



## **Standard Technical Specifications – Part 5: Wastewater Pump Stations**



Section A: Construction specification .....	4
1.0 Chamber .....	4
2.0 Cable bracket .....	4
3.0 Water supply .....	5
4.0 Remote terminal unit and telemetry system .....	5
5.0 Cable duct .....	5
6.0 Commissioning test .....	5
7.0 As built information .....	5
8.0 Electrical specifications .....	5
8.1 Electricity Act 1992 .....	5
8.1.1 General .....	5
8.1.2 Self Certification .....	6
8.1.3 Certificate of Compliance (CoC) .....	6
8.1.4 Inspections .....	6
8.4 Technical Requirements .....	7
8.4.1 General Introduction .....	7
8.4.2.1 Direct Buried Cables and Cable Ducts .....	7
8.4.2.2 Glanding of Cables .....	7
8.4.2.3 Wiring .....	7
8.4.2.4 Identification of Cables, Wiring and Equipment .....	9
8.4.3 Switchboard Construction .....	9
8.4.3.1 General .....	9
8.4.3.2 Detailed Requirements .....	10
8.4.3.3 Workshop Inspection .....	10
8.4.5 Equipment .....	11
8.4.5.1 Moulded Case Circuit Breakers - Miniature Circuit Breakers .....	11
8.4.5.2 Power Isolators .....	11
8.4.5.3 Starters/Contactors .....	11
8.4.5.4 Thermal Overloads .....	11
8.4.5.5 Relays .....	11
8.4.5.6 Indicating Meters .....	12
8.4.6 Inspection, Testing, Commissioning .....	12
8.4.6.1 Notice of Testing .....	12
8.4.6.2 Test Instruments .....	12
8.4.6.3 Testing .....	12
8.4.6.4 Commissioning .....	13
8.5.1 Scope .....	13
8.5.2 Standards .....	14
8.5.2.1 Main Earth .....	14
8.5.3 Switchboard .....	14
8.5.3.1 Layout .....	14
8.5.3.2 Construction .....	14
8.5.3.3 Electrical equipment and wiring features .....	15
8.5.3.4 Labelling .....	15
8.5.4 Rating of equipment .....	16
8.5.5 Drawings .....	16
8.5.5.1 General .....	16
8.5.6 Workshop Inspection .....	17
8.5.7 Component Specification .....	17
8.5.7.1 Electrical Panel .....	17
8.5.8 Electrical Components .....	18
8.5.9 Circuit Breakers .....	18
8.5.10 Control Switch (Auto/Off/Man) .....	18
8.5.11 Motor Isolating Switch .....	18



8.5.12	Mains Switch (MCCB) .....	18
8.5.13	Generator Socket Outlet.....	19
8.5.14	Change-Over Switch .....	19
8.5.15	Motor Control Contactors and Overloads: .....	19
8.5.15.1	D.O.L.....	19
8.5.15.2	Electronic Soft Starter .....	19
8.5.16	Ammeter .....	19
8.5.17	Control Relays .....	19
8.5.18	Phase Failure Relay .....	20
8.5.19	Overflow Float Switch.....	20
8.5.20	Level Control .....	20
8.5.21	Night Latch Locks .....	20
8.5.22	Telemetry.....	21
8.5.23	Flow Meter.....	21
8.5.24	1 Phase Outlet.....	21
8.5.25	Thermostat .....	21
8.5.26	Cabinet Heater .....	21
8.5.27	Cabinet Lights .....	22
Section B: Works completion and clearance.....		23
Section C: Acceptable fittings and materials.....		24
1.0	Scope .....	24



## **Section A: Construction specification**

**Note:** MPDC is in the process of developing its own design drawings for wastewater pump stations. This document is an interim one pending completion of that work and where there is conflict between the HCC Drawings and the examples of recent MPDC pump stations, the concept and intent of the MPDC Drawings will take precedence

### **1.0 Chamber**

The Pumping Station chamber shall be constructed from flush jointed Class 4 reinforced concrete pipes installed as shown on the Drawings.

Pipe joints shall be sealed and made watertight using “Expocrete UA” or an acceptable equivalent.

Care shall be exercised to ensure that the pump chamber is vertical and set to the correct levels before the station floor is poured. A precast base may be used provided flotation of the chamber is prevented.

Buoyancy of the chamber is considered at the time of designing a pump station. Accordingly the chamber may require mass concrete in the bottom to counter buoyancy forces. The depth and extent of mass concrete shall be as specified on the construction plans.

Once excavated to a firm foundation free of any organic soil, the wet well pump station foundation shall be prepared with a layer of compacted GAP 40 no less than 250mm thick followed by a capping of site concrete no less than 100mm thick.

The top slab shall be cast as shown on the Drawings. The placement of reinforcement shall be carefully controlled to ensure adequate cover. The lids and frames shall be carefully set into the concrete upstands so that they fit flush with the finished upstand level. All concrete shall be ordinary grade 21 MPa crushing strength.

The lid and frame specified on the drawings shall be constructed as shown on the Drawings and hot dip galvanised after manufacture.

The pump discharge holding down bolts shall be grouted in and accurately positioned so that the 50mm dia. pipe guide rails stand vertically between the guide rail brackets and the discharge connection. Care is to be exercised in grouting in the bolts to ensure that they will not vibrate loose with use.

All reinforcing steel bars shall be grade 300 deformed bars complying with NZSS.3402: 1989. All nuts, bolts and washers shall be grade 316 stainless steel. Where concrete is to be poured around high density polyethylene pipe, the pipe shall be first wrapped with 1.5mm thick butynol sheeting.

Any blockwork mortar joints shall be pointed inside and outside and all cores filled with grout. The outside of the blockwork shall be painted with two coats of “Mulseal” or acceptable equivalent in accordance with the manufacturers specifications.

### **2.0 Cable bracket**



The float and motor cables shall be secured by a grade 316 stainless steel bracket and insulators. The bracket shall be mounted in such a position as to be easily accessible from the lid opening.

### **3.0 Water supply**

A 40mm diameter water supply, or standard 63OD MDPE pipeline as used for water supply ridermains shall be provided to the pump station. Wastewater pump stations are a "High Hazard" risk requiring reduced pressure zone type backflow prevention devices installed above ground level (refer BIA Acceptable Solution G12/AS1 and AS/NZS2845.1:2009). The backflow prevention device is to be positioned adjacent to the electrical control cabinet. An acceptable alternative is to install a backflow prevention device as per Drawing TS540 (enquiries about the availability of these backflow prevention device should be directed to Council).

### **4.0 Remote terminal unit and telemetry system**

An Abbey Systems remote terminal and telemetry system shall be installed for station control and alarm communication. It shall be installed by the manufacturer's agent and communicate to the "Base Station" situated in the Council offices.

### **5.0 Cable duct**

One Pump Cable duct and one Control Cable duct of 100 mm dia shall be installed from the base of the Electrical Control Cabinet concrete plinth to the pump stations chamber. One 100 mm duct will be installed in the plinth for the mains cable. A 50 mm duct will be installed from the Electrical Control Cabinet concrete plinth to the overflow manhole and flow meter if one is going to be installed. Seal duct to restrict corrosive fumes entering the electrical cubicle.

### **6.0 Commissioning test**

All pumping stations shall undergo a commissioning test. Council shall be present at the test. A minimum of 24 hours notice shall be given to Council prior to the test taking place. Any defect found or non-conformance to agreed standards shall be rectified prior to acceptance of the pumping station by Council.

### **7.0 As built information**

An accurate "as built" record shall be maintained as work progresses

### **8.0 Electrical specifications**

#### **8.1 Electricity Act 1992**

##### **8.1.1 General**

The Contractor shall provide copies of Practising Licences of all personnel proposing to work on electrical components within this pump station and control cabinet. The Contractor shall ensure all personnel are familiar with relevant requirements under the Electricity Act 1992, Electricity Safety Regulations 2010 and AS/NZS 3000: 2007.



### 8.1.2 Self Certification

The Contractor shall note the requirements of self Certification under the Electricity Act. To that end the Contractor shall set up a written procedure of checking, testing and Quality Assurance self assessment for the duration of the Contract. This shall be submitted to the Principal for comment within 10 days of awarding of the Contract.

### 8.1.3 Certificate of Compliance (CoC)

The Contractor shall ensure a Certificate of Compliance is purchased for the contract. This Certificate shall be completed and copies with a full schedule of test results appended, shall be returned to:

- (a) Council
- (b) The Engineer

The Contractor shall note, unless prior agreement has been reached with the Principal, no payments will be made until the completed CoC's have been received by Council and approved by the Engineer. Furthermore, the Contractor shall note the requirement for switchboard certification as defined in the Section clause applicable to "Switchboard Construction" in 8.5.3 .

### 8.1.4 Inspections

The Contractor shall allow for inspections to be undertaken by the Principal, or subject to the Principal's approval, an independent Inspector.

Allowance to correct, change, add to or delete equipment/works shall be the Contractor's expense and to the Principal's satisfaction, should it be found:

- (a) The work does not comply with the Specification.
- (b) The work does not meet the requirements of the Electricity Regulations, Codes of Practice, NZS 3000 and/or Technical Safety Regulations.

Any extra inspection time required of the Inspector shall be deducted from moneys otherwise owing to the Contractor.

#### Equipment and Materials Standards

Unless otherwise specified, all materials and supplies required under this contract shall be new. Sub-standard or lower grade items shall not be used.

All works must be carried out in accordance with the specified and relevant statues, standards and any equipment supplied must also comply with the relevant safety and current regulations covering trade practices and manufacturing practices for such equipment.

#### Redundant Equipment

The Contractor shall be aware that all existing electrical equipment and componentry in the pump station is the property of the Principal.

Unless the existing equipment or componentry has obviously failed or deteriorated to a point where it is of no further use or value, in which case it can be disposed of, the



Principal retains the right to receive any residual value available from its scrap or resale

The Contractor shall not dispose of any such equipment without first bringing the matter to the Principal's attention, and reaching agreement on the course of action in this regard.

## 8.4 Technical Requirements

### 8.4.1 General Introduction

Tenderers are referred to the preferred vendors listed in this document. Any deviations require specific approval from MPDC

#### Cabling and Wiring

##### 8.4.2.1 Direct Buried Cables and Cable Ducts

Where specified cables laid direct in the ground shall be located not less than 0.6 metres below ground on a 50mm thick bed of clean sand. The trench shall be backfilled with a 75mm thick layer, measured from the top of the cable, of clean sand. Lengths of "Mag- Slab" cable cover shall then be laid end to end to provide cable protection. The trench shall then be further backfilled with clean sand or soil, free from rock, stones or other debris, to a level 200mm below the surface. Orange PVC Signal tape shall then be laid and backfilling completed, the surface being restored to the Engineer's satisfaction.

##### 8.4.2.2 Glanding of Cables

Cables shall be terminated in weather-proof metric threaded cable glands in accordance with the cable gland manufacturer's instructions and as noted on the cable schedules or as specified. The Contractor shall install threaded adapters to equipment having other than metric threaded cable entries.

The Contractor shall be responsible for ensuring that a cable gland of the correct type and size is used to terminate individual cables.

Where non-circular (e.g. two core neutral screened cables) are glanded they shall be taped circular before glanding. PVC weather-proof shrouds shall be fitted at all exterior glands. Glands shall be of the type approved by the Engineer.

##### 8.4.2.3 Wiring

###### Termination of Conductors

The conductors in electrical cables shall be terminated in the terminal strips provided in equipment in accordance with an appropriate connection schedule or connection diagram. Terminations shall use an approved crimp lug, no multi-strand cable shall be terminated bare.



All conduction ends shall be either pre-tinned or where bare copper, be tinned prior to termination and components which have bare brass or alloys will not be accepted. Alternative plated components shall be submitted to Council for approval.

Conductors terminated on stud type terminals shall be fitted with "full circle" crimp lugs. After crimping the lugs shall be fitted with heat shrink sleeving to ensure that the termination has a minimum area of uninsulated conductive surface.

Where terminals are provided by the Contractor, these shall be the type to be selected from the preferred vendors list.

#### Wire Colouring:

##### (a) General

All power/control AC circuits to which these practices are applicable shall normally operate at a supply frequency of 50 Hz. The colouring of AC circuits of different frequencies, other than signal circuits, shall be subject to approval. The exception being where power/control circuits applicable to variable frequency speed drive power circuitry in which case the standard 3 phase AC or DC conductor colouring shall apply.

##### (b) Earth Conductors (All Systems)

Earth linking/bonding conductors                      Green/Yellow

Each conductor for intrinsically safe systems shall be legibly and permanently identified as intrinsically safe earths and shall be terminated in accordance details given by the appropriate drawing/specification.

##### (c) Neutral Conductors

The colour black applies only to the neutral of an earthed system. The two live poles of an unearthed single phase AC system (men) shall be wired in the same colour.

That is, from the secondary side of a transformer where the conductors are "above earth".

##### (c) Colours

(i)	400/230V AC Power Wiring	
	Phases (as appropriate)	Red/Yellow/Blue
	Neutral	Black

(ii)	400/230V AC Control Wiring	
	230V control circuit sourced from one phase:	
	Phase (irrespective of source)	Brown
	Neutral (earthed)	Black
	Neutral (unearthed)	Brown

	Extra Low Voltage Supplies	
	Positive	Violet
	Negative	Violet plus "-ve" ferrules

Limited to supplies derived from the switchboard battery system(s). The colour will apply to all conductors connected to the incoming supply terminals, isolation/power supply switches, protective devices, loads or the first of a series control circuit contacts.





Otherwise in control panels all conductors supplying such power to instruments, loads and supply side of control circuits will utilize the colours designated above, ie. Including transformed and rectified DC circuits

Extra Low Voltage DC Control	
Positive	Orange
Negative	White
Signal Wiring Twisted Pairs	
Positive	White
Negative	Black
Intrinsically Safe	
All conductors (except earth)	Blue

#### 8.4.2.4 Identification of Cables, Wiring and Equipment

All cables, including TPS wiring, neutral and earth continuity conductors installed or terminated or re-terminated under this contract, shall be identified at each end by means of Critchley cable markers type K and approved equivalent wire ferrule markers on a standard carrier strip tied with cables, tied at both ends of the cable or approved Graftoplas method.

All wires identified by means of wire numbers on the schematics or connection diagrams shall be identified at each and every termination with that wire number by means of full circle plastic cable markers, Critchley "Z" or Graftoplas or approved equivalent.

Similarly, each and every terminal in which an identified wire is terminated shall itself be identified with wire numbers shown on the termination diagrams using terminal markers matching the terminals. It shall be noted that terminal numbers will not necessarily be identical with wire numbers.

Equipment identification labels with permanent marking of a type to be approved by MPDC shall be provided to identify all components and items of equipment.

#### 8.4.3 Switchboard Construction

##### 8.4.3.1 General

Where specified elsewhere herein, the Contractor shall supply and install the main Switchboard and any associated distribution switchboards and Linked Busbars switchboards as shown on the drawings.

The dimensions shown on the switchboard arrangement are typical only. However, in the event the actual switchboard dimensions vary from those shown as limiting, it shall be the responsibility of the Contractor to ensure the board, as built, will fit into the space allotted to it in every way suitable for its intended purpose.

The switchboard shall be built so as to withstand a maximum prospective through fault current for the site for a period of one second.



The Contractor has three options for provision of an approved main switchboard integral and associated downstream distribution boards, and linked busbar switchboards as follows. That is, design, fabrication and testing:

- (a) To a type tested design - with full supporting documentation.
- (b) To a standard accepted in New Zealand and proven equivalent to or better than the current NZS or AS documents. Full documentation supporting written proof that the switchboard and/or distribution boards have been designed and constructed to such standards shall be provided to MPDC before they are accepted.

Completion of a separate Certificate of Compliance for the Switchboard(s) and each distribution switchboard or linked busbar switchboard with the following appended thereto:

- (i) Reference documentation for design and construction; and
- (ii) Complete set of test results according to AS/NZS 3000:2000 and AS/NZS 3017: 2007

The Switchboard shall be built by a Vendor approved by the Principal, who is regularly engaged in the manufacture of similar switchboards.

Before manufacture is commenced, the Contractor shall provide a reasonably detailed shop drawing of the board for review and comment by Council.

#### 8.4.3.2 Detailed Requirements

For the detailed specified requirements for the Switchboards under this contract, Tenderers should refer to Clause 8.5 included as part of this set of documents.

#### 8.4.3.3 Workshop Inspection

Where specified in the "Job Specification", (Clause 8.5) the Contractor shall allow to make arrangements for Council or the appointed Engineer to visit the Specialist Switchboard manufacturer's premises for a workshop inspection prior to despatch to site. Failure to observe this prerequisite requirement could see recommendation of deductions of monies owing to the contractor, by the Principal, to allow to compensate the Principal for any extra costs for the Engineer to pursue.

#### Earthquake Precautions

Provisions shall be made to restrain all plug-in devices and modular elements. Complete switchboard/panels and equipment mounted thereon shall comply with the following Earthquake requirements:

NZS 4219: 1983, Clause 2.24, 2.26, 2.27 and 2.28. Proof of compliance may be requested by the Engineer and to that end a written report shall be made available within 48 hours of the request.



Full details of how the Contractor proposes to achieve this requirement shall be submitted to the Principal for comment.

#### 8.4.5 Equipment

##### 8.4.5.1 Moulded Case Circuit Breakers - Miniature Circuit Breakers

MCCB's shall have a rated breaking capacity at 50kA symmetrical and 90 kA asymmetrical. Where the fault level is reduced by transformer and/or cable impedance, breaking capacity may be correspondingly reduced to the Principal's approval. All such MCCB's shall be equipped with adjustable thermal protection devices.

MCB's shall have a rated breaking capacity of not less than 6 kA. They shall be of the manually operated trip free type incorporating thermal and magnetic tripping mechanisms and shall be rated P2. However, the Contractor must check the prospective short circuit current at each site and allow appropriately rated MCB's or provide current limiting HRC fuses should the MCB's be underrated for the fault capacity.

##### 8.4.5.2 Power Isolators

Power isolators shall be of the rotary type contact. Microgap switches will not be accepted.

##### 8.4.5.3 Starters/Contactors

###### D.O.L

All contactors shall be of the block type rated for motor starting, category of duty AC23 (AC3) unless otherwise specified. They shall be suitable for reception of "add-on" auxiliary contact blocks and/or timers.

###### Electronic Soft Starters

Where required by the Power Supply Network Company, constraints or pumping system operational requirements shall be of a proprietary brand, Allen Bradley, Aucom or PDL.

##### 8.4.5.4 Thermal Overloads

TOL's shall be 3 pole adjustable electronic. Manually resettable with operational trip test facility. Single phasing protection shall be inherent.

##### 8.4.5.5 Relays

All control relays shall have contacts of at least 10A inductive load rating. All relays shall be of the circular plug-in type with relay securing restraint. They shall have the following features:



- a) Be for a common type readily available;
- b) Mechanical operator accessible from the front; and
- c) Operation indicator.

#### 8.4.5.6 Indicating Meters

Analogue type ammeters, where shown, shall show full load current at approximately midscale.

#### 8.4.6 Inspection, Testing, Commissioning

##### 8.4.6.1 Notice of Testing

The Contractor shall give 2 days notice in writing to the Engineer of the date after which the works are ready to carry out any tests required under the Contract.

On receipt of such notice the Engineer shall agree with the Contractor as to the day or days on which the tests shall take place which shall be within 10 days of the date on which the Contractor has indicated the works will be ready for the tests.

##### 8.4.6.2 Test Instruments

All test instruments and other testing facilities shall be provided by the Contractor within his tender price. Should the Engineer have any doubt as to accuracy of a measuring device, he reserves the right to instruct the Contractor to have the instrument re-calibrated at no extra cost. Nevertheless, if the re-calibration was in fact not necessary, the cost will be borne by the Principal.

Should it be evident to the Engineer that the pre-testing has not been completed and the Contractor is not ready to carry out the workshop testing or site commissioning testing programme in a logical sequence, then the charge for the Engineer's extra (wasted) time may be compensated for by reduction of the Contractor's claim/contract moneys by the equivalent amount.

##### 8.4.6.3 Testing

All testing shall be carried out in strict accordance with NZECP 11.

A thorough test schedule shall be prepared and copies of all test results as required by NZECP 11 and as specified herein for AS/NZS 3017:1996, shall be appended to the COC and shall be executed by an independent registered Electrical Inspector, (Not part of the Contractors business organisation), on a subcontract basis. Any such or similar subcontractor service and responsibilities shall be in full compliance with and subject to the requirements of this specification, drawings and ensuing contract agreement.

Note: A Certificate of Practical Completion will not be issued until all test schedules results and the signed COC's are received.



#### 8.4.6.4 Commissioning

As a follow on from testing, the Contractor shall allow for a full re-commissioning of the switchboard, associated existing pumps, soft starters, control, alarms, and measurement/instrumentation and telemetry systems and commissioning of the new pump, filter and extract fan. Included with this requirement is the re-commissioning of the standby generator on the new switchboard and interconnections. Full operational checks and pump running shall be carried out on the Standby Power generator supply.

A fully scheduled pre-commissioning and commissioning program shall be derived and submitted to the Engineer. This shall include, but not necessarily be limited to, defining all activities to be undertaken after the testing is completed. Such pre-commissioning checks and commissioning shall allow to co-ordinate with the Principal's operational staff and include for their input.

Commissioning in the regard is the confirming of operational safety and reliability only after all non livened tests have been completed.

Full written records of all operational set points, readings of all dials, instrument digital displays for the whole range of operational equipment, alarm indications etc, shall be taken at the time, on site, and presented in a tabulated and written/typed form to the Engineer.

#### Job Specification

##### 8.5.1 Scope

Work shall be as indicated in the specification and on the drawings. In accordance with the specification the Contractor shall carry out the detailed design, fabrication, supply and delivery of the pump station switchboard and integral control panels.

The Contractor shall be responsible for equipment/component selection, quantities and rating to ensure electrical compliance with the regulations and Codes of practice. In addition the Contractor shall be responsible for ensuring that all circuits are adequate for their anticipated operational peak loading and that they shall comply with all requirements of MPDC

For existing installation upgrades or replacements the Contractor shall check incoming mains cables and upgrade if appropriate upon Maximum Demand assessment. Check with MPDC if any future loads are to be imposed:

- For existing installation upgrades or replacements, the disconnection and removal of old wiring and fittings and, the supply installation and testing of the new purpose throughout new works. Redundant electrical fittings are to be removed where applicable.
- For new installations the incoming power applicable supply.
- Supply, installation and termination of switchboard and ancillary equipment.
- The wiring of all fixed wired outlets



- Provision of all ducting where required. Note the cables are to be concealed or protected by approved ducting.
- Allow to wire from the enclosure field devices to a demarcation terminal barrier for connections by others to the Telemetry equipment.
- Testing and commissioning of all equipment specified herein.
- Provision of as-built drawings and information for inclusion into Operating, Maintenance and Spare Parts manuals) as outlined in this Specification.

## 8.5.2 Standards

This Job Specification and the following additional specifications or standards shall comprise the complete Specification for the works:

- NZ Electricity Regulations.
- NZ ECP 04 (Supply by LV Generating System).
- NZ ECP 11 (Testing).
- NZ ECP 14 Control Protection & Switchboards).
- NZ ECP 36 (Harmonic Levels).
- NZS 3000 (Wiring Rules).
- Previously issued Electrical Supply Regulations “Earthquake Requirements” as detailed in the 23 October 1980 issue of the NZ Gazette or latest equivalent document.
- In the event of conflict or ambiguity, the Job Specification shall have precedence

### 8.5.2.1 Main Earth

The Contractor shall allow to install a main earth system to comply with AS/NZS 3000:2000 as amended.

## 8.5.3 Switchboard

### 8.5.3.1 Layout

The layout shall be generally as per the Drawings The Contractor to check dimensions on site and allow to suit allocated space.

The switchboard shall be designed and fabricated for front and rear entry.

### 8.5.3.2 Construction

#### Materials

The switchboard material shall be industrial formica P1 brown, size 1050 x 850 x 9 mm for the DOL Starter Panel and size 11263 x 850 x9 mm for the Soft Starter Panel.

#### Features

The switchboard shall be an MEN (Multi Earth Neutral) switchboard.

IP Rating: The enclosure shall be at least IP21 rating.



Door: Access shall be from the front and rear via hinged doors (no side access). Key lockable and keyed alike to the Principal's standard master key system.

Hinges: The door shall be capable of being opened at least 180 degrees and be fitted with a restrainer to prohibit "over-openings" and hinge stretching. Allow for tinned flexible braid across all door hinges where electrical equipment is mounted on the door.

Sealing: Door seals shall be provided to ensure dust tight sealing, all around the door. The sealing material shall be of a compressible nature to allow for door fabric movement and temperature variations.

Penetrations: Shall be sealed to ensure compliance with the IP rating

Colour: The enclosure shall be deep Brunswick green in colour, details of which shall be provided with the tender

Gland Plate: All cables entering the panel via the base gland plate shall be round in external section. They shall pass through an appropriate cable gland which will ensure a good air seal. Any additional cut outs shall be sealed.

### 8.5.3.3 Electrical equipment and wiring features

#### General

The enclosure shall be equipped with all the componentry as shown on the attached single line diagrams and itemised elsewhere in this specification in order to meet the power supply, control, starting and distribution functions required.

All mechanical supports for internal equipment shall be aluminium and all fixings shall be STAINLESS STEEL.

Where possible all equipment shall be din rail mounted and all wiring contained within internal (snap-on cap) trunking. With the exception of the incoming mains, generator and pump power cabling, all outgoing circuits shall be wired to designated terminals for connection of the field cabling and/or remote monitoring interfacing circuitry.

The Contractor is referred to the preferred Vendors as shown on the attached data sheet. Where a component is not specified, or no longer available, the Contractor shall nominate the component proposed for MPDC's consideration.

Alternative components may be proposed providing it can be shown that these have technical and/or economic advantage.

### 8.5.3.4 Labelling

Provide labels, white letters on black background, engraved to show wording appropriate to the function and description for all componentry. Permanent fixing and not gluing is required for all labelling and numbering systems. All such labelling shall be to MPDC's satisfaction.



## 8.5.4 Rating of equipment

Where equipment details & type are not specified, the Contractor shall be responsible for correctly selecting and rating all other equipment to meet the installed plant and functioning requirements. Record the installed rating on the as built drawings.

The Contractor shall ensure all equipment complies with NZECP 36 for acceptable Harmonic Levels.

The Contractor shall allow to check and confirm effectiveness of these devices on site during testing and commissioning.

## 8.5.5 Drawings

### 8.5.5.1 General

The Contractor shall allow for production of all manuals and As-built drawings as specified

Scope.

The Contractor is referred to the following HCC Standard Drawings which shall be read in conjunction with the specification.

- TS 501 – SPS Site Plan Layout
- TS 502 – SPS Concrete - Section
- TS 503 – Standard WPS for Flygt 3120, 3127 & 3085 Pumps
- TS 504 – SPS Concrete Cover - Reinforcing
- TS 510 – Storage Plan - Option 1
- TS 511 – Storage Plan - Option 2
- TS 512 – Storage Section
- TS 513 – Storage Ends Elevation & Details
- TS 520 – SPS Lid & Frame 3085 - 3102
- TS 521 – SPS Lid & Frame 3127 - 3153
- TS 524 – SPS Lid & Frame 3085 - 3102
- TS 525 – SPS Lid & Frame 3127 – 3153
- TS 530 – Standard Electrical Cabinet for Wastewater PS
- TS 531 – SPS Flow Meter – Control Cabinet
- TS 532.1 – PLC Controlled PS DOL - Main Power
- TS 532.2 – Soft Starter PS Main Power
- TS 523.3 – PLC Controlled PS DOL - Control Power Pump Call & Values
- TS 523.4 – Soft Starter PS - Control Power Pump Call & Values
- TS 523.5 – Soft Starter PS – DOL & Soft Starter Instrument Power Supply
- TS 532.6 – PLC Controlled PS DOL – PLC Control Wiring
- TS 532.7 – Soft Starter PS PLC Control Wiring
- TS 532.8 – PLC Controlled PS DOL Soft Starter - PLC Digital Input  
Expansion Module Wiring
- TS 532.9 – PLC Controlled Pump Station DOL Soft Starter - PLC Analog  
Input Expansion Module Wiring
- TS 540 – SPS Backflow
- TS 541 – SPS Backflow Prevention Cage





The following MPDC Numbered Drawings are interim typical drawings pending completion of specific MPDC designs. Where there is conflict between the HCC Drawings and these Drawings, the concept and intent of these MPDC Numbered Drawings will take precedence

PS 1 – Plan sections of Pump Station & Valve Chamber – Allen St

PS 2 – Hynds 1800dia Pump Station & Valve Chamber – Overall Arrangement

PS 3 – Hynds 1800dia Pump Station & Valve Chamber – General Arrangement

PS 4 – Hynds 1800dia Pump Station & Valve Chamber – Chamber Details

PS 5 – City Care Motor Control 2 x 2.5 KW – Sheet 1

PS 6 – City Care Motor Control 2 x 2.5 KW – Sheet 2

PS 7 – City Care Motor Control 2 x 2.5 KW – Sheet 3

PS 8 – City Care Motor Control 2 x 2.5 KW – Sheet 4

### 8.5.6 Workshop Inspection

The Contractor shall allow for the Engineer's Inspection of the Switchboard at the manufacturers/fabricators premises and prior to despatch to site and include for all associated workshop inspection and travel time.

To this end, the Contractor shall produce a full schedule of all tests to be carried out and submit these to the Engineer for review at least two weeks prior to any testing.

Allow to accurately record all results and append a copy of the test results and functional checks to the Certificate of Compliance (COC), a copy of which shall be forwarded to the Engineer within three days of placing in service.

Note: The Engineer regards the proof and submission of a full and accurate set of test and functional checks results, crucial to the proof of a satisfactory and safe installation and to this end may recommend to the Principal withholding of up to one third of the contract payment sums should the Contractor fail to complete the tests satisfactorily and submit the results.

### 8.5.7 Component Specification

#### 8.5.7.1 Electrical Panel

See the relevant Standard Drawings. The installation shall comply with the relevant Electrical Regulations and Standards. Also to comply with WEL Networks Ltd electrical supply requirements.

The switchboard shall be an MEN (Multiple Earth Neutral) Switchboard, material to be industrial formica P1 brown, size 1050 x 850 x 9 mm for the DOL Starter Panel size and 1263 x 850 x 9 mm for the Soft Starter Panel. Labels shall be black letters on white background, fixed just above or on component.

All cables entering the panel via the base gland plate shall be round in external section. They shall pass through an appropriate cable gland which will ensure a good air seal. Any additional cut outs shall be sealed.



With respect to the need or otherwise of electronic soft starters, reference to the Networks Company's requirements shall dictate. Ensure early consultation to gauge any starting restrictions. At this stage also consult with respect to the need for power factor correction.

#### 8.5.8 Electrical Components

See the relevant Standard Drawings

#### 8.5.9 Circuit Breakers

3 phase circuit breakers shall be 400V, type and rating to be compatible with pump manufacturers design relative to starting & running loads and prospective short circuit rating for the site.

1 phase circuit breakers shall be 230V, type and rating to be compatible with the design criteria of the user circuit.

They shall be clearly marked with pump identification e.g "Pump No 1"

#### 8.5.10 Control Switch (Auto/Off/Man)

Shall be three position selector switch from Allen Bradley 800FP-SM32PX20 fitted on to a plastic box for manual/automatic function. It shall be clearly marked with pump identification e.g "Pump No 1" and mounted in the same box with Ammeters and Phase Failure Relay.

#### 8.5.11 Motor Isolating Switch

Shall be rotary type PDL 56SW4XX four pole fitted in plastic boxes; each one individually fitted near its corresponding motor contactor clearly marked with pump identification e.g. "Pump No 1". All such switches shall be a minimum AC3 individually rated.

#### 8.5.12 Mains Switch (MCCB)

Prior to starting construction of a cabinet, an assessment of the short circuit fault current is to be made at which point a decision will be made as to the main switch type.

Where "excessive" fault current potential exist at a site then the Main Switch shall be at least 63Amp AC3 rated wiping contact type but not less than the AC3 total load rating of site.

This Mains Switch is to be mounted in its own compartment in the main switch board.



### 8.5.13 Generator Socket Outlet

A flush mounted socket outlet, SCAME type, shall be fitted for portable generator application. The rating of this socket outlet shall be suitable for each individual pump station electrical loading. One of three standard types of SCAME socket outlets shall be installed as follows;

1. 380/415V, 32A, 3P+N+E; SCAME Type 247.3297
2. 380/415V, 63A, 3P+N+E; SCAME Type 246.6398 + Base 570.M0163
3. 380/415V, 125A, 3P+N+E; SCAME Type 246.12597 + Base 570.M0125

### 8.5.14 Change-Over Switch

K&N Change-Over Switch, type for 63 Amp power supply KG64B T904 NZ 007VE or for 63 to 100 Amp power supply KG100 T904 NZ 007VE shall be fitted for Generator/Off/Mains selection. Note: the requirement for neutral switching to allow compliance with ECP4.2.5.5(c).

### 8.5.15 Motor Control Contactors and Overloads:

#### 8.5.15.1 D.O.L.

7.5 kW or under shall be Allen Bradley type DOL-16P1 Cat.No.DOL-16P1-VA-X, coils to be 230V, in enclosure fitted with reset button. Overloads to be type 193-EEDB. Over 7.5 kW to 12kW shall be Allen Bradley type DOL-16P1 Cat.No.DOL-30P1-VA-X, coils to be 230V, in enclosure fitted with reset button. Overloads to be type 193-EEED.

Starter to be clearly marked with pump identification e.g. "Pump No 1".

#### 8.5.15.2 Electronic Soft Starter

Motors over 12 kW shall be Allen Bradley SMC-3 soft starter. Or unless directed otherwise by the Network Company.

### 8.5.16 Ammeter

Shall be Analog type Carrel & Carrel CEQ-72.

### 8.5.17 Control Relays

Shall be Omron type -G2R and LY4 relays and mounted in the same box as the Auto/Off/Manual switches.



### 8.5.18 Phase Failure Relay

This relay will be a TELE Automation Components Enya EP3F model relay. It is mounted inside the distribution board, connected via a three phase circuit breaker.

### 8.5.19 Overflow Float Switch

One float switch shall be installed to monitor overflows at the pump station. The float switch shall be wired to the telemetry to provide an “overflow alarm” and to the overflow relay to operate the pumps in the event of the level control system failing. There are three floats connected to the telemetry system, these are installed to provide an alternative system of level control. All four float switches are Flygt -: ENM 10-13.

### 8.5.20 Pressure Sensor

The Contractor shall allow to supply and install the complete level control system.

Note; MPDC have used a variety of controllers with varying success and now prefers to use a system based on pressure control.

A pressure sensor shall be connected to a small PLC with operator display showing the following information:

- Well level and the following alarms;
- High level,
- Overload fault pump 1 and 2,
- High Amps pump 1 and 2,
- Low Amps pump 1 and 2,
- Power fail,
- Well level sensor fault.

The PLC with operator display will have the following indications and control functions;

- pump run hours,
- pump starts,
- stop level in millimetres,
- standby levels in millimetres,
- current duty pump,
- fault reset,
- hour and start counter resets and change set points.

### 8.5.21 Night Latch Locks

Night Latch locks are to be fitted on specified doors for access security. Lock barrels will be supplied by MPDC.



### 8.5.22 Telemetry

The Contractor shall note MPDC require the pump stations to be monitored and controlled via its Telemetry system, the current system utilises ABBEY Systems via Allen Bradley PLC's. The Contractor shall be responsible for installing the appropriate Telemetry equipment and carrying out the necessary work requirement to set up the Base Station Scada screens. This is to be done by an approved agent of ABBEY Systems . The DLP shall be the latest Council approved programme. The ABBEY Swampfox RTU shall be used.

The Contractor shall allow a space as per cabinet drawing to allow this equipment to be accommodated.

Allow to wire from the enclosure field devices to a demarcation terminal barrier for connection by others to the Telemetry equipment. (Refer to example drawings – terminal assemblies A & B). Note in this regard all telemetry I/O's and prepared an associated I/O schedule with description adjacent to each entry.).

The Contractor is also to produce a drawing of the connections in AutoCad version 14LT or better upon completion,.

### 8.5.23 Flow Meter

Where specifically required by the Principal, the flow meter shall be an ABB MagMaster which is required to be factory "Finger printed". The size is to be approved by Council.

It is to be installed as per the manufacturer's instructions.

### 8.5.24 1 Phase Outlet

Shall be 3 pin standard RCD socket outlet type PDL 691RCD-30.

### 8.5.25 Thermostat

To control 60 watt cabinet heater shall be type Seitron TAM011.

### 8.5.26 Cabinet Heater

Shall be flat or round low wattage (minimum 60 watt) protected by aluminium or stainless steel mesh or expanded metal grill to prevent fire risk or finger contact with element. This heater shall be well away from the doors to prevent contact with any paper material present inside cabinet. Cabinet heater is only required in electrical switchboard compartment. Controlled by thermostat and connected via a circuit breaker on the switchboard which shall be clearly marked as per the drawings. The thermostat is to be set to 10 degrees C.



### 8.5.27 Cabinet Lights

Shall be Thorn ML 8 watt, "Mini Lite", light to be fitted at the front to illuminate component side of the switchboard, to be switched manually by means of architrave light switch type PDL 661 VH.



## Section B: Works completion and clearance

The minimum requirements for reporting data that is entered into the utilities asset management program BizeAsset is as following:

Service Plans for sewer, stormwater and water are to be on separate sheets; however for simple subdivision combining the services onto one plan is acceptable.

Existing services prior to development must be identified on the “as-built” and clearly identified as “existing”.

Measured positions in both x and y directions of all manholes, catchpits, valves, tobies etc must be related to legal boundaries.

Co-ordinate Information:

All spatial information provided must be supplied in terms of:  
NZGD2000 (New Zealand Geodetic Datum 2000)

Projection co-ordinates must be in terms of:  
NZTM (New Zealand Transverse Mercator)

Invert and lid levels must be in terms of: Moturiki Datum

Asset details to be completed on the GST/Asset Register form must include:

Material type and diameter for all pipes including service connections.

Diameters for all point features e.g. manholes, valves, hydrants, tobies etc.

All costs to be broken down into the groupings as set out on the form and not supplied as a lump sum for each utility.

“As built” information and costs for utility assets must be supplied and approved by Council before the 224 Certificate can be issued.

Utility asset and co-ordinate details may be submitted electronically as an excel spreadsheet (as per the example below) along side a hard copy “as built” plan.

	A	B	C	D	E
	Asset	Easting_X	Northing_Y	RL_Z	Depth
2	SSMH A	1844968.97	5801846.62	60.90	1.39
3	IH 1	1844938.94	5810872.30	61.20	1.47
4	Catchpit	1844975.53	5810860.30	61.00	

As-built plans for water supply shall include test results of all hydrants showing flows complying with the requirements of the current NZ Fire Service Code of Practice for Fire Fighting Water Supplies.



## Section C: Acceptable fittings and materials

### 1.0 Scope

This specification covers the list of materials acceptable for use in Matamata Piako District Council wastewater pump stations, and covers materials which Council has or will, assume responsibility for. Fittings not in accordance with this list will be rejected, unless written approval from Council is obtained prior to installation. Rejected products and materials will be subject to removal at the Contractor or Developer's cost.

This list of Acceptable Fittings and Materials will be updated as required

All applications to the Acceptable Fittings and Materials list must be accompanied by the pro-forma Volume 4: Quality Checklists & Appendices: Part 9 Appendix 6: Application for Acceptance of Water or Drainage Product for Use in the Matamata Piako District Council Water Supply Area or Drainage District.

Requirements for acceptance of materials are as follows:

- conforms to appropriate New Zealand, Australian or British standards with evidence of the licence number issued;
- manufacturer operates to an acceptable quality assurance standard;
- details of composition, dimensions and specific use and design life are supplied by the manufacturer;
- details of acceptance by other New Zealand local authorities
- details are supplied by the manufacturer on how the product should be installed;
- the product is acceptable to MPDC HCC (taking into account such factors as compatibility with other approved products, ease of use, availability of supply, etc).

Where there is no standard, the manufacturer will be required to supply copies of their quality assurance procedures and producer statements to support their performance and composition claims for the products concerned.

Completed applications and supporting information should be addressed to:

Resource Consents Engineer  
Matamata Piako District Council  
P.O. Box 266  
Te Aroha 3320

Council reserves the right to refuse any material or fitting from the Acceptable Fittings and Materials list for any reason and at any time. In such circumstances, Council will provide written notification, stating reasons why the material or fitting has been refused or removed from the Acceptable Fittings and Materials list.

	PRODUCT	MANUFACTURERS	DESCRIPTION
PIPES	UPVC	MARLEY IPLEX PIPELINES  THOR PLASTICS	Sewer grade or Stormwater grade





	VITRIFIED CLAY	NAYLOR	Sewer grade
	EARTHENWARE		Sewer grade
	CONCRETE	HUMES HYNDS	Class X, Y, Z Class X, Y, Z
FITTINGS	UPVC	MARLEY IPLEX PIPELINES	Sewer grade or Stormwater grade
	RUBBER ADAPTERS	THOR PLASTICS FERNCO	PVC wye connection to 150mm PVC sewer
		QUICK PLUMB	PVC wye connection to 150mm PVC sewer
	VITRIFIED CLAY	NAYLOR	Sewer grade
	EARTHENWARE		Sewer grade
	CONCRETE	HUMES HYNDS	Class X, Y, Z Class X, Y, Z
MANHOLES & DRY CHAMBERS	HEAVY DUTY FRAME & COVER	HUMES	
	LIGHT DUTY FRAME & COVER	SURECAST HUMES	
	1050 CONCRETE BASE	SURECAST HUMES	
	600 CONCRETE RISER	HYNDS HUMES	
	1050 CONCRETE RISER	HYNDS HUME	
	1050 CONCRETE LID	HYNDS HUMES	
	STAINLESS STEEL STEPS	HYNDS HUMES	
	MANHOLE SEALANT	HUMES	

