

1. Polybutylene (PB) Grey - Clamped Joint

2. Polyethylene (PE) Black - Clamped Joint

All fittings and pipes shall be from the same manufacturer. The metal reinforced fitting shall be firmly joint via a forged clamp tool design to mechanically seal the joints all in accordance with the manufacturer's recommendation and specification.

3. Cold & Hot Water Pipes and Fittings

Item	Pipe Size (mm)	Materials	Standard	Remarks
<u>Above Ground</u>				
1. Cold Water	Above 32mm (1in) dia			
	32mm(1in)dia and below	Polyethylene (BUTE-PE)	MS1058	Pipes
2. Hot Water		Co-polymer (Duracon M25)	ISO14236	Fittings Materials
	Above 28mm (1in) dia			
	28mm(1in) dia and below	Polybutylene (BUTE-PB)	ASNZS 2642 part 1 & 2	Pipes
		Polysulphone (PLS)	ASNZS 2642 part3	Fittings Materials

Item	Description
A	<p data-bbox="363 286 549 322"><u>PLUMBER</u></p> <p data-bbox="363 376 513 412"><u>Materials</u></p> <p data-bbox="363 465 1225 591">All materials for use shall be new, free from any form of defects and of the best type with regards design, quality, manufacture and performance.</p> <p data-bbox="363 636 1254 672"><u>Polybutylene (PB) and Polyethylene (PE) Pipes & Fittings</u></p>
B	<p data-bbox="363 725 1222 851">Material of pipes & fittings for potable hot water supply shall be Polybutylene (PB) manufactured in compliance with ASNZS 2642 Parts 1,2 and 3.</p> <p data-bbox="363 860 1289 1021">Material of pipes for potable cold water supply shall be Polyethylene (PE) manufactured in compliance with MS1058. PE pipe fittings shall be in compliance with ISO14236.</p> <p data-bbox="363 1030 1289 1111">Material for fittings shall be of Copolymer type of engineering resin.</p> <p data-bbox="363 1164 555 1200"><u>Pipe fittings</u></p> <p data-bbox="363 1245 1289 1594">All fittings shall be of those approved by the manufacturer. Properties of material shall be in accordance with the specifications in the above prescribed standards. Polybutylene (PB) & Polyethylene (PE) pipes and copolymer metal reinforced fittings shall be firmly joined via a forged clamp tool designed to mechanically seal the joints in accordance with manufacturer's recommendation and practice for installation and commissioning.</p>
C	<p data-bbox="363 1644 679 1680"><u>Storage of Materials</u></p> <p data-bbox="363 1733 1276 1895">All materials shall be stored in a proper dry shed with adequate ventilation and be adequately protected from inclement weather, rising water, contamination with salts or impurities, growth of fungus, etc.</p>

Item	Description
D	<p data-bbox="363 286 644 324"><u>Materials (cont'd)</u></p> <p data-bbox="363 421 863 459"><u>Hot and Cold Water Application</u></p> <p data-bbox="363 510 740 548"><u>Application - cold water</u></p> <p data-bbox="363 595 1278 633">For cold water application the following ratings shall apply:</p> <p data-bbox="363 680 639 719">Working Pressure</p> <p data-bbox="395 725 1238 763">: 20mm pipes (PN 16) - 1600 kpa (230psi) @ 20°C</p> <p data-bbox="395 770 1238 808">: 25mm pipes (PN12.5) - 1250 kpa (180psi) @ 20°C</p> <p data-bbox="395 815 1238 853">: 32mm pipes (PN12.5) - 1250 kpa (180psi) @ 20°C</p> <p data-bbox="363 909 1238 947">Hydrostatic Design Stress 5.5 mpa (800 psi) @ 20°C</p> <p data-bbox="363 1043 724 1081"><u>Application - hot water</u></p> <p data-bbox="363 1128 1262 1167">For hot water application the following ratings shall apply:</p> <p data-bbox="363 1223 1246 1261">Working Pressure 740 kpa (107psi) @ 80°C</p> <p data-bbox="363 1267 1254 1305">Hydrostatic Design Stress 3.5 mpa (507 psi) @ 80°C</p>

Item	Description
	<p data-bbox="363 244 584 282"><u>Workmanship</u></p> <p data-bbox="363 331 488 369"><u>General</u></p> <p data-bbox="233 421 1289 629">A The plumbing work shall be carried out by experienced and authorized license plumber registered with Surahanjaya Perkhidmatan Air Negara. The name and registration of the plumber must be submitted to the Architect for approval before commencement of the plumbing works.</p> <p data-bbox="233 680 1289 804">B Notwithstanding the details and layout shown in the drawings, the Contractor shall be responsible to ensure the workability of the whole of the plumbing works.</p> <p data-bbox="233 855 1289 1113">C The Contractor shall be responsible for arranging with the Local Authority for the inspection of all underground pipeworks and to obtain approval form the Local Authority prior to the covering up of the underground pipeworks. <u>NO</u> underground pipeworks shall be covered up unless inspected and approved by the Local authority.</p> <p data-bbox="363 1164 655 1202"><u>Cutting to Lengths</u></p> <p data-bbox="233 1254 1289 1417">D Pipes shall be cut squarely and cleanly to lengths as required. All pipe ends shall be cut clean with a approved PE or PB pipe cutter and all scrapings, oil, grease cleaned out from the bore with solvents if necessary.</p>

Item	Description
	<u>Workmanship (cont'd)</u>
	<u>Core-Holes, Ducts, Chases and Recesses for Pipes and Fittings</u>
E	<p>Before commencement of the works under this work sections and notwithstanding the schematic layout shown in the Drawings, the Contractor shall provide details of the plumbing layout to the Architect for his approval. The details of the plumbing layout shall also show the location of all core-holes, ducts, chases and recesses and also pipes and fittings which the Contractor intends to cast in concrete members. Where the Architect does not permit the location of the core-holes, ducts and recesses and casting of pipes and fittings at specific places, the Contractor shall seek an alternative layout and position which meet the approval of the Architect at the Contractor's own cost.</p>
F	<p>The Contractor shall not cut or hack any core-holes, ducts, chases and recesses through any structural member without obtaining the prior written permission of the Architect.</p>
G	<p>All core-holes, ducts, chases and recesses and the adjoining works shall be filled up and made good to the satisfaction of the Architect especially with regards finishes against water penetration and/or leakage and sound transmission.</p>
	<u>Fixing of Pipes</u>
H	<p>Polybutylene (PB) and polyethylene (PE) pipes should be installed ensuring any bending radius is at least 10 and 12.5 times respectively the outside diameter of the pipe. Sharp bends should be made with appropriate fittings.</p>
I	<p>PB installations should have a minimum of 1 meter of copper tube from the hot water cylinder. When using a tempering valve use Buteline PB pipe direct from mixing outlet.</p>

Item	Description
	<p data-bbox="363 286 735 327"><u>Fixing of Pipes (cont'd)</u></p> <p data-bbox="233 376 1289 501">J PB or PE pipe should not be installed closer than 150mm to gas or central heating vents, nor located in any confined space containing appliance vents.</p> <p data-bbox="233 551 1289 631">K “Pipe Sleeves” and bored holes should be large enough to allow free movement of PB or PE pipe.</p> <p data-bbox="233 680 1289 806">L PB or PE pipe must be supported at least every 500mm by approved clips which allow free movement. Pipes unsupported by clips are unsightly and can be damaged.</p> <p data-bbox="233 855 1214 891">M PB pipe should not be fixed rigidly between two points.</p> <p data-bbox="233 940 1289 1066">N PB & PE pipe which penetrates fire resistant construction must be installed to ensure the fire resistant integrity of the building is retained.</p> <p data-bbox="233 1115 1289 1240">O Notwithstanding the above, no pipe shall be left unsupported. At least one support shall be provided for any length of pipe.</p> <p data-bbox="233 1290 1289 1415">P All pipes, other than those chased or cast in walls, floors, etc., shall be fixed projecting off the walls, floors, etc., by at least 1 1/4” with distance pieces.</p>

Item	Description
	<p data-bbox="363 286 715 327"><u>Workmanship (cont'd)</u></p> <p data-bbox="363 376 890 416"><u>Installation of Pipes And Fittings</u></p> <p data-bbox="236 465 1289 672">A All plumbing work shall generally be located and installed so that the plumbing is accessible for inspection, replacement and/or repair. All stop valves, taps, etc., shall be placed in positions which allow for convenient operation and maintenance.</p> <p data-bbox="236 721 1289 806">B Horizontal pipework shall be arranged to have maximum gradient to allow proper flow for the contents it carries.</p> <p data-bbox="236 855 1289 1061">C Pipework in branch connection shall always be arranged to allow free drainage of the system. Connection to main or branch pipes shall be so arranged as to prevent cross flow from one appliance to another. Connections shall be made with an easy sweep in the direction of flow.</p> <p data-bbox="236 1111 1289 1545">D Ventilating pipes shall be installed so that water cannot be retained in them. Trap ventilating pipe shall be connected to the top of the branch soil pipe or branch waste pipe between 3" and 18" from the crown of the trap and risers vertically or at an angle not more than 45 degree from the rim of the fixture it is venting before off setting horizontally or before connecting to the branch ventilating pipe. The branch ventilating pipe shall be fixed at least 6" above the floor level rim of the highest fixture served and shall be sloped to allow for free drainage.</p>

Item	Description
	<p data-bbox="363 244 715 282"><u>Workmanship (cont'd)</u></p> <p data-bbox="363 331 922 369"><u>Inspection Access for Soil Plumbing</u></p> <p data-bbox="231 421 1289 539">E Inspection access shall be provided at location shown in the Drawings to enable the cleaning and inspection of plumbing work.</p> <p data-bbox="231 591 1289 757">F Generally the inspection access shall be provided on the vertical stack directly opposite a branch line, at the extreme end of a main branch line, at the junction of a subsidiary branch and at bends.</p> <p data-bbox="231 808 1289 891">G Oval access openings shall have an area of not less than the cross-sectional area of the pipe to which they are fitted.</p> <p data-bbox="231 943 1289 1155">H The internal face of the inspection core shall be shaped to form a true completion of the bore of the pipe. The inspection opening shall be made gas-tight and watertight and the inspection covers firmly secured with gun-metal or other approved screws or studs.</p> <p data-bbox="363 1207 547 1245"><u>Pipe Works</u></p> <p data-bbox="363 1296 1289 1462">Unless stated or shown otherwise, water supply pipeworks in distribution pipes above ground shall be executed in approved classifications of ASNZS2642 Parts 1,2 and 3, Polybutylene (PB) pipes and fittings</p> <p data-bbox="363 1514 1289 1680">All PB hot water distribution shall be pipes and fittings complying to ASNZS2642 Parts 1,2 and 3. All PE cold water distribution shall be pipes and fittings complying to MS1058 and ISO14236 respectively.</p> <p data-bbox="363 1731 1289 1897">The socket and spigot joints of Polybutylene (PB) and polyethylene (PE) pipes shall be firmly joined via a forged clamp tool which allows pipe material to “flow” into insert tail grooves.</p>

Item	Description
	<p data-bbox="363 286 715 324"><u>Workmanship (cont'd)</u></p> <p data-bbox="363 376 1054 414"><u>Inspection Access for Soil Plumbing (cont'd)</u></p> <p data-bbox="363 465 1289 589">Pipe ends are inserted fully into fittings where built-in pipe end stop shoulder ensures pipe is correctly fitted prior to forge clamping.</p> <p data-bbox="363 640 1289 853">During clamping process, a 2mm wide spacing/flare is maintained at end of metal reinforcing sleeve. This process ensures no stress from clamping is transmitted to insert tail or pipe at end of fitting which is crucial to ensure metal sleeve cannot impinge into pipe even in bending.</p> <p data-bbox="363 904 1289 1028"><u>Joining of Stainless Steel pipes, copper pipes and other approved pipe materials to Buteline Polybutylene (PB) and Polyethylene (PE) fittings.</u></p> <p data-bbox="363 1079 1289 1245">The joints of the approved pipe material shall be made with flanges complying with BSPT standards. Flanged joints can be made without joining material as in-built washer ensures water tightness when carefully tightened.</p> <p data-bbox="363 1341 1155 1379"><u>Lump sum tender and schedule of rates for Plumber</u></p> <p data-bbox="363 1431 1203 1469">The rates for plumber shall also be held to include for:-</p> <ul style="list-style-type: none"> <li data-bbox="363 1469 1134 1507">(i) all short lengths, sockets, connectors, backnuts: <li data-bbox="363 1507 1289 1597">(ii)holderbats, supports, hangers and the like and distance pieces, and; <li data-bbox="363 1597 1289 1720">(iii)cutting and pinning end of holderbats, supports, hangers and the like to brick or blockwork or casting in concrete work.

Buteline Polybutylene (PB) & Polyethylene (PE) Pipe Specifications for Potable Hot & Cold Water Supply.

Material of pipes for potable hot water supply shall be Polybutylene (PB) manufactured in compliance with ASNZS2642 Parts 1 and 2.

Material of pipes for cold water supply shall be Polyethylene (PE) manufactured in compliance with MS1058.

Material for fittings shall be of Copolymer type of engineering resin.

Pipe fittings.

All fittings shall be of those approved by the manufacturer. Properties of material shall be in accordance with the specifications in the above prescribed standards. Polybutylene (PB) and polyethylene (PE) fittings shall be firmly joined via a 8mm forged clamp tool designed to mechanically seal the joints in accordance with manufacturer's recommendation and practice for installation & commissioning.

Application - cold water.

For cold water application the following ratings shall apply:

Working Pressure - 20mm (PN16)	1,600 kpa (235psi) @ 20°C
- 25mm (PN12.5)	1,250 kpa (180psi) @ 20°C
- 32mm (PN12.5)	1,250 kpa (180psi) @ 20°C
Hydrostatic Design Stress	5.5mpa (800 psi) @ 20°C

Application - hot water.

For hot water application the following ratings shall apply:

Working Pressure	740 kpa (107psi) @ 80°C
Hydrostatic Design Stress	3.5mpa (507 psi) @ 80°C

Classification/Headings

1. Pipe Works

Unless stated or shown otherwise, water supply pipeworks in distribution pipes above ground shall be executed in approved classifications of ASNZS2642 Parts 1,2 and 3 Polybutylene pipes and fittings and MS1058 for polyethylene (PE) pipes and AS1460.1 for PE pipe fittings.

Alternatively,

2. Polybutylene (PB) Pipes and polyethylene (PE) & Fittings

All polybutylene (PB) hot water distribution shall be Class 16 pipes complying to ASNZS2642 Parts 1 & 2 and fittings shall comply to ASNZS2642 part 3.

All polyethylene (PE) cold water distribution shall be at minimum PN12.5 pipes complying MS1058 and fittings shall comply to MS1058.

3. Workmanship

The socket and spigot joints of Polybutylene (PB) and polyethylene (PE) pipes shall be firmly joined via a 8mm forged clamp tool which allows pipe material to “flow” into insert tail grooves.

Pipe ends are inserted fully into fittings where built-in pipe end stop shoulder ensures pipe is correctly fitted prior to forge clamping.

During clamping process, a 2mm wide spacing/flare is maintained at end of metal reinforcing sleeve. This process ensures no stress from clamping is transmitted to insert tail or pipe at end of fitting which is crucial to ensure metal sleeve cannot impinge into pipe even in bending.

Joining of Stainless Steel pipes, copper pipes and other approved pipe materials to Buteline polybutylene (PB) and polyethylene (PE) fittings.

The joints of the approved pipe material shall be made with flanges complying with BSPT standards.

Flanged joints can be made without joining material as in-built washer ensures water tightness when carefully tightened.