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**TECHNICAL SPECIFICATION FOR  
INSTALLATION OF  
HYDRAULIC SERVICES  
LINUWEL STEINER SCHOOL  
PROPOSED SCIENCE  
BUILDING**

**Revision**

01

**Issue**

For Construction

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**HYDRAULIC SERVICES - GENERAL REQUIREMENTS****1 PRELIMINARIES****1.1 EXTENT OF WORK**

The work under this section covers the complete supply, installation, testing and commissioning of the work specified herein after. Any material, apparatus, etc. not shown on the drawings but which is mentioned in the specification or vice versa, shall be supplied and installed at no extra cost. Any services, item, work or small detail not usually specified but inferred and necessary for the satisfactory operation of the system or installation, shall be provided by the Main Contractor.

- Preliminaries  
Refer to all requirements within the Preliminaries section of the contract.
- Materials  
Include for the supply and installation of all materials and ancillary items to all be in accordance with the relevant Australian Standards. Supply and install all material necessary to ensure that all hydraulic services systems are fully operational and in full compliance with all codes, standards and authorities requirements prior to practical completion.
- Potable Cold Water  
The Potable Water system is to connect to all potable water fixtures and shall include connection to the potable hot water generator unit. Includes the supply and installation of all backflow prevention valves. All in accordance with AS3500.1.
- Potable Hot Water  
The potable hot water system is to include for the supply and installation of all hot water generators, hot water pipelines and insulation of the pipelines as scheduled. Connect to all hot water fixtures and the thermostatic mixing valve as appropriate. All in accordance with AS3500.4.
- Potable Warm Water  
Includes the supply and installation of the thermostatic mixing valve, valve box, pipelines and insulation as scheduled. All in accordance with AS3500.4.
- Non-Potable Cold Water  
The Non-Potable Water system is to connect all non-potable water fixtures. Includes the supply and installation of all backflow prevention valves. All in accordance with AS3500.1.
- Non-Potable Warm Water  
The non-potable warm water system is to include for the supply and installation of all warm water pipelines and insulation of the pipelines as scheduled. Connect to all non-potable warm fixtures as appropriate. All in accordance with AS3500.4.
- Sanitary Drainage  
Sanitary Drainage works include the supply and installation of all in-ground sanitary pipelines. The works include coordination with the civil drawings to ensure all works are undertaken in accordance with the sites ground conditions and additional requirements noted in the hydraulic documentation. All in accordance with AS3500.2.
- Sanitary Plumbing  
Sanitary Plumbing shall encompass all works required above ground for the sanitary system including connection to the sanitary drainage system. Include all necessary venting and junctions. All works to be in accordance with AS3500.2.

- Service trenching  
Includes the location and identification of existing services and other items below ground, the setout and coordination of all proposed services and items to be installed below ground, the excavation of trenching for all terms to be installed below ground and the bedding materials , backfill, compaction, dewatering and surface reinstatement. All works to be conducted in accordance with OH&S and Workcover requirements.
- L.P Gas Service  
The L.P gas service is to include the coordination with Elgas for the supply of the L.P gas bottles, supply and installation of the high pressure pipelines to the gas regulator and the low pressure fixture supply pipelines from the regulator set to the gas turrets. Include all required safety items in accordance with AS 5601.
- Vibration and Noise Suppression  
Include all expansion joints, flexible connections, roller mountings, vibration free fixings, noise arrestors and acoustic insulation as necessary to all services to ensure that the buildings hydraulic services are both free of vibration and noise upon completion.

**1.2 TENDER DRAWINGS**

The drawings supplied with the specification at the time of tendering are diagrammatic and approximate only. These drawings, together with the specification, are intended to be mutually explanatory and to indicate the complete scope of the work required.

<b>Drawing No.</b>	<b>Service</b>	<b>Drawing Title</b>
H-01	Hydraulic Services	Title, Legend, Notes and Details Sheet
H-02	Hydraulic Services	Floor Plan – Hydraulic Services

**1.3 ASSOCIATED WORKS**

The works listed below are integral to the Hydraulic Services contract and are to be provided by and coordinated with other trades as part of the main building contract.

**Electrical Services**

- Electrical GPOS for the Potable hot water unit.

**General**

- Sleeves for penetrations and subsequent making good including adequately detailed drawings.
- Sealing of penetrations with an Australian Standard approved 2 hour fire rated material.
- Concrete plinths under equipment.
- Any additional core holes in floors and walls as required for the installation of hydraulic services as a result of additional works being required.
- Making good of any additional penetrations and surfaces to allow installation of hydraulic services pipelines and fittings as a result of additional works being required.

**2 GENERAL REQUIREMENTS**

**2.1 GENERAL**

**Contract Documentation**

This specification section forms only a part of the contract documentation. It must be read in conjunction with the whole of the project specification, Architectural, Mechanical, Electrical, Structural and Civil Services drawings in order to fully understand the Scope of Works required under the hydraulic services contract for the project.

**Precedence**

Requirements of individual technical sections of the specification override conflicting requirements in this section.

Approvals of the documents and installation are to be obtained from the:

1. Supply Authorities
2. On completion of the project provide the Proprietor with certification of Essential Services in accordance with Local Council requirements. Copies of these forms shall be provided to the superintendant for comment before formal submission to the Proprietor and before insertion into Operation and Maintenance Manuals.

**2.2 CROSS REFERENCES**

Refer to the Preliminaries section of the general technical and contractual requirements. Refer to the main Fixtures/furniture Schedule.

**2.3 REFERENCED DOCUMENTS****Current editions**

General: Use referenced documents which are editions, with amendments, current one month before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

**Contractual relationships**

Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in referenced documents.

**2.4 INTERPRETATION**

Unless the context otherwise requires, the following definitions apply:

- Supply: "Supply", "furnish" and similar expressions mean "supply only".
- Provide: "Provide" and similar expressions mean "supply and install".
- Approved: "Approved", "reviewed", "directed", "rejected", "endorsed" and similar expressions mean "approved (reviewed, directed, rejected, endorsed) in writing by the contract administrator".
- Give notice: "Give notice", "submit", "advise", "inform" and similar expressions mean "give notice (submit, advise, inform) in writing to the contract administrator".
- Obtain: "Obtain", "seek" and similar expressions mean "obtain (seek) in writing from the contract administrator".
- Proprietary: "Proprietary" mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.

**Technical**

Zinc-coated steel: Includes zinc-coated steel, zinc/iron alloy-coated steel, and aluminium/zinc-coated steel.

Pipe: Includes pipe and tube.

**Maintenance period**

Co-extensive with the defects liability period. Unless stated otherwise, the maintenance and warranty period shall be a minimum of 12 calendar months from the date of Practical Completion.

**2.5 CONTRACT DOCUMENTS**

Diagrammatic layouts: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only and indicate the approximate location of pipework, fixtures and fittings etc, except where figured dimensions are provided or calculable. Before commencing work on-site or beginning fabrication of any items offsite, obtain accurate on-site measurements, levels

and other necessary information. Allow for all necessary diversions, offsets and adjustments of pipework necessary to complete the installation.

Refer to Architectural, Mechanical, Electrical and Civil/Structural Services drawings for exact locations and numbers of all items, allow for hydraulic services to connect to all items. Coordinate with other services prior to installation to ensure all items to be installed fit in the intended location.

The hydraulic services drawings, which have been issued for either tendering, or contract purposes are not to be used for construction unless specifically approved for that purpose.

Levels: Spot levels take precedence over contour lines and ground profile lines.

Should the Plumbing Contractor identify any items during the Tender Period, either within the specification or on the contract drawings which the contractor may believe conflicts with any other part of the contract documents or current Building Codes and Australian Standards, the Plumbing Contractor shall make allowance for the more onerous item in the tender amount and notify the superintendent immediately.

Failure to bring any conflicts to the attention of the superintendent prior to installation of the item identified will result in dismissal of any variation claim.

### **Obvious Work**

The nature and the intent of this specification and associated drawings is to provide for the Hydraulic Services enumerated and shown on the Tender Documents. It is to be fully understood that the contractor, on accepting the Contract, agrees to furnish everything reasonably necessary for such construction, notwithstanding any omission in this specification and/or drawings.

If a fixture is shown on the drawings and is not nominated as 'existing', unless noted otherwise the Contractor must allow for both water supply and drainage connections to it in accordance with current codes and standards. Additionally, the contractor is to allow for the supply and installation of the fixture and associated tapware to a standard equal to other fixtures and tapware nominated for the project.

## **2.6 DESIGN**

### **Space requirements**

Check space requirements of equipment and services indicated diagrammatically in the contract documents and submit a report on consequent variations to the design.

## **2.7 FEES AND CHARGES**

The Plumbing Contractor shall be responsible for paying all fees and charges with regards to those amounts required by the relevant authorities, which shall include but not be limited to the following:

- Authorities Fees
- Commencement of Work Fees
- Inspection Fees
- Certification Fees
- Investigation Fees

## **2.8 CERTIFICATION**

Prior to Practical Completion being given and Final Payment being made, the Plumbing Contractor is to make all necessary applications, pay all fees, obtain all necessary certificates and issue certification of the works to the superintendent, stating that the works installed comply with Current Codes, Australian Standards and Authorities requirements. Supply evidence of Authority Certification where possible.

It is the Plumbing Contractors role to liaise and coordinate with the relevant authorities to obtain the controlling authorities requirements and comply with them in order to attain certification of the installation.

**2.9 SITE VISIT**

The Plumbing Contractor must visit the site during the Tender period in order to familiarise themselves with existing site conditions and make the necessary allowances for such in the tender. Failure to comply with this clause will forfeit any Contract Variation Claims for not being fully aware of pre-existing conditions. **Confirm a site visit has been undertaken in the tender.**

**2.10 STAGING OF WORK**

The Plumbing Contractor during the course of all Construction Stages, and according to the Building Program must make allowance for the total operation of all existing hydraulic services at all Construction Stages. This includes the supply and installation of all materials necessary for the temporary connections required.

It is the Plumbing Contractors role to liaise and coordinate with relevant Contractors, Sub-contractors, Authorities, the Project Manager and the Superintendent to perform the required construction work during normal business hours, or, after hours to ensure total operation of the building hydraulic services at all times.

**3 QUALITY**

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**3.1 INSPECTIONS AND TESTS****Notice**

Witness and Hold points: If notice of inspection or testing is to be given in respect of parts of the works, advise if and when those parts are to be concealed. Do not conceal those parts without approval.

Minimum notice for inspections and tests to be made shall be to the controlling statutory authorities requirements.

**Reports**

General: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and compliance or non-compliance with requirements.

Number of copies of test certificates: 2

**Endorsement**

If tests are to be carried out on parts of the works, do not conceal those parts and do not commence further work on those parts until the tests have been satisfactorily completed and compliance verified.

**3.2 SUBMISSIONS****Timing**

General: Submit documents in a timely manner, to suit the construction program. Advise if any of the documents are to be returned.

Delays: Coordinate submissions of related items. Do not cause delays by making late or inadequate submissions.

**Quantity**

All documents: 3 copies.

**Identification**

Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify non-compliances with project requirements, and characteristics, which may be detrimental to successful performance of the completed work.

**Endorsement**

Witness points: Give notice before commencing work affected by contractor's submissions, unless the submissions have been endorsed as satisfactory.



**Design**

Variation documents: If it is proposed to change the installation from that shown on the contract documents, or if changes are required by statutory authorities, submit variation documents showing the proposed changes.

**Authorities**

Correspondence: Submit copies of correspondence and notes of meetings with authorities.

Authorities' approvals: Submit documents showing approval of the authorities whose requirements apply to the work.

**Execution**

Embedded services: Submit proposals for embedding services in concrete walls or floors, or chasing into concrete or masonry walls.

**3.3 PROGRAM**

It is the Plumbing Contractors responsibility to coordinate the plumbing installation with the Main Contractors building program, all Suppliers delivery dates and any works or approvals requiring Authority input. The Plumbing Contractor is responsible for all costs attributable to this contract arising through insufficient coordination of the Plumbing installation with any of these items.

**4 MATERIALS AND COMPONENTS**

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**4.1 GENERAL**

**Proprietary items**

Implication: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

Alternatives: If alternatives are proposed, submit proposed alternatives and include samples, available technical information, reasons for proposed substitutions and cost. If necessary, provide an English translation. State if use of proposed alternatives will necessitate alteration to other parts of the works and advise consequent costs.

**Manufacturers' or suppliers' recommendations**

General: Select, if no selection is given, and transport, deliver, store, handle, protect, finish, adjust, prepare for use, and use manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier.

Instructions: Submit the recommendations and instructions, and advise of conflicts with other requirements.

Project modifications: Advise of activities that supplement, or are contrary to, manufacturer's or suppliers' written recommendations and instructions.

Product certification: If products must comply with product certification schemes, use them in accordance with the certification requirements.

**Sealed containers**

If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

**Consistency**

For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

**5 EXECUTION**

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**5.1 INSTALLATION**

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements. Under suspended ground floors, keep services at least 150 mm clear above ground surface, additional to insulation, and ensure access is not impeded.

**5.2 SERVICES CONNECTIONS**

Variation claims for works installed without first locating each service and determining its suitability for connection in regards to its material, position and relative level will not be entertained.

**5.3 SYSTEM INTEGRATION**

Interconnect system elements so that the installations perform their designated functions.

**5.4 BUILDING PENETRATIONS****Piping sleeves**

General: Provide metal or UPVC sleeves formed from pipe sections, for piping penetrations through building elements.

Finish: Prime paint ferrous surfaces.

**Fire rated building elements**

Seal penetrations using a system to AS 4072.1.

**Early fire hazard indices**

Spread of flame index: To AS/NZS 1530.3.

Smoke developed index: To AS/NZS 1530.3.

Flammability index: To AS 1530.2.

**Non-fire rated building elements**

Seal penetrations around sleeves. If the building element is acoustic rated, maintain the rating.

**Limitations**

General: Do not penetrate or fix to the following without approval:

- Structural building elements including external walls, fire walls, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings.

Membranes: If approval is given to penetrate membranes, provide a waterproof seal between the membrane and the penetrating component.

**5.5 PIPING****Cleaning**

Protection: Before installation, remove loose scale, burrs, fins and obstructions.

**Installation**

General: Install piping in straight lines at uniform grades with no sags. Arrange to prevent air locks. Provide sufficient unions, flanges and isolating valves to allow removal of piping and fittings for maintenance or replacement of plant. Include for all pipework, bends, offsets, brackets, valves and items of equipment required for the installation.

Arrangement: Arrange and support piping so that it remains free from vibrations whilst permitting necessary movements. Minimise the number of joints.

Spacing: Provide at least 25 mm clear between pipes; and between pipes and building elements, additional to insulation.

Dissimilar metals: Join dissimilar metals using fittings of electrolytically compatible material.

**Fixing and Supports**

Fix and Support all pipework in accordance with manufacturers instructions and the appropriate governing Australian Standard. Do not use Explosive powered tools for installation of fixings.

**Cover plates**

If piping emerges from exposed building surfaces, provide cover plates of non-ferrous metal, finished to match the pipe, or of stainless steel, close fitting and firmly fixed in place.

**Cover plate sizes table**

Nominal pipe size, DN	Cover plate diameter
< 20	65 mm
≥ 20, < 50	100 mm
≥ 50	50 mm larger than pipe

**5.6 VIBRATION AND NOISE SUPPRESSION**

Refer to the 'Vibration and Noise Suppression' section of the Hydraulic Services specification.

**5.7 PAINTING SERVICES AND EQUIPMENT****General**

If exposed to view, paint new services and equipment including in plant rooms, except chromium, anodised aluminium GRP, UPVC, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Repaint proprietary items only if damaged.

**5.8 FINISHES****Piping**

General: Finish all exposed piping, fittings, supports, traps, Floor waste covers and Sealed Floor Waste covers (unless individual items are specified otherwise) as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- Externally, and steel piping and iron fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.

Valves: Finish valves to match connected piping.

**5.9 MARKING**

General: Mark equipment, piping and valves to provide a ready means of identification.

Piping, conduits and ducts: To AS 1345, as applicable.

**Labels**

Type: Select from the following:

- For indoor applications only, engraved two-colour laminated plastic.
- Engraved and black filled lettering on stainless steel or brass, minimum thickness 1 mm.
- Cast metal.

**Fixing**

General: Provide mechanical fixing. Do not penetrate vapour barriers.

Valves and pumps: Screw fix to body or attach by key ring to valve handwheels.

**Piping**

Identify all concealed pipework throughout its entire length, including in concealed spaces.

Use 'Safetyman' stick on markers or equivalent for internal pipework indicating flow direction. Locate the markers in visible locations along pipelines at 5 metre centre maximum and adjacent valves, junctions and bends.

Install detectable warning tape over all underground pipework installations.

**5.10 ACCESS CHAMBER LIDS**

Access chamber lids for pits installed in finished surface areas such as paved, exposed aggregate, concrete, vinyl or similar must be fitted with a lid suitable to accept the material proposed and be fitted with a brass rim flush with the nominated surface level.

Clearouts are bolted trap screws and are to be finished flush with the finished floor/surface area. In trafficable areas install cast iron items. In internal areas install chrome-plated brass screwed items. In external areas where not subject to loading, install UPVC items.

**5.11 EXISTING SERVICES**

The Plumbing Contractor shall make allowance in the tender amount to locate all existing services in the area of the proposed works prior to carrying out any associated works on the site. The location of services will include but not be limited to use of existing documentation procured for the relevant authorities and use of electronic detection equipment suitable for the task. Contact 'Dial Before You Dig' within appropriate areas of operation.

Should existing services be encountered, the plumbing contractor must allow to divert, offset extend, and connect the existing services as necessary to maintain their working function.

All care must be taken by the Plumbing Contractor to ensure that existing services are adequately protected during construction. Should any existing services be found to be damaged, the plumbing contractor is to inform the superintendent to arrange for remedial works to be undertaken. If the damage is as a result of the Plumbing Contractors own actions, the Plumbing Contractor shall repair the service or arrange for the service to be repaired and pay all associated costs for the repair.

**5.12 REDUNDANT SERVICES**

The Plumbing Contractor shall make allowance in the tender amount to locate, isolate and remove all redundant services (both above and below ground) from the site. Services to be removed are to be identified from all available records and the Plumbing Contractors on-site investigation.

**5.13 MECHANICAL SERVICES**

The Plumbing Contractor must review all Mechanical services drawings and conduct on-site coordination with the Mechanical Services Contractor. Ensure all vent pipes are a minimum of 6 metres horizontally from a mechanical services air intake point.

**5.14 ELECTRICAL SERVICES**

The Plumbing Contractor must review all Electrical services drawings and conduct on-site coordination with the Electrical Services Contractor in order to ensure that all Hydraulic Services equipment requiring power has the appropriate connection and power supply in the correct position for connection to the equipment.

**5.15 CIVIL/STRUCTURAL WORKS**

The Plumbing Contractor must review all Civil and Structural Works drawings and conduct on-site coordination with the Civil/Structural Works Contractor in order to ensure that the proposed ground levels and locations of all stormwater drainage pipes are known. Coordinate to ensure pipes have sufficient coverage and clashes between pipework runs are avoided.

**5.16 FIXTURE/ PLANT CONNECTION**

Provide and install all necessary valves and unions to all fixtures to both enable correct usage, easy isolation for routine maintenance and ease of removal of all fixture and plant items.

**5.17 PLANT AND EQUIPMENT**

It is the Plumbing Contractors responsibility to supply and install all items of plant and equipment shown on the drawings and in relevant details unless noted in the specification as being 'provided by others for installation by the Plumbing Contractor'.

**5.18 SCAFFOLDING AND LIFTING EQUIPMENT**

The Plumbing Contractor is responsible for the supply and erection of all scaffolding and lifting equipment required to complete the plumbing services installation.

**5.19 RUBBISH REMOVAL**

The Plumbing Contractor is responsible for the removal from site prior to practical completion of all rubbish, redundant materials, excess spoil, left over materials and material offcuts generated by the Plumbing Contractor during the installation.

**6 COMPLETION**

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**6.1 GENERAL****Contractor's submissions**

Within 2 weeks after practical completion, submit 3 copies of designated documents.

**Warranties**

General: Name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion. The warranty period is for a minimum of one calendar year from the acceptance of the installation.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

**6.2 RECORD DRAWINGS****General**

Record Drawings shall be produced entirely by the Plumbing Contractor and be of a minimum standard and size equal to the contract documents.

Submit Three (3) sets of record drawings for approval plus an electronic copy of the documents in a .dwg format. Show the "as installed" locations of building elements, plant and equipment. Show off-the-grid dimensions where applicable.

**Services**

Show dimensions, types and location of equipment and piping in relation to permanent site features and other underground services. Include relationship to building structure and other services, and changes made during commissioning and the maintenance period. Include diagrammatic drawings of each system showing accurate locations of all valves, piping and principal items of equipment.

**Format**

Use the same borders, scales and title block as the contract drawings.

**6.3 OPERATION AND MAINTENANCE MANUALS**

General: Submit operation and maintenance manuals for installations.

Include the following:

- Installation description: General description of installation.
- Drawings and technical data: As necessary for the efficient operation and maintenance of the installation.
- Equipment descriptions:
  - . Name, address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.
  - . Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed.

- Maintenance procedures:
  - . Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
  - . Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.
  - . Control sequences and flow diagrams for systems installed.
- Valve Schedule:
  - . Include a schedule of all valves including the Area in which they are located, their Position, Size and Function.
- Format:
  - . Index of Contents.
  - . General.
  - . Freshwater.
  - . Non-Potable Water.
  - . Waste Water.
  - . Fuel Gas.
  - . Sanitary Fixtures and Tapware.
  - . Record Drawings.

**Timing and quantity**

Final copies: Submit 3 sets of final volumes 2 weeks prior to practical completion. Submit additional data due to feedback from review and from training of principal's staff immediately after practical completion.

**6.4 TRAINING**

**Operation & Maintenance**

Immediately after practical completion, explain and demonstrate to the principal's staff the purpose, function, operation and maintenance of the installations.

**6.5 COMPLETION TESTS**

Carry out acceptance tests and final tests. Supply all materials and apparatus necessary for testing of services to authorities requirements. Pay all Fees necessary to carry out tests required.

**Hydraulic site tests**

Preparation for pressure testing: Securely anchor pipes and fittings in position to prevent movement during tests. Leave pipe joints exposed to enable observation during tests. Disconnect equipment which is not designed to carry the test pressure.

**6.6 MAINTENANCE**

General: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.

Emergencies: Attend emergency calls promptly.

**Maintenance records**

Referenced documents: If referenced documents or technical sections require that log books or records be submitted, include this material in the maintenance records.

Certification: On satisfactory completion of the installation, submit certificates stating that each installation is operating correctly.

<b>FRESHWATER</b>
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## **1 GENERAL**

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### **1.1 CROSS REFERENCES**

Refer to the *Hydraulic Services - General requirements* section.

#### **Related sections**

Refer to the following sections:            *SERVICE TRENCHING*

### **1.2 STANDARDS**

#### **Water supply**

General: To AS/NZS 3500.1.2.

Copper Pipe: TO AS 4809

#### **Hot water supply**

General: To AS/NZS 3500.4.2.

## **2 MATERIALS AND COMPONENTS**

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### **2.1 AUTHORISED PRODUCTS**

#### **Standard**

To SAA MP52, unless otherwise required by the statutory authority.

### **2.2 THERMOSTATIC MIXING VALVES**

#### **Type**

General: Water temperature regulated by a single hand control, and capable of delivering water at the temperature of either of the supply systems and at any temperature in between, and suitable for controlling single or multiple outlets, as appropriate.

Controls: Incorporate the following:

- A temperature sensitive automatic control which maintains temperature at the pre-selected setting and rapidly shuts down the flow if either supply system fails, or if the normal discharge water temperature is exceeded.
  - Hot water flush facility.
  - Isolation Valve, Backflow Prevention Valve and Adjustable Pressure Reduction Valve on both the Hot water and Cold Water inlets to each valve.

The Thermostatic Mixing Valve shall be of a type approved by the NSW Department of Health.

Supply and Install a Pressure Control Valve on the Hot and Cold inlets to all Thermostatic Mixing Valves equal to RMC EB35 Pressure Reducing. Valves adjusted to 400kpa within the recessed enclosure.

### **2.3 INTERNAL ISOLATION VALVES**

Install isolation Valves for each room or fixture within the room they serve. The valves are to be located in inconspicuous locations such as below basins, sinks and the like. Where this is not possible, position the valves immediately below the ceiling within the room. The valves are to be fitted with ceramic discs and have handles to match those within the room or as specified.

Valves located externally are to be located in approved valve boxes with the appropriate identification markings with the covers flush with the surrounding surface level.



**2.4 PRESSURE CONTROL VALVES**

**Type**

Provide reduction valves, pressure limiting valves, or ratio valves, which produce the necessary reduction in pressure.

**2.5 BACKFLOW PREVENTION VALVES**

Supply and install appropriate Backflow Prevention Valves for Property Containment, Zone Containment and Individual Containment as required by AS 3500.1 and the regulatory authority. Carry out all testing and provide certification of the valves to the regulatory authority prior to practical completion. Include a copy of the certification in the project manual. All testing and Certification is to be by suitably accredited plumbers.

In internal locations install the valves in a Stainless Steel enclosure. Include a drain of sufficient diameter from the enclosure to the drainage system to accept any discharge from the device.

Make provision for possible future water hammer arrestor on the downstream side of the device by the installation of a capped female thread of a size one size smaller than the device.

Do not install the devices in pits, ceiling voids or any location where damage to adjacent materials may occur by discharges from the device.

Isolation valves for devices to be resilient seated ball valves.

**2.6 LINE STRAINERS AND FILTERS**

**Description**

Fit line strainers immediately prior to all Thermostatic Mixing valves within the recessed enclosure where applicable.

**3 EXECUTION**

**3.1 RETICULATION**

**Cold water system**

Provide the cold water supply system, installed from the existing water supply to the draw-off points or connections to other services.

**Hot water system**

Provide the hot water system, installed from the cold water connection points to the draw-off points or connections to other services.

**Hot and Cold water piping system schedule**

<b>Pipeline location</b>	<b>Material</b>	<b>Nominal Internal Bore</b>	<b>Jointing method</b>
Locations nominated in Australian Standards	Copper to AS1432	Refer to Drawings	To manufacturers requirements

**3.2 FITTINGS AND ACCESSORIES**

Provide the fittings necessary for the proper functioning of the water supply system, including taps, valves, backflow prevention devices, pressure and temperature control devices.

**Tap and valve heads**

Vandalproof heads: If available, provide vandalproof or anti-tampering devices for the designated types.

Metal heads and handles: Provide brass fittings or suitably bush to prevent electrolysis and growth.

**Tap positions**

Locate hot tap to the left of, or above, the cold tap. Refer to architectural drawings for exact locations.

**Valve spindles**

If practicable, install in a vertical position.

**3.3 PIPING****Material identification marking**

Pipes with grade or class identification markings: Install so that the markings are visible for inspection.

**3.4 PIPING INSULATION - THERMAL**

Application: Fit insulation tightly to piping surfaces without gaps. Close butt ends of insulation sections. Minimise number of joints. If the insulation is in half-sections, make only half-circumferential joints at any one place. Seal longitudinal seams in foil laminate and fix insulation at maximum 500 mm centres with polypropylene, zinc-coated steel or aluminium straps.

Unions and other items requiring service: Install the insulation so that it is readily removable.

Fittings: Provide insulation of thermal resistance equivalent to the piping insulation.

**Thermal Insulation material**

Provide insulation material as listed in **Insulation schedule**:

**Metal sheathing**

Provide metal sheathing to all piping insulation:

Where exposed to weather.

Where exposed to view.

Where subject to mechanical damage.

On valves, pipeline components and pumps in sheathed pipework.

General: Cover piping with metal sheathing sprung over the insulation in one piece with laps at least 30 mm wide, and fastened with self tapping screws or snap head rivets at 150 mm maximum centres. Preform the sheathing to match the shape of the insulated pipe and fittings. Position laps to avoid water penetration. In external locations weatherproof the joints and fixings using a non-setting mastic.

Material: 0.5 mm thick zinc-coated steel sheet.

**Surface preparation**

Clean the surfaces to remove scale, rust, grease and dirt and prepare surfaces to suit the insulation. Restore surface coatings, which have been damaged or affected by welding.

**Testing**

Do not install insulation until the piping has been tested.

**Insulation schedule**

<b>Pipelines location</b>	<b>Material</b>	<b>Thickness (mm)</b>	<b>Outer jacket</b>
Internal Pipes in Roof Voids, Ceilings and Stud Walls	Thermotec 4-Zero	25mm minimum	Foil lined minimum. Acoustic requirements as per 'Vibration & Noise Suppression'
Branch Pipes in masonry walls	Thermotec Polytube	13mm	None
External Pipes and Plant Rooms (All locations)	Thermotec Quickseal or Sealed Tube	25mm	Metal Sheathing

### 3.5 PIPE SUPPORTS

Pipework for this project may be installed within steel stud framed walls. The plumber is to use a dual grommet silicone pipe fixing system to avoid water 'hammer'. i.e. Use grommets recommended by the pipework manufacturer and/or the steel frame manufacturer. Hold grommets and pipe in place by the use of a flexible silicone sealant covering the grommet, part of the pipe and the surrounding steel frame.

#### **Insulated pipe**

General: Provide supports formed to fit around the insulation.

Protection: For pipes DN 25 either

- protect the insulation at the support point with metal sheathing extending sufficient distance both sides of the support so the insulation thickness is reduced by < 10% ; or
- replace the insulation at the support point with a shaped wooden spacer block. Butt the insulation up to the wooden block and seal with silicone compound. Clad the block and insulation in 0.5 mm zinc-coated steel sheet extending 100 mm both sides of the support.

## 4 WATER HEATING SYSTEMS

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### 4.1 PROPRIETARY WATER HEATERS

#### **Standard**

Energy performance: To AS 1056.1

#### **Tariff**

Install so that the heating system qualifies for the tariff concession or subsidy offered by the statutory authority.

#### **Unitary storage heaters**

Location: > Preparation Room

Water heater type: > Electric 'Rheemglas'

Heat storage volume: > 50L

#### **Plinths**

Install Hot Water Units in plant rooms on a 100mm high plinth with width and depth dimensions suitable for the installation of safe trays under the units.

#### **Safe Trays**

Supply and install a Safe Tray in accordance with Australian Standards for all Water Heating units. Drain the Safe Trays to the Sanitary Drainage system.

#### **TPR Valves**

Drain TPR valves from Water Heating units via a copper pipe of a size in accordance with Australian Standard 3500.4 to a Tundish or other approved receptacle connecting to the Sanitary Drainage system unless stated otherwise.

## 5 COMPLETION

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### 5.1 GENERAL

Test the system on completion.

#### **Charging**

On completion of installation, commissioning, testing and disinfection, fill the system with water, turn on control and isolating valves and the energy supply and leave the water supply system in full operational condition.

**Hydraulic Shock**

Upon completion, should there be any evidence of Hydraulic Shock 'Water Hammer', the installation will not be accepted until the problem has been rectified by the Plumbing Contractor by identifying the source of the problem and installing the appropriate Valve, Expansion fitting or Arrestor at no additional cost.

**5.2**

**MAINTENANCE**

**Heated water systems**

Maintenance Manuals: To AS/NZS 3666.2

**WASTEWATER**

**1 GENERAL**

**1.1 CROSS REFERENCES**

Refer to the *Hydraulic Services - General requirements* section.

**Related sections**

Refer to the following sections: *SERVICE TRENCHING*

**1.2 STANDARD**

**Sanitary plumbing and sanitary drainage**

General: To AS/NZS 3500.2.2.

**2 MATERIALS AND COMPONENTS**

**2.1 AUTHORISED PRODUCTS**

**Standard**

To SAA MP52, unless otherwise required by the statutory authority.

**2.2 SANITARY FIXTURES**

Provide the accessories necessary for correct installation.

**3 EXECUTION**

**3.1 SANITARY PLUMBING**

**Laboratory wastes**

General: If there are chemically corrosive effluent wastes, provide compatible traps and waste connections, and drain to a treatment pit.

Pipework: Heavy Duty Polyethylene

Trap material: Heavy Duty Polyethylene

**Vent pipes**

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide vent cowls of the same material as the vent pipe.

**Sanitary plumbing piping schedule**

Location	Pipe material	Nominal size	Grade or class	Jointing method
All Locations except exposed	UPVC	Refer To Drawings	DWV	Solvent Weld

**3.2 SANITARY DRAINAGE**

**Trade wastes**

Dispose of trade waste through Heavy Duty Polyethylene pipelines laid, bedded and jointed as necessary. Provide necessary sumps or interceptors.

**Pipeline identification**

Lay detectable plastic warning tape, 300 mm above buried piping, for the full length of the piping.

**Sanitary drainage piping schedule**

<b>Location</b>	<b>Pipe material</b>	<b>Grade or class</b>	<b>Jointing method</b>	<b>Bedding material</b>
All Locations except exposed	UPVC	DWV	Solvent Weld	Gravel as specified on drawings

**3.3 FLOOR WASTES & GRATED DRAINS**

Riser pipes to floor wastes are to be a minimum of 100mm diameter. Floor Wastes are to be manufactured from metal and the grate is to be either Chrome Plated or Polished Nickel Bronze. Floor Wastes for vinyl flooring areas shall be a 'Vinyl Clamp' type equal to Specialty Plumbing Supplies Lo-Grime Type VP100CPASSA4.

<b>SERVICE TRENCHING</b>
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**1 GENERAL**


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**1.1 CROSS REFERENCES**

Refer to the *Hydraulic Services - General requirements* section.

**Related sections**

Refer to the following sections:        *WASTEWATER, FRESHWATER, FUEL GAS*

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**2 SERVICE TRENCHES**


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**2.1 EXCAVATING**

Excavate for underground services, to required lines, levels and grades. Generally make the trenches straight between personnel access ways, inspection points and junctions, with vertical sides and uniform grades.

**Trench widths**

Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits.

Where necessary for safe working, erect shoring and timbering in the trench as the work proceeds. All shoring and timbering shall be withdrawn after installation of services.

**2.2 BACKFILLING**

Backfill service trenches as soon as possible after the service has been laid and bedded, if possible on the same working day. Place the backfill in layers  $\leq 150$  mm thick and compact to the density which applies to the location of the trenches to minimise settlement, and so that pipes are buttressed by the trench walls.

**Backfill material**

General: General fill with no stones greater than 25 mm occurring within 150 mm of the service, or other materials as required for particular services or locations. Well graded, inorganic, non-perishable material, maximum size 75 mm.

Within 4 m of buildings: Coarse sand, controlled low strength material or fine crushed rock.

In topsoil areas: Complete the backfilling with topsoil for at least the top 50 mm.

In reactive clay: In sites classified M, H or E to AS 2870, provide an impervious material where trenches fall towards footings.

**2.3 REMOVAL AND REINSTATEMENT OF EXISTING SURFACES**

Remove, including saw cutting of concrete and asphalt surfaces and/or reinstate existing surfaces removed or disturbed by trench excavations to match existing and adjacent work.

**2.4 DEWATERING**

The Plumbing Contractor is responsible for any dewatering required to enable satisfactory installation of any pipework or items necessary.

Should there be any damage to any excavations due to rainwater or rainwater runoff, the Plumbing Contractor shall reinstate the excavation at no additional cost.





**Certificate holders**

General: Provide a galvanized steel pipe, one end fitted with a brass plug, one end threaded and fitted with a threaded brass cap. Weld to the support member of the tank or cylinder.

Function: For storage of current storage system approval and test certificates.

Marking: Mark the threaded cap with the phrase “LPG CERTIFICATES”.

**Notices and signs**

Required.

**2.4 MARKING**

**Underground installations**

General: During backfilling lay plastic warning tape 300 mm above buried piping, for the full length of the piping.

Warning tape: Minimum 100 mm width, with “GAS PIPE UNDER” marked continuously.

Marker plates: Provide galvanized steel or brass marker plates at ground level at each change of direction in the underground pipeline, engraved to show the direction of the line and name of the service. Inset marker plates in 150 x 150 x 150 mm concrete blocks, with the tops set flush with ground level.

**3 COMPLETION**

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**3.1 GENERAL**

**Commissioning**

General: On completion of installation and testing, turn on isolating and control valves, and purge and charge the system.

Purging: Comply with the recommendations of AS 5601 Appendix D.

Appliances: Commission appliances.

**Charging**

General: Hand over the system fully charged with gas.

LPG systems: Fill gas storage containers and replace gas used in testing.

**VIBRATION AND NOISE SUPPRESSION****1 HYDRAULICS**

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Noise associated with hot and cold water supply pipework is typically structure borne (therefore isolation from the building structure is of utmost importance) while noise associated with soil and waste pipework is air-borne.

**1.1 HOT AND COLD WATER RETICULATION**

If not nominated in the Freshwater section of the specification referring to 'Thermal Insulation', all hot and cold water pipes should be externally sheathed in armafex/aerofoam or equivalent of minimum thickness 10mm.

Isolate pipes, fittings and fixtures from building structures, especially lightweight partitions, by means of resilient sleeves, mounts and underlayments.

Use fully ported faucets, valves etc. to reduce hissing noise, as well as aerators to reduce general noise. Defective, loose or worn valve stems, tap washers or seals give rise to intense chattering of the plumbing system. Such items must be made good/replaced.

Flexible connectors shall be used when coupling supply and drain pipes to vibrating appliances such as pumps, chillers, etc.

**1.2 SOIL WASTE AND VENT PIPES**

Soil and waste water pipes/stacks should be resiliently supported at floor penetrations. There should be no solid connection between soil and waste pipes and the floor slabs or walls.

**Metal sheathing**

Provide metal sheathing to all piping insulation as nominated in the 'Thermal Insulation' schedule in the 'Freshwater' section.