



Ridgistorm-XL Pipework System

Performance Specification

Example Specification

July 2014

Ridgiform-XL Pipework Specification

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Example Specification

Underground Drainage Specification

SCOPE OF WORKS

To meet the specific performance criteria detailed within this specification and accompanying drawings.

Designs shall be based on sound structural and hydraulic calculations; structural calculations shall be in accordance with:

- BS EN 1295-1: 1997; *Structural design of buried pipelines under various conditions of loading – Part 1: General requirements.*

All calculations shall be submitted to the Engineer prior to any works commencing.

The completed drainage systems shall meet the performance requirements stated in:

- BS EN 752: 2008; *Drain and sewer systems outside buildings*
- The requirements of the adopting organisation (i.e. Local Authority).
- the Civil Engineering Specification for the water Industry (CESWI)
- the Manual Contract Documents for Highway Works (MDHW)
- Sewers for Adoption, 7th Edition.

The Installer will provide for the supply and installation of all pipework, fittings and ancillary equipment and is to include for all necessary, jointing, bedding, manhole construction, temporary and enabling works etc to allow the whole of the works to satisfy the tests and performance requirements detailed in this specification.

The Installer will be required to identify, protect and maintain any existing live drainage works adjacent to the site during the construction of all new works.

Notwithstanding the normal testing and inspection procedures it will be noted that there is a requirement under this specification to CCTV survey, video and report on the completed installation immediately prior to practical completion for this package.

The Installer will verify, prior to the commencement of the works detailed in this package, that the location, size and invert level of all points of connection to existing outfalls are as shown on the drawings.

Reference should be made to the sewer and utility record drawings, for all adjacent existing and new infrastructure systems. Provision shall be made that at the commencement of work on site, a sufficient survey shall be undertaken to locate pipes and all other underground works. Where the results of this survey indicate that the proposed works would be affected, the supervising engineer shall be immediately notified.

Foul Water Drainage

The performance objectives are to collect, convey and discharge all foul effluents from within the confines of the site to the infrastructure system provided adjacent to and around the perimeter of the site, operating under gravity principles; an exception typically being the basement, which shall be provided with pumped systems.

Surface Water Drainage

The performance objectives are to collect, convey and discharge all storm and surface water from within the confines of the site, operating under gravity principles, to either:

- infiltration drainage structure(s), situated as close to the point of collection as practically possible, or
- the infrastructure system provided adjacent to and around the perimeter of the site

Surface water infiltration shall take precedence, unless site investigations determine that ground conditions are such, that infiltration of surface water within the confines of the site is inappropriate. Refer to BS 8582:2013, Clause 7.6 for further guidance.

DRAINAGE SYSTEM

Pipework

Polypipe Civils Ridgistorm-XL system pipes are helically extruded thermoplastic structured walled pipes, with system fittings fabricated from extruded pipes of the same minimum stiffness class.

Manufacturer:	Polypipe Civils	
Range:	Ridgistorm XL	PE structured wall pipe
Size(s):	750 - 3000mm Ø	Manufactured in accordance with BS EN 13476-1 & 3 [BS EN 13476 is classed as a guidance document for pipe Ø > 1200mm]
Certification:	750mm - 900mm Ø	BBA HAPAS certificate No 10/H159
	750mm - 2100mm Ø	WRc Certificate No PT/284/0609 [Stiffness class SN2 – 8 assessed by WRc]
	2400mm - 3000mm Ø	Pending
Colour:	Black with blue interior as standard	
Stiffness Class:	Determined by structural design [Pipe ring stiffness manufactured to suit]	

Ridgistorm-XL pipework and fittings are supplied with integral spigot and sockets, with the following two methods of jointing on site available, as standard:

- a) 750mm – 1800mm Ø EPDM ring seals
- b) 750mm – 3000mm Ø. Electro-fusion

Store elastomeric jointing ring seals in their delivery bags or protective containers. Do not expose to direct sunlight.

Do not remove protective coverings over electro-fusion pipe joints until the joint is about to be formed.

Store lubricant in a cool place out of direct sunlight and away from any heat source.

Stack pipes on a level surface. Provide side supports; do not expose to direct sunlight.

Keep fittings under cover, do not remove from packaging until required.

Inspect all pipes and fittings carefully before installing, ensure products are clean and free from contamination. Reject any which are defective.

Chambers

Fabricated polyethylene inspection and component chambers

Manufacturer:	Polypipe Civils
Material	Fabricated from Ridgistorm XL PE structured walled pipe
Diameter (s):	750 - 3000mm Ø
Depth:	Chamber depth fabricated to suit
Colour:	Black with blue interior as standard
Pipe Connections:	Type, number, level and orientation of pipe connections fabricated to suit
Surface termination:	All elements required to terminate chambers, supplied by others

Chemical Resistance

Polypipe HDPE pipe work is resistant to the types and quantities of chemicals likely to be found in surface water drainage pipes and uncontaminated soils; HDPE pipes are also resistant to most common acids. The type, concentration, temperature and probable duration of exposure of chemical(s) expected to be discharged into the drainage system should be confirmed prior to installation.

For further information refer to Polypipe Civils Technical Department or to BS CP 312, Part 1; *Code of Practice for Plastic Pipework*.

MATERIALS

All materials used in or upon the works will be to the satisfaction of the Resident Engineer (RE). Unless otherwise agreed in writing, where an appropriate Specification issued by the Engineer is current at the date of execution of the works, all goods and materials used will be in accordance with that Specification.

Pipework and fabricated fittings shall be procured from the same manufacturer and shall be jointed in accordance with the manufacturer's recommendations using the recommended adaptors and couplings.

A list of suppliers from which materials are to be purchased and the materials proposed for installation in the execution of the works will be submitted to the RE. The information regarding the names of the suppliers may be submitted at different times as may be convenient but no source of supply will be changed without the authority of the RE.

The Installer is responsible for co-ordinating all works within the Public Highway with the Local Highway Authority, the Police Authority, relevant Statutory Authorities and any other bodies or persons that may be affected by the works in progress.

The Installer is responsible for co-ordinating all access to site by vehicular traffic with the Local Highway Authority the Police Authority and any bodies or person that may be affected by vehicle movements both in and out of the site.

Manhole Concrete Cover Slab

All precast concrete cover slabs shall be supported by the chamber surround, shall not bare directly onto the top of the fabricated Polypipe chamber and shall be manufactured to BS5911-3 and BS EN 1917.

Manhole Covers and Gratings

To be completed by specifier

Concrete

To be completed by specifier

Portland Cement

To be completed by specifier

Aggregate for Concrete

To be completed by specifier

Granolithic Aggregate

To be completed by specifier

Aggregates for Mortar

To be completed by specifier

Water

Only clean water to be used for concrete works.

Ready mixed Concrete

To be completed by specifier

Example Specification

INSTALLATION

Design and install inspection chambers, pipework, fittings and accessories to ensure that:

- a) Storm and foul water discharge is drained quickly, quietly and completely at all times without nuisance or risk to health.
- b) Discharge is conveyed without crossflow, backfall, leakage or blockage.
- c) The system can be adequately tested, cleaned and maintained.

Pipe Routes

To be the shortest practical with as few bends as possible, access via inspection manholes.

Bends and Branches

All Ridgistorm-XL fabricated bends and branches shall be in direction of flow at all connections.

Handling of Pipes and Fittings

The Installer will provide apparatus for the off-loading and handling of all system components in accordance with manufacturer's requirements/recommendations and good practice. Under no circumstances whatsoever will a wire or chain sling be permitted through the pipe barrel. Any pipes suffering damage, resulting from any means, will be immediately rejected from the site. Making good of damaged pipes will not be permitted.

Handling of Chambers

The Installer will provide apparatus for the off-loading and handling of fabricated modular manholes in accordance with manufacturer's requirements / recommendations and good practice. Where practicable, manholes shall incorporate lifting lugs for ease of handling, and any manholes suffering damage resulting from any means, will be immediately rejected from the site. Making good of damaged manholes will not be permitted.

Pipe Laying

Immediately following excavation of the trench, pipes shall be laid and jointed on the pipe bed.

Pipes shall be laid and bedded with their inverts to the lines and levels shown on the drawings and schedules, within the tolerances specified by the design. Any adjustments to level shall be made by raising or lowering the bedding, ensuring pipes are continuously supported along their whole length.

Where electro-fusion jointing is to be utilised, consideration should be given to the position of welding terminals and any access requirements.

Under no circumstances should any pipes be laid without the correct bedding and surround material.

Pipes with flexible joints will be laid only in straight lines. Pipes will be laid in the opposite direction to the flow so that the spigot end of the pipe is drawn into the socket.

Pipes shall be protected at all times from the ingress of debris with pipe ends being sealed during construction. Properly fitted temporary stoppers will be provided and constantly used to close the ends of all incomplete pipelines. The stoppers are only to be removed when pipes are being laid and jointed.

For further information refer to Polypipe Civils Technical Department or BS EN 1610:1998; *Construction and testing of drains and sewers*

Bedding, Laying and Surrounding of Pipes

A firm, stable, uniform trench base shall be formed, free of all debris or large soil particles that might cause damage to or point loading on the pipeline. The invert of the trench base shall be to a level that is able to accommodate the minimum depth of bedding material specified on the construction drawing(s).

Pipe bed and surround material shall consist of natural and/or recycled coarse aggregate complying with BS EN 13242 and the requirements in the table below:

BS EN 13242, Coarse aggregate (Clause 4.3.2)		
Category for general grading requirements	G _c 80-20	
Category for tolerances at mid-size sieves	GT _{NR} (no requirements)	
Category for maximum values of fines content	Gravel – $f_{1.5}$ Crushed rock, recycled aggregate – f_4	
Aggregate size [mm]	Graded	Single sized
	2/14, 4/20 or 4/40	4/10, 6/14, 10/20 or 20/40
Note 1. Coarse aggregate materials shall be in accordance with the relevant provisions of BS EN 13242, as detailed within: <ul style="list-style-type: none"> • SW Drainage MCHW, Vol 1, Clause 503 i) • Sewer WIS 4-08-02 (amendment Nov 2008), Tables A4 & A5 2. Alternative pipe bed & surround material specifications shall not be used without prior written approval from the overseeing engineer.		

The granular bedding shall be placed, uniformly spread and carefully compacted by means of a vibrating plate or other approved apparatus over the full width of the pipe trench. Bedding shall be cut away and removed at each pipe socket so that the socket does not bare on the bed and pipes are supported along the whole length of their barrel.

Placement of sidefill and the main backfill shall only commence once the pipe joints and bedding are in a condition to permit loading. Haunching of the pipes with granular material shall proceed in layers not exceeding 150mm, ensuring proper placement and compaction of material occurs equally along both sides of the pipe. Care shall be exercised to avoid disturbance of the bedding beneath the pipe, with any disturbance being made good.

Placement of side and backfill material shall be carried out on both sides of the pipe, in such a manner, to prevent lateral or vertical displacement of the pipeline.

Where trench supports are used, these shall be progressively removed during placement of the embedment. Where removal of sheeting, prior to completion of backfilling is not practicable, it shall be immediately brought to the attention of the overseeing engineer.

Mechanical compaction plant shall not be allowed to pass above the pipe crown until a minimum 300mm depth of cover has been achieved. The minimum depth of cover above the pipe crown, before mechanical compaction is commenced, is dependant on the type of compaction device.

Inspection

Pipelines laid upon granular bedding will be inspected after the completion of the placing of the granular bedding material to the pipe spring line.

Concrete Protection to Pipes and Chambers

Concrete protection shall have a minimum compressive strength class of C20/25, to the thickness stated on the drawings. After completion of the excavation, unless otherwise considered within the design of the concrete surround, a concrete blinding shall be laid and allowed to achieve sufficient strength to avoid damage before further operations are carried out.

Pipes shall be laid upon shaped precast concrete blocks, the top face of each block covered with two layers of compressible packing. Blocks shall be of sufficient size, number and strength to provide continuous support to the pipe and prevent settlement during installation. The blocks shall be placed upon the base in the specified manner; whereupon concrete shall be initially placed on one side of the pipe only and worked under the pipe, along its full length, until it appears on the other side of the barrel. Thereafter the remainder of the concrete shall be placed evenly on both sides of the pipe, while at the same time being vibrated and worked into position. All necessary

precautions shall be taken to prevent the creation of voids and ensure the line and level of the pipe is maintained during installation activities.

No timbering or steel sheeting will be fixed inside the concrete protection, and all timber sheets likely to interfere with the concrete will be withdrawn before concreting is commenced.

The concrete will be thoroughly compacted as specified, ensuring equipment does not come into direct contact with the pipe. Suitable precautions shall be taken to prevent flotation or other movement of pipes during installation.

The concrete protection shall be interrupted over its full cross section, at intervals coinciding with every pipe joint but not exceeding 6.0m (or as directed by the RE) by a minimum 54mm thick compressible filler of bitumen impregnated compressible board.

Where pipes are suspended below concrete slabs special attention shall be given to the support details provided on the drawings with pipes being either encased in concrete to form a downstand beam arrangement or being supported from the slab using stainless steel hangers and fixings.

EXCAVATION GENERALLY

During the progress of the works the installer shall ensure that all trenches and shafts are properly supported as necessary in order to guarantee the safety of the works, in accordance with The Health and Safety at Work etc Act 1974 and all other relevant legislation or code of practice; reference may be made to BS 6031 (2009) – *Code of practice for earthworks* and BS5975 (2009) – *Code of practice for temporary works procedures etc.* for further guidance.

The Installer will excavate for the works in open cutting in straight lines, and to the levels and gradients as shown on the drawings.

Any soft spots shall be excavated and made good with suitably compacted granular material.

If the base of any excavation is allowed to become soft, or otherwise unsuitable for the construction of the pipeline or structure, it shall be made good in a similar manner as detailed above, or as agreed with the RE.

Excavation to Chambers and Trenches

The excavations are to be trimmed and finished accurately to the required construction depths, the bottom of the sewer trenches being parallel to the invert gradients of the sewer.

All trenches will be of sufficient width at formation level to give the minimum width of bed specified.

Trench supports shall be progressively withdrawn during placement of the embedment material, with particular attention paid to the compaction at the embedment material where previous layers of backfill is disturbed during support removal.

Trenches will be excavated such that the horizontal width measured at the top of the pipe barrel between the undisturbed trench faces does not exceed the tabulated widths as shown on the drawing.

Schedule of Trench Widths

Trench widths shall comply with the table shown on the detail drawings.

Trench walls shall be vertical to at least 300mm above the top of the pipe crown.

Should any of the conditions described below occur, the RE may make such modifications to the type and class of pipe bedding or surround material as he will deem necessary:-

- a) Where the maximum permitted trench width in the Schedule of Trench Widths is exceeded.
- b) Where any collapse of the trench side occurs.
- c) Where the trench sides are not vertical to at least 300mm above the top of the pipe barrel.
- d) Where the trench depth varies from that shown on the drawings.
- e) Where the backfill or the bedding conditions do not comply with those shown on the drawings.
- f) Where any change in loading conditions may occur.

Excavation to extra depths, patches of bad ground

If, due to an error on the Installer's part or his method of working, the excavations are taken out deeper than required, then the excavated material will be removed and the extra depth filled in with a suitably compacted granular material.

If patches of loose, soft or bad ground are encountered at the proper foundation levels, the installer will excavate to a solid foundation and fill up to the proper level with a suitably compacted granular material.

Dealing with Water

The works will at all times be kept drained and clear of water, to a level below the lowest part of the works. No water shall be allowed to run over, rise behind or against any brickwork or concrete until it has achieved a sufficient strength so as not be injuriously affected by it.

The Installer will not be permitted to use the finished sewers as an outlet for the water which may be found in trenches, and he may, therefore, be required to pump to keep the trenches, headings and other excavations dry where he may have to contend with water.

Should the Installer consider it necessary in order to remove water from the works, he may lay temporary drains in such a manner and of such material as necessary. The Installer will ensure that the construction of such temporary drains does not undermine the works and he will properly stop, close and grout all such temporary drains upon the completion of the works to the satisfaction of the RE.

The positions and sizes of all sumps will be to the satisfaction of the RE.

The disposal of water from the excavations for drainage can only be discharged to water course with the approval of the Environment Agency and with the required interception to ensure river/brook water quality is maintained.

Works to be made watertight

Unless otherwise specified, the Installer will construct the works so that they will be watertight and should any leakages appear, make them good to the satisfaction of the RE..

Back Filling

General

Backfilling in accordance with the Building Regulations, BS EN 752, Sewers for Adoption and CESWI will only be carried out after the works have been inspected and approved.

Mechanical compaction will not be employed until 600mm of cover has been placed to protect the pipes from the effects of this equipment. Heavy mechanical plant will not be allowed to run over the pipeline until all the backfill has been consolidated.

Where the pipe run detailed on the engineers drawings, is shallower than the manufactures recommended minimum for the expected load conditions, concrete protection will be required as detailed on the Engineers drawings. Consideration should also be given to any further requirements of the approving and/or adopting organisation

Trench sheeting and other excavation supports shall be carefully removed as the filling proceeds except as otherwise specified. The removal of such supports shall not relieve the Installer of responsibility for the stability of the work.

Cleaning of works

Prior to CCTV survey, all pipelines and associated structures (i.e. benching, traps etc) shall be flushed with water and left free from obstructions, with all extraneous materials removed. Where water jetting is used it shall be by low pressure high volume in accordance with the WRc Sewer Jetting Code of Practice, 2nd Edition.

All interceptors, flow control and pump chambers shall be pumped out and extraneous materials removed.

All arisings from the cleaning and pump outs must be removed from site by bowser and not discharged to public sewer or water courses.

Record drawings

The Installer will supply record drawings in accordance with the preliminaries of this contract.

CCTV Inspection of Pipelines

Carry out and record internal inspection of foul and surface water systems, interceptors and pump chambers with CCTV equipment. Provide all necessary equipment, including suitable covered accommodation for viewing monitor screen, together with personnel experienced in the operation of equipment and interpretation of the results. Ensure that adequate intensity illumination within pipe(s) is maintained. Provide for continual positioning recording, still photographs and stopping movement of the camera at any point requested by the Engineer. Provide 2 No. colour copies of videotape recording and full report to the RE within one week of survey. Obtain instruction from the CA on remedying any defects which may be revealed.

Health and Safety

The Installer will comply fully with all Health and Safety requirements as detailed in the preliminaries.

Existing Services

The install shall not solely rely on any record of installed services made available and will obtain up to date record drawings from the Utilities Companies. All routes of services shall be traced and surfaces marked prior to the commencement of works.

Operating and Maintenance manuals

The Installer will supply Operating and Maintenance Manuals in accordance with the preliminaries of this contract.

TESTING

Testing generally

The installer shall:

- (a) Inform the Main Contractor sufficiently in advance to give him a reasonable opportunity to observe tests.
- (b) Check that all sections of installation are securely fixed and free from obstruction and debris.

Keep a record of all tests and provide a copy of each to the Engineer and RE.

The Installer is to allow for intermediate testing where work is to be concealed by other installations, final finishes and to suit phased handover of areas.

Tests shall be carried out on the drainage installation as specified, and shall be carried out under the inspection of and to the approval of the RE.

Observation of Tests

The Contractor shall inform the RE and visiting Engineers at the earliest opportunity to give reasonable notice to observe the carrying out of tests.

The Installer will be responsible for arranging all necessary tests, surveys and inspections to ensure that materials and components in this specification are properly installed in accordance with the Contract Programme and that they will fulfil the function and performance requirements specified.

Generally, the drainage works will be inspected and tested in three stages:

- 1) Preliminary - As the works proceed.
- 2) Final - Immediately prior to handover or practical completion
- 3) Pre-handover - CCTV survey, invert level check and record drawing check.

Records

A pro-forma test sheet will be issued to the Installer as part of the overall project commissioning program and the sheets will be completed, witnessed by the RE and or, visiting engineers and handed to the RE on satisfactory completion of the test required.

Responsibility

All new lengths of drain, manholes, and inspection chambers to be capable of passing the tests specified both before and after surface treatment and reinstatement is complete. Locate and remedy all defects and re-test to the satisfaction of the RE.

Preliminary Tests

Obstruction and water or air tests to be carried out as soon as practicable after laying and jointing but before backfilling or laying concrete surround or concrete slab.

Final Tests

Obstruction and water or air tests to be carried out immediately prior to handover or practical completion when all permanent manhole covers, gratings etc have been installed and temporary and airtight caps have been fitted to all discharge pipes and rainwater pipes.

Air Test (Non-Pressure Pipeline)

Temporarily seal the ends of drain and all connections to the pipe section being tested.

Connect glass 'U' tube gauge to drain plug in length of drain under test.

Pump air into test section by suitable means to 100mm water gauge for pipelines or where trapped gullies and/or ground floor appliances are connected, 50mm water gauge.

Allow five minutes for stabilization of air temperature.

Adjust air pressure to 100mm or 50mm water gauge as necessary.

In a period of five minutes, without further pumping, the head of water should not fall by more than 25mm for a 100mm water gauge test pressure and 13mm for a 50mm water gauge test pressure.

Pre-Handover

Following the satisfactory completion of all final tests the completed system including the drainage elements installed will be pressure jet cleaned and all debris removed by tanker and not drained to either public sewers or water courses. Carry out a CCTV survey as detailed within this specification and a full level check. When carrying out the aforementioned exercise compare findings with the record drawings required to ensure the latter are accurate.

Remedial Works

Remedial works found necessary as a result of test failures will be carried out by the Installer in agreement with the EA.

Test Certificate

A test certificate shall be submitted following successful testing of the pipework (please see example overleaf).

Test Certificate

Project Name:

Name of Contractor/Sub-Contractor:

Section under Test:

Nature of Test:

Air/Water

Pressure

Duration

Materials and installation in accordance with the specification: Yes/No

Signatures for contractor/ Sub-contractor:

Witness:

Date of Test:

Example Specification

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