Materials	High Density Polyethylene (HDPE) 高密度聚乙烯
產品資料 Product Standards	AASHTO M 252 : d110-d250 MM AASHTO M 294 : d300 -d1200 MM

產品分類 Product Categories

H-DUAL : Gapex 高密度聚乙烯雙壁無孔排水波紋管 Gapex HDPE Corrugated Twin Wall Solid Drainage Pipe	
供應尺寸 Supply Size	直徑100MM 至1200MM 100MM Dia to 1200MM Dia
用途 Application	排水管 電纜保護管 通風管 Drainage pipe、Cable Duct、Ventilation tube
H-DUAL : Gapex 高密度聚乙烯雙壁有孔疏水波紋管 Gapex HDPE Corrugated twin wall perforated sub-soil drain pipe	
供應尺寸 Supply Size	直徑100MM 至600MM Supply Size: 100MM Dia to 600MM Dia
用途 Application	疏水管 綠化園林 高速公路 機場跑道 高爾夫球場 運動場 Application: sub-soil drain pipe for highway、green、garden、railway、Golf Course、stadium runway

E-MONO: Gapex 高密度聚乙烯單壁無孔排水波紋管 Gapex HDPE Corrugated single wall solid drainage pipe	
供應尺寸 Supply Size	直徑100MM 至150MM 100MM Dia to 150MM Dia
用途 Application	疏水管 綠化園林 高速公路 機場跑道 高爾夫球場 運動場 sub-soil drain pipe for highway、green、garden、railway、Golf Course、stadium runway
E-MONO : Gapex 高密度聚乙烯單壁有孔疏水波紋管 Gapex HDPE Corrugated single wall perforated sub-soil drain pipe	
供應尺寸 Supply Size	直徑100MM 至150MM 100MM Dia to 150MM Dia
用途 Application	疏水管 綠化園林 高速公路 機場跑道 高爾夫球場 運動場 sub-soil drain pipe for highway、green、garden、railway、Golf Course、stadium runway

五、產品規格資料 Product Specifications

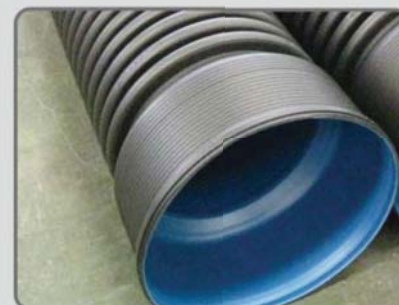
產品分類 Product Categories

常規尺寸 Nominal Diameter	產品外徑 Mean Outside Diameter	產品內徑 Mean Inside Diameter	單壁管 Single Wall (Class C)	雙壁管 Twin Wall (Class S)	排水管 Drainage	疏水管 Sub Soil Drain	承插口 Bell end / 平口 Flat End
100*	110	95	※	※	Class C/S	Class C/S	Flat end
150*	160	140	※	※	Class C/S	Class C/S	Flat end
200	225	200		※	Class S	Class S	Bell end
225	250	225		※	Class S	Class S	Bell end
250	292	250		※	Class S	Class S	Bell end
300	340	300		※	Class S	Class S	Bell end
400	478	400		※	Class S	Class S	Bell end
500	595	500		※	Class S	Class S	Bell end
600	711	600		※	Class S	Class S	Bell end
700	800	700		※	Class S	Class S	Bell end
800	957	800		※	Class S	Class C/S	Bell end
1000	1200	1050		※	Class S	Class C/S	Bell end
1200	1350	1200		※	Class S	Class C/S	Bell end

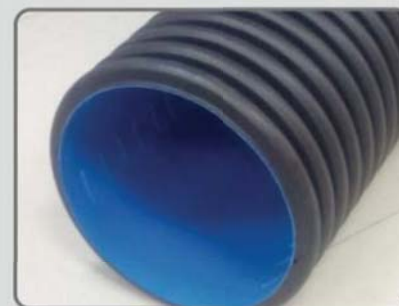
Class C: Cl 4.1.1. of AASHTO M252 - This pipe shall have a full circular cross section, with a **corrugated surface both inside and outside.**

Class S: Cl.4.1.2. of AASHTO 252 - This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a **smooth inner liner.**

承插口管
The Bell End Pipes
**不需要配直接頭接駁
The bell end pipe do not need coupler to be connected



平口管
The Flat end pipes
**需要配直接口接駁
The Flat end pipe need coupler to be connected



五、產品規格資料 Product Specifications

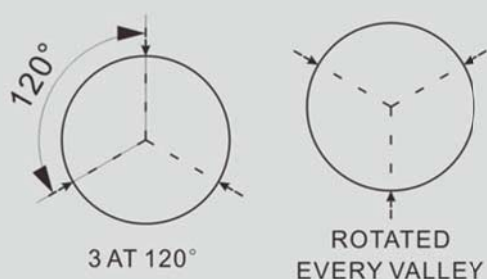
疏水管的開孔方法

Perforation Patterns Of Sub-soil Drain Pipe

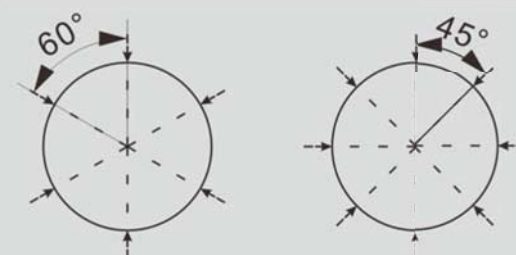


常規尺寸 Nominal ID	開孔型狀 Perforation Type	開孔尺寸 Max. Slot Length or Diameter	最大寬度 Max. Slot Width	最小開孔面積 Minimum Inlet Area
mm	Slot條型 / Circular圓型	mm	mm	cm ² /m
100	Slot條型	18	1.8	21
150	Slot條型	20	2.5	21
200	Slot條型	28	3	21
225	Slot條型	28	3	21
250	Slot條型	28	3	32
300	Slot條型	30	3	32
400	Circular圓型	8	na	32
500	Circular圓型	8	na	32
600	Circular圓型	8	na	32
700	Circular圓型	8	na	32
800	Circular圓型	9.5	na	42
1000	Circular圓型	9.5	na	42
1200	Circular圓型	9.5	na	42

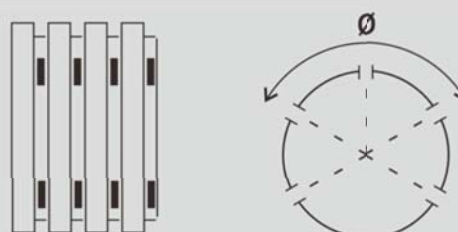
360度開孔圖 I型 (適用尺寸110-1200MM 直徑)
Full perforation pattern I (110-1200MM Dia)



360度開孔圖 II型 (適用尺寸110-1200MM 直徑)
Full perforation pattern II (110-1200MM Dia)



1/3底部無孔開孔圖 (適用尺寸110-1200MM 直徑)
1/3 solid invert perforation pattern (110-1200MM Dia)



五、產品規格資料 Product Specifications

Gapex HDPE 雙壁波紋管符合美国AASHTO M252 或 ASSHTO M294 環剛度要求
**環剛度測試標準ASTM D2412 (STANDARD TEST METHOD FOR DETERMINATION OF EXTERNAL LOADING CHARACTERISTICS OF PLASTIC PIPE BY PARALLEL-PLATE LOADING)

Gapex twin wall H-Dual HDPE pipe' s pipe stiffness complies with the requirements of American Standards: AASHTO M252 or ASSHTO M294.

*** Stiffness of pipes are tested in according to ASTM D2412 parameters (STANDARD TEST MEHTOD FOR DETERMINATION OF EXTERNAL LOADING CHARTERISTICS OF PLASTIC PIPE BY PARALLEL-PLATE LOADING)

根據AASHTO M252或AASHTO M 294要求管道環剛度不可低於以下指標
According to AASHTO M252 & M2934, minimum parallel plate pipe stiffness values for HDPE Corrugated pipe shall be as specified in the table below.

Diameter		Pipe Stiffness ASTM D 2412 (5% Deflection)	
in	mm	psi	kN/m ²
4"	100	70	485
6"	150	65	450
8"	200	60	415
10"	250	50	345
12"	300	50	345
15"	375	42	290
18"	450	40	275
24"	600	34	235
30"	750	28	195
36"	900	22	150

六、直接頭與配件 Coupling and Fittings

6.1 E-mono 單壁Solid Tight有孔管/無孔管配件 E-mono Single wall Solid Tight for perforate pipe and solid pipe 適用範圍：100MM -150MM Dia



45°Y型三通
45° Y



承插直通
Snap Coupling



T型三通
Snap Tee



管堵
End Cap



彎徑直接頭
Reducing Coupler



承插旁通
Tep Tee

6.2 H-Duel雙壁water Tight 有孔管/無孔管配件 H-Duel Twin Wall Water Tight for perforate pipe and solid pipe 適用範圍 100MM -1200MM Dia



變徑T型三通
Reducing Tee



45 度彎頭
45 Deg Elbow



90 度大彎邊
90 Deg Bend



四通
Cross Tee



管夾接頭
Split coupler



管夾接頭
Split coupler

七、Gapex 管道安裝要求 Site Installation of Gapex HDPE corrugated pipes

用於排水的雙壁波紋管，在設計中，管道的排水主要是靠管坑的傾斜坡度來實現，所以在安裝管道時，管坑的傾斜坡度必須嚴格按照設計進行施工。

When the pipes are adopted as drainage applications, media flows inside pipes are designed mainly be achieved by the gradient of pipes situated at trenches. Therefore, stringent measures and monitoring of pipe gradient alignment shall be enforced in attaining the proper pipe alignment in achieving the desire flow profile.

管溝的寬度、深度、回填材料、回填密實度直接影響管道的使用，Gapex 管道安裝應該根據ASTM –D 2321進行安裝，以保證管道的使用質量。

Installation of Gapex HDPE corrugated pipes recommends to follow ASTM-D2321 requirements so as to assure the quality of pipes and their applications. Adequate trench width, trench depth, backfill materials and density shall be followed, since those factors could affect Gapex pipes' performance.

7.1 回填要求

高密度聚乙烯波紋管覆蓋厚度與可承受壓力 HDPE Corrugated pipe min cover and loading

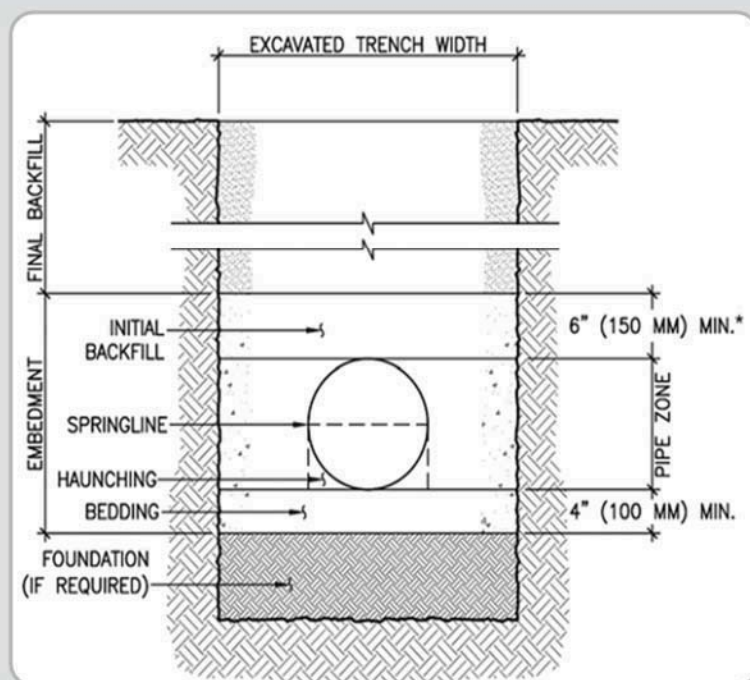
常規直徑 Nominal Pipe Diameter,mm	最小覆蓋 MIN Cover H-20 loading	最小覆蓋 MIN Cover E-80 loading
100 mm	300MM	600MM
150 mm	300MM	600MM
200 mm	300MM	600MM
225mm	300MM	600MM
250 mm	300MM	600MM
300 mm	300MM	600MM
400 mm	300MM	600MM
500 mm	300MM	600MM
600 mm	300MM	600MM
700 mm	300MM	600MM
800 mm	300MM	600MM
1000 mm	300MM	600MM
1200 mm	300MM	600MM

七、Gapex 管道安裝要求 Site Installation of Gapex HDPE corrugated pipes

7.2 (H-Dual)雙壁波紋管安裝 Installation of Twin Wall Corrugated Pipes (H-Dual)

建議管溝深度：Recommend trench depth

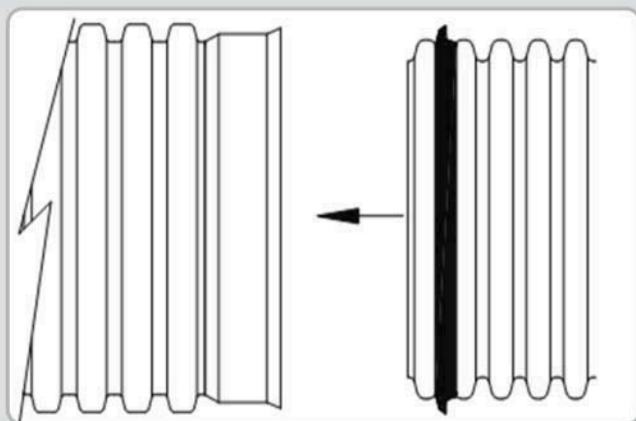
Nominal Pipe Diameter (DN), mm 常規直徑	Minimum Trench Width, mm 最小管溝寬度
100 mm	530 mm
150 mm	580 mm
200 mm	630 mm
225mm	680mm
250 mm	710 mm
300 mm	790 mm
400 mm	860 mm
500 mm	1100mm
600 mm	1220 mm
700 mm	1680 mm
800 mm	1980 mm
1000 mm	2110 mm
1200 mm	2260 mm



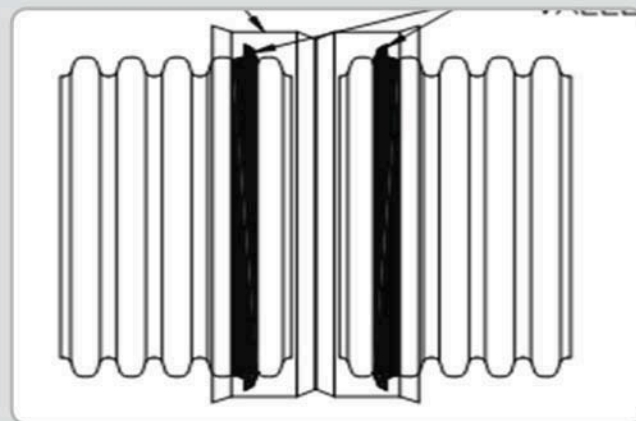
ASTM-D2321 Installation Standard specification

連接方法 Connection Methods

承插接口 Bell End

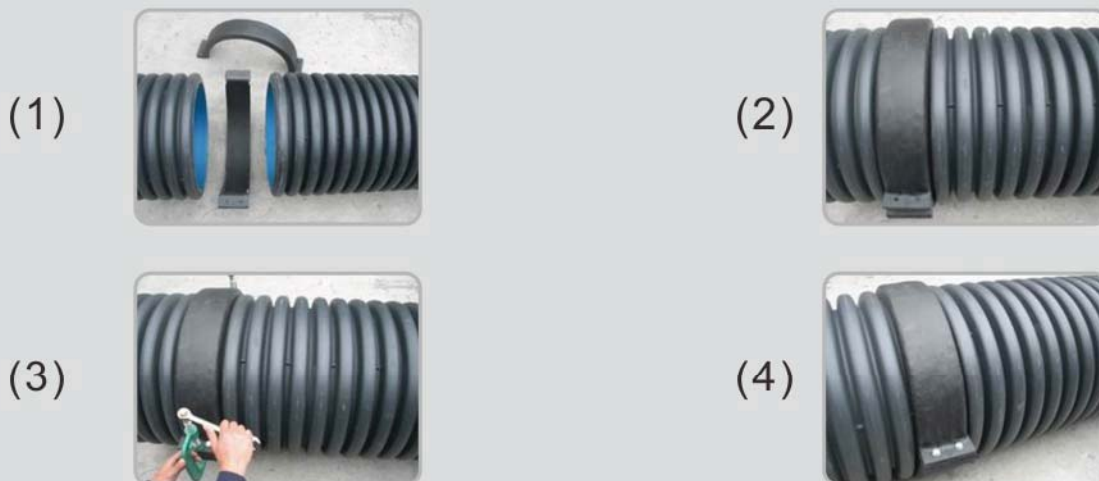


直通 Snap Coupler

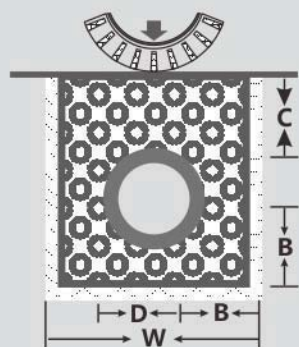


七、Gapex 管道安裝要求 Site Installation of Gapex HDPE corrugated pipes

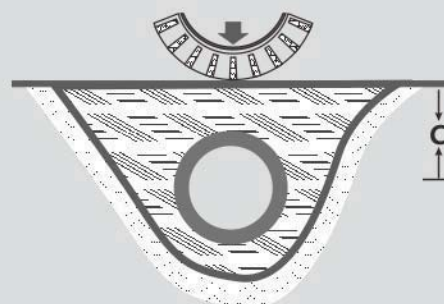
開邊直接頭安裝 Split coupler installation



7.3 (E-Mono)單壁管安裝 Installation of Single wall corrugated pipe (E-Mono)



管溝安裝 Trench Installation



開放式安裝
Open Ditch Installation

常規直徑 A Nominal Pipe Diameter (DN), mm	最少回填土B Minimum B	最小覆蓋 C Minimum C	最小管溝寬度 W Minimum Trench width
100mm	100mm	300mm	300mm
150mm	100mm	300mm	580mm



八、完成個案 Job Reference



Contract No.is13/04 Cheung Chau Old Town Road & Drainage Improvement Stage 2



MTRC XRL 822
Tse UK Tsuen To Shek Yam Tunnels



MTRC XRL 821
Shek Yam To Mei Lai Road Tunnels



Refurbishment Of Soccer Pitch Kowloon Bay Park Kowloon Bay Park Kowloon Bay



Contract no.tcp071
Fanling Soccer Court



Contract no. MTRC XRL 823
Shek Yam To Mei Lai Road Tunnels



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