APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

TRENCHING

Trenches should be excavated in accordance with the plans and specifications and should allow adequate space for compaction of the embedment material in the side support zone.

Trenches should be straight and as narrow as practicable at the top of the pipe. The minimum trench width should be as shown in Table 1.0.

TABLE 1.0 MINIMUM EMBEDMENT ZONE DIMENSIONS - AS/NZS 2566

DN	H	B*	k
100	75	350	100
150	75	400	100
200	100	550	150
225	100	550	150
250	100	600	150
300	100	650	150

*** Note: The tabulated values may provide insufficient clearances for installation purposes in certain circumstances.**

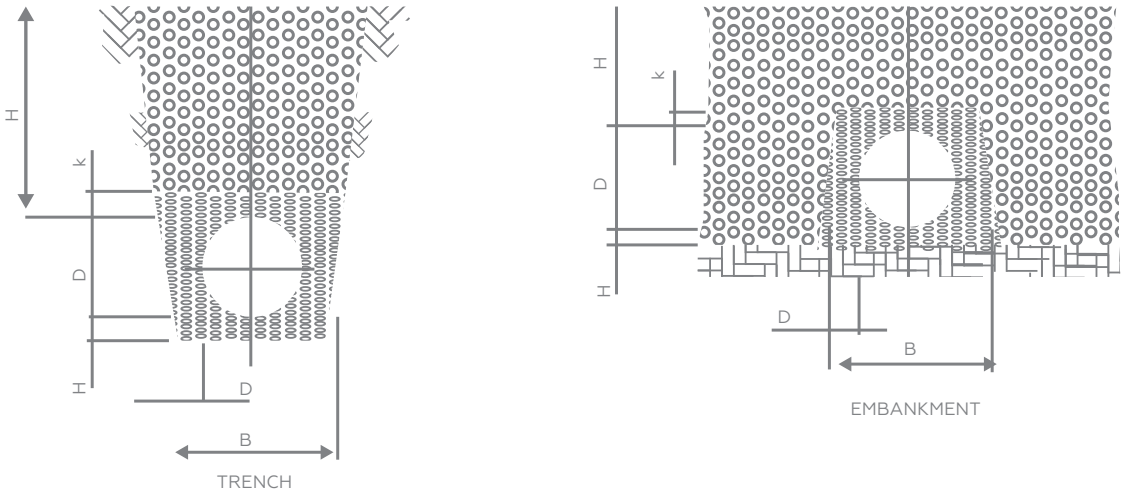

Figure 1.0 Embedment, clearance and cover dimensions

The information contained in this document should serve as a guide only and is subject to change without notice. For more information please contact Iplex Pipelines Australia Pty Ltd.

APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

EMBEDMENT AND BACKFILLING

The quality of the embedment material and its compaction, combined with the type and density of the native soil are all relevant to the ultimate performance of Apollo® pipes once installed.

The trench bottom should be as smooth as possible and to grade. Embedment material, used in the bedding, side support and overlay are generally non-cohesive granular materials. Pipes should not be buried in contact with soil particle sizes larger than 5% of its diameter, with 20mm maximum.

Soil clods must be excluded from the pipe embedment zone and under no circumstances should temporary supports such as bricks or timber be left under or in contact with pipes. If the excavated material is not granular or friable, or does not comply with the project specification, then suitable embedment must be imported.

Jointing or "clearance holes" should be excavated in the bedding for pipe sockets to ensure the pipes are evenly supported along their full length. It is important that only non-cohesive or granular embedment be used. Careful attention to the placement of embedment material to the specified relative compaction with an absence of voids is important.

Mechanical joints, especially flanged joints, should be left exposed if possible until the line is tested. Pipes should not be left uncovered. The possibility of pipe flotation in the event of rain and water in trench will occur unless it is backfilled to a height of at least one and a half diameters above the pipe.

The method of placing the remainder of the trench backfill will depend on whether the pipeline is located in an area with no traffic loading or under a roadway. In a roadway it is normal practice to continue backfilling and compacting with good quality embedment material up to pavement level. Heavy compaction of backfill should not commence without at least 300mm of material covering the pipeline.

APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

JOINING INSTRUCTIONS

Apollo® pipes are supplied with the BLUEseal rubber ring spigot and socket joint. The gasket is factory fitted and subsequently MUST NOT BE REMOVED. If the ring is tampered with or damaged in any way after leaving the factory then the seal can be removed. Contact Iplex Pipelines for specific instructions.

Joining to compatible ductile iron socketed fittings with rubber rings requires a similar procedure but with appropriate changes to the position of the witness mark and chamfer length.

The recommended jointing procedure is as follows:

01 CUTTING PIPES

If required, pipes can be cut to length on site using either a hand saw or powered cutting disc. Ensure that the cut end is then chamfered with an appropriate field-lathing tool. Removal of 25% of the wall thickness at an angle of 10 to 15 degrees will give satisfactory results. The size of the chamfer may be less where joining to ductile iron fittings.

A new witness mark should be made on the pipe spigot to match the socket depth. Note: this may be shorter for a DI socket.

02 CLEAN THE SPIGOT AND SOCKET PRIOR TO JOINTING

Remove all dust and dirt from the pipe spigot and socket paying particular attention to the insitu BLUEseal gasket and the surrounding housing. If the gasket is damaged or missing, a new one should be installed.

03 INSTALLATION OF REPLACEMENT GASKET

Although this is rarely needed, if a replacement BLUEseal gasket has to be inserted, it should be forced into a "heart shape". This will be assisted by choosing the point of maximum flexure of the retaining ring so as to coincide with a group of closely spaced "drill holes" in the ring perimeter. The gasket should then be placed in the socket ring groove with the blue retaining ring to the outside.

04 APPLY LUBRICANT

Apply lubricant to the spigot, fully covering the circumference up to the witness mark. Ensure the lubricant is also applied to the pipe chamfer.

05 ASSEMBLY

Insert the leading edge of the spigot into the socket mouth. It is essential that the pipes are aligned in a straight line before attempting to make the joint.

06 PUSH SPIGOT INTO SOCKET

A small, longitudinal force applied to the socket end of the pipe is sufficient to insert the spigot into the adjacent pipe socket. For larger diameter pipes requiring a crowbar for jointing, protect the pipe socket with a wooden block.

Care must be taken to ensure that the pipe is not under-inserted as this may result in a leaking joint as the pipe contracts as a result of Poisson's and/or thermal effects. Under-insertion is signified by the witness mark not being pushed up to the end of the socket. Note: When pressurised, Poisson contraction will cause a shortening of the pipes and this might re-expose the witness mark. This is acceptable.

If simple insertion past the witness mark has occurred there is no significant risk to the performance of the joint. Only if the spigot has been forced so hard that it has stressed the transition region at the back of the socket to the barrel of the pipe is there a cause for concern. This is generally only a risk with uncontrolled insertion using mechanical equipment like the bucket of a back hoe.

APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

DUCTILE IRON SOCKET JOINTS

Apollo® pipes can be used with ductile iron socketed fittings complying with AS/NZS 2280.

Note: The witness marks and chamfers to suit these particular sockets should be used.

MECHANICAL JOINTING SYSTEMS

Where cut-ins or repairs are needed in an existing Apollo® pressure main, Iplex recommends fittings complying with WSA 105 and AS/NZS 4998 'Unrestrained mechanical couplings', should be used. E.g. the AVK coupling.

JOINTING FLUIDS (LUBRICANTS)

It is essential to use Iplex Standard or Iplex Plus bactericidal jointing fluid with Apollo® pipes and ductile iron rubber ring sockets. Other lubricants especially MINERAL BASED GREASES MUST NOT BE USED.

Iplex Plus bactericidal jointing fluid is recommended for potable water supplies as it contains a bactericide designed to limit the growth of bacteria by disinfection at its source. During installation bacteria can enter the system and form a colony in the joint area, which is highly resistant, (even to high levels of chlorine) and can cause continuing infection of the line. Being water-soluble, the fluid is quickly removed from potable water systems when flushing commences.

Iplex Plus is safe and has no detrimental effect on the rubbers used in gasket materials and because of its properties, can also lower jointing forces. Keep the container closed when not in use to avoid spillage or contamination by dust or dirt.

As a safety precaution, avoid contact with eyes. If contact does occur, flush with copious amounts water. If ingested drink copious amounts water.

EXPANSION AND CONTRACTION

Distortion can occur when laying pipes in direct sunlight. When one side of the pipe is hotter than the other it may develop a slightly bent shape, which may make jointing difficult. Common practice is to rotate pipes or place pipes in the shade to offset any uneven temperatures within the pipe.

Plastic pipe will contract as it cools, after laying in hot weather. A 6-metre length of Apollo® pipe will expand or contract approximately 5mm for each 10°C rise or fall in temperature.

The following precautions should be taken to ensure that the joints do not pull apart:

1. Laying is best done in the cooler parts of the day.
2. Rubber ring systems will allow for thermal movement of the pipeline after having been layed. In both cases, backfill each length, at least partially, as laying proceeds.

APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

INSTALLING ON A CURVED ALIGNMENT

The tolerances on the Apollo® spigot and socket rubber ring will generally allow up to a 1° deflection, which corresponds to a 105mm offset per 6m pipe length.

In addition Apollo® pipes are flexible enough to be curved to the required effective centre line radii. The minimum radius of curvature is 300 x DN as shown in Table 1.1.

Pipes should be curved evenly along their length controlling the pipe displacement with sand bags or embedment material to prevent excessive point loadings. Pipes should always be joined in a straight line before changing to the construction alignment required.

Some authorities may not allow tightly curved Apollo® pipes to be drilled or tapped. However where the typical displacement of a water main is within the minimum radius of curvature shown in the table below, tapping bands are normally accepted. Alternatively tapped DI couplings may be used.

TABLE 1.1 APOLLO® - ALIGNMENT CRITERIA

NOMINAL DIAMETER DN	MIN ALLOWABLE RADIUS OF CURVATURE (M)	MAXIMUM OFFSET PER 6 METRE LENGTH (MM)
100	30	600
150	45	400
200	60	300
225	67	260
250	75	240
300	90	200

CONCRETE ENCASEMENT

Where concrete encasement is required, PVC-O pipes shall be set to line and level on either bags of natural fibre filled with sand and cement mix or on concrete blocks or saddles cast to the outside diameter of the barrel and located near the socket. Precautions shall be taken to prevent movement, flotation or deformation of the pipe while pouring concrete.

Where damage to pressure pipe surfaces could occur as a result of differential movement of the encased pipe, the pipe and fittings shall be protected by wrapping the pipe in a compressible membrane made of polyethylene, PVC, Petrolatum tape or felt.

For further information refer to AS/NZS 2032 'Installation of PVC pipe systems' and AS/NZS 2566.2 'Buried flexible pipelines Part 2: Installation'.

APOLLO® PVC-O PIPELINE DESIGN

INSTALLATION

TAPPED SERVICE CONNECTIONS

Apollo® pipes can be tapped using approved tapping bands and hole cutters. Fine toothed 'shell cutters' or hole saws are recommended to avoid any risk of spalling of the internal pipe surface. Spade bit cutters should not be used.

Several proprietary bands including Crevet® Taptite DI and Milnes gunmetal bands have been tested when installed on Apollo® pipes in accordance with AS/NZS 4793 'Mechanical Tapping Bands for Waterworks Purposes'. These tests include short and long term hydrostatic testing, vacuum testing, bending, rotation and sliding.

Iplex can advise on tapping bands, which comply with AS/NZS 4793 when used on Apollo®.

UNDER PRESSURE CONNECTIONS

There has been development work on large diameter cut-ins with Apollo® pipes. Initial tests using the Crevet® stainless steel ON 150 x 150-flanged branch tapping band have met the testing requirements of WSA 03 Supplement for 'Under-pressure cut-ins'.

REPAIRS AND CUT-INS

Where a section of pipe has been removed to cut-in another fitting or replace a damaged pipe, the normal range of mechanical joints can be used on Apollo® pipes. E.g. AVK couplings.

Where wrapper or banded types of jointing collars are used, care should be taken to avoid excessive bolt torques as these may result in distortion of the pipe wall.

ABOVE GROUND INSTALLATION

Apollo® pressure pipes can be used above ground provided that long-term exposure to ultra violet radiation is provided. In direct sunlight acrylic paint may be a suitable barrier.

Apollo® pipes should be supported as specified in AS/NZS 2032. Full circle supports should surround the pipes and 'padded' with compressible material such as 3mm thick insertion rubber. This protects the exterior surface of the pipe from abrasion. Special structural supports will be necessary for fittings to resist hydrostatic thrust.

Table 1.2 indicates the maximum support spacing for pipes filled with water where aesthetic considerations require long-term deflections to be limited by the span distance divided by 500.

TABLE 1.2 SPAN BETWEEN SUPPORTS (FOR LONG TERM DEFLECTIONS LESS THAN U500)

PIPE DESIGNATION	SPAN (METRE)
DN 100 & DN 150	2
DN 200 to DN 375	3

The information contained in this document should serve as a guide only and is subject to change without notice. For more information please contact Iplex Pipelines Australia Pty Ltd.